Principles and Practice of Clinical Research
A GLOBAL JOURNAL OF CLINICAL RESEARCH

Non-operative Management of Uncomplicated Appendicitis in Older Adults: Current Evidence and Limitations

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Abstract

Background: *In acute appendicitis, while operative management (OM) remains standard, non-operative management (NOM) with antibiotics is an alternative, especially in the elderly population. However, elderly NOM evidence is limited.*

Aim: *This scoping review explored the efficacy and safety of NOM compared with OM for acute, uncomplicated appendicitis in elderly patients (≥65 years), identified gaps in the literature, and proposed evidence-based recommendations to guide future research.*

Methods: *Following PRISMA Scoping review guidelines, we applied the Population, Concept, and Context (PCC) framework for criteria definition. PubMed and Embase were searched, and Covidence facilitated study selection. The primary outcome was 30-day post-treatment complication, and the secondary outcomes were treatment success (90 days and 1 year), readmission (at 30- and 90-day), and hospital stay (median duration). Risk of bias was assessed using the Newcastle–Ottawa Scale.*

Results: *Of 770 records identified, four retrospective cohort studies conducted in the United States met inclusion criteria, with sample sizes ranging from 2,640 to 61,481 elderly patients (≥65 years) with uncomplicated appendicitis. Methodological quality was moderate to high (Newcastle–Ottawa Scale scores 6–8.5). Frailty was variably assessed across studies, and only two stratified outcomes by frailty status. In one major study (Ashbrook et al., 2024), overall complication rates were similar between non-operative management (NOM) and operative management (OM) (36.4% vs 37.7%); however, complication rates increased markedly with frailty (28.8% in non-frail vs 57.1% in frail patients). In frailty-stratified analyses, operatively managed patients experienced higher complication rates than those managed non-operatively within both frail (66.3% vs 33.7%) and non-frail (69.8% vs 30.2%) groups. NOM success rates ranged from 62% to 82% but were generally associated with longer hospital length of stay, particularly when NOM failed or surgery was delayed. Estimated readmission following NOM was approximately 20%, primarily due to symptom recurrence or treatment failure. Reporting of antibiotic regimens and follow-up periods was inconsistent across studies.*

Conclusion: *Current evidence comparing non-operative and operative management of uncomplicated appendicitis in elderly patients is limited to observational data and demonstrates heterogeneous outcomes. While overall complication rates may appear similar at the population level, frailty substantially modifies treatment-related risk, with higher complication rates observed among operatively managed patients within frailty strata. Non-operative management can achieve acceptable short-term success in selected patients but is associated with longer hospital stays and increased readmission rates. These findings underscore the importance of incorporating standardized frailty assessments into clinical decision-making and highlight the need for prospective studies and randomized trials specifically designed for frail older adults.*

Introduction

Acute appendicitis is the most common surgical emergency worldwide, with 17.7 million new cases diagnosed in 2019 (Moris et al., 2021). It has an age-standardized incidence of 229.9 per 100,000 population (Ruffolo et al., 2013), with the highest prevalence between 10 and 30 years of age (Wilms et al., 2011).

Uncomplicated appendicitis is defined as acute appendicitis without clinical or radiographic evidence of perforation, inflammatory mass, phlegmon, or abscess. In contrast, complicated appendicitis involves rupture of the appendix with subsequent abscess or phlegmon formation (Moris et al., 2021). This distinction is clinically significant in guiding treatment decisions. Operative management (OM) with appendectomy remains the gold standard in complicated cases (Ruffolo et al., 2013). Non-operative management (NOM) with antibiotics has gained increasing acceptance as a potential alternative for selected patients with uncomplicated appendicitis (Wilms et al., 2011). This shift is driven by the aim to reduce surgical complications, hospital stays, and healthcare costs, particularly in carefully selected patient groups.

Treatment considerations for the elderly differ substantially from those for younger adults. The global rise in life expectancy has led to a growing elderly population (Cheng et al., 2020), accompanied by an increasing incidence of acute appendicitis in this age group (Lapsa et al., 2021). Managing acute appendicitis in elderly patients is more challenging than in younger individuals. This is due to vague and atypical clinical presentations, delayed diagnoses (Cimino et al., 2024), a broader differential diagnosis, and a higher burden of comorbidities.

Age-related physiological changes, frailty, and increased functional vulnerability in elderly patients alter the safety and efficacy of NOM for acute appendicitis. They have reduced immune function, diminished physiologic reserve, and a higher prevalence of comorbidities (Ashbrook et al., 2024; Chehab et al., 2021; Lunardi et al., 2024). Frailty status is also a significant risk factor for adverse outcomes in the elderly, increasing the need for institutional care and mortality rates compared with non-frail patients (Reinisch et al., 2022). To prevent progression to complicated appendicitis in elderly patients, early appendectomy is often preferred over antibiotics-only treatment, and it is recommended that the procedure be performed by an experienced surgeon (Kumar, H. R., 2024).

As the surgical risk increases with age (Fan et al., 2020; Stevens et al., 2022), NOM has become a more attractive alternative. Nonetheless, the existing evidence remains limited and conflicting. Establishing the clinical efficacy and safety of both treatment approaches in elderly patients is crucial to improving outcomes and reducing the burden of disease in this growing population. To address this issue, we conducted a scoping review of the current evidence. Our goal was to identify gaps in the existing literature and propose evidence-informed recommendations to guide future research.

Materials and Methods

Study Design

This scoping review was conducted following the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). The inclusion and exclusion criteria were established using the Population, Concept, and Context (PCC) framework (Peters et al., 2024). We included studies that focused on elderly patients, defined as individuals aged 65 years or older, with a diagnosis of uncomplicated acute appendicitis. The primary concept of interest was the comparison between NOM with antibiotics and surgical appendectomy. Studies from all healthcare settings, including hospitals and surgical centers, were considered without geographical restrictions.

Definitions

In this review, NOM refers exclusively to antibiotic therapy without surgery. Other NOM strategies (e.g., observation, percutaneous drainage) were not included because they are not standard for uncomplicated appendicitis. We considered common terminology used to describe NOM, including "non-surgical management," "antibiotics-only treatment," and "antibiotics as first-line treatment." Appendectomy is equivalent to OM throughout the text, regardless of whether it is performed open or laparoscopically (Ashbrook et al., 2024; CODA Collaborative et al., 2020; Di Saverio et al., 2020; Lunardi et al., 2024; Meier et al., 2023; Salminen et al., 2018).

Eligibility

Eligible study designs included randomized controlled trials (RCTs), cohort studies, case-control studies, case series, and registry studies. Both

*Corresponding author: timophyllfyh@pku.org.cn
Received: September 5, 2025 **Accepted:** December 17, 2025
Published: January 16, 2026
Editor: Felipe Fregni
Reviewers: Justyna Garnier, Mariana Correa, Kelvin Vilalva, Renata Moll-Bernardes
Keywords: uncomplicated appendicitis, elderly patients, non-operative management, antibiotic therapy
DOI: https://doi.org/10.21801/ppcrj.2025.113.6

full-text articles and conference abstracts were included. Studies were excluded if they focused exclusively on complicated appendicitis (defined by perforation, abscess, or peritonitis) or if the full text was not available in English. Studies enrolling both uncomplicated and complicated cases were eligible, provided that outcomes for the uncomplicated subgroup were reported separately; when subgroup separation was not feasible, studies were excluded due to non-extractable data. Early in-hospital deaths, when reported, were included in the outcome assessment and were not used as an exclusion criterion. Although scoping reviews often adopt broader criteria, we prespecified focused eligibility to enable a clinically relevant comparison between antibiotic-only NOM and OM in the elderly with uncomplicated appendicitis. Studies meeting the conceptual definition of antibiotic-based NOM were retained to ensure comprehensive synthesis without compromising methodological focus.

Search Strategy

A comprehensive literature search was conducted in the PubMed and Embase databases on May 8, 2025, and May 15, 2025, respectively. The search strategy combined controlled vocabulary (Medical Subject Headings [MeSH] for PubMed and Emtree for Embase) with relevant keywords (Appendix A). These terms focused on three main domains: appendicitis, the elderly population, and operative versus non-operative treatments.

PubMed and Embase were selected for their comprehensive coverage of clinical and surgical research. While other databases were considered, preliminary scoping suggested they would offer minimal additional yield relative to the available resources. We acknowledge that institutional access limitations contributed to the decision not to include other databases evaluated during preliminary scoping.

Selection, Extraction, and Synthesis

Study selection was performed systematically using the Covidence platform to ensure transparency and streamline the workflow. In the first phase, two reviewers independently screened titles and abstracts, excluding records and advancing potentially eligible articles to full-text review. Each full text was independently assessed by two reviewers based on predefined eligibility criteria. Inclusion decisions and reviewer comments were documented. Any conflicts were resolved through discussion, with a third reviewer consulted if necessary.

A standardized data-charting form was developed and piloted for this review using Microsoft Excel. Covidence's data extraction tools lacked the customization needed to capture heterogeneous observational designs and subgroup fields. Although Excel is not a database, files were stored on an institutionally managed, access-controlled drive with version control; access was restricted to the study team.

For each included study, two data extractors independently recorded key information, including: author(s), year of publication, country and setting, study design, duration of follow-up, inclusion and exclusion criteria, sample size, patient demographics (age, sex, comorbidity [Table 1]), interventions (Table 3), and outcomes (Table 4 and Table 5). All included studies reported on frailty in elderly patients, but only some quantified it and with different instruments. Frailty was defined as a declined physiological reserve and increased vulnerability to stressors, leading to adverse health outcomes (Doody et al., 2023). Stratification and classification of frailty were examined in all included studies, noting any conceptual frameworks, assessment tools, or criteria employed.

To ensure data integrity, we implemented a two-step verification process. A third reviewer cross-checked each dataset against the original article and reconciled discrepancies in collaboration with the initial two extractors.

Outcomes

Primary and secondary outcomes were defined *a priori* based on international guidelines and relevant clinical trials (World Society of Emergency Surgery Jerusalem Guidelines, 2020; American College of Surgeons National Surgical Quality Improvement Program, 2021; Comparison of Outcomes of Antibiotic Drugs and Appendectomy Trial, 2020; Antibiotic Therapy vs Appendectomy for Treatment of Uncomplicated Acute Appendicitis Trial, 2015). The primary outcome was 30-day post-treatment complications, characterized by their frequency and type. Secondary outcomes included treatment success (defined as avoidance of surgery at 90 days and 1 year), 30- and 90-day readmission rates, and the median length of stay during the index hospitalization.

Risk of Bias Assessment

Two reviewers independently assessed risk of bias in observational studies using the Newcastle–Ottawa Scale (NOS) (Wells et al., 2011); disagreements

were resolved by consensus or adjudication by an independent third reviewer (Table 2). Overall risk was categorized as low, moderate, or high using pre-specified NOS star thresholds.

Results

A total of 770 studies were identified through database searches (PubMed = 634 and Embase = 127). After removing duplicates and screening titles and abstracts, 75 full-text articles were assessed, and four met the inclusion criteria. All of these studies (Ashbrook et al., 2024; Chehab et al., 2021; Lunardi et al., 2024; Meier et al., 2023) were retrospective cohort studies conducted in the United States. All studies included the elderly population ($\geq$65 years) with acute, uncomplicated appendicitis; however, studies that included both uncomplicated and complicated cases were also considered if subgroup data for uncomplicated appendicitis were available (Lunardi et al., 2024; Meier et al., 2023). The methodological quality of the included observational studies, assessed using the Newcastle–Ottawa Scale (NOS), ranged from 6 to 8.5 out of 9, indicating an overall low risk of bias across the domains of selection, comparability, and outcome assessment.

Most studies were excluded based on the inclusion of complicated appendicitis, early in-hospital death, or incomplete data. Sample sizes ranged from 2,640 patients to 61,481 patients. Frailty was reported across the four studies using different scales: Chehab et al. used the five-factor modified frailty index (mFI); Ashbrook et al. applied an adapted claims-based frailty index; Lunardi et al. estimated frailty using the Risk Analysis Index (RAI) in an external cohort to support bias analyses; and Meier et al. modeled frailty as an unmeasured confounder in sensitivity analyses. However, only two studies assessed frailty as a key variable and used it to stratify outcomes (Ashbrook et al., 2024; Chehab et al., 2021). Chehab et al. (2021) achieved balance on age, frailty, and comorbidity using 1:1 propensity-score matching, while the remaining studies adjusted for confounders using multivariable regression. No significant sex differences were observed across cohorts. All studies defined NOM as initial antibiotic treatment; however, antibiotic regimens were inconsistently reported (Table 3).

For the primary outcome, three studies (Ashbrook et al., 2024; Chehab et al., 2021; Meier et al., 2023) directly compared postoperative complications between NOM and OM, whereas Lunardi et al. (2024) focused on age-related differences and outcomes of successful versus failed NOM without a direct OM comparison.

Ashbrook et al. (2024) analyzed outcomes in 24,320 patients aged $\geq$65 years with uncomplicated appendicitis using a national inpatient cohort and an adapted claims-based frailty index. In this study, overall complication rates were similar between management strategies, occurring in 36.4% of patients managed non-operatively (NOM) and 37.7% of those undergoing operative management (OM), yielding an overall complication rate of 37.3% across the cohort. When stratified by frailty status, complication rates varied substantially, ranging from 28.8% among non-frail patients to 57.1% among frail patients. Further frailty-stratified cluster analyses demonstrated higher complication rates among operatively managed patients within both frailty strata. Among frail patients, complications occurred in 66.3% of those undergoing OM compared with 33.7% managed with NOM, while among non-frail patients, complication rates were 69.8% for OM and 30.2% for NOM.

Chehab et al. (2021) reported *Clostridium difficile* infection rates in NOM patients (3%) compared to OM (1%). Lunardi et al. (2024) reported a 10.7% complication rate in the NOM group only. In contrast, Meier et al. (2023) described several complication categories, such as wound infection and abscess formation, but did not specify rates by management type. Most studies reported complications during hospitalization, except Chehab et al. (2021), which included follow-up data up to six months.

Regarding secondary outcomes, treatment success and hospital length of stay (LOS) were reported across studies, allowing for NOM–OM comparison where applicable. Chehab et al. (2021) documented an 82% treatment success rate for NOM at six months versus 100% for OM, with NOM showing a significantly longer median LOS 5 [3–9] days compared to OM 4 [2–7] days ($p<0.001$). Lunardi et al. (2024) observed a 62% success rate for NOM during hospitalization, with failed NOM cases having a significantly longer LOS (12 vs. 6 days; $p<0.001$). Ashbrook et al. (2024) found that delayed OM led to the longest stays among frail patients (median 12 days), followed by NOM (7 days for frail, 4 for non-frail) and immediate OM (5 days for frail, 3 days for non-frail). Meier et al. (2023) similarly reported an average increase of 3.22 days in LOS for NOM compared to OM. Overall, while NOM demonstrated clinical success in selected geriatric patients, it was generally associated with higher complication rates and longer hospital stays compared to OM.

None of the studies followed a standardized recommended timeframe; instead, each applied its own predefined observation period. Chehab et al. (2021) reported outcomes at six months, while Ashbrook et al. (2024) and Lunardi et al. (2024) assessed complications during hospitalization. Meier et al. (2023)

Study	Country	Study Design	Inclusion Criteria	Exclusion Criteria	Group Difference	Number of patients	Antibiotics vs. Surgery	Sex
Chehab et al., 2021	USA	Retrospective cohort study	Frail geriatric (≥65 y/o) with acute uncomplicated appendicitis; Frailty defined as mFI-5 ≥0.4	Elective admissions; died during index admission without operation	Matched groups similar in age, frailty, comorbidities	2,640	1,320 vs 1320	Female: NOM: 49.9%, OM: 48.6%
Meier et al., 2023	USA	Retrospective cohort study	Adults with acute uncomplicated appendicitis; survived 24h; no inflammatory bowel disease	Age <18; missing procedure date; died within 24h; inflammatory bowel disease	NOM (no surgery day 0-1) vs. Appendectomy (within 1 day)	474,845 (total); 61,481 (age ≥65)	11,373 vs 50,108	Female*: NOM: 51.2%; OM: 51.3%
Ashbrook et al., 2024	USA	Retrospective cohort study	Adults ≥65 years diagnosed with uncomplicated appendicitis (ICD-10-CM K35.3)	Age <65 years; complicated appendicitis	NOM vs. immediate OM vs. delayed OM; Frail vs. non-frail subgroups	24,320	7,915 vs 16,405 (Immediate + Delayed)	Female: 50.9%,
Lunardi et al., 2024	USA	Retrospective cohort study	Acute uncomplicated appendicitis (ICD-9:540; ICD-10:K35); Nonoperative management (no surgery/intervention on hospital day 0-1)	Complicated appendicitis (perforation/abscess/peritonitis)	NOM failure vs. success	43,734 (total), 11,264 (age >65)	43,734 (all initially NOM); Surgery: N/A	NR

Note: NR = not reported; OM = operative management (appendectomy, open or laparoscopic); NOM = non-operative management (antibiotic treatment only).
*Only the subgroup analysis of patients aged ≥65 is included.

Table 1: *Summary of the basic characteristics and study populations across the four included studies.*

Study	Selection(4*)	Comparability (2*)	Outcome (3*)	Total Score (max 9)
Chehab et al., 2021	☆☆☆☆	☆☆	☆☆⯪	☆☆☆☆☆☆☆☆⯪ (8.5)
Meier et al., 2023	☆☆☆●	☆●	☆☆●	☆☆☆☆☆☆●●● (6)
Ashbrook et al., 2024	☆☆☆☆	☆☆	☆☆●	☆☆☆☆☆☆☆☆● (8)
Lunardi et al., 2024	☆☆☆☆	☆☆	☆☆●	☆☆☆☆☆☆☆☆● (8)

The Newcastle-Ottawa Scale (NOS) assesses the quality of non-randomized studies across 3 domains: Selection (4 stars), Comparability (2 stars), and Outcome/Exposure (3 stars), for a maximum of 9 stars. Each star reflects good methodological quality in areas like sample selection, control of confounding, and outcome/exposure assessment. ☆=1 point, ⯪=0.5 point and ●=0 point.

Table 2: *The quality assessment of four observational studies using the Newcastle-Ottawa Scale (NOS).*

Study	Intervention	Antibiotics	Dose	Route	Duration
Chehab et al., 2021	NOM OM	NR	NR	NR	NR
Ashbrook et al., 2024	NOM (antibiotics only), Immediate OM (appendectomy within 1 day), Delayed OM (appendectomy >1 day after admission)	NR	NR	IV (initial) and/or oral (step-down; not specified)	NR
Lunardi et al. ,2024	NOM (antibiotics)	NR	NR	NR	NR
Meier et al., 2023	NOM: Antibiotics vs OM: Appendectomy	NR	NR	NR	NR

Note: NR = not reported; OM = operative management (appendectomy, open or laparoscopic); NOM = non-operative management (antibiotic treatment only).

Table 3: *Comparison of the interventions employed across four studies.*

Study	Complication definitions	Number of cases, n	Complications, (%)	Three most common complications,(%)	Timeframe
Chehab et al.,2021	Clostridium difficile enterocolitis	NR	NOM vs OM: 3 vs 1	N/A	6 months
Ashbrook et al.,2024	Composite outcomes (*)	Overall:9,065; NOM vs OM: 2,885 vs 6,180; frailty vs w/o frailty: 4,165 vs 4,900	Overall: 37.3; NOM vs OM: 36.4 vs 37.7 ; frailty vs w/o frailty: 57.1 vs 28.8	Frailty NR; W/O Frailty: **1.Infection** (Immediate vs Delayed): 0.4% vs 2.7%, **2.Cardiopulmonary complications** (Immediate vs Delayed): 5.8% vs 9.3%	During hospitalization
Lunardi et al.,2024	Composite of wound complications, infection, UTI, thromboembolism, CVA, renal failure, bleeding	NOM only, 1,209	10.7	NR	During hospitalization
Meier et al.,2023	Composite outcomes (**)	NR	NR	NR	2004-2017

*In the study of Asbrook et al., composite outcome includes Clinical outcome variables included in-hospital mortality and complications, including pulmonary, cerebrovascular, cardiovascular, gastrointestinal, infectious, wound related, genitourinary, neurocognitive, and systemic complications. Composite infectious complication (including infection, systemic, and procedural infectious complications) and cardiopulmonary complications; and hospital length of stay (LOS) and total hospital charges.

**In the study of Meier et al., Variables were identified based on validated ICD-9/10 codes and included wound complications, infections, urinary tract infections, pulmonary and gastrointestinal complications, cardiovascular events, thromboembolism, cerebrovascular accidents, kidney failure, and bleeding. For nonoperative patients, the dataset also captured delayed interventions, including appendectomy, colonic resection, or interventional radiology (IR) drainage performed more than one day after admission.

Note: N/A= Not applicable, NR = not reported; OM = operative management (appendectomy, open or laparoscopic); NOM = non-operative management (antibiotic treatment only).

Table 4: *Comparison of the primary outcome (complications) across four studies.*

	Treatment success			Readmission			Hospital stay
Study	**Number of cases (n)**	**Rate,%**	**Timeframe**	**Number of cases,n**	**Rate,%**	**Timeframe**	**Timeframe (Median)**
Chehab et al.,2021	OM: 1,320 NOM: 1,082	OM: 100 NOM: 82	6 months	NR	NR	NR	OM 4 days (IQR: 2–7) NOM 5 days (IQR: 3–9)
Ashbrook et al.,2024	Frail patients						
	NOM: NR	NR	In-hospital	NR	NR	NR	7 days (IQR: 4-11)
	Immediate OM: NR	NR	In-hospital	NR	NR	NR	5 days (IQR: 3-9)
	Delayed OM: NR	NR	In-hospital	NR	NR	NR	12 days (IQR: 8-19)
	Non-frail patients						
	NOM: NR	NR	In-hospital	NR	NR	NR	4 days (IQR: 3-7)
	Immediate OM: NR	NR	In-hospital	NR	NR	NR	3 days (IQR: 2-5)
	Delayed OM: NR	NR	In-hospital	NR	NR	NR	8 days (IQR: 6-12)
Lunardi et al.,2024	7,026	NOM:62	In-hospital	NR	NR	NR	Failure vs. Success: 12 vs 6 days
Meier et al.,2023	NR	NR	In-hospital	NR	NR	NR	+3.22(mean increase vs operative)

NR = not reported; OM = operative management (appendectomy, open or laparoscopic); NOM = non-operative management (antibiotic treatment only).

Table 5: *Comparison of the secondary outcomes across four studies.*

analyzed data from 2004 to 2017 without specifying a follow-up duration (Table 3 and Table 4). Moreover, detailed antibiotic regimens for NOM groups were largely missing across studies (Table 3).

Discussion

This scoping review explored the efficacy and safety of non-operative management (NOM) compared with operative management (OM) for uncomplicated appendicitis in adults aged 65 years or older. Four observational studies met inclusion criteria; no experimental studies were included. Overall, NOM was consistently associated with higher complication rates, lower treatment success rates, and longer hospital stays compared with OM, although the magnitude of these associations varied across studies. Despite a highly similar study population ($\geq$65 years old, all from the United States), the included studies showed considerable heterogeneity in methodology and outcomes. Since this review included four observational studies with low-risk Newcastle–Ottawa Scale (NOS) scores, the findings can be interpreted with moderate confidence. The consistency of low bias risk across studies strengthens the reliability of the summarized evidence, even though the sample size is limited.

Complication rates were generally higher in patients treated with NOM, particularly due to recurrent appendicitis, perforation, peritonitis, sepsis, and higher *Clostridium difficile* infection rates (Chehab et al., 2021; Meier et al., 2023; Ashbrook et al., 2024). While an overall higher complication rate was observed in NOM groups, further analysis of Ashbrook et al. (2024) (Appendix B) indicated that within the frailty cluster, more than twice as many OM patients experienced postoperative complications compared with NOM patients, suggesting a higher perioperative risk in frail elderly individuals (Fehlmann et al., 2022). A similar pattern was observed in the non-frail group, where complication rates remained higher among patients managed operatively than those managed non-operatively. Frailty therefore appears to act as an effect modifier of postoperative complication risk. Supporting evidence from other studies also indicated that OM was associated with complications such as wound infection, intra-abdominal abscesses, and pulmonary infections (Cimino et al., 2024; Weinandt et al., 2020). Future studies should stratify patients by frailty status to more accurately assess patient safety when comparing NOM and OM.

Although NOM was associated with lower treatment success rates, treatment success definitions varied substantially across studies. Chehab et al. (2021) defined treatment success as no recurrence within six months post-admission, whereas Lunardi et al. (2024) defined success as no in-hospital mortality and absence of surgery or interventional radiology procedures within the first 48 hours of hospitalization. Farah et al. (2024) reported multiple definitions across studies, ranging from no recurrence within 30 days to up to five years. These inconsistencies limit cross-study comparability and risk conflating the concepts of "success" and "failure." To improve clarity, future studies should adopt standardized reporting of both short-term (within 30 days) and long-term (up to one year) outcomes, clearly defining whether recurrence, need for surgery, or mortality are included in these endpoints (Salminen et al., 2018).

Readmission rates and hospitalization outcomes are particularly important variables in the NOM group due to their close relationship with frailty and overall morbimortality (Chehab et al., 2021; Meier et al., 2023; Salminen et al., 2018). Length of stay (LOS) also warrants close attention, as prolonged hospitalization may significantly affect functional status, independence, and recovery (Cheng et al., 2020; Lapsa et al., 2021; Omari et al., 2014). While Ashbrook et al. (2024) found that patients successfully managed with antibiotics had shorter LOS, failed NOM was consistently associated with longer LOS due to delayed surgery (Cimino et al., 2024; Moris et al., 2021). These delays may contribute to functional decline, increased complication rates, and disruptions in discharge planning. These findings emphasize the importance of individualized treatment planning based on geriatric risk factors and the need to report geriatric-specific outcomes, such as functional status at discharge.

In frail elderly patients, assessment of frailty was inconsistent across the included studies. Only two studies (Ashbrook et al., 2024; Chehab et al., 2021) applied validated tools, limiting comparability and potentially masking important differences in physiological reserve. Ashbrook et al. (2024) reported approximately twofold higher complication rates in frail patients compared with non-frail individuals. Chehab et al. (2021), in contrast, included only frail elderly patients and reported *Clostridium difficile* infection as the main complication in the NOM group. However, it remains unclear whether non-frail patients also demonstrated higher *Clostridium difficile* infection rates in the NOM group. We recommend that future studies adopt standardized and feasible frailty measures, such as the Modified Frailty Index (mFI-5) or the Clinical Frailty Scale (CFS), to ensure consistent risk stratification and improve the design of geriatric-specific trials evaluating OM and NOM (Weaver et al., 2019).

Another factor limiting comparisons between studies was the inconsistent reporting of antibiotic protocols, including regimen, dosage, and duration. The lack of standardization may obscure important differences in treatment efficacy and hinder comparability between NOM and OM. The consistency of NOM implementation is therefore questionable. Future studies should report antibiotic protocols in detail to allow accurate evaluation of treatment efficacy. A recent meta-analysis suggested that variations in antibiotic regimens may influence treatment success, highlighting the need for comprehensive documentation of antibiotic protocols in future research (Xu et al., 2023).

Strengths and Limitations

Our review has several limitations. The literature search was limited to two databases, which may have excluded potentially relevant studies. Most included articles lacked detailed reporting of NOM interventions, particularly antibiotic regimens, limiting the feasibility of subgroup analyses. Furthermore, all studies were conducted in the United States, potentially limiting generalizability to other healthcare systems and cultural contexts. Heterogeneity in study design, population characteristics, and systemic factors such as surgical availability, postoperative care, and antibiotic stewardship policies may further influence comparability and applicability.

Nevertheless, the inclusion of studies based on large national datasets, most of which demonstrated a low risk of bias, represents a major strength. Although reliance on data from a single country may limit generalizability, large representative datasets enhance external validity and applicability. To our knowledge, this is the first scoping review to systematically evaluate and highlight methodological limitations in comparing NOM and appendectomy for uncomplicated appendicitis in the elderly population. Based on these findings, we also provide practical recommendations to guide and improve future research in this field.

Conclusion

NOM with antibiotics is an increasingly adopted strategy for treating acute, uncomplicated appendicitis. However, its efficacy and safety in the elderly population remain insufficiently understood. This scoping review demonstrated that NOM may be associated with increased risk of complications, lower success rates, and longer hospital stays. Nevertheless, differences in variables and outcome definitions across the included studies may hinder the ability to draw conclusions. A key finding of this review is that frailty appears to act as an effect modifier, influencing treatment outcomes.

Further research is needed to clarify the clinical contexts in which NOM represents the most appropriate management strategy, particularly among frail elderly patients. To enable meaningful comparisons between NOM and OM, future studies should incorporate standardized frailty assessments, clearly defined outcome measures, and detailed antibiotic protocols. This review highlights the scarcity of high-quality data in this population and the urgent need for robust clinical trials to inform evidence-based, elderly-specific treatment guidelines.

Acknowledgement

The authors would like to extend our gratitude to Professor Felipe Fregni for his valuable guidance on the study design and for setting the criteria for paper selection. We also acknowledge the contributions of Luciana Davanzo and Ameinah Alrasheedi, who assisted with the initial screening of five papers during the collection process.

Supplementary Materials

Search strings for PubMed and Embase; frailty and management calculations summary.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

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