

An analysis of outcomes in surgical vs. non-surgical management for acute appendicitis in a large nation-wide hospital database.

Tameem Jamal MS MD, Shruthi Srinivasan MD, Heather O’field MD, Eleah Porter MD, Ralph Wesley Vosburg MD

Background

- Appendicitis is a common surgical emergency characterized by acute abdominal pain, nausea, and vomiting. The condition is often caused by obstruction of the appendiceal lumen due to pathology such as fecalith, lymphoid hyperplasia or rarely tumors.
- Traditionally, the standard treatment for appendicitis has been an urgent or emergent appendectomy.
- Recently, however, there has been increasing evidence supporting non-operative management for acute appendicitis. The APPAC RCT in 2015 demonstrated that 72.7% of patients were successfully treated with antibiotics alone, however the study was unable to demonstrate the non-inferiority of antibiotic treatment relative to appendectomy.
- In 2020, the CODA trial showed that quality of life outcomes was similar between patients undergoing operative management and those treated non-operatively with antibiotics. However, the trial's primary endpoint was a quality-of-life questionnaire.
- There remains a gap in the literature regarding more long-term outcomes of non-operative management for acute appendicitis.

Objective

This study evaluates clinical and resource-utilization outcomes associated with surgical versus non-surgical management of acute uncomplicated appendicitis within a large nationwide hospital database. The study focused on metrics such as return visits to the emergency department, readmissions, subsequent appendectomy rates, length of stay and cost associated with treatment.

Methods

A retrospective cohort study was performed using enterprise data warehouse records from 2021, with follow-up through 2025.

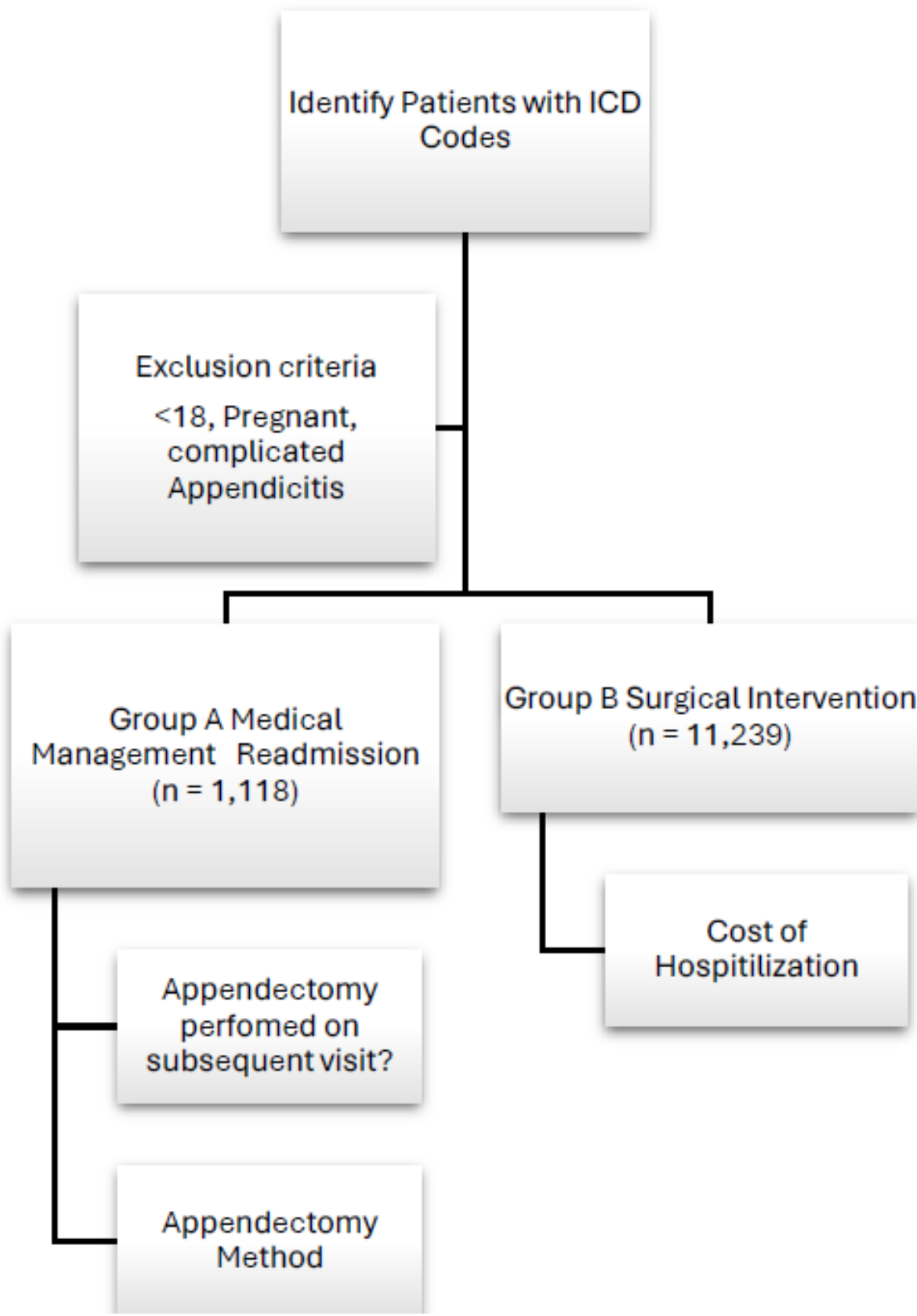
Included adult patients (≥18 years) diagnosed with uncomplicated acute appendicitis identified by ICD-10 code.

Patients were divided into surgical or non-surgical management groups based on CPT codes for appendectomy.

Analyzed demographics, hospital length of stay (LOS), costs, antibiotic use, and readmissions.

Outcomes assessed included readmission rates, interval appendectomy, and conversion to open surgery.

Statistical analysis involved two-sample t-tests, Chi-square tests, or Fisher’s exact test, with significance defined as p < 0.05.

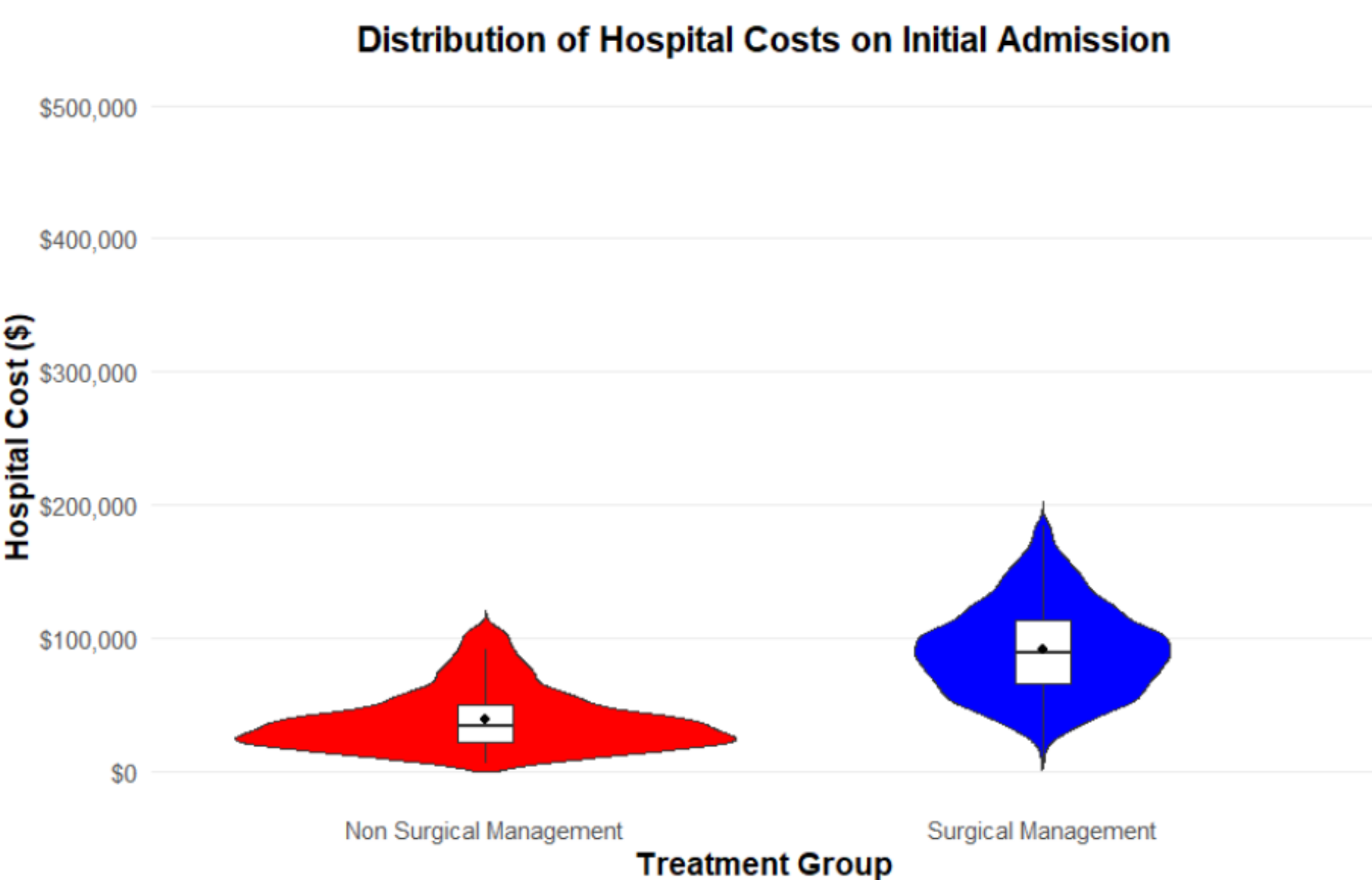
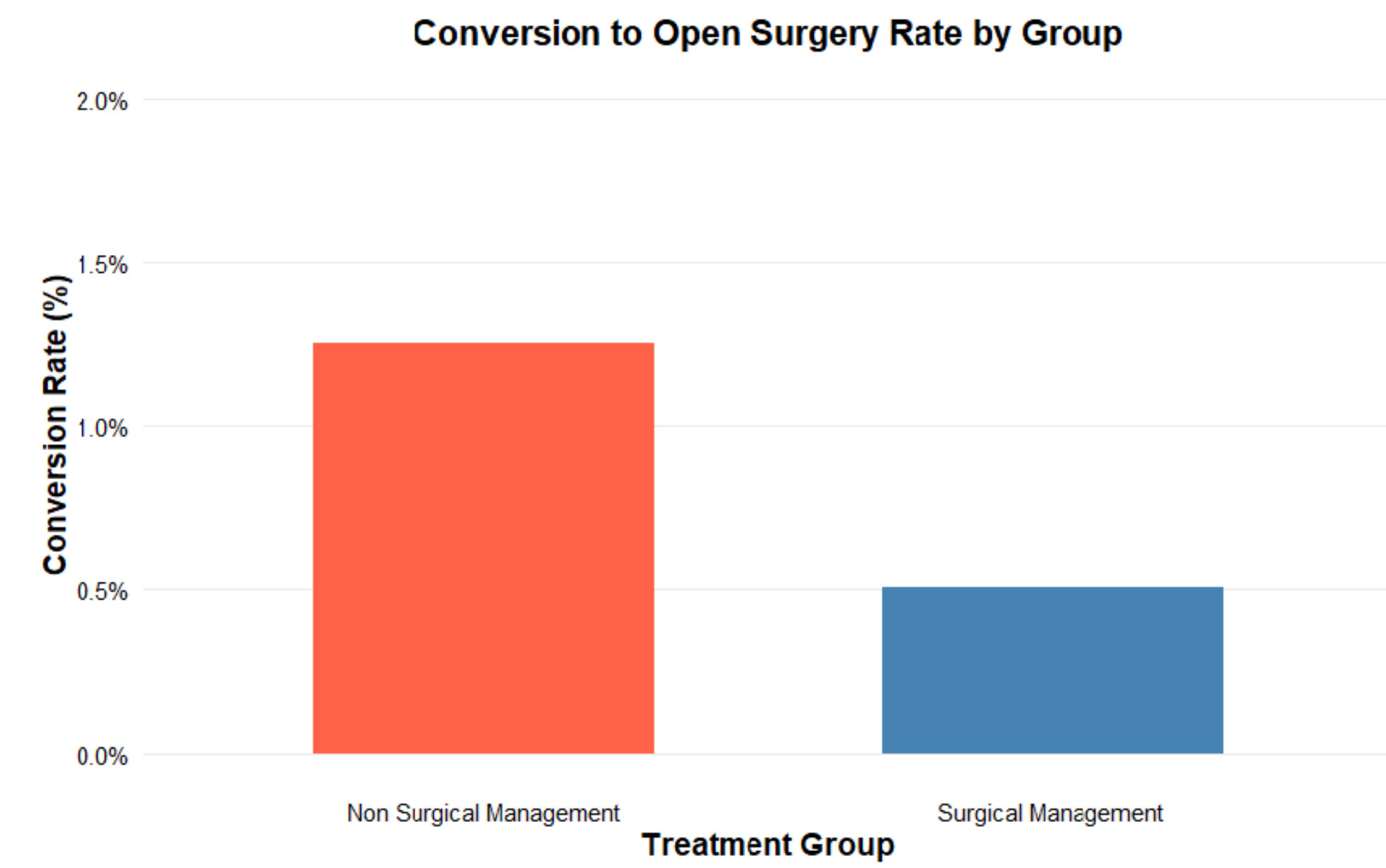


Results

Key Findings From Study

- 12,357 eligible patients studied
- 91% underwent appendectomy, 9% non-operative management
- Medically managed patients were older and more likely to be uninsured (p < 0.01)
- Length of stay was longer with medical therapy (1.28 vs 1.13 days, p = 0.03)
- Surgical group had higher initial hospitalization costs (p < 0.05)
- Broad-spectrum piperacillin-tazobactam usage was higher in surgery (p = 0.02)
- 2,343 readmissions in non-operative group; 6.1% required appendectomy (p < 0.05)
- Higher conversion rate to open appendectomy in medical management group (p = 0.04)

Outcome	Surgery Group	Non-surgery Group	p-value
Length of Stay, mean (days)	1.13	1.28	< 0.001*
Hospital Cost, mean (USD)	\$93,500	\$49,594	< 0.001*



Discussion

- Our analysis of over 12,000 adults with uncomplicated acute appendicitis found that only 9% received non-surgical antibiotic treatment, with these patients generally older and uninsured.
- Readmission and subsequent appendectomy rates after initial non-surgical management were low at 6%, with significantly lower hospitalization costs.
- However, medical management had drawbacks, including higher conversion rates from laparoscopic to open surgery upon recurrence and longer initial hospital stays compared to surgery.
- These findings align with recent meta-analyses supporting non-operative management as a safe and viable option in select acute appendicitis cases.
- The study noted that surgical management, while costlier, resulted in shorter hospital stays due to faster recovery after laparoscopic appendectomy.
- Non-operative patients often require extended inpatient monitoring to evaluate antibiotic response; prolonging hospital stays and delaying recovery.
- Although LOS differences were statistically significant, the small mean difference questions their clinical relevance.
- Providers may favor medical treatment for older patients with higher perioperative risks but less severe disease, indicated by lower white counts.
- The retrospective design introduces potential selection bias and unmeasured confounders, limiting causal interpretations.

Conclusion

Non-operative management of uncomplicated acute appendicitis, though uncommon, proved effective with only 6% requiring appendectomy during follow-up and significantly lower initial hospitalization costs. However, patients who eventually underwent surgery showed a higher rate of conversion to open procedures. These results support selective medical management and underscore the need for further research into long-term surgical complexity after initial antibiotic treatment.

References

CODA Collaborative, Flum DR, Davidson GH, et al. A Randomized Trial Comparing Antibiotics with Appendectomy for Appendicitis. N Engl J Med. 2020;383(20):1907-1919. doi:10.1056/NEJMoa2014320

Writing Group for the CODA Collaborative; Monsell SE, Voldal EC, Davidson GH, Fischkoff K, Coleman N, Bizzell B, Price T, Narayan M, Siparsky N, Thompson CM, Ayoung-Chee P, Odom SR, Sanchez S, Drake FT, Johnson J, Cuschieri J, Evans HL, Liang MK, McGrane K, Hatch Q, Victory J, Wisler J, Salzberg M, Ferrigno L, Kaji A, DeUgarte DA, Gibbons MM, Alam HB, Scott J, Kao LS, Self WH, Winchell RJ, Villegas CM, Talan DA, Kessler LG, Lavallee DC, Krishnadasan A, Lawrence SO, Comstock B, Fannon E, Flum DR, Heagerty PJ. Patient Factors Associated With Appendectomy Within 30 Days of Initiating Antibiotic Treatment for Appendicitis. JAMA Surg. 2022 Mar 1;157(3):e216900. doi:10.1001/jamasurg.2021.6900. Epub 2022 Mar 9. PMID:35019975; PMCID:PMC8756360.

Salminen P, Paajanen H, Rautio T, et al. Antibiotic Therapy vs Appendectomy for Treatment of Uncomplicated Acute Appendicitis: The APPAC Randomized Clinical Trial. JAMA. 2015;313(23):2340–2348. doi:10.1001/jama.2015.6154

Scheijmans JCG, Haijnen J, Flum DR, Bom WJ, Davidson GH, Vons C, Hill AD, Ansaloni L, Talan DA, van Dijk ST, Monsell SE, Hurme S, Sippola S, Barry C, O’Grady S, Ceresoli M, Gorter RR, Hannink G, Dijkgraaf MG, Salminen P, Boermeester MA. Antibiotic treatment versus appendicectomy for acute appendicitis in adults: an individual patient data meta-analysis. Lancet Gastroenterol Hepatol. 2025 Mar;10(3):222-233. doi:10.1016/S2468-1253(24)00349-2. Epub 2025 Jan 16. PMID:39827891.

Podda M, Cillara N, Di Saverio S, et al. Antibiotics-first strategy for uncomplicated acute appendicitis in adults is associated with increased rates of peritonitis at surgery: A systematic review with meta-analysis of randomized controlled trials comparing appendectomy and non-operative management with antibiotics. Surgeon. 2017;15(5):303-314. doi:10.1016/j.surge.2017.02.001

Hosokawa Y, Moritani M, Makuuchi Y, Nagakawa Y. Indication of conservative treatment by antibiotics for uncomplicated and complicated acute appendicitis. World J Gastrointest Surg. 2024;16(8):2538-2545. doi:10.4240/wjgs.v16.i8.2538

Herrod PJJ, Kwok AT, Lobo DN. Randomized clinical trials comparing antibiotic therapy with appendicectomy for uncomplicated acute appendicitis: meta-analysis. BJS Open. 2022 Jul 7;6(4):zrac100. doi:10.1093/bjsopen/zrac100. PMID:35971796; PMCID:PMC9379374.

Sippola S, Grönroos J, Tuominen R, Paajanen H, Rautio T, Nordström P, Aarnio M, Rantanen T, Hurme S, Salminen P. Economic evaluation of antibiotic therapy versus appendicectomy for the treatment of uncomplicated acute appendicitis from the APPAC randomized clinical trial. Br J Surg. 2017 Sep;104(10):1355-



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