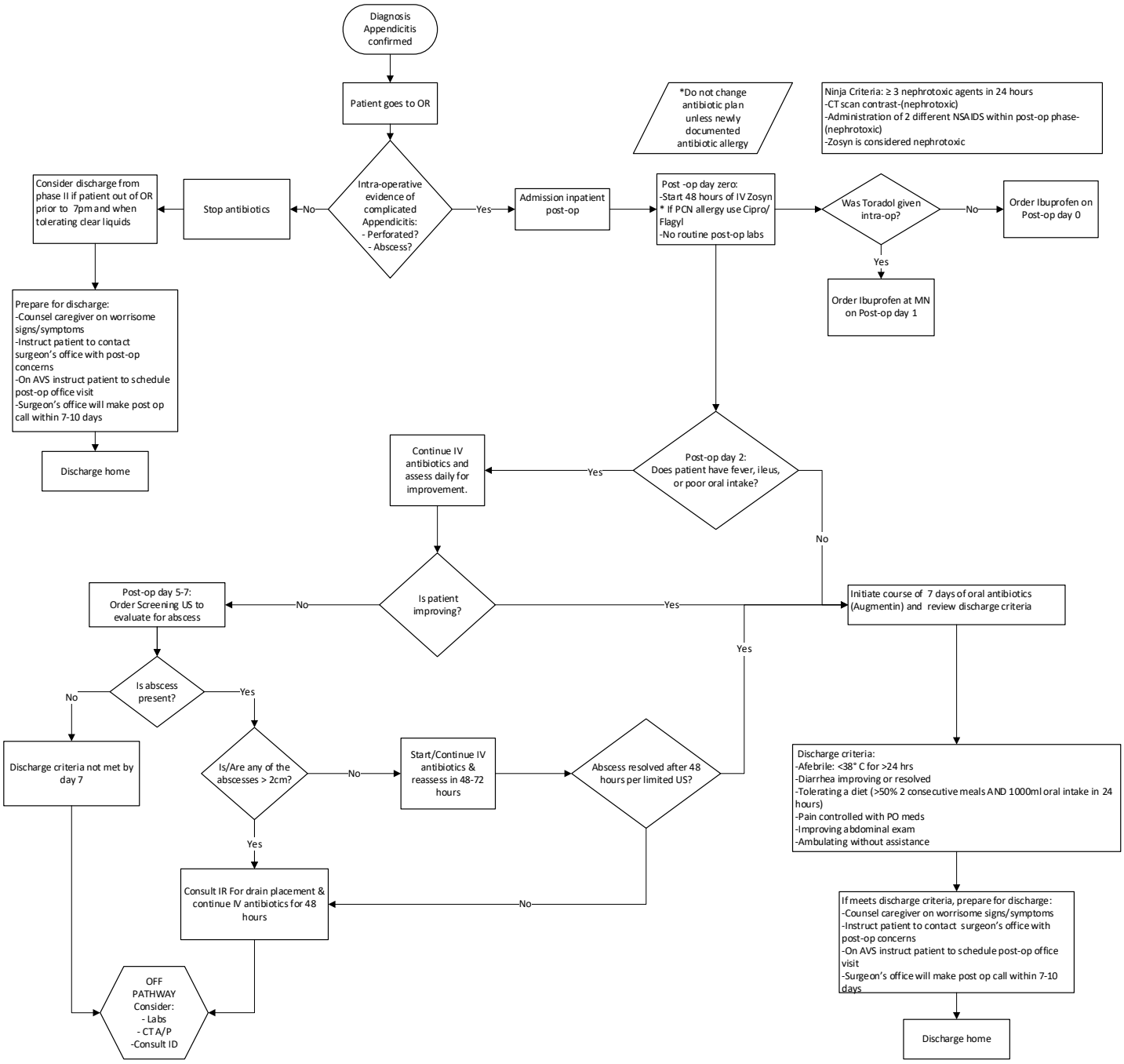
Clinical Standardization

PEDIATRIC APPENDICITIS, INPATIENT, PATHWAY

Updated: November 11, 2022

Clinical algorithm:



Clinical pathway summary

CLINICAL PATHWAY NAME: Pediatric Appendicitis

PATIENT POPULATION AND DIAGNOSIS: Children between 2 and 18 years with a diagnosis of appendicitis

A. Exclusion Criteria

I. Children <2 years
II. Previous appendectomy
III. History of bloody stools
IV. Confirmed or suspected Inflammatory Bowel Disease
V. History of cystic fibrosis, transplant, or malignancy

APPLICABLE TO: Helen Devos Children's Hospital

BRIEF DESCRIPTION: A guideline for the optimization of post-operative care of patients who have appendicitis.

OPTIMIZED EPIC ELEMENTS (if applicable): Pediatric Postoperative Appendectomy 30410001014

IMPLEMENTATION DATE: November 2022

LAST REVISED: November 2022

Clinical pathways clinical approach

TREATMENT AND MANAGEMENT: Concern for appendicitis → OR (presence or absence of perforation determined by surgeon)

A. **Non-Perforated appendicitis** (with or without VP shunt):
   I. Cefoxitin antibiotic preop
   II. No antimicrobials needed beyond perioperative period

B. **Perforated appendicitis** (with or without VP shunt)
   I. Preferred: 48 hours of IV piperacillin-tazobactam
   II. If PCN allergy: use ciprofloxacin PLUS metronidazole

*No post-operative antibiotic changes unless newly documented allergy (i.e., do not change for diarrhea)

C. **Post-Operative assessment and empiric* antimicrobial recommendations**

*No routine post-operative labs (C. difficile, CMP, CBC with or without differential, UA, blood culture, CRP)!

III. **Non-Perforated appendicitis** (with or without VP shunt):

a. No antimicrobials needed beyond perioperative period (consider up to 24 hours if gangrenous)

I. **Perforated appendicitis** (with or without VP shunt)
Assess clinical response (i.e., fever, ileus, PO intake) post-operatively after a minimum of 48-hours IV antimicrobials:
   a. Good clinical response: Change to PO* antibiotic for 7 days of oral antibiotic therapy (amoxicillin-clavulanate)
   b. Poor clinical response:
      i. Continue IV antibiotics until patient meets discharge criteria*, then change to PO* antibiotics for an additional 7 days of antimicrobial therapy
      ii. No post-operative imaging before POD #5
      iii. Order screening US to evaluate for abscess between 5 and 7 days
      iv. If discharge criteria not met by POD #7 Consider: labs, CT A/P, consult Infectious disease

II. **Perforated appendicitis** (with VP shunt):
After a minimum of 48-hours IV antimicrobials- assess clinical response (i.e., fever, ileus, PO intake) post-operatively
   a. Good or poor clinical response:
      i. Continue IV antibiotics until CSF cultures negative x3 (minimum of 4 days) until patient meets discharge criteria, then change to PO* antibiotics for an additional 5-7 days of antimicrobial therapy
      ii. No post-operative imaging before POD #5
      iii. Consider: Labs, CT A/P, Consult Infectious disease
   b. VP shunt recommendations:
      i. Externalize the shunt on admission. Cultures should be taken at the time of externalization. Consider reinternalization if initial and all subsequent CSF cultures (at surgeon's discretion) remain negative and if the appendicitis/peritonitis is resolved per Infectious Disease/General Surgery
   c. *PO antibiotics:
      i. First Line: amoxicillin-clavulanate 25-45 mg/kg/day divided BID (maximum 875 mg per dose: 400mg-57mg/5ml OR 875 mg tablet.
      ii. Second line: (for PCN allergy) ciprofloxacin 15mg/kg PO every 12 hours (maximum 500 mg per dose) PLUS metronidazole 13.3 mg/kg PO every 8 hours (maximum 500 mg per dose)

*Post-operative antimicrobial recommendations may change and will be based on culture and sensitivities, if obtained

*Discharge Criteria:
   i. Afebrile: <38°C for >24 hrs
   ii. Diarrhea improving or resolved
   iii. Tolerating a diet (>50% 2 consecutive meals AND 1000 ml oral intake in 24 hours)
   iv. Pain controlled with PO meds
   v. Improving abdominal exam
   vi. Ambulating without assistance

Pathway information

OWNER(S): Dr. Emily Durkin

CONTRIBUTOR(S): Ann Shupe and Nisreen Parniske

EXPERT IMPROVEMENT TEAM (EIT): Emily Durkin, Jessica Andrina, Pediatric Surgeons of West Michigan, Rosey Olivero, Sara Ogrin, Jackson Lanphear, Erica Michiels, Julia Steinke, Lisa Stevens, Bradford Betz, Jarrod McFarlane, Matthew Christy, Dr. Robert Nolan

CLINICAL PRACTICE COUNCIL (CPC): Children's Health

CPC APPROVAL DATE: October 20,2022

OTHER TEAM(S) IMPACTED HDVCH ED, HDVCH Radiology, HDVCH Surgery, HDVCH Patient Care Units, HDVCH Infectious Disease

References

Fujishiro, J., Fujiogi, M., Hirahara, N., Terui, K., Okamoto, T., Watanabe, E., Ishimaru, T., Miyata, H. Abdominal Drainage at Appendectomy for Complicated Appendicitis in Children. *Annals of Surgery*. 2021;274:(6); 599-604

Gasior, A., Knott, E.M., Ostlie, D. J., St. Peter S.D. To drain or not to drain: an analysis of abscess drains in the treatment of appendicitis with abscess. *Pediatric Surgery Int*. 2013; 29:455-458. Doi: 10.1007/s00383-013-3262-3

Gerard RR, Kielhorn BA, Petersen B, Mullard AJ, McCahill LE. Post-operative management of perforated appendicitis: Can clinical pathways improve outcomes?. *Am J Surg*. 2018;215(4):593-598. doi:10.1016/j.amjsurg.2017.06.003

Ingram MC, Harris CJ, Studer A, et al. Distilling the key elements of pediatric appendicitis clinical practice guidelines. *J Surg Res*. 2021;258:105-112. doi:10.1016/j.jss.2020.08.056

Wakeman D, Livingston MH, Levatino E, et al. Reduction of surgical site infections in pediatric patients with complicated appendicitis: Utilization of antibiotic stewardship principles and quality improvement methodology. *J Pediatr Surg*. 2022;57(1):63-73. doi:10.1016/j.jpedsurg.2021.09.031

Wakimoto M, Miller R, Shafy SZ, Tumin D, Veneziano G, Tobias JD. Safety of same-day discharge compared to overnight observation following laparoscopic appendectomy in the pediatric-aged patient: A national surgical quality improvement program project. *J Laparoendosc Adv Surg Tech A*. 2019;29(7):965-969. doi:10.1089/lap.2019.0046