Appendicitis Management Pathway

Introduction

This pathway is for use with children aged 2-18 years old with no underlying disease or co-morbidity who have a confirmed diagnosis of appendicitis (either non-perforated or perforated) by the General Surgery Team who require a surgical appendectomy or medical management. Patients are to be removed from this pathway if there are significant postoperative complications (eg. bowel obstruction or prolonged TPN) or a change in diagnosis.

Target Users

- General Surgery Surgeons, Residents, Fellow, Nurse Practitioners, and nurses on the inpatient units

Definitions

- **Non-perforated appendicitis** - Appendix is normal, injected, inflamed or suppurative. Presence of cloudy fluid +/- local fibrinous exudate, or gangrenous appendicitis but with no visible hole in appendix, abscess or free fecalith
- **Perforated appendicitis** - Visible hole in appendix, free fecalith, diffuse peritonitis with fibrinous exudate or abscess
- **Appendectomy** - surgical removal of the appendix
- **Fever** - a fever is defined as any temperature reading greater than 38.3°C
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Recommendations

Child in ED with confirmed diagnosis of Appendicitis on ultrasound

ED to consult General Surgery team and initiate ED Appendicitis orderset

Are there signs of perforation on ultrasound and symptomatic for ≥ 5 days? OR is there a sign of walled off abscesses on ultrasound or appendical mass?

Initiate surgical management

Initiate medical management of perforated appendicitis with IV ceftriaxone/metronidazole using Epic order set. Refer to e-formulary

Are there drainable collections on ultrasound?

Post-op:

Initiate IV ceftriaxone/metronidazole using Epic order set. Refer to e-formulary

Continue IV ceftriaxone/metronidazole

NO

YES

Converting to oral antibiotics when child is tolerating oral diet and is afebrile for 12 hours

In the child ≥ 5 years of age?

Convert to oral Cipfloxacin/moxifloxacin/metronidazole and discharge home to complete total of 7 days of antibiotics (days include inpatient stay). Refer to e-formulary

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Inpatient Non-Perforated Appendicitis Care Pathway  Expected Date of Discharge: within 24 hours post-op

<table>
<thead>
<tr>
<th>PRE-OPERATIVE</th>
<th>POST OPERATIVELY</th>
<th>DISCHARGE: WITHIN 24 HOURS POST-OP</th>
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</thead>
<tbody>
<tr>
<td>GOALS</td>
<td></td>
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</tr>
<tr>
<td>1. Obtain history</td>
<td>1. Complete pain assessment every 4 hours</td>
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<tr>
<td>2. Complete physical exam</td>
<td>2. Ensure child has adequate pain control (refer to Pain Management Guidelines)</td>
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<tr>
<td>3. Assess vital signs</td>
<td>3. Monitor vital signs as per bedside PEWS</td>
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<tr>
<td>4. Obtain accurate in and out</td>
<td>4. Obtain accurate in and out</td>
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<tr>
<td>PHYSICAL</td>
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<tr>
<td>5. Complete wound assessment</td>
<td>5. Complete wound assessment</td>
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<tr>
<td>DEBT &amp; IV fluids</td>
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<td></td>
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<tr>
<td>7. Ensure that child is NPO</td>
<td>7. Clear fluids to regular diet as tolerated</td>
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<tr>
<td>8. Administer OOPW and O.5 NaCl with 200mL KCl at maintenance</td>
<td>8. IV to maintenance: TKO once adequate oral fluid intake</td>
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<tr>
<td>9. Reassess as indicated</td>
<td>9. Reassess fluid intake as indicated</td>
<td></td>
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<tr>
<td>10. Refer to Fluid and Electrolyte Guidelines</td>
<td>10. Refer to Fluid and Electrolyte Guidelines</td>
<td></td>
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<tr>
<td>MEDICATION</td>
<td></td>
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<tr>
<td>11. Ceftriaxone IV, if allergy then Clindamycin or Ciprofloxacin &amp; Metronidazole. Refer to the e-Formulary</td>
<td>11. Morphine IV bolus PRN</td>
<td></td>
</tr>
<tr>
<td>12. Pain control as needed: morphine/sufentanil/oxycodone: Refer to the e-Formulary</td>
<td>12. Antibiotics as needed for pain control</td>
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<tr>
<td>13. Ketamine or benzodiazepines every 6 hours as needed for pain management</td>
<td>13. Ketamine or benzodiazepines every 6 hours as needed for pain management</td>
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<tr>
<td>ACTIVITY &amp; EDUCATION</td>
<td></td>
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<tr>
<td>15. Consent for surgery</td>
<td>15. Activity as tolerated</td>
<td></td>
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<tr>
<td>16. Pre-op procedures for child and caregiver</td>
<td>16. Activity as tolerated</td>
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<tr>
<td>17. Review parental involvement in care (pre and post-operatively)</td>
<td>17. Activity as tolerated</td>
<td></td>
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<tr>
<td>18. Diet:</td>
<td>18. Advance diet as tolerated</td>
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<tr>
<td>19. Pain:</td>
<td>19. Antibiotics and supplements if not contraindicated for 48 hours then as needed</td>
<td></td>
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<tr>
<td>21. Signs and symptoms of wound infection:</td>
<td>21. Lesion swelling and tenderness until off of bed or removed after 15 days</td>
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<tr>
<td>22. Activity:</td>
<td>22. Once drain-strings removed, may wash incision gently with soap and water</td>
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<tr>
<td>23. Follow up:</td>
<td>23. Bedrest around incision</td>
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<tr>
<td>24. Drainage from incision</td>
<td>24. Increasing pain around incision</td>
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<tr>
<td>25. Discharge:</td>
<td>25. May shower or bathe, and ambulate 48 hours after surgery</td>
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<tr>
<td>26. Activity:</td>
<td>26. Ambulate in hallway at least 5 times</td>
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<tr>
<td>27. May return to normal daily activities as patient feels able</td>
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Evaluation

- Process measures:
  - Antibiotic utilization
  - Rate of oral antibiotics tolerated (how often)
  - Slicer dicer program utilization in Epic

- Outcome measures:
  - At 6 months and 1 year after implementation compare the hospital length of stay, surgical site infection rate (as defined by the American College of Surgeon National Surgical...
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Quality Improvement Project [ACS NSQIP]), organ space infection rate/abscess rate (as defined by ACS NSQIP), and 30-day readmission rate among children being treated for appendicitis, and compare these metrics to historical controls (those children treated for the 6 months prior to the implementation of this pathway); and

- Repeat analysis at 1 year. We will also follow abscess cultures over the course of one year to ensure there is not a large change in the types of bacteria being cultured from our abscesses.

### References

4. Children’s Hospital of Philadelphia: Appendicitis without Known GI Disease Clinical Pathway- Emergency
5. Children’s Hospital of Philadelphia: Appendicitis Clinical Pathway- Inpatients
6. Cincinnati Children’s Hospital: Emergency Appendectomy Clinical Pathway
26. University Hospitals of Cleveland: Pediatric Appendicitis/Simple Laparoscopic/Open Technique Care Path

Guideline Group and Reviewers

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Attachments:
non_perf_june 10.pdf
Implementation of CPG.docx

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