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°C
Appendicitis Algorithm

Recommendations - Printable Version

If child in ED with confirmed diagnosis of Appendicitis on ultrasound:

- ED to consult General Surgery team and initiate ED Appendicitis protocol.

If there are signs of perforation on ultrasound:

- Is perforation seen on ultrasound?
  - No: Continue medical management.
  - Yes: Refer to anesthesiology, prepare for OR.

- Admit patient to General Surgery for further management.

If perforation is not seen on ultrasound:

- Is there a distended collection on ultrasound?
  - No: Continue medical management.
  - Yes: Insert percutaneous drain for collection, determine length of time until drain removal.

- Child will remain on IV Ceftriaxone/Metronidazole until drain is removed.

- Post-op:
  - Initiate IV ceftriaxone/metronidazole using Epic order set (Refer to INTRANET).
  - Convert to oral antibiotics within 48 hours, unless abscess or drain site issues. Stopping oral antibiotics.
  - Switch to clindamycin/metronidazole to complete 7 days of oral antibiotics (days include patient stay on end medical)

**If patient clinically worsens, consider upgrade to IV clindamycin/metronidazole. If no ultrasound within the past 2-3 days, repeat in order to rule out distal collection.**

**Alternatives to antibiotic therapy with Ceftriaxone and Metronidazole may be considered in settings of confirmed beta-lactam allergy.**

**Antibiotic therapy should be reassessed based on any available microbiological data (e.g. if cultures are obtained from an abdominal abscess aspiration).**

**A fever is defined as any temperature reading greater than 38°C (Refer to Severe Clinical Pathway).**
## Appendicitis Management Pathway

### Inpatient Non-Perforated Appendicitis Care Pathway

<table>
<thead>
<tr>
<th>PRE-OPERATIVE</th>
<th>POST-OPERATIVE</th>
<th>EXTRAVASATION: WITHIN 24 HOURS POST-OP</th>
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<tbody>
<tr>
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<tr>
<td><strong>GOALS</strong></td>
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<tr>
<td></td>
<td>Obtain history</td>
<td>Complete pain assessment every 4 hours</td>
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<td></td>
<td>Complete physical exam</td>
<td>Ensure child has adequate pain control (refer to Pain Management Guidelines)</td>
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<td></td>
<td>Assess vital signs</td>
<td>Monitor vital signs as per Bedside Pearls (refer to Perioperative Pathway)</td>
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<tr>
<td></td>
<td>Complete pain assessment (refer to Pain Assessment Guidelines)</td>
<td>Obtain accurate in and out</td>
</tr>
<tr>
<td></td>
<td>Obtain accurate in and out</td>
<td>Complete abdominal assessment</td>
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</tbody>
</table>

| **PHYSICAL EXAM** |               |                                        |
|                   |               |                                        |
|                   | Ensure that patient is NPO to allow for analgesia without interference | Clear fluids to regular diet as tolerated |
|                   | Administer O2 and 6.0% NaCl with 20mm HCO3 at maintenance | IV to maintenance, TKPO once adequate oral fluid intake |
|                   | Blood as indicated | Bolus as indicated |
|                   | Refer to Fluid and Electrolyte Guidelines | Refer to Fluid and Electrolyte Guidelines |

<table>
<thead>
<tr>
<th><strong>MEDICATION</strong></th>
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<tbody>
<tr>
<td></td>
<td>Meperidine/Midazolam IV, if allergy then Clonidinum or Diphenoxylate &amp; Atropine</td>
<td>Acetaminophen as needed for pain/fever</td>
</tr>
<tr>
<td></td>
<td>Refer to e-formulary</td>
<td>Nalbuphine or bupivacaine as needed for pain management</td>
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<tr>
<td></td>
<td>Morphine IV bolus PRN</td>
<td>Morphine IV bolus PRN</td>
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<table>
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<tr>
<th><strong>ACTIVITY ADJUDICATION</strong></th>
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<tr>
<td></td>
<td>Activity as tolerated</td>
<td>Activity as tolerated</td>
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<tr>
<td></td>
<td>Consent for surgery</td>
<td>Consent for surgery</td>
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<tr>
<td></td>
<td>Pre-operative procedures for child and caregiver</td>
<td>Pre-operative procedures for child and caregiver</td>
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<tr>
<td></td>
<td>Review parental involvement in care (pre and post-operatively)</td>
<td>Review parental involvement in care (pre and post-operatively)</td>
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<table>
<thead>
<tr>
<th><strong>Diet</strong></th>
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</tr>
<tr>
<td></td>
<td>Advance diet as tolerated</td>
<td>Advance diet as tolerated</td>
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<tr>
<td></td>
<td>Acetaminophen and ibuprofen (if not contraindicated) for 48 hours then as needed</td>
<td>Acetaminophen and ibuprofen (if not contraindicated) for 48 hours then as needed</td>
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<tr>
<td></td>
<td>Review need for pain management</td>
<td>Review need for pain management</td>
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<tr>
<th><strong>Intracranial care</strong></th>
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<tr>
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<tr>
<td></td>
<td>Leave skin-strips until fall off on own or remove after 10 days</td>
<td>Leave skin-strips until fall off on own or remove after 10 days</td>
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<tr>
<td></td>
<td>Once skin-strips removed, may wash incision gently with soap and water</td>
<td>Once skin-strips removed, may wash incision gently with soap and water</td>
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<table>
<thead>
<tr>
<th><strong>Signs and symptoms of wound infection</strong></th>
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<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Fever</td>
<td>Fever</td>
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<tr>
<td></td>
<td>Redness around incision</td>
<td>Redness around incision</td>
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<tr>
<td></td>
<td>Drainage from incision</td>
<td>Drainage from incision</td>
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<td></td>
<td>Increasing pain around incision</td>
<td>Increasing pain around incision</td>
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<tr>
<th><strong>Bathing</strong></th>
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<tbody>
<tr>
<td></td>
<td>May shower or bath, 48 hours after surgery</td>
<td>May shower or bath, 48 hours after surgery</td>
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<tr>
<td></td>
<td>Activity:</td>
<td>Activity:</td>
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<td></td>
<td>Ambulate in hallway</td>
<td>Ambulate in hallway</td>
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<tr>
<td></td>
<td>May return to normal daily activities as patient feels able</td>
<td>May return to normal daily activities as patient feels able</td>
</tr>
</tbody>
</table>

When to call surgeon’s office:
- Wound infection
- Vomiting
- Fever
- Pain

Follow-up:
- Confirm need for follow-up with Primary Surgeon
- Family doctor/physician in 1-2 weeks

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## Inpatient Perforated Appendicitis Care Pathway

### DAY OF ADMISSION

- **Goals**
  - Hypertension control
  - Adequate pain control
  - Patient prepared for OR if surgical management required
  - IV fluids administered

- **Pharmacology**
  - **IV**
    - Normal saline
    - Lactated Ringer's
    - Reference: **Fluid and Electrolyte Guidelines**

- **Physiologic Status**
  - VITAL SIGNS
  - Blood pressure
  - Heart rate
  - Respiratory rate
  - Temperature
  - Oxygen saturation
  - Reference: **Pain Assessment Guidelines**

### DAY #1

- **Admissions**
  - **Activity**
    - Ambulating
  - **Intravenous Infusion**
    - IV fluids as prescribed
  - **Intravenous Infusion**
    - IV fluids as prescribed
  - **Intervention**
    - Consider abdominal ultrasound to evaluate for drainage into abdominal collection if child is not improving or clinically worsens
  - **Gastrointestinal**
    - Diet as tolerated

### DAY #2 - #3

- **Admissions**
  - **Activity**
    - Ambulating to chair, progress to walking in hallway X 5

### DAY #4

- **Admissions**
  - **Activity**
    - Diet as tolerated
  - **Intervention**
    - If NPO, ensure that child is receiving IV fluids with D5W
  - **Gastrointestinal**
    - Oral intake

### DAY #5

- **Activity**
  - Ambulating to chair daily
  - Progress to ambulating in hallway X 5

### Related Documents

- **E-formulary**
- **Sepsis Pathway**
- **Pain Management Guidelines**
- **Pain Assessment Guidelines**
- **Fluid & Electrolyte Guidelines**

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References


6. Children’s Hospital of Philadelphia: Appendicitis without Known GI Disease Clinical Pathway- Emergency

7. Children’s Hospital of Philadelphia: Appendicitis Clinical Pathway- Inpatients

8. Cincinnati Children’s Hospital: Emergency Appendectomy Clinical Pathway


14. Inpatient and Surgical Care: Appendectomy for Ruptured Appendicitis with Abscess or Generalized Peritonitis Care Guideline


28. University Hospitals of Cleveland: Pediatric Appendicitis/Simple Laparoscopic/Open Technique Care Path


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3. Christine McGovern, Sr Clinical Manager- 5B General Surgery

Attachments:
appendicitis algorithm.docx
appendicitis algorithm.pdf
Non perforated appy pathway.pdf
Non perforated appy pathway.rtf
Perforated appy pathway.pdf
Perforated appy pathway.rtf