

Guideline

Acute Abdominal Pain - Emergency Management in Children

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| Applicable to | All CHQ staff involved in the care of children with abdominal pain | | | | |
| Authorisation | Executive Director Clinical Services | | | | |

Purpose

This procedure provides clinical practice guidelines to guide clinicians involved in the emergency management of children with acute abdominal pain.

Scope

This guideline relates to all staff involved in the care and management of children with acute abdominal pain.

Related documents

Procedures, Guidelines, Protocols

- [CHQ-GDL-60019 Ingestion of Foreign Body – Emergency Management in Children](#)
- [CHQ-GDL-60001 Acute Scrotal Pain – Emergency Management in Children](#)

Introduction

Acute abdominal pain is a common problem in childhood and is responsible for 5 - 10% of emergency service presentations each year.^{1,2} The pain may be acute, recurrent or chronic.

Abdominal pain usually falls into one of three (3) categories:

- **Visceral (splanchnic)** — originates from distension of organs, feels dull and is poorly localised to the midline
- **Parietal (somatic)** — arises from irritation of the parietal peritoneum, is sharper and localises to the inflamed area. Ischaemia can cause this sharp pain.

- **Referred pain** — where afferent visceral or somatic nerves from distant locations share a common central pathway. Diaphragmatic irritation can lead to referred abdominal or thigh pain in the setting of Community acquired pneumonia (CAP) and testicular pain.

Table 1: Causes of acute abdominal pain in children

| Neonatal | 3-12 months | Toddler | Child | Adolescent |
|----------------------|-----------------|---|---|--|
| Malrotation/volvulus | Sepsis | Sepsis | Sepsis | Sepsis |
| NAI | Intussusception | Intussusception | Testicular Torsion | Gonadal Torsion |
| Torsion of gonad | Colitis | DKA | DKA | DKA |
| Hirschsprungs | Gastroenteritis | Constipation | Appendicitis | Appendicitis |
| Pyloric stenosis | Incarcerated | Gastroenteritis | Mesenteric adenitis | Mesenteric Adenitis |
| Colitis | Hernia | Pneumonia | Meckels | Obstetric and Gynae |
| Infantile colic | | UTI | GORD/gastritis | <ul style="list-style-type: none"> • Dysmenorrhoea • Mittelschmerz • PID • Endometriosis • Ovarian Pathology • Ectopic |
| Incarcerated hernia | | FB- beware button battery, multiple magnets | Coeliac Pneumonia HSP Pancreatitis UTI EBV HUS Poisoning- venoms, paracetamol, lead, iron FB- beware button battery, multiple magnets Porphyria Familial Mediterranean Fever | GORD IBD EBV Cholecystitis/lithiasis Abdominal migraine Renal tract calculi UTI Poisoning- venoms, paracetamol, lead, iron Functional Bowel Disease |

Adapted from: Leung and Sigale³

There are many causes of acute abdominal pain (Table 1). Commonly in the Emergency Department (ED), a cause for abdominal pain is not found (“non-specific abdominal pain”). Other frequent non-surgical causes of abdominal pain in children include gastroenteritis, mesenteric adenitis, constipation and urinary tract infection.^{1,4} The more common important surgical conditions include appendicitis, intussusception and bowel obstruction. Less common but higher risk surgical emergencies include malrotation/volvulus and suspected testicular or ovarian torsion. At QCH between 2018 and 2020, we had 18 532 children present with acute and chronic abdominal pain (10% of all ED presentations) of which 9.9% had surgery. In the literature, surgery occurs in 1 - 7% of cases of acute abdominal pain.^{2,5} It is important to remember that diabetic ketoacidosis, pneumonia and toxic exposures may also present with acute abdominal pain.

Assessment

Paediatric acute abdominal pain is often a diagnostic dilemma. While the vast majority of these episodes are benign and self-limiting, persistent abdominal pain may indicate underlying pathology requiring urgent intervention. Timely assessment and intervention are critical in preventing untoward sequelae.

Because of the spectrum of conditions that manifest as abdominal pain, the differential diagnosis remains broad and diagnosis can be challenging. In most cases, a thorough history and physical examination can narrow the differential. However, depending on the age of the child, additional investigations may be required to delineate between conditions that present with similar symptoms. Furthermore, even with the assistance of parents or carers, a comprehensive history is often difficult to obtain, and diagnosis therefore relies heavily on the clinical judgment of the health practitioner.



ALERT – Abdominal Examination

Children presenting with abdominal pain should **ALWAYS** have a documented examination of groin and genitalia with consideration given to differential diagnoses including hernia and genital pathology. See [Acute Scrotal Pain Guideline](#)

Investigations

Few investigations are required in the assessment of acute abdominal pain. Where the diagnosis is unclear, the need for investigations should be based upon presenting signs / symptoms and clinical findings. A senior emergency medical officer should be consulted prior to the ordering of tests.

Simple and inexpensive investigations that may be performed to aid in diagnosis include:^{4,6,7}

- Urinalysis to help exclude a urinary tract infection and pregnancy
- Blood glucose and ketone level to help exclude diabetic ketoacidosis
- Chest x-ray to identify pneumonia-associated abdominal pain if the child has tachypnoea, increased work of breathing, or cough.

Plain film abdominal x-rays are often requested as a *screening procedure* for children with a non-specific presentation with abdominal pain, however they seldom yield useful information.⁸ Abdominal x-rays **are** of value when an obstruction, foreign body or perforation is suspected. Abdominal x-rays **are not** routinely ordered for investigation of abdominal pain or suspected constipation in children.

Abdominal ultrasound should be restricted to answering a specific question in individual cases where discussion with or review by a surgeon or emergency physician suggests it may be of value (e.g. suspected intussusception or ovarian torsion, equivocal clinical findings for appendicitis). Bladder filling and fasting time are important for most scans, see. The use of ultrasound after hours is indicated for intussusception but is rarely needed for other conditions (peritonitis due to perforated viscus is determined by a clinical examination). See [Appendix 1](#) and [Appendix 2](#)

Pain Assessment

The patient has presented with pain. Give them pain relief while diagnosing / working up. This has been proven not to mask the signs.¹⁰⁻¹² Administration of opioids to children with moderate to severe abdominal pain results in a significant reduction of their pain without any significant difference in diagnostic accuracy, and usually aids examination.^{11,13-15} Assessment and documentation of pain and distress scoring (e.g. FLACC behavioural pain assessment scale or the Faces Rating Scale) should be used to document pain before and after analgesia, with analgesic medication titrated accordingly.¹⁶⁻¹⁸

Management

Management is directed initially at providing resuscitation and analgesia and then focussing on the underlying cause and should include the following based on the findings of physical examination and investigations:^{3,6}

- Structure as ABCDE
- Children with abdominal pain commonly have concurrent haemodynamic or hydration compromise from the underlying disease, third space losses or from prolonged poor oral intake. Specific assessment of haemodynamic and hydration parameters should occur with documentation of findings. **Shock should be managed with appropriate fluid boluses +/- inotropic support.** Dehydration *needs to be rectified expediently*, especially if the child requires operative management
- Pain assessment and documentation with titrated analgesia according to pain requirements.
- Early surgical referral if a surgical condition is suspected. Full diagnostic workup can be performed concurrently to referral. If the referral is between midnight and 0600, unless this is an emergency, it is reasonable for the child to be admitted to short stay and be referred early in the morning.
- Rectal examination is rarely indicated and should only be performed once if necessary. It is preferred in surgical diagnoses that this be done by the surgical doctor as repeated rectal examinations on children causes distress without offering any additional useful information.
- Child should remain "nil by mouth" if imminent surgery likely i.e. testicular torsion or have clear fluids until surgical review and/or a decision that the cause of the abdominal pain is surgical.
- Investigations as previously described. Use topical local anaesthetic cream where possible and obtain blood samples whilst cannulating to avoid unnecessary venepuncture.
- Insertion of nasogastric tube if bilious vomiting or obstruction is suspected. Bile-stained vomitus is a surgical emergency especially in neonates and should prompt urgent surgical review.
- If constipation is diagnosed, refer to [CHQ-GDL-60003 Constipation - Emergency Management in Children](#) for treatment.

Pain management

Best practice principles¹⁹ for management of paediatric abdominal pain include:

- **Principle 1** - Diagnosis of abdominal pain is not masked or compromised by analgesia, therefore analgesia should not be withheld [Level 1].
- **Principle 2** - Pain assessment at triage facilitates appropriate and timely administration of analgesia. Pain assessment score should be documented on initial assessment and re-documented post analgesia. Regular pain assessment facilitates effective pain management in children [Level 1].
- **Principle 3** - Analgesia should be given as soon as possible (within 30 minutes) of pain assessment at triage.

- **Principle 4** - Appropriate analgesia should be given to the child with abdominal pain according to the pain score and the child's weight. Under-dosing of analgesia does not provide effective or timely pain relief [Level 1].
- **Principle 5** - Oral analgesia may be given irrespective of fasting requirements.
- **Principle 6** - Non-pharmacological therapies such as distraction and cognitive behaviour interventions are effective in reducing pain in children [Level 1].

Analgesia is recommended as follows:

| Analgesic dosing for the treatment of pain in children (If considering prescribing narcotic analgesia, check QScript before proceeding) | |
|--|---|
| Mild Pain (score 1-3) | Dose |
| Paracetamol (oral) | 15 mg/kg up to 4 hourly, maximum 4 doses in 24 hours |
| Ibuprofen* (oral) | 10 mg/kg (maximum 400 mg) up to 6 hourly, maximum 3 doses in 24 hours Avoid in children <6 months |
| Moderate Pain (score 4-6) | ADD |
| Oxycodone (oral) | 0.1–0.2 mg/kg (maximum 5mg) 4 to 6 hourly |
| +/- Fentanyl (intra-nasal) | 1.5 mcg/kg (maximum 100 mcg/dose) intra-nasal as initial dose (repeat dose of 0.75 micrograms/kg if required) |
| Severe Pain (score 7-10) | ADD |
| Fentanyl (intra-nasal, unless already given) | 1.5 mcg/kg (maximum 100 mcg/dose) intra-nasal as initial dose (repeat dose of 0.75micrograms/kg if required) |
| Morphine (IV) | 0.1 mg/kg (maximum 2.5 mg) IV as initial dose then titrate in 0.05 mg/kg aliquots |
| Ketamine (IV) | 0.1 mg/kg IV as an initial dose and titrate to effect. |

*Ibuprofen should be used with caution or avoided in children with compromised renal function or severe dehydration and shock.¹⁷ Children who have had difficulty in controlling pain can be referred to the acute pain service if a parent/patient controlled analgesia device is required.

Codeine is **NOT** recommended as efficacy is variable in up to 50% of children due to metabolism issues.¹⁷

Disposition

If the cause of the abdominal pain is non-specific and the child is discharged, ensure appropriate follow-up is arranged i.e. GP review in 24-48 hours. Educate the parents/caregivers with regards to pain management, providing reassurance and clear advice about symptoms/signs that should prompt return.

Provide parents with written advice.² Advise the parents/caregivers to keep a record of time, nature and association of future episodes of pain. Where a child presents with recurring symptoms, GP should consider referral to General Paediatrics for further assessment.

Some children may require admission to a children's ward for observation if the clinical diagnosis is unclear and they require ongoing significant pain management.^{4,5}

Children with findings suggestive of a surgical cause for pain need to have analgesia, surgical referral and appropriate fluid resuscitation.

The timing of the surgical review needs to consider urgency especially between midnight and 0600hrs. Urgent conditions require review overnight. These include:

- severe pain
- abdominal pain with haemodynamic instability
- conditions that fit trauma attend criteria
- signs of peritonitis, bilious vomiting, bowel ischaemia, bowel obstruction, gonadal torsion
- ingestion of some foreign bodies particularly multiple magnets see [Ingested Foreign Body Guideline](#)

Button batteries (ingested) with or without abdominal pain above the gastro-oesophageal junction need urgent review by the gastroenterology/ENT teams overnight.

Other patients with less urgent abdominal pain may be admitted to Short Stay and the surgical team can be contacted at 0600hrs for review.

When to escalate care

Follow your local facility escalation protocols for children of concern. Transfer is recommended if the child requires care beyond the level of comfort of the treating hospital. Clinicians can contact the services outlined below to escalate the care of a paediatric patient.

| Service | Reason for contact by clinician | Contact |
|---|--|---|
| Local Paediatric service | For specialist paediatric advice and assistance with local transfers as per local arrangements. | As per local arrangements |
| Children's Advice and Transport Coordination Hub (CATCH) | For access to specialist paediatric advice and assistance with inter-hospital transfer of non-critical patients into and out of Queensland Children's Hospital. For assistance with decision making regarding safe and appropriate inter-hospital transfer of children in Queensland. Click here for the QH Inter-hospital transfer request form | Ph: 13 CATCH or CATCH website 24 hours |
| Telehealth Emergency Management Support Unit (TEMSU) | For access to generalist and specialist acute support and advice via videoconferencing, as per locally agreed pathways, in regional, rural and remote Queensland. | TEMSU QHEPS website 24 hours |
| Retrieval Services Queensland (RSQ) | For access to telehealth support for, and to notify of, critically unwell patients requiring retrieval in Queensland. For any patients potentially requiring aeromedical retrieval or transfer in Queensland. | RSQ QHEPS website 24 hours |

Consultation

Key stakeholders who reviewed this version:

- Senior Medical Officer Emergency
- Director of Emergency
- Director of Radiology
- Paediatric Surgeon
- Ultrasonographers
- Radiologist
- Emergency Registered Nurses
- Emergency Safety and Quality Registered Nurse
- Pharmacist advanced Safety and Quality

Key stakeholders who reviewed the previous version:

- Emergency Fellows and Senior Medical Officers
- General Surgical Senior Medical Officer
- General Paediatric Fellows
- Medicines Advisory Committee (endorsed 15/04/2021)
- Pharmacist advanced Safety and Quality

Definition of terms

| Term | Definition |
|-------|--|
| CHQ | Children's Health Queensland |
| FLACC | Refers to the FLACC Behavioural pain assessment scale — Face, Legs, Activity, Cry, Consolability |
| NAI | Non Accidental Injury |
| DKA | Diabetic Ketoacidosis |
| UTI | Urinary Tract Infection |
| FB | Foreign Body |
| GORD | Gastro oesophageal Reflux Disease |
| HSP | Henoch Scholein Purpura |
| EBV | Ebstein Barr Virus |
| HUS | Haemolytic Uraemic Syndrome |
| IBD | Inflammatory Bowel Disease |
| PID | Pelvic Inflammatory Disease |
| CSCF | Clinical Services Capability Framework |

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Guideline revision and approval history

| Version No. | Modified by | Amendments authorised by | Approved by |
|---|--|--|---|
| 1.1 | Greater Brisbane metropolitan area clinical procedures working group | Greater Brisbane metropolitan area clinical procedures editorial group | Chief Executive Officer, Children's Health Services |
| 2.0 17/11/2014 | Emergency Fellow, CHQ | Director Paediatric Emergency Medicine | General Manager Operations, CHQ |
| 3.0 12/03/2021 | Director Paediatric Emergency Medicine, QCH | Divisional Director, Critical Care | Executive Director Clinical Services |
| 4.0 09/12/2021 Minor update flowchart | Senior Medical Officer Emergency Department | Director Emergency | Divisional Director, Critical Care |

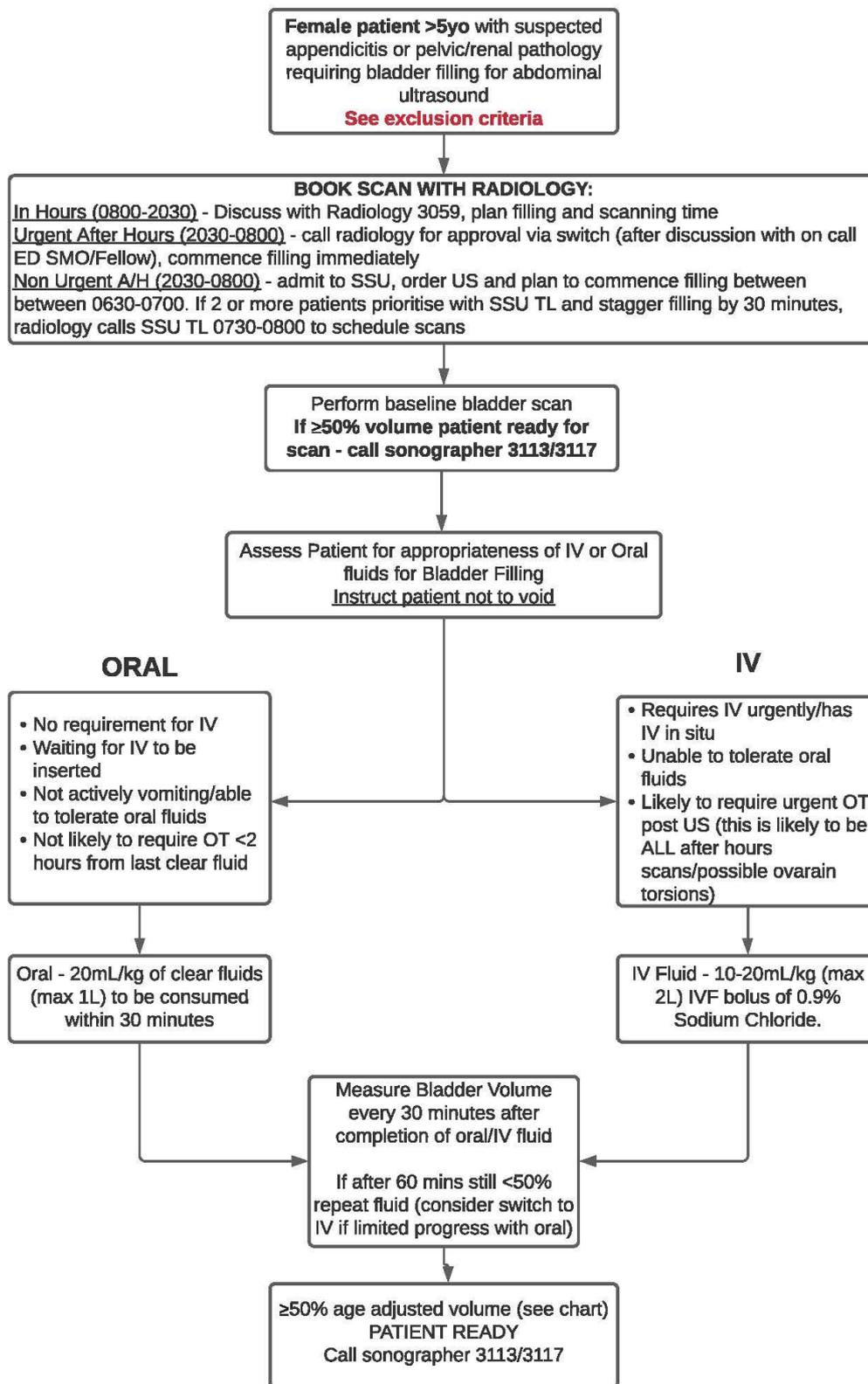
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Appendix 1 Bladder Filling for USS investigation of pelvic pain

No specific consideration is required in male patients.

In female patients in whom a possible diagnosis of appendicitis or ovarian torsion is being considered, the bladder must be adequately filled for optimal imaging. Ovarian torsion must be considered at all ages, and does not always present with the classical, dramatic onset of severe pain. If ovarian torsion is being seriously considered as a possible diagnosis, remember that USS may delay diagnosis and treatment and that urgent surgical review is indicated in these patients. There is some evidence that ultrasound with a non-distended bladder will diagnose the majority of ovarian torsion (specificity 99.4% and sensitivity 88.9%) so ultrasound should not be delayed if clinical suspicion is high ²¹.

Bladder Filling for Abdominal Ultrasounds



- Exclusion Criteria**
- **DO NOT delay USS for bladder filling if suspected ovarian torsion (discuss with radiology)**
 - Significant cardiac or renal conditions
 - Issues with continence
 - Parental concern re: continence compliance

Appendix 2: Bladder Filling Capacity²²

| Age (Years) | Capacity (mls) | |
|-------------|----------------|-----|
| | Full | 50% |
| 3 | 162 | 81 |
| 4 | 216 | 108 |
| 5 | 270 | 135 |
| 6 | 324 | 162 |
| 7 | 378 | 189 |
| 8 | 432 | 216 |
| 9 | 486 | 243 |
| 10 | 540 | 270 |
| 11 | 594 | 297 |
| 12 | 648 | 324 |
| 13 | 702 | 351 |
| 14 | 756 | 378 |
| 15 | 810 | 405 |
| 16 | 864 | 432 |

