

Acute Abdomen in Children: Red Flags

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References: Nelson Textbook of Pediatrics, UpToDate



Definition

Acute abdomen is the **sudden onset of abdominal pain and associated symptoms requiring urgent evaluation**. Some causes are self-limited, whereas others are surgical emergencies requiring immediate intervention.

Self-Limited

Some presentations resolve with conservative management and close observation.

Surgical Emergencies

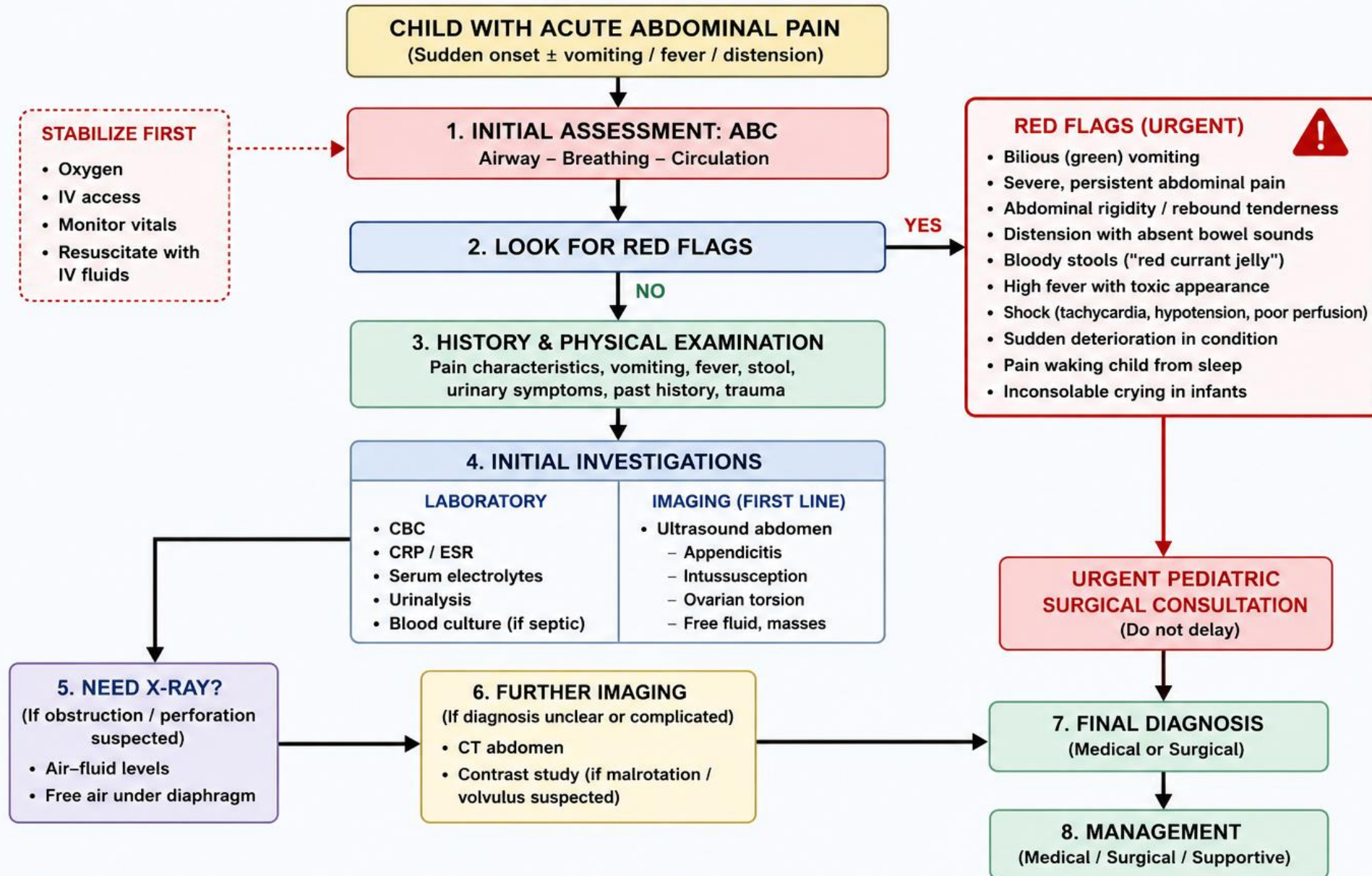
Others demand immediate operative intervention — delay can be life-threatening.



Phase / Setting	Intervention	Technique/ Details	Notes
Phase 1 (immediate)	ABC stabilization	Airway,breathing, circulation	Life - saving priority
Phase 2	IV access + fluids	Isotonic fluids [NS/RL]	Correct dehydration / shock
Phase 3	NPO [nil per oral]	Stop oral intake	Prevent Aspiration
Phase 4	Nasogastric tube	Decompression	Especially in obstruction
Phase 5	Analgesia	Paracetamol/ opioids	Do NOT delay diagnosis
Phase 6	Antibiotics	Broad spectrum IV	If infection/peritonitis suspected
Phase 7	Imaging	Ultrasonography —> CT if needed	Guide diagnosis
Phase 8	Surgical referral	Early consult	Essential for RED FLAGS

DIAGNOSTIC APPROACH ALGORITHM

ACUTE ABDOMEN IN CHILDREN



Common Causes by Age

The differential diagnosis of acute abdomen in children varies significantly with age. Recognizing age-specific patterns is essential for timely diagnosis.

Age Group	Common Causes
Neonates	Malrotation with volvulus, Necrotizing enterocolitis, Hirschsprung disease
Infants	Intussusception, Incarcerated hernia
School-age children	Appendicitis, Mesenteric adenitis
Adolescents	Appendicitis, Ovarian torsion, Pelvic inflammatory disease



Initial Assessment: ABC First

A – Airway

Assess airway patency and level of consciousness.

B – Breathing

Assess respiratory distress and oxygen saturation.

C – Circulation

- Tachycardia
- Hypotension
- Delayed capillary refill
- Poor peripheral perfusion



Shock is a surgical emergency until proven otherwise.

Clinical Features

General Symptoms



- **Abdominal Pain**
The cardinal presenting complaint — assess onset, character, location, and severity.
- **Vomiting**
Note color, frequency, and relationship to pain. Bilious vomiting is a red flag.
- **Fever**
May indicate infection, peritonitis, or systemic sepsis.
- **Refusal to Feed / Anorexia**
Common in infants and young children with significant abdominal pathology.
- **Irritability**
Especially important in infants who cannot verbalize pain.

Abdominal Examination

A thorough and systematic abdominal examination is critical to identifying surgical pathology.

Localized Tenderness

Suggests focal pathology such as appendicitis or ovarian torsion.

Generalized Tenderness

May indicate peritonitis or diffuse bowel pathology.

Guarding & Rigidity

Involuntary muscle contraction — a hallmark of peritoneal irritation.

Rebound Tenderness

Pain on release of pressure — strongly suggests peritoneal involvement.

Distension & Bowel Sounds

Abdominal distension with decreased or absent bowel sounds suggests obstruction.

RED FLAGS — Must Not Be Missed

⊗ Any of these findings requires urgent pediatric surgical consultation.



Bilious (Green) Vomiting

Intestinal obstruction until proven otherwise.



Rigidity / Rebound Tenderness

Peritoneal irritation — surgical emergency.



Severe Persistent Pain

Unrelenting abdominal pain demands urgent workup.



Distension + Absent Bowel Sounds

Suggests obstruction or ileus.



Bloody Stool ("Red Currant Jelly")

Classic sign of intussusception.



High Fever + Toxic Appearance

Sepsis or peritonitis must be excluded immediately.

Shock

Tachycardia · Hypotension · Poor perfusion

Sudden Deterioration

Rapid clinical decline requires immediate action.

Pain Waking from Sleep

Organic pathology — never dismiss.

Inconsolable Crying

In infants — may be the only sign of severe pain.

Investigations: Laboratory Tests



A targeted panel of laboratory investigations helps narrow the differential diagnosis and assess severity.



CBC

Complete blood count — assess for leukocytosis, anemia, or thrombocytopenia.



CRP ± ESR

Inflammatory markers to gauge severity of infection or inflammation.



Serum Electrolytes

Identify metabolic derangements, especially in vomiting or dehydrated children.



Blood Culture

Indicated when sepsis is suspected — obtain before starting antibiotics.



Urinalysis

Exclude urinary tract infection or renal pathology as a cause of abdominal pain.

Imaging: Ultrasound

FIRST-LINE IN CHILDREN

Why Ultrasound First?

Ultrasound is the preferred initial imaging modality in pediatric acute abdomen. It is radiation-free, widely available, and highly informative when performed by an experienced operator.

Useful For Diagnosing:



Appendicitis

Identifies a non-compressible, dilated appendix with periappendiceal changes.



Intussusception

Classic "target sign" or "doughnut sign" on transverse view.



Ovarian Torsion

Enlarged ovary with absent or reduced Doppler flow.



Free Fluid

Detects peritoneal fluid suggesting perforation or hemorrhage.

Imaging: Abdominal X-Ray



Plain abdominal radiography remains a valuable and rapid tool in the initial evaluation of suspected obstruction or perforation.

Intestinal Obstruction

Dilated bowel loops with a paucity of distal gas suggest mechanical obstruction.

Air-Fluid Levels

Multiple air-fluid levels on upright or decubitus views indicate obstruction or ileus.

Free Air (Perforation)

Subdiaphragmatic free air on erect film is a hallmark of bowel perforation.



Imaging: CT Abdomen



CT involves ionizing radiation — use judiciously in children and only when clinically indicated.

Unclear Diagnosis

When clinical and ultrasound findings are inconclusive and the child remains unwell.

Complicated Cases

Complex presentations with multiple possible diagnoses or atypical features.

Suspected Abscess

CT provides superior characterization of intra-abdominal collections and abscesses.

Suspected Perforation

Identifies free air, free fluid, and extent of contamination more precisely than X-ray.

Imaging: Contrast Studies

Contrast studies (upper GI series or contrast enema) are specialized investigations reserved for specific clinical scenarios.

i **Indicated when malrotation or volvulus is suspected.** An upper GI contrast study demonstrates the position of the duodenojejunal flexure (ligament of Treitz). Malposition confirms malrotation. A contrast enema may also be used therapeutically to reduce intussusception.

Malrotation

Upper GI series shows abnormal position of the duodenojejunal junction — the "corkscrew" sign in volvulus.

Volvulus

Midgut volvulus is a life-threatening emergency. Contrast study confirms diagnosis and guides surgical planning.





Management: Step 1 — Stabilization

ABC FIRST

Oxygen

Administer supplemental oxygen if the child shows signs of respiratory distress or hypoxia.

Continuous Monitoring

Attach cardiac monitor, pulse oximetry, and measure blood pressure at regular intervals.

IV Access

Establish large-bore intravenous access immediately. Obtain blood samples at the same time.



Stabilization must precede all diagnostic workup in the hemodynamically unstable child.

Management: Step 2 — Fluid Resuscitation



Administer:

Normal Saline (NS)

Isotonic crystalloid — first choice for volume resuscitation.

Ringer Lactate (RL)

Balanced crystalloid — preferred in prolonged resuscitation to avoid hyperchloremic acidosis.

Correct:

Shock

Bolus 10–20 mL/kg over 15–20 minutes, reassess after each bolus.

Dehydration

Calculate deficit and replace over 24–48 hours alongside maintenance fluids.

Electrolyte Imbalance

Monitor and correct sodium, potassium, and bicarbonate as guided by labs.

Management: Step 3 — Keep the Child NPO

Nil Per Oral

Avoid all oral feeding and fluids until a definitive diagnosis is established and the surgical team has been consulted.

Why NPO?

- Prevents aspiration during potential emergency surgery
- Avoids worsening distension in obstruction
- Reduces risk of vomiting and aspiration pneumonia

Maintain Comfort

While the child is NPO, ensure adequate IV fluid maintenance, pain control, and parental reassurance. NPO does not mean withholding analgesia.

Management: Step 4 — Nasogastric Tube

Intestinal Obstruction

Decompresses the stomach and proximal bowel, relieving distension and reducing vomiting.

Persistent Vomiting

Prevents aspiration and reduces ongoing fluid and electrolyte losses.

Significant Abdominal Distension

Gastric decompression improves respiratory mechanics and patient comfort.

- ❏ Insert a nasogastric tube and place on free drainage or low intermittent suction. Document output volume and character.





Management: Step 5 — Pain Control

Paracetamol

First-line analgesic. Safe, effective, and available IV, oral, or rectal. Dose: 15 mg/kg every 4–6 hours.

Opioids

Use when pain is severe and not controlled by paracetamol. Morphine or fentanyl IV with careful titration and monitoring.

- ✔ **Analgesia should NOT be delayed because of diagnostic concerns.** Evidence shows that adequate pain relief does not mask clinical findings and improves the quality of examination.

Management: Step 6 — Antibiotics

Start broad-spectrum intravenous antibiotics promptly when any of the following are present:



Peritonitis Suspected

Clinical signs of peritoneal irritation
mandate empirical antibiotic
coverage targeting gram-negative
organisms and anaerobes.



Bowel Perforation Suspected

Broad-spectrum coverage is
essential to prevent or treat
bacterial peritonitis from enteric
flora.



Sepsis Present

Follow sepsis bundles — obtain
blood cultures first, then administer
antibiotics within one hour of
recognition.



Obtain blood cultures before administering the first antibiotic dose whenever possible.



Management: Step 7 — Surgical Consultation

IMMEDIATE REFERRAL REQUIRED

1

Bilious Vomiting

Obstruction until proven otherwise — do not delay.

2

Peritonitis

Rigidity, rebound, guarding — operative exploration likely needed.

3

Appendicitis with Complications

Perforation, abscess, or periappendiceal phlegmon.

4

Intussusception / Volvulus / Perforation

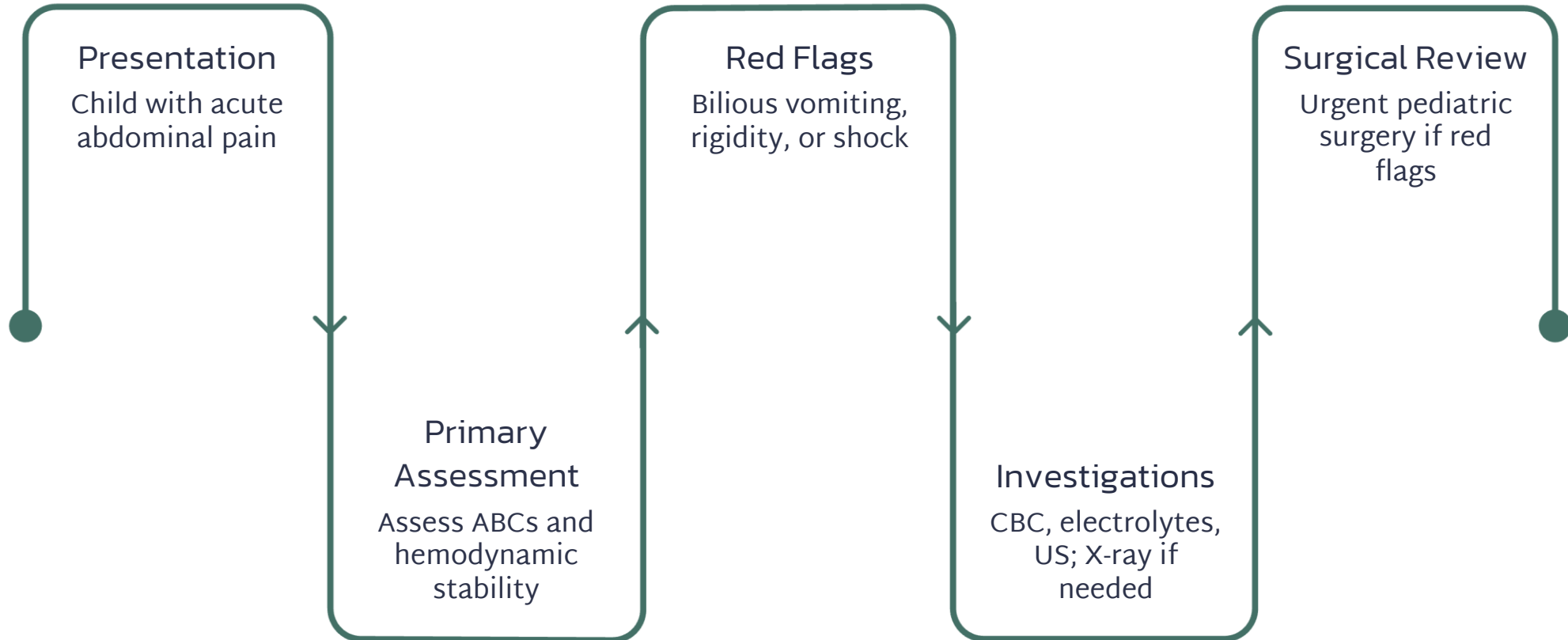
All require urgent surgical assessment and likely operative management.



Hemodynamic instability in the context of acute abdomen is a surgical emergency. Call the surgeon immediately.

Diagnostic Approach

A structured, stepwise approach ensures no red flag is missed and that the sickest children are identified and escalated rapidly.



This pathway ensures that life-threatening causes are identified early, investigations are targeted, and surgical consultation is not delayed when red flags are present.

Key Home Messages



ABC Stabilization Always Comes First

Airway, breathing, and circulation must be secured before any diagnostic workup proceeds.



Bilious Vomiting = Obstruction Until Proven Otherwise

Never dismiss green vomiting in a child — treat as intestinal obstruction and consult surgery immediately.



Rigidity + Rebound = Peritonitis

These examination findings demand urgent surgical evaluation without delay.



Ultrasound is the Preferred First-Line Imaging

Radiation-free, rapid, and highly informative — always start with ultrasound in children.



Early Surgical Consultation Saves Lives

When in doubt, call the surgeon. A timely consultation is never wrong.

"Bilious Vomiting + Distension + Pain = Surgical Emergency until proven otherwise."