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CLINICAL GUIDELINE · PEDIATRIC COMPLEX CARE PLATFORM

Pediatric Gastroesophageal Reflux Disease (GERD): Including Children with Medical Complexity (CMC)

Assessment, diagnosis, management, monitoring and referral of pediatric GERD

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Intended for healthcare professionals as a clinical reference. Apply with clinical judgment and in line with local protocols.

CONTENTS

1 Scope
2 Definitions
3 Clinical Assessment
4 Red Flags
5 Investigations
6 Treatment
7 Acid Suppression
8 Reassessment
9 Prokinetics & Others
10 Refractory GERD
11 GI Referral
12 Algorithms
13 References

1 Scope

This guideline applies to **infants, children and adolescents** with suspected or confirmed gastroesophageal reflux disease (GERD), including **children with medical complexity (CMC)** and those receiving **enteral tube feeding**. It covers the assessment, diagnosis, management, monitoring and referral of pediatric GERD.

2 Definitions

GER	Passage of gastric contents into the esophagus, with or without regurgitation/vomiting.
GERD	GER causing **troublesome symptoms and/or complications**.
Optimal therapy	Appropriate pharmacological and/or non-pharmacological treatment at an adequate dose and duration, individualized to the patient.
Refractory GERD	GERD not responding to optimal therapy after **8 weeks**.
Regurgitation	Passage of refluxed gastric contents into the pharynx or mouth, with or without expulsion.
Vomiting	Forceful expulsion of gastric contents through the mouth.
Retching	Repetitive, involuntary contractions of the respiratory and abdominal muscles without expulsion of gastric contents.

3 Clinical Assessment

3.1 Signs and symptoms

General

- Discomfort / irritability*
- Feeding refusal or intolerance
- Poor weight gain / faltering growth
- Dystonic neck posturing (Sandifer syndrome)

Gastrointestinal

- Regurgitation / vomiting / retching
- Heartburn / retrosternal pain**
- Epigastric pain**
- Hematemesis
- Dysphagia / odynophagia

Respiratory / airway

- Cough
- Wheeze
- Stridor
- Hoarseness
- Apnea
- Halitosis
- Sialorrhea
- Recurrent pneumonia / aspiration

* If excessive irritability is the single manifestation, it is unlikely to be related to GERD. ** Typical GERD symptoms in older children.

In CMC, do not automatically attribute vomiting, feeding intolerance, irritability or respiratory symptoms to GERD.

3.2 Additional clinical assessment

Growth & nutrition	Assess growth trajectory, weight gain and nutritional status.
Feeding	Review feeding route, volume, frequency, rate and potential overfeeding.
Swallowing	Assess for oropharyngeal dysphagia and aspiration risk.
Gastrointestinal	Assess for constipation and abdominal distension, which may contribute to or exacerbate reflux symptoms.
Medications	Review medications that may worsen reflux or delay gastric emptying.
GERD complications	Assess for esophagitis, esophageal stricture, gastrointestinal bleeding/anemia, dental erosion and recurrent otitis media.
Alternative / contributing diagnoses	Consider cow's milk protein allergy, eosinophilic esophagitis, delayed gastric emptying/dysmotility and anatomical obstruction.

4 Red Flags

Red flags suggesting an alternative diagnosis or complication

General

- Weight loss or growth faltering.
- Fever, lethargy or excessive irritability/pain.
- Infants: onset of regurgitation/vomiting after 6 months, or persistence/worsening beyond 12–18 months.

Neurological

- Bulging fontanelle or rapidly increasing head circumference.
- New-onset seizures or abnormal neurological findings.

Gastrointestinal

- Bilious (green) vomiting.
- Persistent forceful/projectile vomiting.
- Nocturnal vomiting.
- Hematemesis or rectal bleeding.
- Persistent abdominal distension.
- Chronic diarrhea.
- Progressive dysphagia or odynophagia.

Respiratory

- Recurrent aspiration events or pneumonia.
- Apnea, cyanosis or significant respiratory distress.

! Red flags warrant evaluation for alternative diagnoses or GERD complications rather than empiric acid suppression alone. **Urgent assessment** is indicated for bilious vomiting, significant gastrointestinal bleeding, acute neurological abnormalities or severe abdominal distension.

5 Investigations

GERD is primarily a **clinical diagnosis** in children with typical symptoms. Routine investigation is not required in every patient. Investigate when **red flags, complications, diagnostic uncertainty or refractory symptoms** are present.

Test	Indication
Upper GI contrast	Suspected anatomical abnormality; **not diagnostic of GERD**.
Endoscopy + biopsies	Suspected reflux esophagitis or GERD complications, alternative mucosal disease (e.g., EoE), or persistent symptoms despite optimal treatment.
pH-MII	Persistent symptoms despite optimal treatment; assess acid/non-acid reflux and correlate reflux episodes with symptoms.
pH-metry	If pH-MII is unavailable; assesses esophageal acid exposure and correlation with symptoms, but not non-acid reflux.
Manometry	Suspected motility disorder.
Gastric-emptying study	Suspected delayed gastric emptying.

5.1 Interpretation of reflux monitoring (pH-MII)

In children with persistent esophageal symptoms and **normal endoscopy**, pH-MII may help differentiate:

Diagnosis	Acid exposure	Symptom–reflux association
NERD	Abnormal	Positive or negative
Reflux hypersensitivity	Normal	Positive
Functional heartburn	Normal	Negative

Note: these distinctions are most applicable to children who can reliably report symptoms. Symptom–reflux correlation may be difficult to establish in nonverbal children with medical complexity. These categories are derived from adult Rome IV/Lyon criteria and are mainly validated in adolescents.

5.2 Pre-fundoplication investigations

Investigations should be **individualized** to confirm GERD, assess upper gastrointestinal anatomy, and identify conditions that may influence surgical outcomes.

pH-MII	Assess reflux burden and symptom–reflux correlation, particularly when objective confirmation of GERD is required.
Upper GI contrast study	Assess upper gastrointestinal anatomy and exclude structural abnormalities (e.g., hiatal hernia, malrotation or obstruction). Ensure visualization of the **duodenojejunal junction**; extend to small-bowel follow-through if clinically indicated.
Upper GI endoscopy ± biopsies	Assess for esophagitis and exclude alternative mucosal disease.
Esophageal manometry	If an esophageal motility disorder is suspected.
Gastric emptying study	If gastroparesis is suspected.

Note: no single investigation is universally required in every child. The preoperative workup should be guided by the clinical presentation, available evidence of GERD, and multidisciplinary assessment.

6 Treatment

Step 1 Optimize feeding

Infants

- ✓ Continue breastfeeding.
- ✓ Avoid overfeeding; adjust feeding volume and frequency.
- ✓ Consider **thickened feeds** for troublesome regurgitation/vomiting.
- ✓ **Positioning:** supine for sleep. Consider upright holding after feeds or supervised left lateral positioning while awake. **Avoid head-of-bed elevation during sleep.**
- ✓ If symptoms persist, consider a **2–4-week trial of extensively hydrolyzed formula** when cow's milk protein allergy is suspected.

Children and adolescents

- ✓ **Positioning:** consider head-of-bed elevation or left lateral positioning, particularly during sleep, for nocturnal reflux symptoms.
- ✓ **Weight management:** encourage weight reduction in children with overweight or obesity.

Clinical notes

- Evidence for positional therapy in children is limited. These measures are more applicable to older children and adolescents than infants.
- **Not recommended:** massage therapy, prebiotics, probiotics and herbal remedies, due to insufficient evidence of benefit.

Children with medical complexity (CMC) / tube-fed children

Feeding optimization	Review feeding volume, caloric intake, rate and schedule; avoid excessive volumes or rapid administration. Consider **thickened feeds** for visible regurgitation (particularly in infants), or **formula modification** (whey-based, extensively hydrolyzed or amino acid–based) according to feeding tolerance, nutritional needs and suspected cow's milk protein allergy (CMPA). **Note:** thickened feeds are not routinely recommended for tube-fed children; consider only when safe and compatible with the feeding tube.
Feeding intolerance	Consider smaller, slower bolus feeds or continuous gastric feeding when appropriate. Continuous feeding may improve tolerance but does not consistently reduce reflux.
G-tube venting	Consider intermittent **G-tube venting** to relieve gastric distension, bloating or retching, particularly before or after feeds as needed. Venting may improve feeding tolerance but **does not reliably reduce gastroesophageal reflux**.
Nasogastric (NG) tubes	May contribute to gastroesophageal reflux, although evidence is inconsistent.
Constipation	Identify and treat constipation, which may contribute to feeding intolerance and reflux symptoms.
Swallowing & aspiration	Assess for oropharyngeal dysphagia and aspiration, recognizing that respiratory symptoms may not be caused by GERD.
Empirical PPI trial in nonverbal children	Consider a **time-limited PPI trial (4–8 weeks)** when GERD is clinically suspected, following individualized assessment and exclusion of alternative causes. **Define measurable outcomes** and reassess response before continuing therapy.
Advanced interventions	For severe gastric feeding intolerance or confirmed refractory GERD with significant complications, consider post-pyloric feeding (NJ, GJ or jejunostomy) or fundoplication following multidisciplinary assessment (see **Section 10**). **Important:** post-pyloric feeding and fundoplication do not prevent aspiration of oropharyngeal secretions.

7 Acid Suppression

Do NOT routinely treat physiological infant reflux, isolated irritability, uncomplicated regurgitation or isolated respiratory symptoms with acid suppression.

For typical GERD symptoms or documented reflux esophagitis: PPI — preferred

Omeprazole — PO / IV

1–2 mg/kg/day

divided q12–24h · **maximum 40 mg/day**

Pantoprazole — PO / IV

1–1.5 mg/kg/day

divided q12–24h · **usual maximum 40 mg/day**

Lansoprazole — PO, once daily

1–11 years, ≤30 kg	**15 mg**
1–11 years, >30 kg	**30 mg**
≥12 years (depending on indication and severity)	**15–30 mg**
Usual maximum	**30 mg/day**

Esomeprazole — PO, once daily

EROSIVE ESOPHAGITIS

1 month–11 years, <5 kg	**5 mg**
1 month–11 years, 5–20 kg	**10 mg**
1 month–11 years, ≥20 kg	**20 mg**
≥12 years	**20–40 mg**

NON-EROSIVE REFLUX DISEASE

1 month–11 years, <5 kg	**5 mg**
1 month–11 years, ≥5 kg	**10 mg**
≥12 years	**20 mg**

Famotidine (H_2RA) — PO

0.5 mg/kg/dose BID

Maximum 40 mg/dose. Consider if a PPI is unsuitable; tachyphylaxis limits long-term usefulness.

Dosing: doses and age/weight bands vary between formularies and product labeling. Verify against the local formulary before prescribing, particularly for neonates and infants.

7.1 PPI administration and formulations

Omeprazole	Do not crush delayed-release tablets. Suitable liquid formulations may be administered via enteral tubes. IV formulation available.
Pantoprazole	IV formulation available. Do not crush delayed-release tablets.
Esomeprazole	Granule sachets can be dispersed in water for enteral-tube administration according to product instructions (feeding tube ≥6 Fr).
Lansoprazole	Orally disintegrating tablets (ODTs) are useful for children with swallowing difficulties. They may be dispersed in water and administered via feeding tubes ≥8 Fr; do not split or crush. Risk of tube blockage. Capsules may be opened and granules mixed with approved soft foods.

7.2 Additional pharmacological considerations

Proton pump inhibitors (PPIs)

- **Metabolism:** primarily hepatic via CYP2C19 and CYP3A4. Genetic variability in CYP2C19 may affect PPI response; in selected refractory cases, consider pharmacogenetic testing, dose adjustment or switching to rabeprazole (less CYP2C19-dependent).
- **Onset:** acid suppression begins within hours, but maximal effect generally requires 3–5 days of repeated dosing.
- **Administration:** give 30–60 minutes before meals when applicable.
- **Drug interactions:** PPIs may inhibit CYP2C19, increasing exposure to clobazam's active metabolite (N-desmethylclobazam) and potentially causing excessive sedation. Monitor when co-prescribed, particularly with omeprazole or esomeprazole.
- **Discontinuation:** rebound acid hypersecretion may occur following prolonged therapy; consider gradual withdrawal if clinically appropriate.

Adverse effects of PPIs

- **Common:** headache, nausea, abdominal pain, diarrhea and constipation.
- **Infections:** increased risk of GI infections (including *C. difficile*), possible SIBO and pneumonia; causality is not fully established.
- **Rare:** acute interstitial nephritis.
- **Long-term concerns:** potential vitamin B12 deficiency and increased fracture risk; causality remains uncertain.

H_2-receptor antagonists (H_2RAs)

- **Onset:** approximately 30–60 minutes; duration generally 6–12 hours, depending on the agent.
- **Metabolism:** famotidine is predominantly eliminated renally; adjust dose in renal impairment.
- **Adverse effects:** headache, dizziness, fatigue/somnolence and GI disturbances.
- **Limitation:** tachyphylaxis develops with continuous use.

8 Reassess at 4–8 Weeks

Reassess **all children** receiving a trial of acid suppression, including CMC.

If improved

- ✓ Attempt weaning or discontinuation when appropriate.
- ✓ If ongoing treatment is needed, use the lowest effective dose.

If not improved

- **Do not automatically increase acid suppression.**
- Reassess diagnosis, adherence, dose/timing and feeding practices (particularly in infants and tube-fed children).
- Consider alternative or contributing conditions: constipation, oropharyngeal dysphagia/aspiration, EoE, or delayed gastric emptying/dysmotility.
- Consider Pediatric GI referral ± endoscopy with biopsies or pH-MII.

9 Prokinetics and Other Medications

Prokinetics are not routinely recommended for pediatric GERD due to limited evidence of benefit and potential adverse effects.

Metoclopramide
Risk of extrapyramidal symptoms and other neurological adverse effects.

Domperidone
Risk of QT prolongation, cardiac arrhythmias and hyperprolactinemia.

Cisapride
Risk of serious cardiac arrhythmias; generally unavailable or restricted.

If delayed gastric emptying or gastrointestinal dysmotility is suspected, assess and manage separately, preferably in consultation with Pediatric Gastroenterology.

Other medications
- **Antacids, alginates and sucralfate:** not recommended for long-term treatment of pediatric GERD.
- **Baclofen:** may be considered in selected children with refractory GERD before surgery, under Pediatric GI supervision. Limited evidence and neurological adverse effects restrict routine use.

10 Refractory GERD

Persistent symptoms despite 8 weeks of optimal treatment:

- ✓ Reassess diagnosis, adherence and alternative causes.
- ✓ Refer to Pediatric Gastroenterology.
- ✓ Consider upper GI endoscopy with biopsies and/or pH-MII.
- ✓ Assess gastric emptying/motility if clinically indicated.
- ✓ **Baclofen:** may be considered in selected patients before surgery, under Pediatric GI supervision; limited evidence and neurological adverse effects restrict routine use.

10.1 Advanced interventions (selected patients)

NJ feeding
Consider as a temporary trial of post-pyloric feeding for severe gastric feeding intolerance or refractory GERD.

GJ / J feeding
Consider when long-term post-pyloric feeding is required, particularly if fundoplication is unsuitable.

Fundoplication
Consider for objectively confirmed GERD with severe complications or persistent symptoms despite optimal medical management.

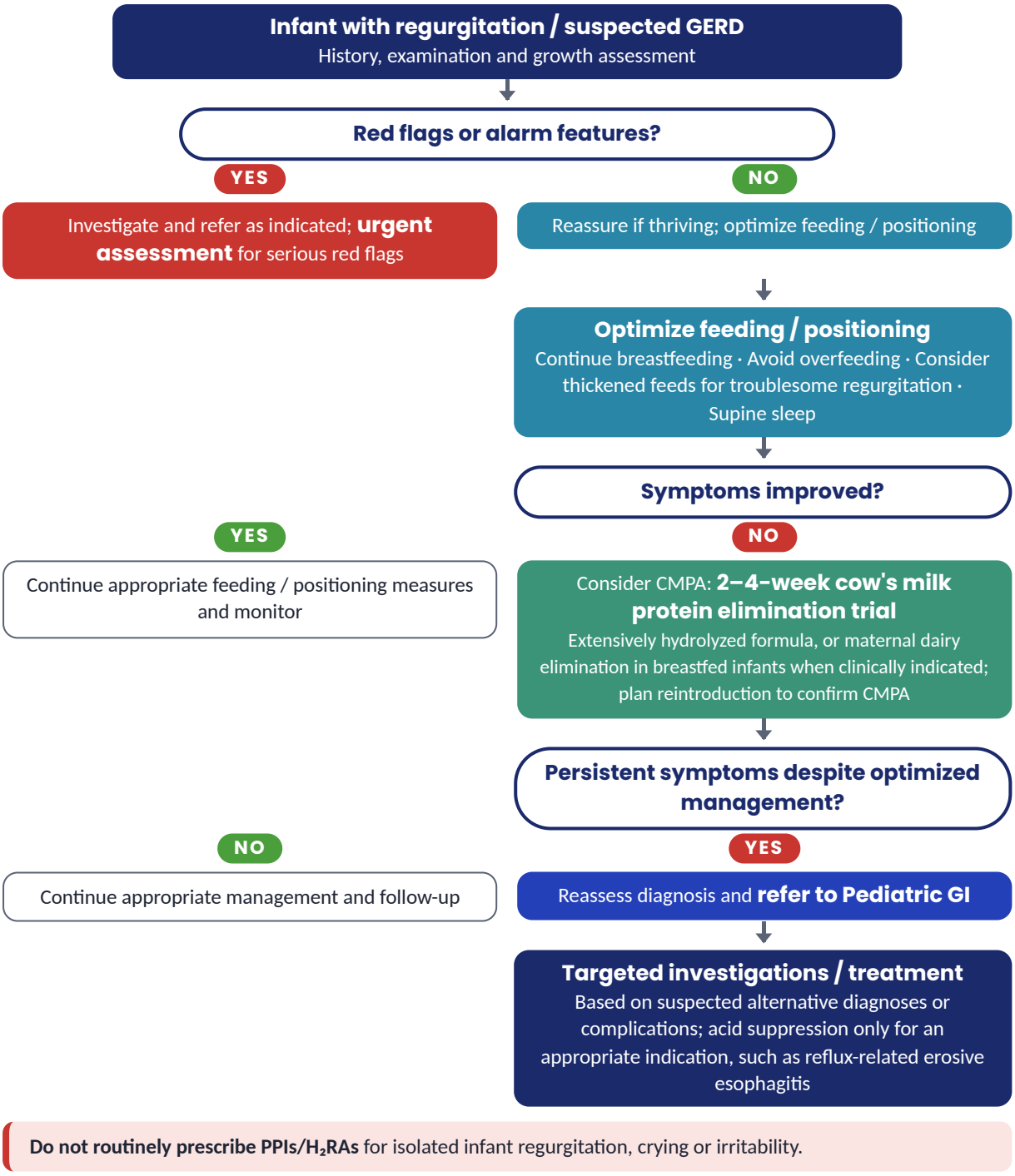
Important considerations
- Individualize decisions through **multidisciplinary discussion** involving Pediatric GI, Surgery and the family.
- Fundoplication carries risks of dysphagia, gas-bloat, retching and recurrent reflux.
- GJ/J feeding requires ongoing tube management and may involve migration, blockage or repeated replacements.
- **Neither intervention eliminates aspiration risk**, particularly aspiration of oropharyngeal secretions.

11 Pediatric GI Referral

- Red flags or suspected GERD complications.
- Persistent symptoms despite 4–8 weeks of optimal treatment.
- Inability to discontinue acid suppression within 6–12 months.
- Consideration of advanced interventions.

12 Management Algorithms

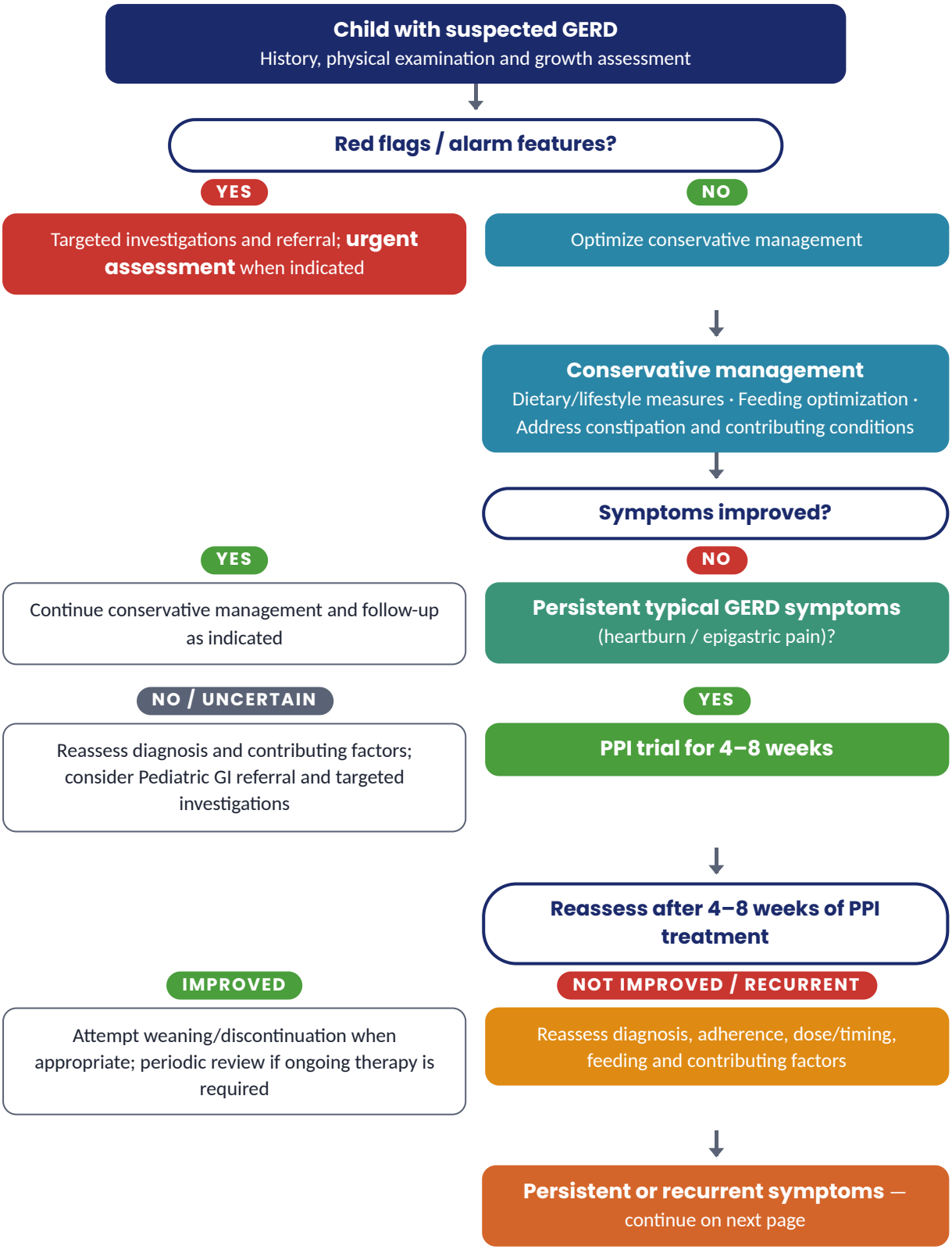
Algorithm 1 · Management of suspected GERD in infants



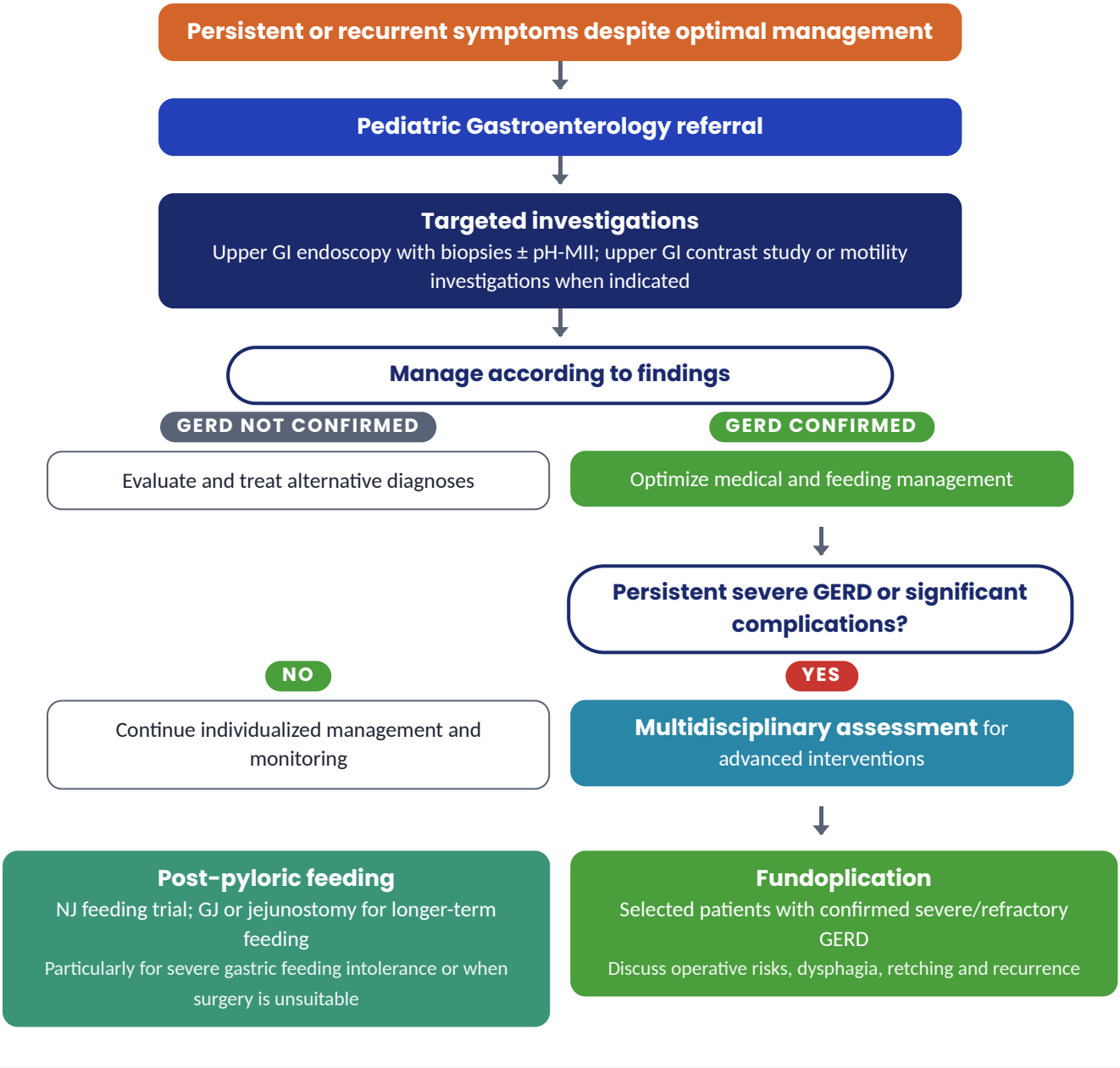
Do not routinely prescribe PPIs/H_2RAs for isolated infant regurgitation, crying or irritability.

Algorithm 2 · Management of GERD in children and adolescents

Including children with medical complexity (CMC) and tube-fed children.



Algorithm 2 (continued) · Persistent symptoms and advanced management



Clinical notes: the empiric 4–8-week PPI trial is intended for older children with typical heartburn or epigastric pain, not for nonspecific feeding or respiratory symptoms alone. In nonverbal CMC, suspected GERD complications warrant individualized assessment; a time-limited PPI trial with defined outcome measures may be considered after individualized assessment. Upper GI contrast studies evaluate anatomy rather than diagnose GERD. Post-pyloric feeding can also be considered for severe gastric feeding intolerance independently of GERD confirmation.

Adapted from NASPGHAN/ESPGHAN Pediatric GERD Guidelines (2018).

13 References

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