



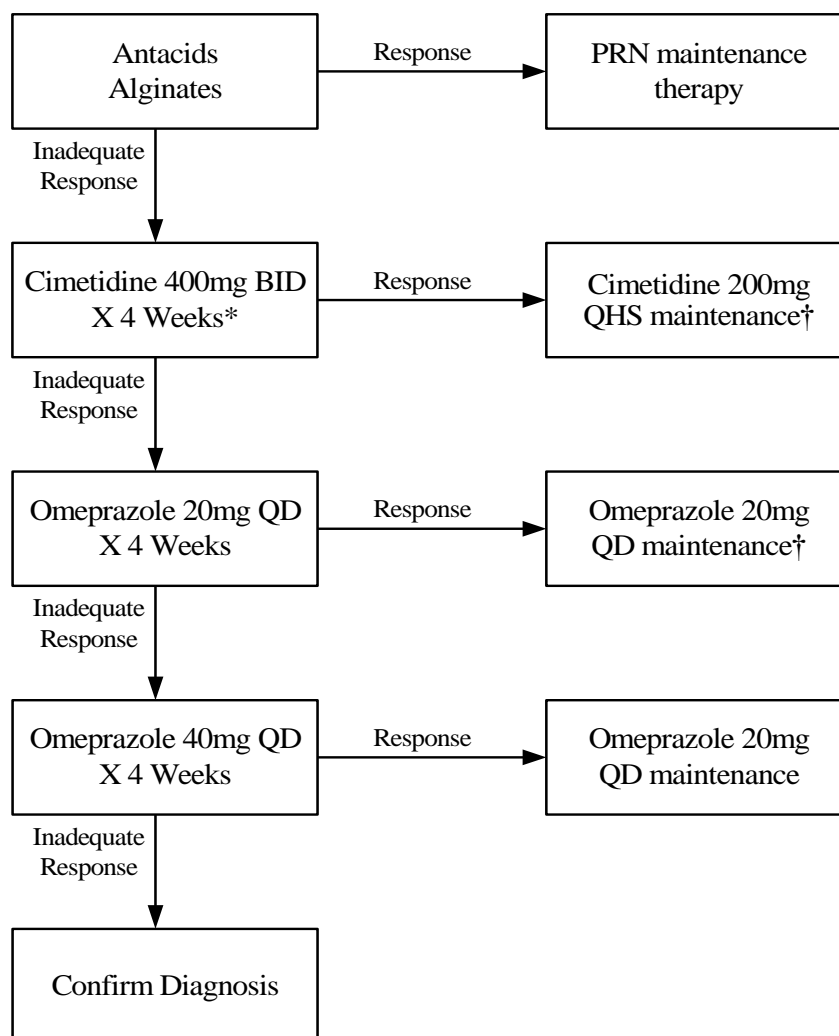
**INLAND EMPIRE HEALTH PLAN**

# **Clinical Practice Guideline on the Management of GERD**

Renewed: November 2010

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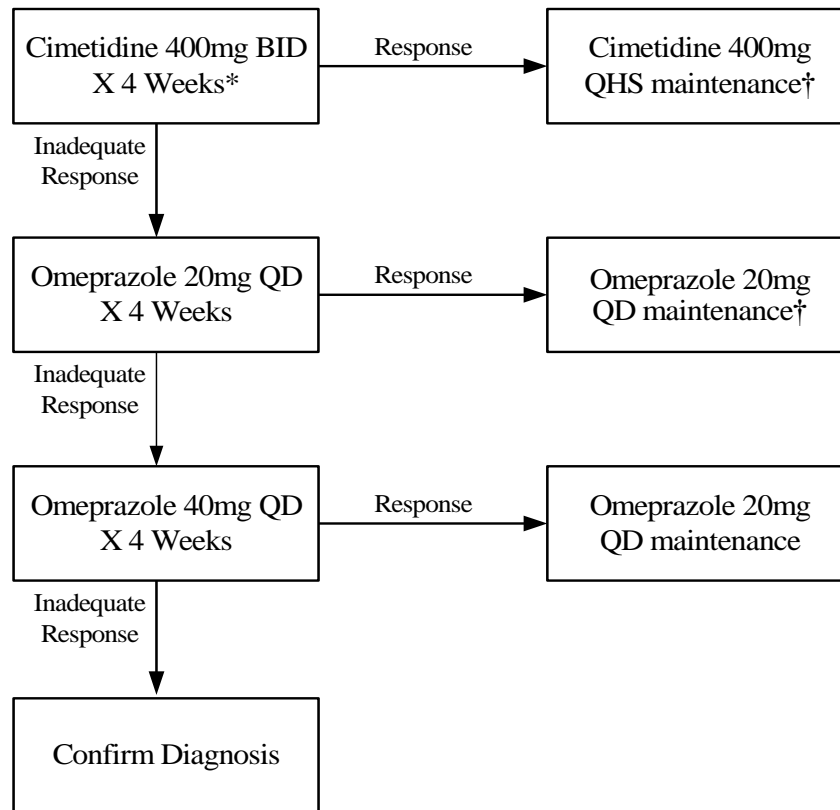
## Uncomplicated Heartburn / Mild GERD



\* May consider metoclopramide 10mg (30 minutes AC) in patients with decreased GI motility (eg. Diabetes); combination therapy with a prokinetic agents and acid-reducing agent should be reserved only for patients failing high doses of PPIs.

† The optional duration of maintenance therapy is undetermined but should be continued at the lowest possible dosage necessary to prevent recurrence. In mild GERD, a drug-free trial is warranted after 8-12 weeks of therapy. For moderate/severe GERD or esophagitis, long term (potentially life-long) maintenance therapy may be necessary.

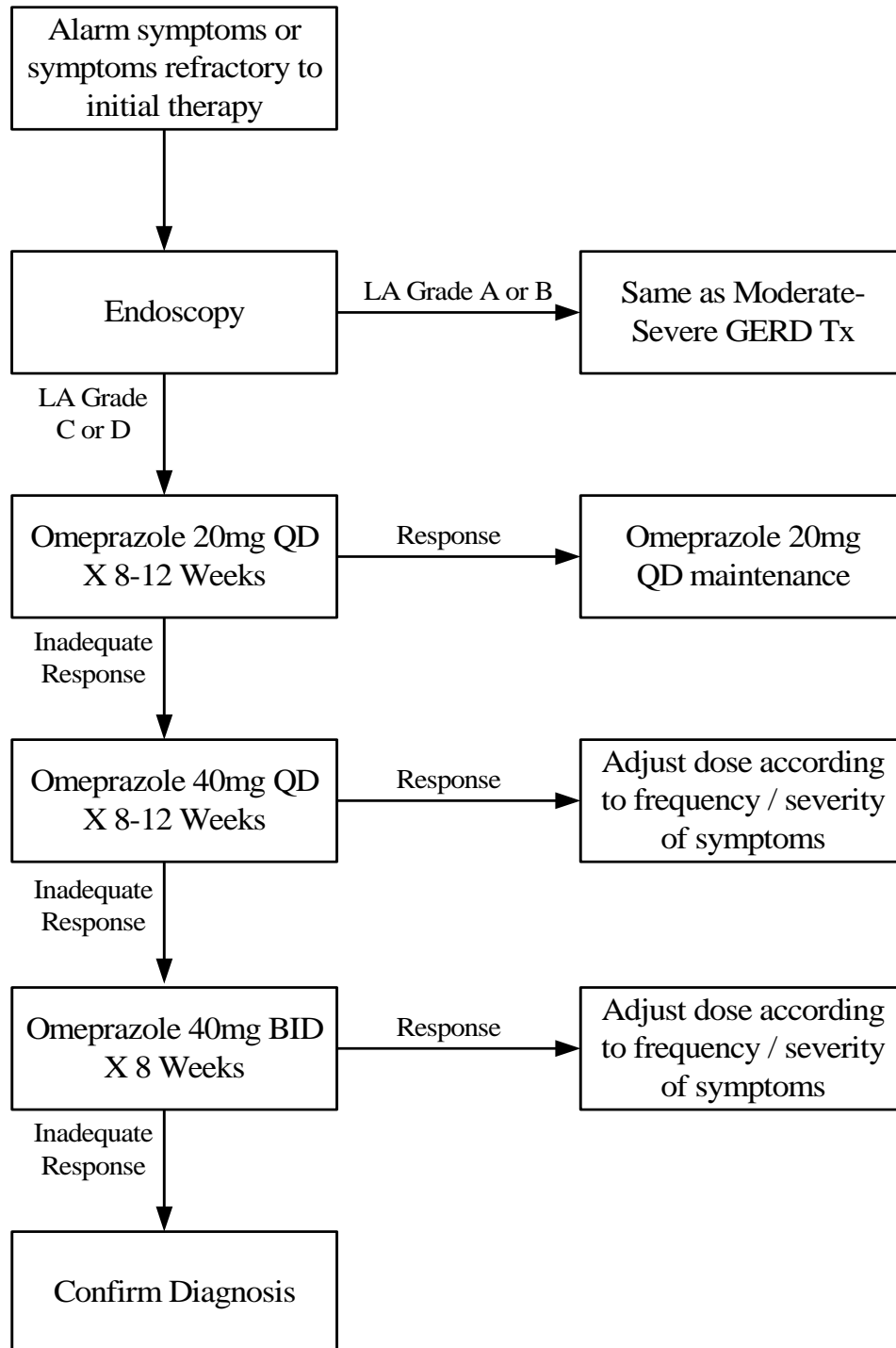
## Reflux Esophagitis / Moderate-Severe GERD



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† The optional duration of maintenance therapy is undetermined but should be continued at the lowest possible dosage necessary to prevent recurrence. In mild GERD, a drug-free trial is warranted after 8-12 weeks of therapy. For moderate/severe GERD or esophagitis, long term (potentially life-long) maintenance therapy may be necessary.

## Treatment of patients with GERD undergoing endoscopy



## GASTROESOPHAGEAL REFLUX DISEASE (GERD)

1. GERD is defined as any symptomatic clinical condition presumed to result from esophageal exposure to gastric contents. Heartburn is the classical symptom.
2. Therapy for GERD includes:
  - a. Initial therapy includes lifestyle change, antacids/alginate, and discontinuance of medications that may aggravate GERD (if possible).
  - b. If antacids fail, a 4-8 week trial of an H2 antagonist should be attempted. Cimetidine 400mg BID is the least expensive and should be the medication of choice. 60 to 70% of patients responded to acid neutralization or acid inhibition by OTC medications.
  - c. A short-term(4 weeks) course of treatment with a PPI may be tried.
  - d. ~~Prokinetic agents (metoclopramide/Reglan) may be used as an alternate initial medication for patients with significant nocturnal heartburn or decreased GI motility. If symptoms are relieved by the initial 4-8 weeks treatment, this medication may be continued as a maintenance therapy.~~ Combination therapy with [PPIs](#) ~~prokinetic agents~~ and [PPIs](#) ~~prokinetic agents~~ should only be reserved for patients failing high dose PPIs.
3. PPIs are indicated for treatment of moderate/severe erosive esophagitis and symptomatic GERD poorly responsive to H2RA or prokinetic agent treatment. If symptoms are relieved by the initial 4-week treatment, this medication may be continued as a maintenance therapy. Patients unresponsive to low doses of PPIs may be given high dose therapy for 8 weeks. However, low doses should be attempted after 8 weeks of high dose treatment.
4. Standard doses of the PPIs omeprazole, lansoprazole, pantoprazole, and rabeprazole resulted in comparable rates of healing and remission in erosive esophagitis. Any advantage of esomeprazole over omeprazole or lansoprazole in erosive esophagitis is largely confined to LA esophagitis grades C and D.
5. PERs submitted for treatment of GERD with medication other than cimetidine or omeprazole must have medical justification including either the failure of the patient to respond to an adequate trial of cimetidine or documentation for the use of other medications as noted above.
6. The patient's need for continued therapy should be evaluated after six month of maintenance therapy.

# Improving the Management of Gastroesophageal Reflux Disease (GERD)

## Evidence-Based Therapeutic Strategies

American Gastroenterological Association Consensus Development Panel

Summary Findings of the Consensus Development Panel for each area examined

### *Evidence for Efficacy of Over-the-Counter Medications for GERD in Patients with Mild-to-Moderate Symptoms*

- Randomized clinical trials evidence for over-the-counter medications (antacids, H<sub>2</sub>RAs, combination alginate/antacid, combination antacid/H<sub>2</sub>RA) demonstrate their effectiveness in patients with mild-to-moderate GERD in prevention of symptoms, providing rapid pain relief, and reduction in frequency and severity.
- Evidence for some agents (antacids alone) is primarily from small studies while evidence for other agents (H<sub>2</sub>RAs and antacid/H<sub>2</sub>RAs) comes from large, well-designed clinical trials. The FACT Trial had a large antacid monotherapy arm.
- OTCs can be used for "breakthrough" GERD symptoms concurrent with H<sub>2</sub>RA or PPI therapy, but clinical trial data on this use are not available.
- Evidence is lacking for a role of OTC medications in erosive esophagitis.
- Combination H<sub>2</sub>RA/antacid is better at symptom relief than its constituent components used alone.

### *Risk of Adenocarcinoma in Patients with Barrett's Esophagus*

- The incidence of adenocarcinoma in patients with BE is probably closer to 0.5% per year, rather than the previously thought 1% to 2% per year.
- While almost all esophageal adenocarcinomas occur in patients with BE, most patients with BE will never develop this tumor.
- Most patients with Barrett's metaplasia who develop cancer present for the first time with both findings.
- Surveillance guidelines should be modified to reflect up-to-date evidence on cancer risk.

### *Effect of Surgical Fundoplication on the Need for Medical Therapy and the Risk of Esophageal Adenocarcinoma*

- The best data indicate that only 40% of patients have complete, long-term relief after surgery.
- Overall at least 20% to 30% of patients resume medical therapy 1-3 years after antireflux surgery.

- Guidelines for the use of surgery and report of morbidity and mortality outcomes are based on studies that do not meet accepted standards for clinical evidence.
- Side effects (e.g. late dysphagia, lower quality of life) of antireflux surgery are more serious and widespread than currently believed.
- Surgery does not prevent esophageal cancer.
- Risk of morbidity and mortality of surgery probably outweighs the risk of developing esophageal cancer in GERD.

### ***Referral for Endoscopy, Consultation, and Antireflux Surgery***

- There is a need for GI specialists to play an active role in decision making for antireflux surgery and long-term management issues in GERD.
- Clinical evidence does not support the use of screening endoscopy in patients with heartburn who respond to medical therapy and for whom there is no concern about other diagnoses.

### ***Effect of Endoscopic Therapy for GERD on the Need for Medical Therapy***

- Current endoscopic/intraluminal therapeutic procedures are approved for safety, not efficacy.
- There is currently no adequate randomized clinical trial evident to support endoscopic/intraluminal therapies.
- The public and physicians should be educated about the risk and limitations of endoscopic/intraluminal therapies.

### ***The Search for Clinically Significant Differences Among Proton Pump Inhibitors***

- Standard doses of lansoprazole, omeprazole, pantoprazole and rabeprazole produce comparable rates of healing and remission in patients with erosive esophagitis.
- Esomeprazole (40 mg) is slightly more effective than other PPIs in relieving heartburn and healing erosive esophagitis.
- For endoscopy-negative GERD, randomized clinical trial evidence shows that PPIs are superior to placebo in symptom relief.
- PPIs are less efficacious in providing symptom relief in the setting of erosive esophagitis than in endoscopy-negative GERD.
- No clinical trial evidence supports the existence of long-term negative side effects of PPIs.

### ***Evidence for a Role of GERD in Pulmonary Symptoms***

- Epidemiological studies consistently demonstrate modest but significant associations, though no causal relationships, between pulmonary manifestations and GERD.

- Classic reflux symptoms, chest pain, and other ENT complications are absent in the majority of patients with pulmonary manifestations.
- Randomized clinical trials provide evidence of symptom improvement with GERD therapy; lung function tests, however, do not improve.

# Updated Guidelines for the Diagnosis and Treatment of Gastroesophageal reflux Disease

Kenneth R. DeVault. Updated Guidelines for the Diagnosis and Treatment of Gastroesophageal reflux Disease. *Am J Gastroenterol* 2005;100:190-200.

## DIAGNOSTIC GUIDELINE:

1. For uncomplicated GERD, an initial trial of empirical therapy (including lifestyle modification).
2. Endoscopy at presentation should be considered in patients who have symptoms suggesting complicated disease, those at risk for Barrett's esophagus, or when the patient and physician feel early endoscopy to be appropriate.
3. Endoscopy is the technique of choice used to identify suspected Barrett's esophagus and to diagnose complications of GERD. Biopsy must be added to confirm the presence of Barrett's epithelium and to evaluate for dysplasia.
4. Ambulatory monitoring of the esophagus helps to confirm gastroesophageal reflux in patients with persistent symptoms (both typical and atypical) without evidence of mucosal damage, especially when a trial of acid suppression has failed. It may also be used to monitor the control of reflux in patients with continued symptoms on therapy.
5. Esophageal manometry may be used to ensure accurate placement of ambulatory monitoring probes and may be helpful prior to antireflux surgery.

## TREATMENT GUIDELINE:

1. Lifestyle modification may benefit many patients with GERD, although these changes alone are unlikely to control symptoms in the majority of patients. (Lifestyle modifications include elevation of the head of the bed, decreased fat intake, cessation of smoking, and avoiding recumbency for 3h postprandially.
2. Antacids and over-the-counter (OTC) acid suppressants are options for patient-directed therapy for heartburn and regurgitation. When symptoms persist, continuous therapy is required or alarm symptoms or signs develop, the patient should have additional evaluation and treatment.
3. Acid suppression is the mainstay of therapy for GERD. Proton pump inhibitors provide the most rapid symptomatic relief and heal esophagitis in the highest percentage of patients. Although less effective than PPIs, histamine<sub>2</sub>-receptor blockers given in divided doses may be effective in some patients with less severe GERD. All PPIs have been demonstrated to control GERD symptoms and to heal esophagitis when used at prescription dosages. There have been several physiologic studies suggesting modest benefits of one agent over another.
4. Prokinetic agents may be used in selected patients, especially as an adjunct to acid suppression. Currently available prokinetic agents are not ideal monotherapy for most patients with GERD.

5. Because GERD is a chronic condition, continuous therapy to control symptoms and prevent complications is appropriate.
6. Antireflux surgery, performed by an experienced surgeon, is a maintenance option for the patient with well-documented GERD.
7. Endoscopic therapy controls symptoms in selected patients with well-documented GERD.
8. GERD that is refractory to medical therapy is rare. The diagnosis should be carefully confirmed, preferably with ambulatory pH testing, prior to antireflux surgery.

## COST OF GERD THERAPY

GENERIC NAME	TRADE NAME	FORMULARY STATUS*	INITIAL DOSE	COST / MONTH †	MAXIMUM DAILY DOSE	COST / MONTH†
<b>H-2 ANTAGONISTS (H2RAs)</b>						
cimetidine	Tagamet®, Generic	F	800mg qd	\$ 11	2400mg**	\$ <del>33</del> 61
famotidine	Pepcid®, Generic	F	40mg qd	\$ 36	80mg**	\$ <del>72</del> 73
nizatidine	Axid®, Generic	NF	300mg qd	\$110	300mg**	\$ <del>110</del> 100
ranitidine	Zantac®, Generic	F	300mg qd	\$ 13	600mg**	\$ <del>26</del> 61
<b>PROTON PUMP INHIBITORS (PPIs)</b>						
esomeprazole	Nexium®	NF	20mg qd	\$158	40mg	\$ <del>158</del> 181
lansoprazole	Prevacid®	NF	15mg qd	\$146	30mg**	\$164
omeprazole	Prilosec® , Generic	F	20mg qd	\$127	40mg**	\$ <del>143</del> 30
pantoprazole	Protonix®	NF	40mg qd	\$127	40mg	\$ <del>127</del> 143
rabeprazole	Aciphex®	NF	20mg qd	\$145	20mg	\$ <del>145</del> 154
Omeprazole	Prilosec OTC®	F	20mg qd	\$23	40mg	\$ <del>46</del> 23
<b>ALGINATES</b>						
alginic acid combinations	Gaviscon® Tablets, Gaviscon® Liquid, Various	F	10-20mL qid prn	\$ 13	100mL	\$ <del>33</del> 42
<b>ANTACIDS</b>						
magnesium / aluminum salts	Maalox®, Mylanta®, Generic	F	5-30mL qid prn	\$ 7	120mL	\$ <del>44</del> 42
aluminum salts	AlternaGEL®, Amphogel®, Generic	F	5-20mL qid prn	\$ 8	90mL	\$ <del>34</del> 46
<b>PROKINETIC AGENTS</b>						
metoclopramide	Reglan®, Generic	F	10mg qid ac	\$ 6	60mg	\$ <del>9</del> 21
bethanechol	Urecholine®, Generic	F	25mg qid	\$ 48	200mg	\$ <del>96</del> 150

F - Formulary, NF - Non-Formulary, Code 1 - Restricted for Specified Indications

† Cost based on AWP for brand as of October ~~2006~~2008, MAIC for generic; rounded to the nearest \$1.

\*\* Higher doses may be used for pathological hypersecretory conditions.

# **Pediatric Gastroesophageal Reflux Clinical Practice Guideline Summary**

Adopted from North American Society for Pediatric Gastroenterology, Hepatology and Nutrition  
Guideline endorsed by American Academy of Pediatrics  
*Journal of Pediatric Gastroenterology and Nutrition*, Vol 32, Suppl.2, 2001

This guideline is not intended for the management of:

- Neonates less than 72 hours old
- Premature infants
- Infants and children with either neurologic impairments or anatomic disorders of the upper gastrointestinal tract.

## **DEFINITIONS**

- Gastroesophageal reflux (GER): the retrograde passage of gastric contents into the esophagus
- GER disease (GERD): symptoms or complications of GER

## **CLINICAL MANIFESTATIONS OF GERD IN CHILDREN**

- Vomiting
- Abdominal or substernal pain
- Poor weight gain
- Esophagitis
- Dysphagia
- Respiratory disorders

## **RED FLAGS IN INFANT**

- Bilious vomiting
- Hematemesis

## **History and Physical Examination**

- Sufficient to reliably diagnose GER, recognize complications and initiate management in most infants with vomiting, and older children with regurgitation and heartburn.

## **Upper GI Series**

- Neither sensitive nor specific enough for diagnosis of GER
- Useful for evaluation of presence of anatomic abnormalities, such as:
  - Pyloric stenosis (vomiting infant)
  - Malrotation (vomiting infant)
  - Annular pancreas (vomiting infant)
  - Hiatal hernia (older child)
  - Esophageal stricture (older child)

### Esophageal pH Monitoring

- A valid and reliable measure of acid reflux
- Useful to establish presence of abnormal acid reflux
- Useful to determine if there is a temporal association between acid reflux and frequently occurring symptoms
- Useful to assess adequacy of therapy in patients who do not respond to treatment with acid suppression
- Esophageal pH monitoring may be normal in some patients with GERD, particularly those with respiratory complications.

### Endoscopy and Biopsy

- Can assess the presence and severity of esophagitis, strictures and Barrett's esophagus
- Useful to exclude other disorders, such as Crohn's disease and eosinophilic or infectious esophagitis
- A normal appearance of the esophagus during endoscopy does not exclude histopathological esophagitis; subtle mucosal changes such as erythema and pallor may be normal. Esophageal biopsy is recommended when endoscopy is performed to detect microscopic esophagitis and to exclude causes of esophagitis other than GER.

## **THERAPY OPTIONS**

### Empiric Medical Therapy

A trial of time-limited medical therapy for GER is useful for determining if GER is causing a specific symptom.

### Diet Changes in the Infant

- There is evidence to support a one to two-week trial of a hypoallergenic formula in formula fed infants with vomiting.
- Milk-thickening agents do not improve reflux index scores, but do decrease the number of episodes of vomiting.

### Positioning in the Infant

Esophageal pH monitoring has demonstrated that infants have significantly less GER when placed in the prone position than in the supine position. However, the prone position is associated with a higher rate of the sudden infant death syndrome (SIDS).

- In infants from birth to 12 months of age with GERD, the risk of SIDS generally outweighs the potential benefits of prone sleeping.
- Non-prone positioning during sleep is recommended.
- Supine positioning confers the lowest risk of SIDS and is preferred.

- Prone positioning during sleep is only considered in unusual cases where the risk of death from complications of GER outweighs the potential increased risk of SIDS.
- When prone positioning is necessary, it is particularly important that parents be advised not to use soft bedding, which increases the risk of SIDS in infants placed prone.

#### Positioning in the Child and Adolescent. In children older than one year:

- It is likely that there is a benefit to left side positioning during sleep
- It is likely that there is a benefit to elevation of the head of the bed.

#### Lifestyle Changes in the Child and Adolescent

- Avoid caffeine
- Avoid chocolate
- Avoid spicy foods
- Obesity is associated with GER
- Exposure to tobacco smoke is associated with GER
- Exposure to alcohol is associated with GER

It is not known whether lifestyle changes have an additive benefit in patients receiving pharmacological therapy.

#### Acid-Suppressant Therapy

- Histamine-2 receptor antagonists (H2RAs)
  - Produce relief of symptoms and mucosal healing
- Proton Pump Inhibitors (PPIs)
  - Most effective acid suppressant medications
  - Superior to H2RAs in relieving symptoms and healing esophagitis

Chronic over-the-counter antacid therapy is generally not recommended since more convenient and safe alternatives are available.

#### Prokinetic Therapy

No prokinetic agents available in the United States and Canada, including metoclopramide and bethanechol, have been shown to be effective in the treatment of GERD in children.

#### Surgical Therapy

Case studies indicate that surgical therapy generally results in reduction in symptoms of GERD, but the risk of complications including dumping syndrome, intractable gagging and retching needs to be balanced with those of continued medical treatments. The potential risks, benefits and costs of successful, pro- longed medical therapy versus fundoplication have not been well studied in infants or children with various symptom presentations.

# EVALUATION AND MANAGEMENT OF INFANTS AND CHILDREN WITH SUSPECTED GERD

## 1. The Infant with Recurring Vomiting - Uncomplicated GER (Happy Spitter)

Diagnosis:

- A thorough history and physical examination, with attention to warning signals, is generally sufficient to establish a diagnosis of uncomplicated GER.
- An upper GI series is not required unless there are signs of GI obstruction.
- Other diagnostic tests may be indicated if there are symptoms of poor weight gain, excessive crying, irritability, disturbed sleep, feeding or respiratory problems.

Management:

- Parental education, reassurance and guidance
- Thickening of formula and brief trial of hypoallergenic formula are other treatment options.
- If symptoms worsen or do not improve by 18 – 24 months of age, re-evaluation is recommended (upper GI and consultation with a pediatric gastroenterologist).

## 2. The Infant with Recurring Vomiting and Poor Weight Gain

Diagnosis:

- Assess adequacy of calories and effectiveness of swallowing
  - If there is poor weight gain despite adequate caloric intake, conduct diagnostic evaluations to uncover other causes for vomiting or weight loss. This may include the following:
    - Complete blood count
    - Electrolytes
    - Bicarbonate
    - Urea nitrogen
    - Creatinine
    - Alanine aminotransferase
    - Ammonia
    - Glucose
    - Urinalysis
    - Urine ketones and reducing substances
    - Review of newborn screening tests
    - Upper GI series to evaluate anatomy

Management May Include:

- Thickening of formula
- Trial of hypoallergenic formula
- Increasing caloric density of the formula
- Acid suppression therapy
- Prone positioning, in select cases

#### Further Management Options:

- Endoscopy with biopsy
- Hospitalization for observation
- Tube feedings
- Surgical therapy (rarely)
- Careful follow-up to assure adequate weight gain

### 3. The Infant with Recurrent Vomiting and Irritability

Normal infants typically fuss or cry intermittently for an average of two hours daily, which may be perceived as excessive by some parents. A symptom diary may be useful to determine the extent to which the infant is irritable and has disturbed sleep.

#### Diagnosis and Treatment:

- Empiric treatment with either a sequential or simultaneous two-week trial of a hypoallergenic formula and acid suppression
- If there is no improvement, either esophageal pH monitoring to determine the adequacy of therapy or upper endoscopy with biopsy to diagnose esophagitis
- If there is no response to therapy and these studies are normal, it is unlikely that GER is the cause of symptoms.
- Alternatively, evaluation can begin with esophageal pH monitoring to determine if episodes of irritability and sleep disturbance are temporarily associated with acid reflux.

### 4. The Child or Adolescent with Recurrent Vomiting or Regurgitation

In otherwise normal children who have recurrent vomiting or regurgitation after the age of 2 years, management options include:

- Upper GI series
- Upper endoscopy with biopsy

### 5. Heartburn in the Child or Adolescent

#### Management:

- Lifestyle changes
- Two to four-week therapeutic trial of an H2RA or PPI
- If symptoms persist:
  - Referral to a pediatric gastroenterologist for upper endoscopy with biopsy
  - In some cases, long-term therapy

### 6. Esophagitis

#### Management:

- Lifestyle changes
- H2RA or PPI therapy
- In patients with only histopathological esophagitis, monitor efficacy of therapy by degree of symptom relief.

- In patients with erosive esophagitis, repeat endoscopy to assure healing.

## 7. Dysphagia or Odynophagia

### Diagnosis and Management:

- In the child with difficulty swallowing or with painful swallowing, a barium esophagram is recommended.
- If initial history is suggestive of esophagitis, upper endoscopy is recommended.
- Treatment without prior diagnostic evaluation is not recommended.
- In an infant with feeding refusal, empiric therapy for GER is not generally recommended.
- If there are other signs of GERD, then a time-limited course of medical therapy can be considered.

## 8. Apnea or Apparent Life-Threatening Events (ALTE)

In patients with ALTEs recurrent regurgitation or emesis is common. However, investigations in unselected patients with ALTE have not demonstrated a convincing temporal relationship between esophageal acidification and apnea or bradycardia.

### Diagnosis:

- There are no randomized studies to evaluate the usefulness of esophageal pH monitoring in infants with ALTE.
- In patients with frequent ALTEs in which the role of GER is uncertain, esophageal pH monitoring may be useful to determine if there is a temporal association of acid reflux with ALTE.
- Evidence suggests that infants with ALTE and GER may be more likely to respond to anti-reflux therapy when:
  - There is gross emesis or oral regurgitation at the time of the ALTE.
  - Episodes occur in the awake infant.
  - The ALTE is characterized by obstructive apnea.

### Management:

- Thickened feedings
- Acid suppressant therapy
- Surgery is considered only in severe cases.

## 9. Asthma

### Management:

- In patients where symptoms of asthma and GER coexist, and in infants and toddlers with chronic vomiting or regurgitation and recurrent episodes of cough and wheezing:
  - A three month trial of vigorous acid suppressant therapy of GER is recommended.
- In patients with persistent asthma without symptoms of GER:

- Esophageal pH monitoring is recommended in selected patients, including:
  - Patients with radiographic evidence of recurrent pneumonia
  - Patients with nocturnal asthma more than once a week
  - Patients requiring either continuous oral corticosteroids, high-dose inhaled corticosteroids, or more than two bursts per year of oral corticosteroids
  - Patients with persistent asthma unable to wean medical management
  - If esophageal pH monitoring demonstrates an increased frequency or duration of esophageal acid exposure, a trial of prolonged medical therapy for GER is recommended.

#### 10. Recurrent Pneumonia

GER can cause recurrent pneumonia in the absence of esophagitis or when esophageal pH monitoring is normal. There is insufficient evidence to provide recommendations for a uniform approach to diagnosis and treatment. Diagnostic evaluation may include:

- Flexible bronchoscopy with pulmonary lavage for lipid-laden macrophages
- Nuclear scintigraphy
- Assessment of air protective mechanisms during swallowing.

#### 11. Upper Airway Symptoms

There is insufficient evidence to provide recommendations for diagnosis and treatment for such upper air- way symptoms as:

- Hoarseness
- Chronic cough
- Stridor
- Globus sensation

<b>Drugs demonstrated to be effective in gastroesophageal reflux disease</b>		
<b>Drug</b>	<b>Recommended oral dosage</b>	<b>Adverse effects / precautions</b>
<b>Histamine2-receptor antagonists</b>		
Cimetidine (Tagamet)	40 mg/kg/day divided TID or QID (adult dose: 800-1200 mg/dose BID or TID)	rash, bradycardia, dizziness, nausea, vomiting, hypotension, gynecomastia, reduces hepatic metabolism of theophylline and other medications, neutropenia, thrombocytopenia, agranulocytosis, doses should be decreased with renal insufficiency
Famotidine (Pepcid)	1 mg/kg/day divided BID (adult dose: 20 mg BID)	headaches, dizziness, constipation, diarrhea, nausea, doses should be decreased with renal insufficiency
Nizatidine (Axid)	10 mg/kg/day divided BID (adult dose: 150 mg BID or 300mg qhs)	headaches, dizziness, constipation, diarrhea, nausea, anemia, urticaria, doses should be decreased with renal insufficiency
Ranitidine (Zantac)	5 to 10 mg/kg/day divided TID or BID (Adult dose: 300 mg BID)	headache, dizziness, fatigue, irritability, rash, constipation, diarrhea, thrombocytopenia, elevated transaminases, doses should be decreased with renal insufficiency
<b>Proton pump inhibitors - Ideal time for PPI administration is 15 - 30 minutes before first meal of the day</b>		
Esomeprazole (Nexium)	No pediatric dose available (adult dose: 40 mg qd)	headache, diarrhea, abdominal pain, nausea
Lansoprazole (Prevacid)	1.4 mg/kg (adult dose: 15-30 mg qd) Approved starting 1 year of age	headache, diarrhea, abdominal pain, nausea
Omeprazole (Prilosec)	1 - 3.3 mg/kg/day (adult dose 20 mg qd) Approved starting 2 years of age	headache, diarrhea, abdominal pain, nausea, rash, constipation, vitamin B12 deficiency
Pantoprazole (Protonix)	No pediatric dose available (adult dose: 40 mg qd)	headache, diarrhea, abdominal pain, nausea
Rabeprazole (Aciphex)	No pediatric dose available (adult dose: 20 mg qd)	headache, diarrhea, abdominal pain, nausea

## Management of an Infant with Uncomplicated GER (the “Happy Spitter”)

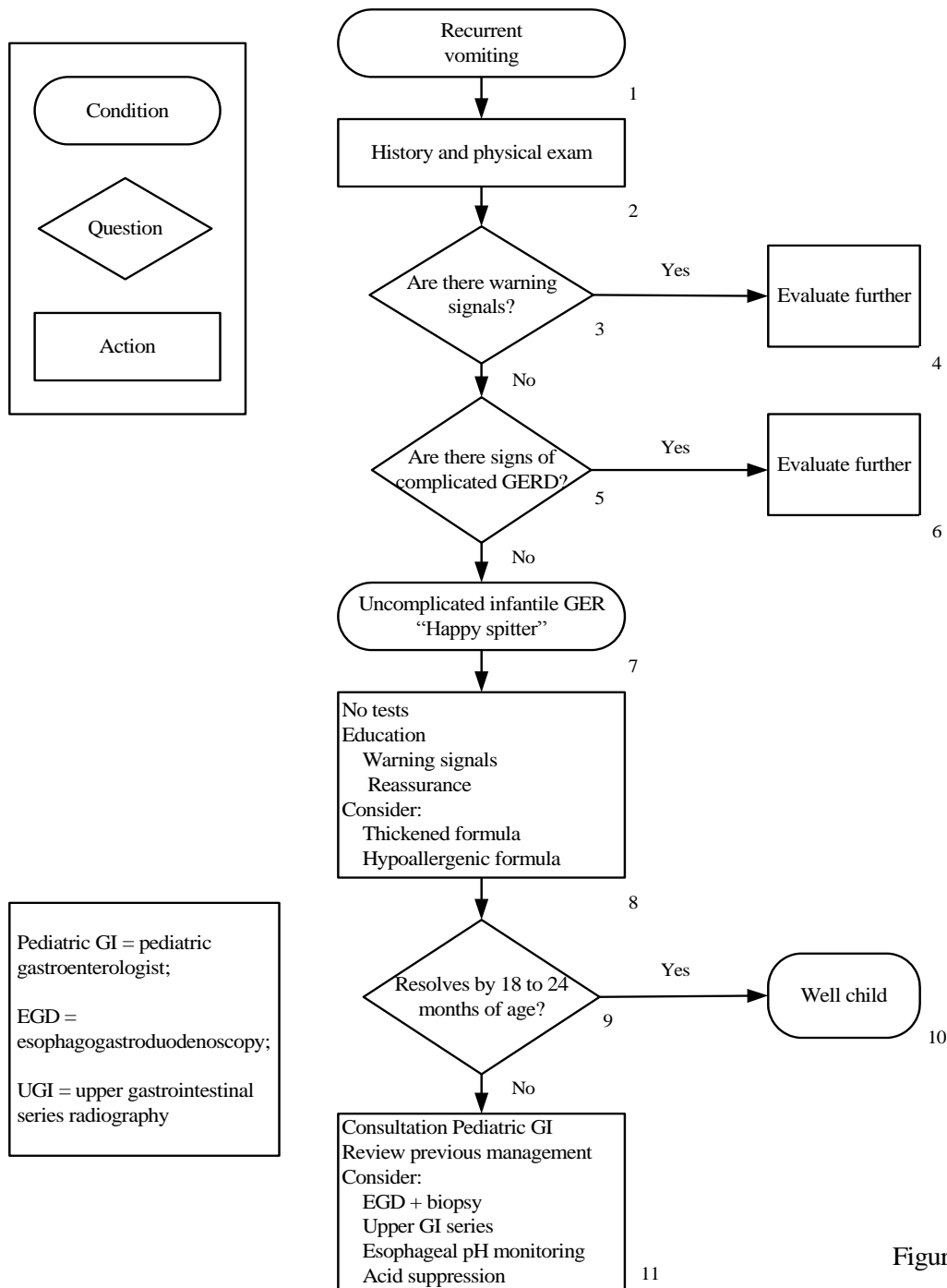
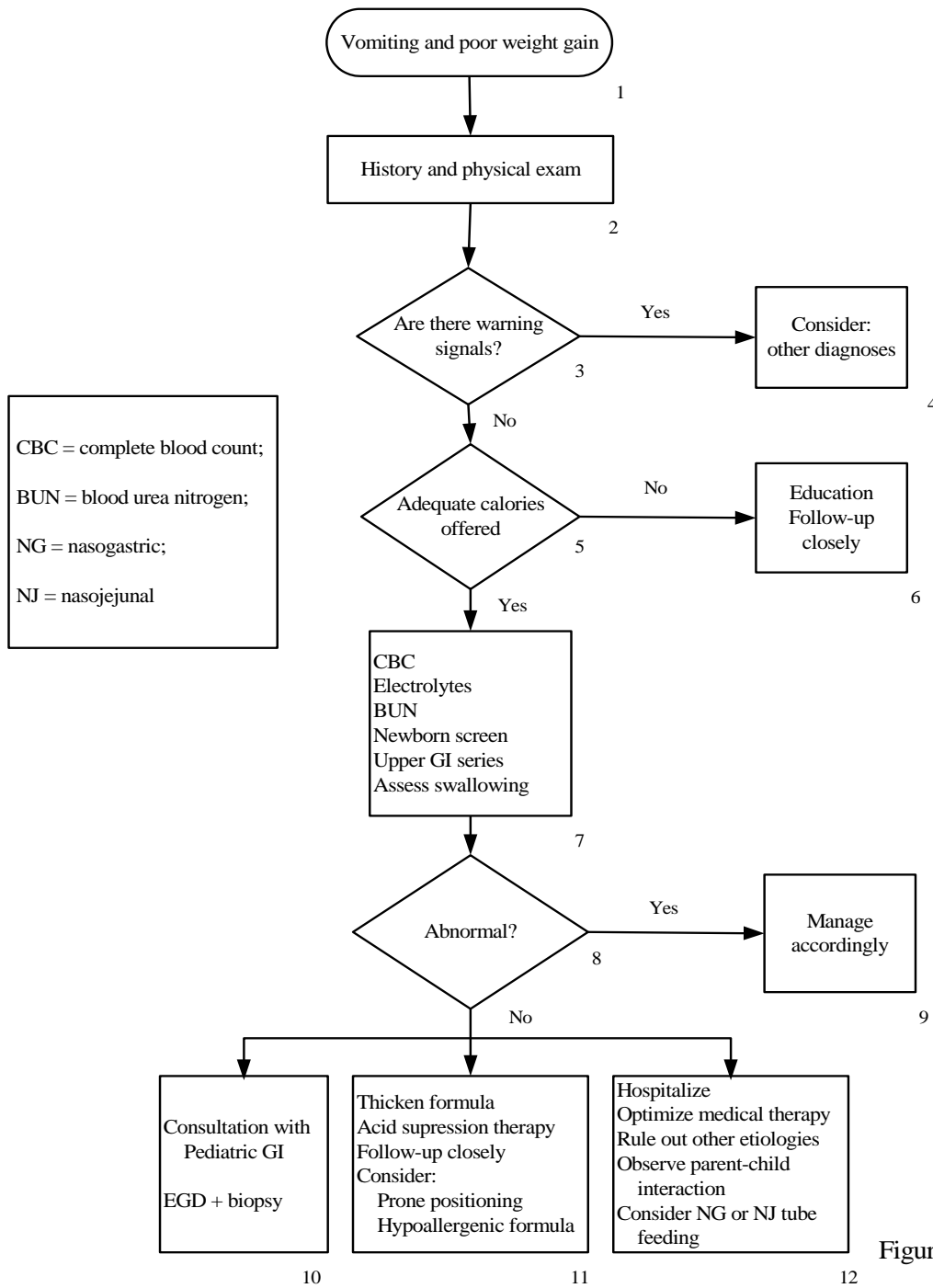


Figure 1

## Management of an Infant with Vomiting and Poor Weight Gain



## Management of a Child or Adolescent with Chronic Heartburn

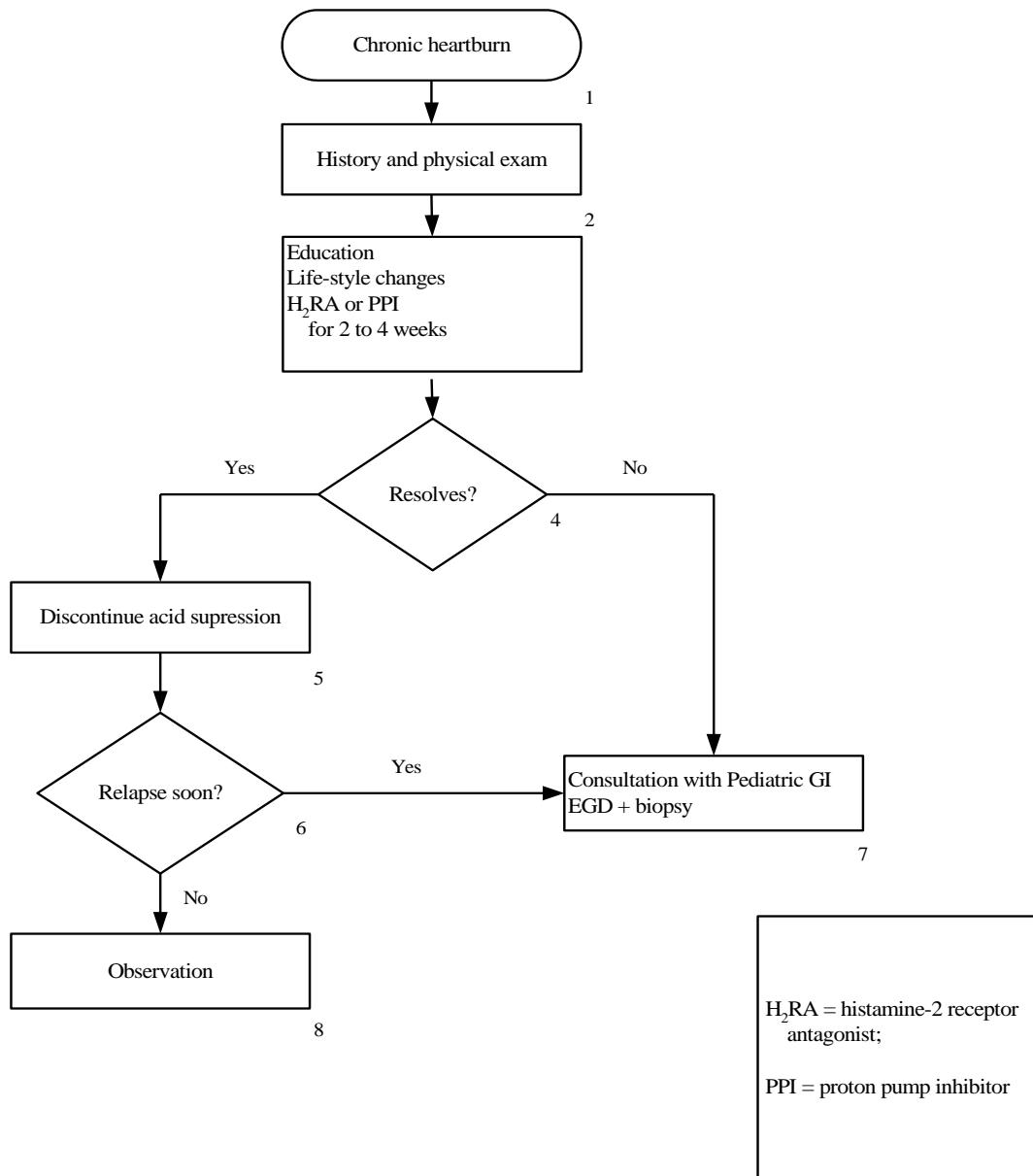


Figure 3

## Continued Management of a Child or Adolescent with Esophagitis

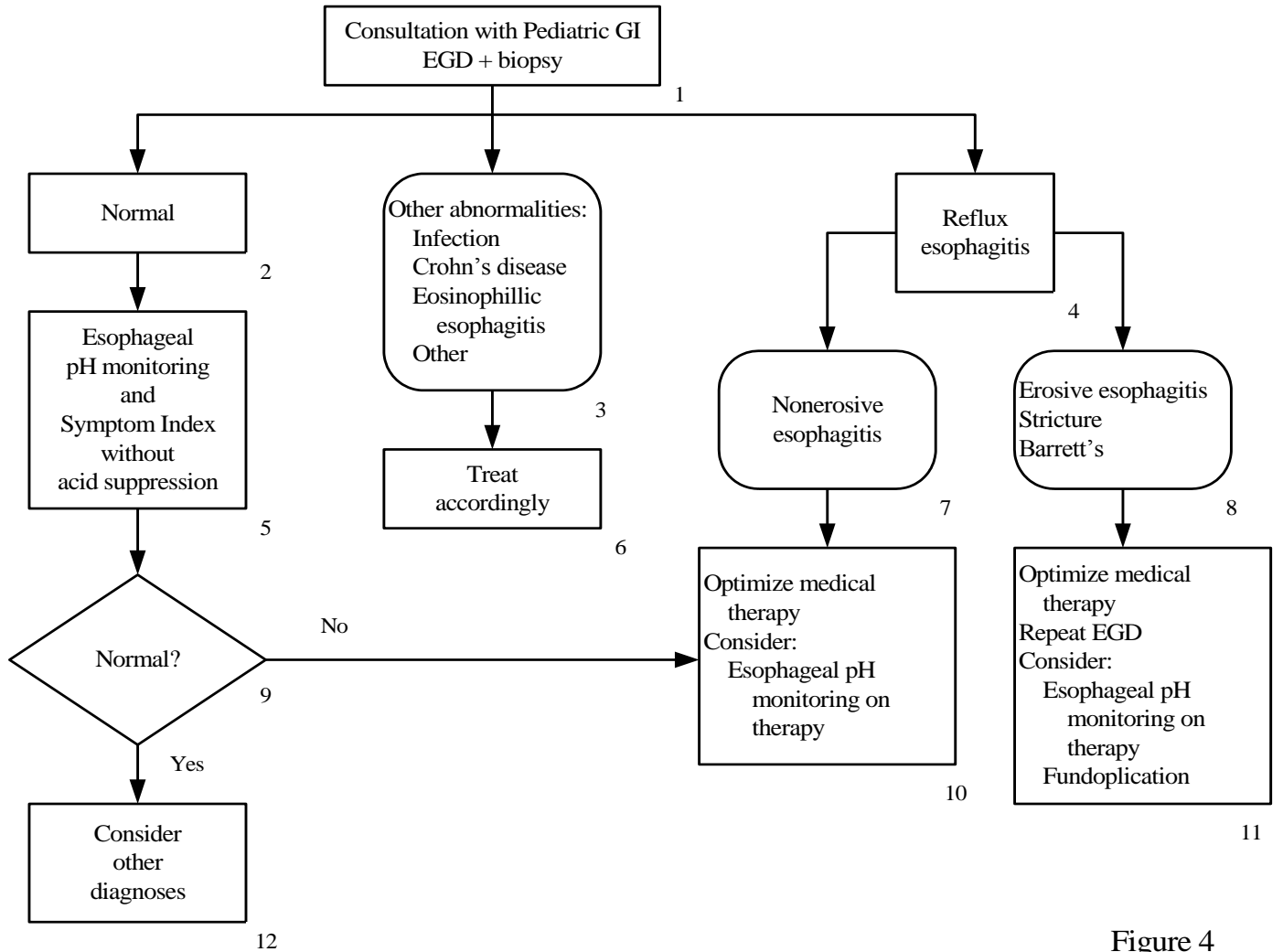


Figure 4