Pediatric Care Online™

Treat with confidence. Trusted answers from the American Academy of Pediatrics.

A Multidisciplinary Approach to Infants with GERD-like Symptoms: A New Paradigm

Mark Fishbein, MD, FAAP

Associate Professor of Pediatrics

Feinberg School of Medicine at Northwestern University

Founding Sponsor

Mead Johnson Nutrition

American Academy of Pediatrics

Disclosure and Disclaimer

- Statements and opinions expressed are those of the author and not necessarily those of the American Academy of Pediatrics.
- Mead Johnson sponsors programs such as this to give healthcare professionals access to scientific and educational information provided by experts. The presenter has complete and independent control over the planning and content of the presentation, and is not receiving any compensation from Mead Johnson for this presentation. The presenter's comments and opinions are not necessarily those of Mead Johnson. In the event that the presentation contains statements about uses of drugs that are not within the drugs' approved indications, Mead Johnson does not promote the use of any drug for indications outside the FDA-approved product label.

GERD – Montreal Definition and Classification of Gastroesophageal Reflux Disease: A Global Evidence-Based Consensus

- **GERD is a condition which develops when the reflux of stomach contents causes troublesome symptoms and/or complications.**

Vakil N, van Zanten SV, Kahrilas P, et al. The Montreal definition and classification of gastroesophageal reflux disease: a global evidence-based consensus. *Am J Gastroenterol.* 2006;101(8):1900–1920

Signs and Symptoms that May be Associated with Infantile GERD

- Discomfort/irritability
- Failure to thrive
- Feeding refusal
- Dystonic neck posturing (Sandifer syndrome)
- Recurrent regurgitation with/without vomiting in the older child
- Heartburn/chest pain
- Hematemesis
- Dysphagia/odynophagia
- Wheezing
- Stridor
- Cough
- Hoarseness
- Apnea spells
- Brief resolved unexplained events (BRUEs)
- Asthma
- Recurrent pneumonia associated with aspiration
- Recurrent otitis media

Rosen R, Vandenplas Y, Singendonk M, et al. Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition. *Pediatr Gastroenterol Nutr.* 2018;66(3):516–554

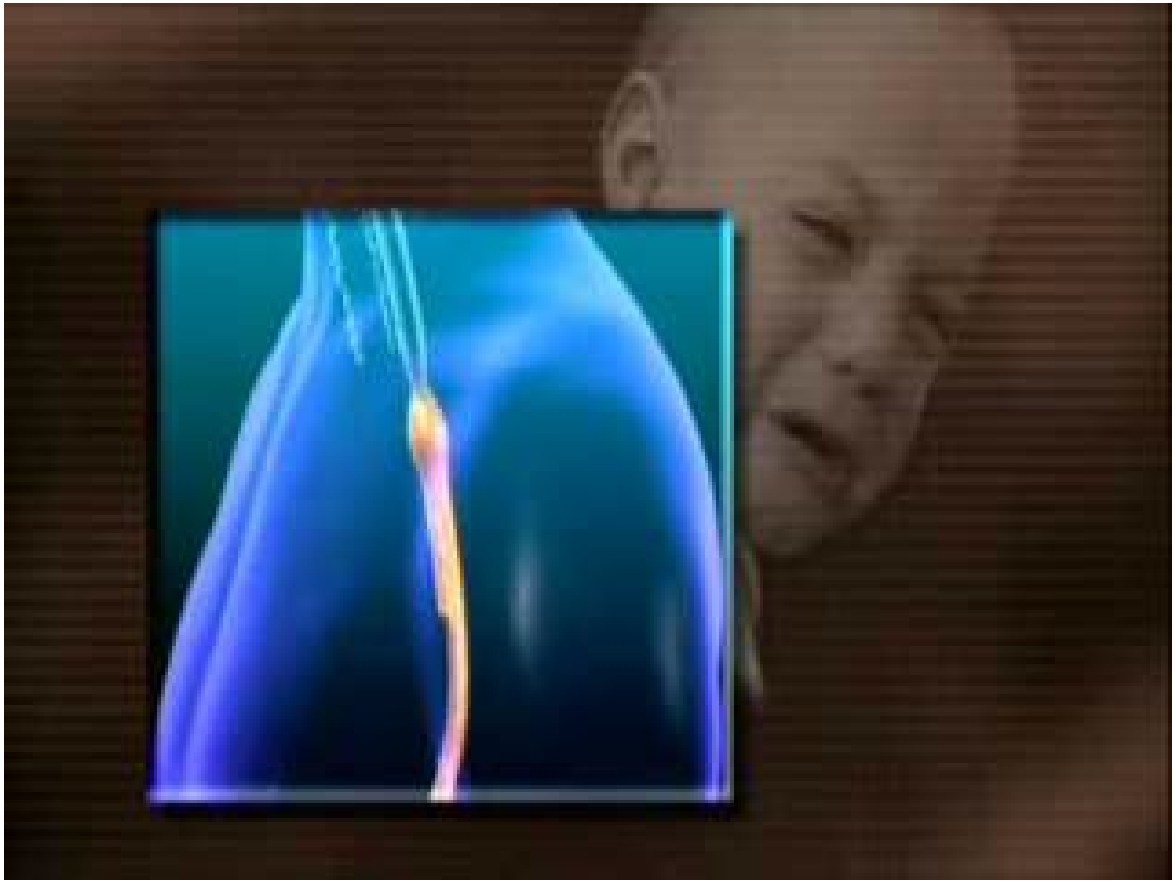
Reflux Terminology Pertaining to Infants

GER	**Passage of gastric contents into esophagus**
GERD	**Reflux causing troublesome symptoms and/or complications**
Regurgitation	**Reflux, which can be seen (Prevalence: 8% to 26%)**
Vomiting	**Expulsion of refluxed gastric contents from mouth**

Zeevenhooven J, Koppen IJN, Benninga MA. The New Rome IV Criteria for Functional Gastrointestinal Disorders in Infants and Toddlers. *Pediatr Gastroenterol Hepatol Nutr.* 2017;20(1):1–13

Regurgitation

Reflux Animation



Founding Sponsor
Mead Johnson Nutrition
American Academy of Pediatrics

Infantile GERD: The Dilemma

- Colic does not equate with GERD.
- Anti-reflux medications do not improve colic.
- Anti-reflux medications are o*verprescribed* in infants.

Heine RG, Jaquiery A, Lubitz L, Cameron DJ, Catto-Smith AG. Role of gastro-oesophageal reflux in infant irritability. *Arch Dis Child.* 1995;73(2):121–125 and Hassall J. Over-prescription of acid-suppressing medications in infants: how it came about, why it's wrong, and what to do about it. *J Pediatr.* 2012;160(2):193–198

If Not GERD, What Causes the Symptoms?

- Milk protein intolerance
  - Overly diagnosed
  - May consider in combination with atopy and/or overt signs of milk allergy

Nocerino R, Pezzella V, Cosenza L, et al. The controversial role of food allergy in infantile colic: evidence and clinical management. *Nutrients.* 2015;7(3):2015–2025

Vignette 1

We were asked to see a 4-month-old child with colomba of the right eye. She is being evaluated by a geneticist, neurologist, and ophthalmologist for related conditions. She has a "hard suck" and takes a bottle rapidly. She also vomits often. Often hear gurgling in stomach. She has been on various bottles, nipples, and formula to treat. Currently fed using a level 2 nipple with thin liquids. No choking, coughing, or gagging associated with feeds. No improvement in hard suck despite all these changes. No problems with bowel movements. Developing well. Full term gestation. Birth weight of 8 lb 4 oz. Adequate growth since birth. Abdominal examination was unremarkable.

Patient has no known allergies.

Current Outpatient Medications:

- Famotidine (PEPCID) Give 2.4 mg by mouth 2 times daily.

Vignette 1

- Evidence of dysphagia
  - Gulping
  - Oral spillage
  - Loud suck
  - Impaired suck, swallow, and breathe coordination

Aerophagia – Chronology

- 1935 – Essential Principles of Infant Feeding Technic
  - "Aerophagia or air swallowing is a partial though by no means complete explanation for slowness, refusal, vomiting, and colic. "
  - "Infants take in air in the normal process of nursing, but this small amount does not normally cause the difficulty. It is when it is taken such quantities that gulping noises may be heard during nursing…that one realizes that it is factor."

Jordan I. Essential principles of infant feeding technic. *AJN, American Journal of Nursing.* 1935;35(10):925–931

Aerophagia – Chronology

- 2004 – Infant colic and feeding difficulties
  - Comparison of feeding patterns in colic vs non-colic infants
    - Infants in the colic group displayed more difficulties with feeding, including disorganized feeding behaviors, less rhythmic nutritive and non-nutritive sucking, more discomfort following feedings, and lower responsiveness during feeding interactions.

Miller-Loncar C, Bigsby R, High P, et al. Infant colic and feeding difficulties. *Arch Dis Child.* 2004;89(10):908–912

Aerophagia – Chronology

- 2013 – The Incidence of Oropharyngeal Dysphagia in Infants with GERD-like Symptoms
  - Chart review of infants referred to GI clinic for GERD
    - 39 of 67 with swallow abnormalities
- Symptoms included anterior loss of bolus, refusal of foods, arching, gagging, prolonged feedings, limited intake, coughing, congestion, irritability following feedings, poor tongue control for latching, increased congestion during feedings, excessive air intake or gas, audible swallows, or apnea spells causing cyanosis during feedings.

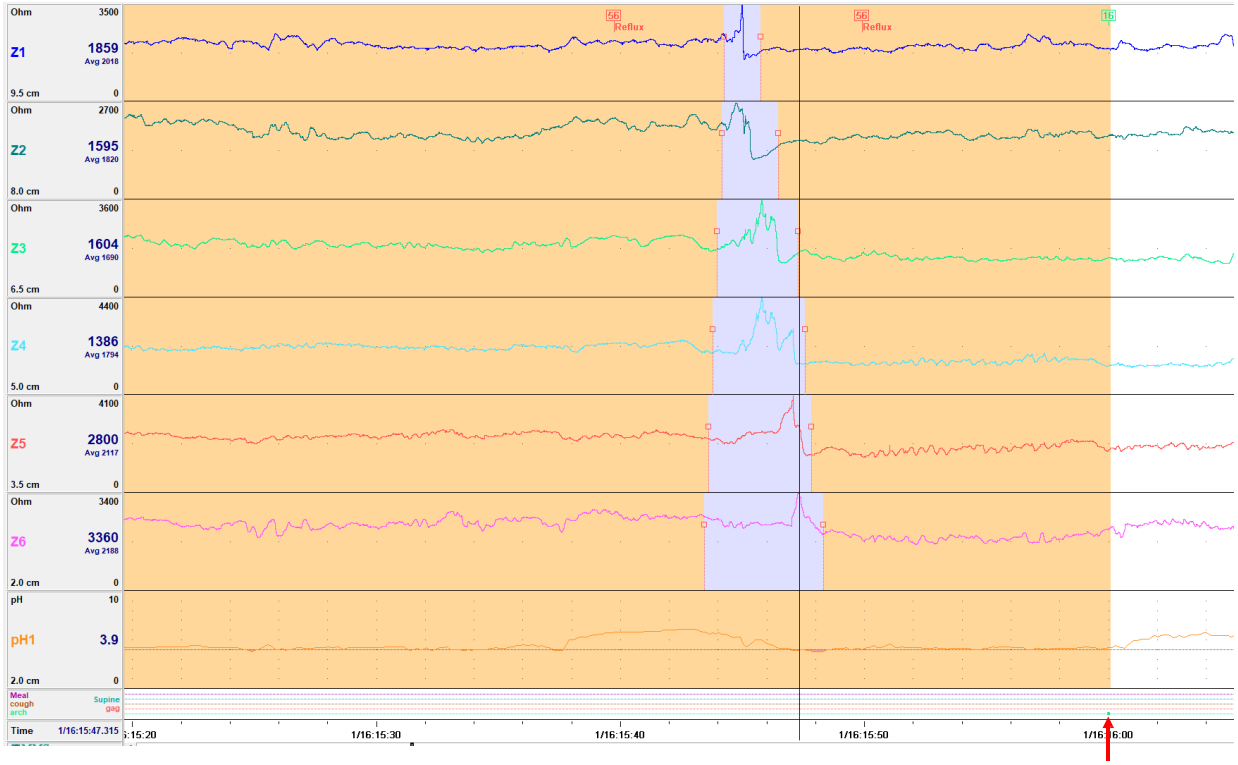
Fishbein M, Branham C, Fraker C, et al. The incidence of oropharyngeal dysphagia in infants with GERD-like symptoms. *JPEN, J Parenter Enteral Nutr.* 2013;37(5):667–673

Aerophagia – Chronology

- 2020 – Novel Use of Impedance Technology Shows that Esophageal Air Events can be Temporally Associated with Gastroesophageal Reflux Disease-like Symptoms
  - 2 infants with GERD-like symptoms including cough, pain/crying, back-arching, and gagging had impedance study demonstrating coupling of air swallowing to symptoms.
  - A post analysis, in response to letter to the editor, showed similar air swallowing events with feeds.

Woodley FW, Ciciora SL, Vaz K, et al. Novel use of impedance technology shows that esophageal air events can be temporally associated with gastroesophageal reflux disease-like symptoms. *J Pediatr Gastroenterol Nutr.* 2020;70(1):e7–e11 and Fishbein M, Daniak D. Aerophagia during infant feeding causing gastroesophageal reflux disease like symptoms. *J Pediatr Gastroenterol Nutr.* 2020;71(2):e77–e78

Aerophagia: Relationship to GERD-like Symptom



Air-swallow that is temporally correlated with a back arching episode (red arrow). The black guide is highlighting the peak maxima of 3360Ω in Z6 which is >1000Ω over baseline of 2188Ω; important for defining an air swallow.

Woodley FW, Ciciora SL, Vaz K, et al. Novel use of impedance technology shows that esophageal air events can be temporally associated with gastroesophageal reflux disease-like symptoms. *J Pediatr Gastroenterol Nutr.* 2020;70(1):e7–e11

ST Evaluation: Features of Dysphagia (Oral or Oropharyngeal)

- Oral spillage
- Weak, poor nutritive suck
- Uncoordinated suck, swallow, breathe
- Gagging
- Wet/upper airway wetness
- Clears throat
- Cough
- Choke/near choke
- Congestion
- Red, watery eyes
- Gulping, audible swallow
- Pulling off nipple
- Stridor
- Breath-holding
- Length/inefficient feed
- Poor intake
- Refusal
- Emesis with feed

Dysphagia – What To Look For

- Poor growth, refusing, coughing/choking with feeds
- ST evaluation:
  - Uncoordinated SSB with breath-holding, nasal congestion, spillage, cough, and choke
  - Stress cues: eyebrow raises, hard eye closes and head turn/arching/fussiness after choking event
  - Instrumental assessment NOT recommended due to oral aversion

ST Recommendations and Results

Strategies:

Thickened liquid and transitioned off disposable nipple (which has a variable flow rate) onto a bottle system

Results:

Stress cues are nicely reduced: calm/organized with hands in midline/ holding the bottle

Nasal congestion is reduced and SSB is more coordinated without spillage.

Dysphagia – What to Look For

- Full term
- Fussy after feeds, lengthy feeds, spillage, gulps
- ST findings:
  - Disorganized, poor suck, gulping swallows, incoordination of SSB
- ST diagnosis:
  - Oral dysphagia, suspected pharyngeal dysphagia
- VFSS
  - Severe oropharyngeal dysphagia

ST Recommendations and Results

Strategies:

Nectar thick liquid, head/neck support, nipple half full to control the flow

Results:

Coordinated SSB

No stress cues

No spillage

Founding Sponsor
Mead Johnson Nutrition
American Academy of Pediatrics

Vignette 2

We are seeing a 5-month-old child with feeding difficulties and poor weight gain. She has been treated with anti-reflux medication for spitting up. She has difficulty latching and hurting nipple during feeds. Feeds last about 5 minutes with frequent pulling off. Bottle feeds are going somewhat better. Infant formula introduced without improvement. Difficulty with sleep. Very fidgety and must be held. Intermittent cough with feeds. Normal bowel movements. Birth weight was 5 lb 10 oz. Small stomach seen on ultrasound. Delivered at 39 weeks. Doing well developmentally. Poor weight gain noted.

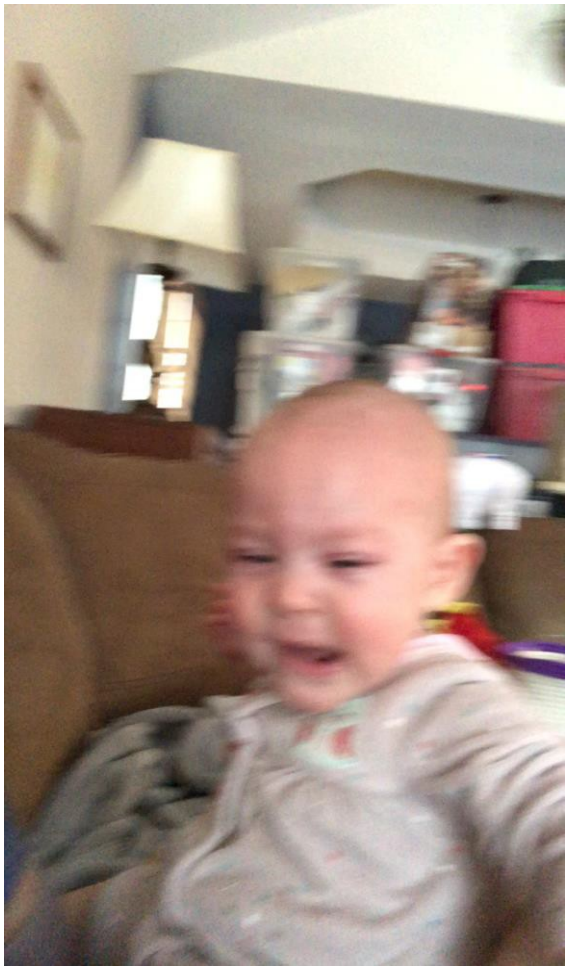
Patient has no known allergies.

Current Outpatient Medications:

- FAMOTIDINE PO, Give 0.2 mL by mouth 2 times daily. 40 mg/5 ml, Disp, Rfl
- FIRST-OMEPRAZOLE OR, Give 2 mL by mouth daily. Disp, Rfl

Vignette 2 – Disorganized Infant

- Fussy
- Key features
  - Arching and extension



Infantile Colic – Rome IV Criteria

- An infant who is <5 months of age when the symptoms start and stop
- Recurrent and prolonged periods of infant crying, fussing, or irritability reported by caregivers that occur without obvious cause and cannot be prevented or resolved by caregivers
- No evidence of infant failure to thrive, fever, or illness
- Caregiver reports of infant crying or fussing for ≥3 hours per day during ≥3 more days in 7 days
- Total 24-hour crying plus fussing in the selected group of infants is confirmed to be 3 hours or more when measured by at least one prospectively kept, 24-hour behavior diary

The prevalence for infant colic is very high: 17%–25% in infants ≤6 wk of age. The treatment consists of addressing parental coping in reassuring patients.

Zeevenhooven J, Koppen IJN, Benninga MA. The New Rome IV Criteria for Functional Gastrointestinal Disorders in Infants and Toddlers. *Pediatr Gastroenterol Hepatol Nutr.* 2017;20(1): 1–13

Colic – Associated Symptoms

- Fussiness, irritability, poor self-calming, intolerance to change, hyperalert state of arousal, and sleeping or feeding problems
- No obvious etiology
  - Behavioral attribute
    - Description and neonatal assessment scale by Brazelton
- Self-limited
- No standard approach including medical, nutritional, or supplements

Brazelton TB. Crying in infancy. *Pediatrics.* 1962;29(4):579–588 and Brazelton TB, Als H. Clinical uses of the Brazelton Neonatal Scale. *Birth and the Family Journal.* 1975;2:12

Founding Sponsor
Mead Johnson Nutrition
American Academy of Pediatrics

OT Evaluation – "Unsettled" Features

- Self-calming
- Soothability
- Poor sleep
- Poor state control
- Extension/arching
- Startles
- Decreased tolerance to handling
- Poor postural control

"Active, Alert" Infant

Founding Sponsor
Mead Johnson Nutrition
American Academy of Pediatrics

"Active, Alert" Infant

- Non fussy presently
- Constantly in motion
- Attempts at self-soothing not sustained
  - Rolling to side
  - Hands to midline

"Overstimulated" Infant

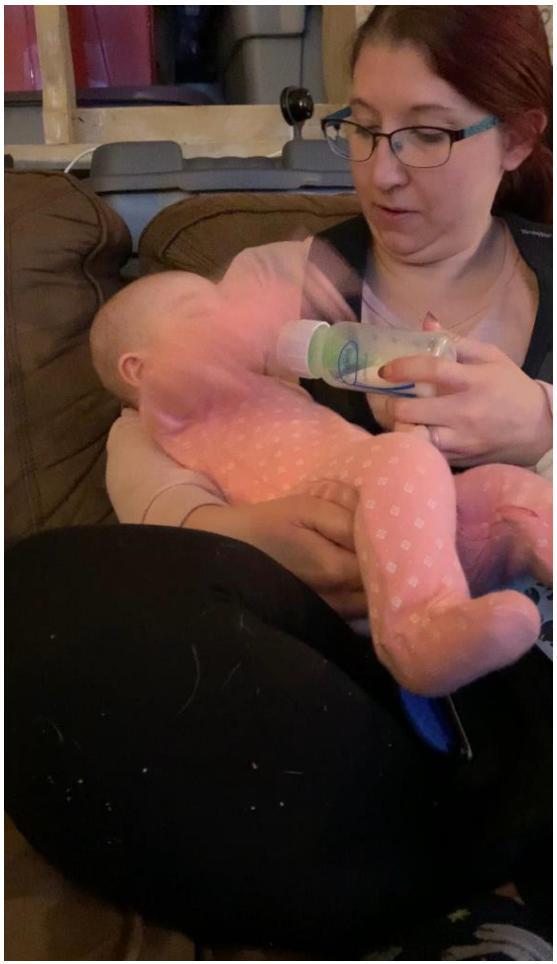
- Sensory threshold already met
- Added stimulation
  - Vestibular (swing)
  - Visual (moving mobile)
  - Tactile (fuzzy toy)

"Not Feeding Ready" Infant

- Quiet alert state sought for feeding
- Infant requires calming prior to feeding

"Not Ready to Feed" Infant

- Hungry yet disorganized
- Arms flailing
- Arching
- Mom chasing with bottle



Addressing Colic – Importance of Reading Baby's Cues

- Hypothesis: Infant has regulatory difficulties in the organization of sleep and waking states and sustaining prolonged episodes of sleep.
- Mediator: Preverbal communication plays a significant role in the regulation of infant states and in the prevention of infantile persistent crying.
- Exacerbator: Parents are usually unaware and attribute these symptoms to other causes inappropriately. Therefore, the baby's cues are not answered in an effective manner.

Barth R. "Reading-your-baby lessons" for parents of excessively crying infants—the concept of "guided parent-infant training sessions" (article in German). *Prax Kinderpsychol Kinderpsychiatr.* 2000;49(8):537–549

OT Evaluation and Therapy

Therapist helps baby get hands to midline and to mouth to assist in self-soothing.

OT – Improved Regulation and Calming

OT – Improved Regulation and Calming

Founding Sponsor
Mead Johnson Nutrition
American Academy of Pediatrics

A Multidisciplinary Approach to GERD-like Symptoms

- Chart review of infants seen in Dr. Fishbein's clinical practice for GER- or GERD-like symptoms from 2010 to 2019
- Inclusion criteria: Full term infants with normal development
- Exclusion criteria:
  - Prematurity (<37 weeks)
  - NG/G tube before seeing GI
  - Genetic disorders (i.e., Down syndrome, Noonan syndrome)
  - Prior ST/OT evaluation
  - Laryngomalacia
  - Cleft palate
  - Cardiac hx
  - Seizure disorders
  - Developmental delay

Study Population

- Infants with GER- or GERD-like symptoms
  - Total, n=174
    - ST: n=46
    - OT: n=37
    - ST and OT: n=26
    - No therapy recommended, uncomplicated reflux: n=65
- Age: 15.1 ± 6.6 wk
- Weight: 5.8 ± 1.2 kg
- Anti-reflux medications: 76 of 109 (70%)
- Elemental formula: 16 of 109 (15%)

ST Swallow Clinical Evaluation

- Total referrals: n=72
  - Features of dysphagia: 49 of 51
    - Median number of features: 5
    - Range: 2 to 10
  - VFSS recommended: n=20
    - Abnormalities (evidence of pharyngeal dysphagia): 16 of 20
  - No show: n=21

OT Clinical Evaluation

- Total referrals: n=63
  - Features of "unsettled" infant: 37 of 37
    - Median number: 7
    - Range: 3 to 8
  - No shows: n=26

Conclusion

- GERD-like symptoms are frequent in infants.
- Many infants are treated for presumptive GERD with anti-reflux medications.
- Aerophagia has been demonstrated to cause GERD-like symptoms.
- Oral dysphagia, oropharyngeal dysphagia, and "unsettled" disposition may account for GERD-like symptoms and when suspected should be addressed in an appropriate therapeutic venue.

A Multidisciplinary Approach to GERD-like Symptoms

- Is there evidence of dysphagia?
- Is there evidence of the "unsettled infant"?
- Pertinent history and examination
  - Premature and developmental delay at risk
  - Be wary of abnormal tone (low or high)
  - Spitting up is frequent but not necessarily representative of GERD
  - Avoid terminology like "silent reflux" or "acid reflux"

Research Team

Pediatric Care Online™

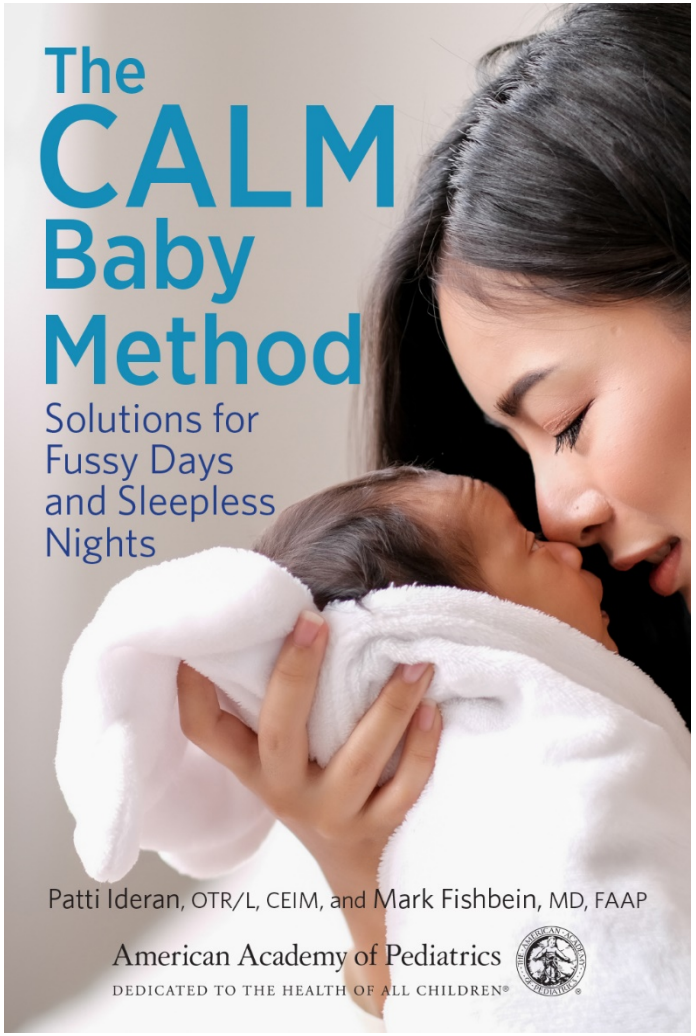
Treat with confidence. Trusted answers from the American Academy of Pediatrics.

Send Parents Home with Dr. Fishbein's Advice!

The CALM Baby Method: Solutions for Fussy Days and Sleepless Nights by Mark Fishbein, MD, FAAP and Patti Ideran, OTR/L, CEIM, makes key elements of an interdisciplinary approach to colic accessible to caregivers.

Parents of colicky, high-needs, or just plain cranky babies can learn the CALM Method and care for their baby by paying attention to **C**ues, **A**rousal **L**evels, and practicing **M**assage.

Save up to 50% when you buy in quantities to share with families in your care! Learn more at shop.aap.org.



Pediatric Care Online™

Treat with confidence. Trusted answers from the American Academy of Pediatrics.

Visit *Pediatric Care Online* today for additional information on this and other topics.

pediatriccare.solutions.aap.org

Pediatric Care Online is a convenient electronic resource for immediate expert help with virtually every pediatric clinical information need with must-have resources that are included in a comprehensive reference library and time-saving clinical tools.

Don't have a subscription to PCO?

Then take advantage of a free trial today!

pediatriccare.solutions.aap.org/SS/Free_Trial.aspx

Founding Sponsor

Mead Johnson Nutrition

American Academy of Pediatrics