CE 3.5 HOURS Continuing Education

Managing Gastroesophageal Reflux Symptoms in the Very Low-Birth-Weight Infant Postdischarge

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ABSTRACT

Gastroesophageal reflux and gastroesophageal reflux disease symptoms are common challenges for very low-birth-weight infants (<1500 g). These symptoms frequently result in feeding difficulties and family stress. Management of symptoms across healthcare disciplines may not be based on current evidence, and inconsistency can result in confusion for families and delayed interventions. The feeding relationship between infant and caregivers may be impaired when symptoms are persistent and poorly managed. An algorithm for managing gastroesophageal reflux-like symptoms in very low-birth-weight infants (from hospital discharge to 12 months corrected age) was developed through the formation of a multidisciplinary community of practice and critical appraisal of the literature. A case study demonstrates how the algorithm results in a consistent approach for identifying symptoms, applying appropriate management strategies, and facilitating appropriate timing of medical consultation. Application to managing gastroesophageal reflux symptoms in the neonatal intensive care unit will be briefly addressed.

Key Words: algorithm, evidence-based practice, feeding refusal, feeding relationship, gastroesophageal reflux, gastroesophageal reflux disease, growth faltering, multidisciplinary team, preterm infant, regurgitation

Very low-birth-weight (VLBW) infants struggle with gastroesophageal reflux (GER) and gastroesophageal reflux disease (GERD) in the neonatal intensive care unit (NICU) and beyond discharge. Parents feel helpless when their infant presents with irritability, arching with feedings, and frequent painful regurgitation. Healthcare providers are inconsistent in recommending GER management strategies and often quickly resort to pharmacologic therapy.[1,2] In our practice, medications are sometimes

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prescribed without considering other factors, such as dietary considerations, feeding skills, and practices that can result in symptoms that mimic GER. The purpose of this article was to provide an overview of GER/GERD and share an evidence-based GER algorithm for consistent assessment and care of VLBW infants postdischarge to 12 months corrected age presenting with reflux-like symptoms.

SIGNIFICANCE OF THE PROBLEM

Gastroesophageal reflux and GERD have been well investigated in healthy term infants and children. However, insufficient evidence exists with regard to GER/GERD symptom identification and management in preterm infants, especially the VLBW infant. Reported incidence of GER in preterm infants varies from 22% to 85% depending on criteria used for diagnosis.[3,4] Wide variation exists in the interpretation and management of symptoms.[1]

Gastroesophageal reflux is defined as the passage of gastric contents into the esophagus with or without regurgitation and vomiting. Gastroesophageal reflux is a normal physiological process occurring several times per day in healthy infants, children, and adults.[5] Gastroesophageal reflux is common in infants, particularly those born prematurely.[6] The most common sign of GER in infants is postprandial regurgitation, which can range from effortless spitting to forceful vomiting. Reflux episodes commonly occur with crying, defecating, coughing, and after meals when there is increased abdominal pressure.[7,8] For most infants, GER is self-limiting and resolves by 12 to 24 months of age; symptoms typically start to improve because of the maturation of esophageal and gastric motility. A more solid diet and upright posture attained with walking facilitate esophageal and gastric emptying, contributing to resolution of GER.[9]

Other factors may contribute to GER-like symptoms in preterm infants. These factors include problems related to feeding management, feeding skill, constipation or infrequent stooling, and cow's milk protein allergy (CMPA).[7] Screening for underlying factors contributing to GER-like symptoms helps direct an appropriate and a more timely intervention. Early resolution of feeding problems may help avoid long-term feeding issues. Persistent feeding and sleeping problems in preterm infants beyond 5 months of age have been demonstrated to be predictive of feeding problems at 4 and 5 years of age.[10]

Gastroesophageal reflux disease is defined as reflux of gastric contents that causes troublesome symptoms and/or complications, such as poor growth, food refusal, pain, abnormal posturing or arching (Sandifer syndrome), grimacing, esophagitis, irritability, sleep disturbances, chronic cough, hoarseness, dysphagia, and respiratory symptoms.[3,5,7,11,12] Morbidities of GERD in preterm infants include aspiration pneumonia, failure to thrive, and exacerbation of respiratory symptoms, including chronic lung disease.[3,13-15] Reflux esophagitis causes painful feeding experience and, in response, infants will modify their feeding behavior to avoid pain.[16,17] Feeding problems that begin with a physiological basis, such as GERD, may later develop a behavioral component. When the physiologic cause resolves, the feeding problem may persist because of the learned behavioral response.[18] Without timely intervention, the noxious GERD sequelae may establish feeding as a negative experience.

Parent-child interaction is affected by GERD consequences, including low intake, feeding refusal, difficulty with introduction of solids, and problems with texture progression.[16,19-21] In a group of 63 infants with remission of regurgitation by 1 year of age, feeding refusal, meal duration, and parental feeding-related distress were significantly increased compared with a control group.[20] In our clinical practice, we noted that parents became focused on feeding volume and weight gain and often resorted to forced feeding. Parents told us that feeding was not pleasurable and feeding challenges impacted how they were able to bond and attach with their infant. Figure 1 contains statements made by parents in our practice. Acierno and colleagues[19] reported similar parental concerns such as poor intake, oral aversion, disturbed sleep, and stress impacting family quality of life. Parents described the difficulty maintaining a loving and gentle attitude while getting food into their infant who needed constant soothing. In addition to the struggles of living with GERD, families were often confused by conflicting recommendations from healthcare professionals. Without timely, consistent and evidence-based

FIGURE 1.

- "I went to the Internet and was relieved to hear other mothers cry when they feed their baby."
- "I fight with my baby until he is worn out and starts to sleep and then he will feed. The entire feeding takes 1½ hours."
- "My baby sometimes goes up to 8 hours during the day without feeding. I set my alarm at 3 am to get up to feed her while she is sleepy because that is the only way she will eat."
- "I have to hold his arms down and swaddle him tightly or he pushes the bottle away."
- "I use a circuit of distractions (toys, TV, verbal distraction) to feed my baby."
- "I worry that I am not enjoying my baby. I feel guilty, but I am so tired of the vomiting."

Living with gastroesophageal reflux disease.

approaches, infant symptoms escalated, and diagnosis and treatments were delayed, resulting in heightened family stress.

GER ALGORITHM DEVELOPMENT

A multidisciplinary committee consisting of acute care and community-based healthcare professionals assembled to reflect on the current clinical challenges faced in managing GER and GERD symptoms in VLBW infants postdischarge. The committee, consisting of clinical dietitians, occupational therapists, and community-based neonatal clinical nurse specialists, used a community of practice (COP) model. Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.[22] Each committee member encountered many VLBW infants (<1500 g) postdischarge with significant reflux-like symptoms impacting growth and willingness to eat. We noted inconsistent advice from multiple healthcare professionals and a tendency to quickly resort to pharmacologic treatment. Inconsistency in practice made it challenging to monitor response to interventions and was confusing for families. Our COP reflected on clinical trends, conducted a critical review of the literature, collaborated with local experts, and developed an algorithm to guide our practice. Each step of the algorithm will be presented along with the literature to provide rational for inclusion.

MANAGEMENT ALGORITHM

The algorithm begins with a screening assessment to rule out factors contributing to reflux-like symptoms and determine the most appropriate management strategy. The algorithm continues with GER/GERD management to minimize the negative impact on growth and the feeding relationship and directs the ideal timing of medical consultation and referral if indicated. "Algorithms are written guidelines to stepwise evaluation and management strategies that require observations to be made, decisions to be considered, and actions to be taken."[23(p241)] The complete algorithm is shown in Figure 2.

The screening assessment identifies several factors contributing to regurgitation, irritability, poor weight gain, and feeding refusal in VLBW infants (Figure 3). These factors can exist independently or contribute to GER/GERD.[5,24,25]

Growth and Feeding History

Growth and feeding history provides insight as to whether regurgitation is related to excessive intake.[5,7,25-27] Overfed infants tend to have more frequent reflux events.[28] Evaluating for higher than anticipated intake for age and a greater than average weight gain helps identify those infants who are overfed. Many parents have difficulty transitioning from a regimented NICU feeding schedule to cue-based feeding at home or have difficulty learning to read their infant's feeding cues. Parental concerns regarding weight gain, wasted expressed breast milk (EBM) or wasted expensive formula, may contribute to overfeeding. Forcing an infant to feed may escalate to feeding refusal. Educating parents to use moderately smaller volume feedings and, most importantly, to recognize and respect infant's feeding cues helps prevent overfeeding.[7,12,25,29] For some infants, this strategy results in decreased regurgitation and feeding refusal.[30]

Incorrect mixing of formula or fortified EBM can lead to increased calorie concentration and higher than average weight gain. Increased calorie concentration increases osmolality, which may increase regurgitation.[31,32] Reviewing the recipe helps identify parents who are inadvertently mixing the recipe to a higher than recommended calorie concentration. For these infants, regurgitation and feeding refusal often resolves when parents are counseled on correct recipe preparation.

Constipation

Constipation has been identified as a contributor to irritability and regurgitation.[5,7,33,34] In our practice, constipation or infrequent stooling often contributes to regurgitation and decreased feeding interest and intake. Management includes assessing hydration and intake, increasing EBM if possible, reviewing formula recipe, offering sorbitol-containing juice (prune nectar), and including higher-fiber foods (barley cereal) for infants eating solids.[33,34] Some infants require pharmacologic support as recommended by their physicians to address constipation when other strategies are ineffective.[33,34]

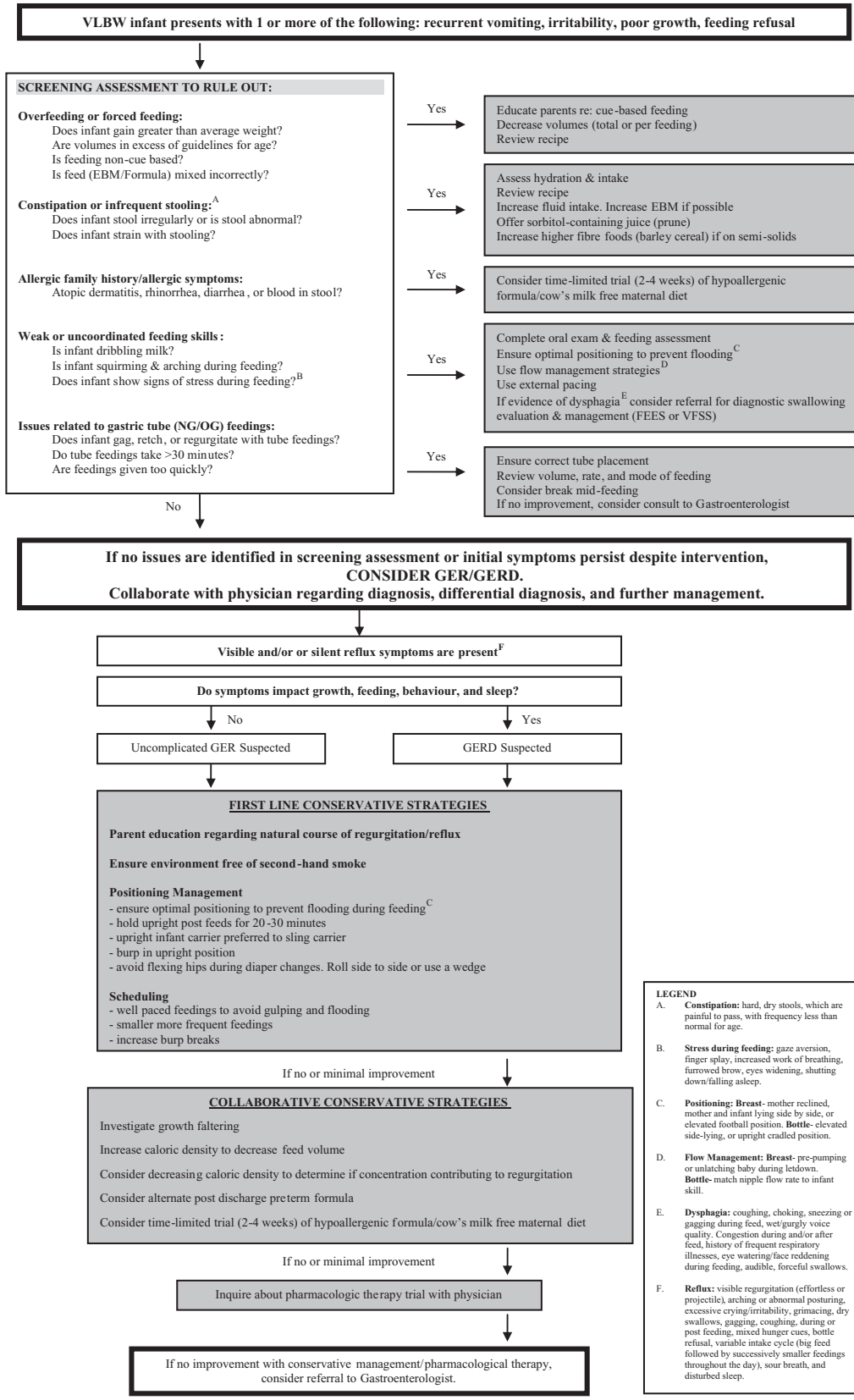
Cow's Milk Protein Allergy

Cow's milk protein allergy-associated GER is suspected in infants with a family history of CMPA or symptoms such as diarrhea, blood in stool, atopic dermatitis, and rhinitis.[35,36] In this case, the algorithm follows the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition clinical practice guidelines, which recommend a time-limited trial of hypoallergenic infant formula and/or maternal cow's milk-free diet for infants receiving breast milk.[5]

Assessment of Feeding Skills

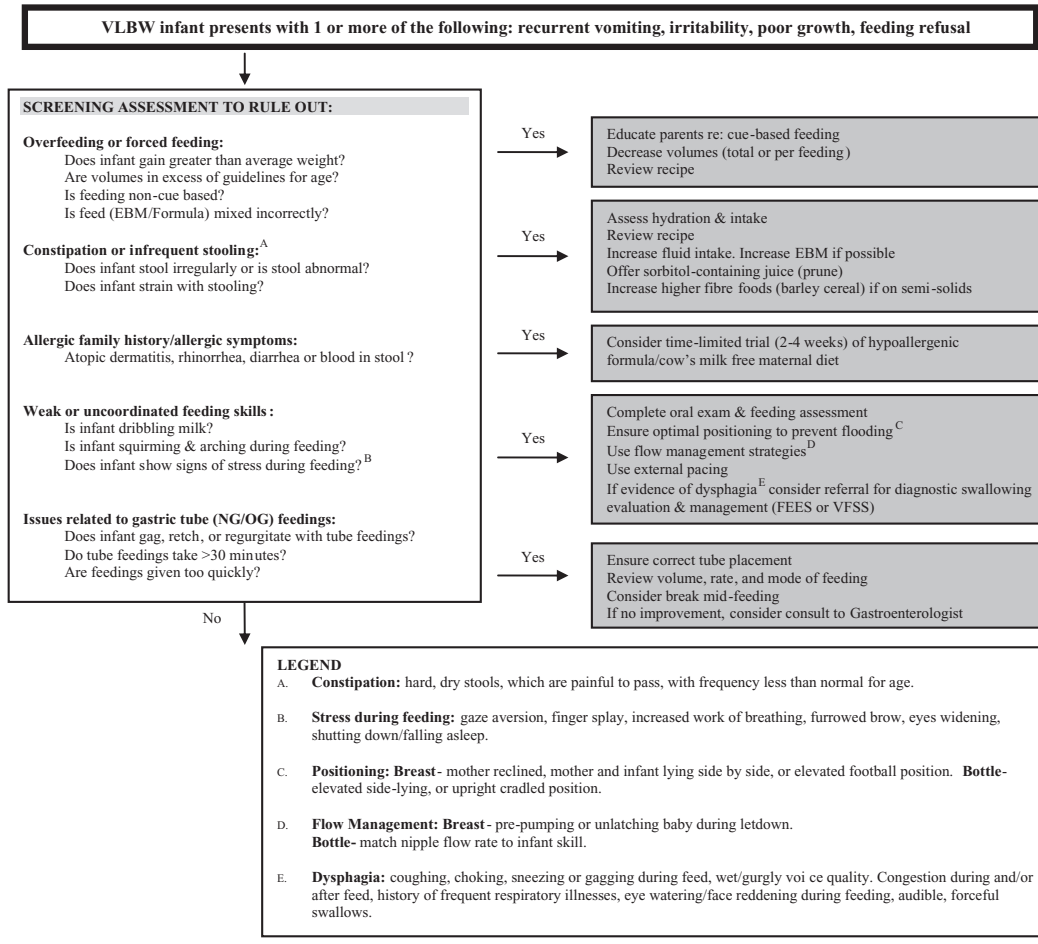
Assessment of feeding skills yields important information about the infant's ability to coordinate sucking/swallowing/breathing (S/S/B) during feeding. Sucking/swallowing/breathing incoordination and feeding skill problems are common in the preterm infant.[18,37,38] Breastfed or bottle-fed preterm infants

FIGURE 2.



Management algorithm. Reprinted with permission from the Alberta Health Services, 2013.

FIGURE 3.



Screening assessment: Management of reflux-like symptoms. Reprinted with permission from the Alberta Health Services, 2013.

with S/S/B incoordination that results in flooding can present with squirming, arching, and feeding refusal. These signs are easily confused with symptoms of reflux. The infant's rapid feeding or gulping may result in regurgitation postfeeding.[39,40] It is important to identify and treat S/S/B incoordination with flow management strategies, external pacing, and positioning for breastfed and bottle-fed infants. Flow management strategies for the breastfed infant include prepumping the breast and releasing the infant from the breast during letdown.[41] External pacing can be done by releasing the latch to prompt the infant to take shorter sucking bursts and additional breaths. The infant's mouth should remain in contact with the breast allowing the infant to re-latch and resume feeding when ready.[41] Positioning strategies include having mother reclined, mother and infant lying side by side, or positioning the infant in an elevated football position.[41] Strategies for bottle-fed infants include the use of slow flow nipples, external pacing, and positioning the infant in an elevated side-lying position or elevated cradled position to prevent flooding.[37,42-47] Strategies to manage S/S/B incoordination during breastfeeding or bottle feeding resolve flooding and regurgitation in many infants.

Infants presenting with symptoms of dysphagia should be referred for diagnostic evaluation of swallowing utilizing Fiberoptic Endoscopic Evaluation of Swallowing or Videofluoroscopic Swallowing Study.[48,49] Dysphagia can be associated with GERD or related to other causes (neurological, structural, and respiratory).[7,49,50] Refluxate can penetrate into the larynx or airway.[31,49,51] Infants with dysphagia regardless of the underlying association should receive a diagnostic swallowing assessment to determine whether they can safely protect their airway.[49]

Enteral Feeding

Issues related to enteral feeding are found to contribute to regurgitation in infants requiring tube feeds at discharge. Symptoms of gagging, retching, and regurgitation may be related to tube-feeding method

and rate of feeding. Interventions include ensuring correct tube placement; reviewing volume, rate, and mode of feeding; and offering a short break mid-feeding to allow some stomach emptying.[7,39] In our experience, infants with feeding tubes benefit from frequent venting similar to burping in the oral fed infant. Enteral feedings delivered slowly by feeding pump are considered for infants who do not tolerate bolus gravity feedings. Longer feeding durations and slower flow rates have been associated with decreased frequency of GER.[39] Long-term placement of a nasogastric feeding tube has also been associated with increased regurgitation and esophagitis.[3,52] Therefore, our goal was to wean from nasogastric feedings as soon as oral feeding skills support growth. In rare cases where long-term tube feeding is required, infants should be referred to a gastroenterologist for consideration of gastrostomy tube placement (with or without fundoplication).

GER/GERD IDENTIFICATION AND MANAGEMENT

For those infants without resolution of symptoms following the screening assessment and accompanying management strategies, it is appropriate to consider GER/GERD. The algorithm continues with screening for visible and silent reflux and determines whether symptoms negatively impact growth, intake, feeding, behavior, or sleep (Figure 4). Symptoms include visible regurgitation (effortless or projectile), arching or abnormal posturing, excessive crying/irritability, grimacing, dry swallowing, gagging, coughing (during or postfeeding), mixed hunger cues, bottle refusal, variable intake cycle (big feed followed by successively smaller feedings throughout the day), sour breath, and disturbed sleep.[5,9,11,21,53]

If visible and/or silent reflux symptoms are present, infants were categorized into the following 2 groups:

1. *Uncomplicated GER suspected*: These infants present with effortless regurgitation and/or painless vomiting with no other symptoms and are often referred to as a "happy spitter."[5]
2. *GERD suspected*: These infants demonstrate symptoms and behaviors that impact feeding, intake, growth, and sleep.[5]

Both groups of infants are initially managed using first-line conservative strategies. However, the infants with suspected GERD require close monitoring and may need to advance to multidisciplinary collaborative strategies.

FIRST-LINE CONSERVATIVE STRATEGIES

Conservative lifestyle approaches are recognized as the appropriate initial management of uncomplicated GER.[5,7,21] Conservative therapies are effective, inexpensive, noninvasive, and avoid the use of pharmacologic therapy.[3,5,54,55] First-line conservative strategies consist of parent education, positioning management, and feeding scheduling. These strategies may have a positive impact on reflux symptoms.

Parent Education

Parent education and reassurance regarding the natural course of GER in infants is recommended.[5,7,30,56] Although GER may resolve spontaneously, we recommend, in the interim, parents be counseled on strategies to minimize reflux and associated discomfort. Education also includes awareness that exposure to second-hand smoke contributes to excessive crying and irritability in infants, which may or may not be related to GERD.[5,55,57] Our COP developed a parent teaching tool to provide information on symptom identification and various strategies to manage reflux in both acute and community healthcare settings.

Positioning Management

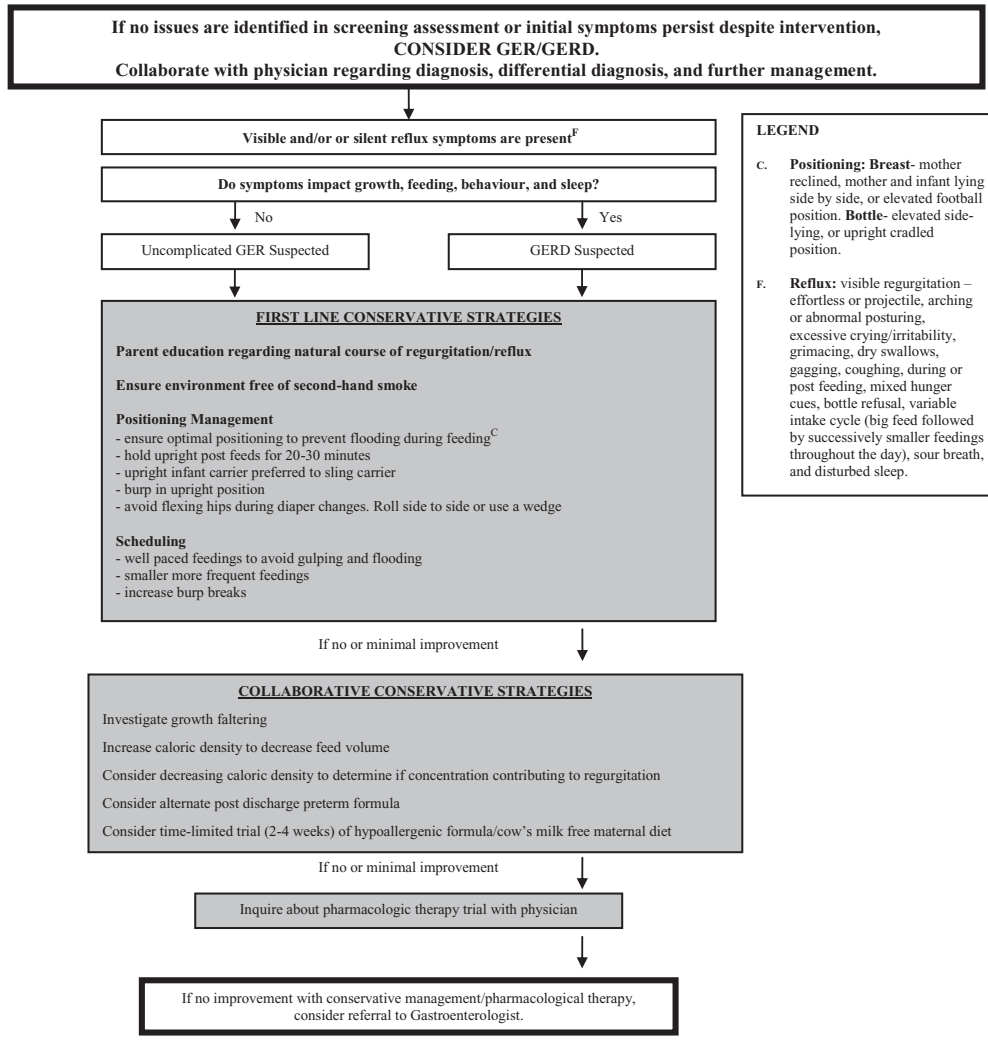
Positioning management strategies are important for GER/GERD management. Techniques to prevent flooding, as previously discussed, are important to implement as rapid feedings may further contribute to GER/GERD by increasing the likelihood of regurgitation.[39,40] Principles of positioning management are aimed at decreasing intra-abdominal pressure.[58] Burping in an upright supported position, either over the shoulder or in an upright sitting position, decreases the risk of regurgitation. Avoid having the infant in a slumped sitting position. Holding the infant upright after feeding for 20 to 30 minutes reduces the incidence of GER/GERD.[5] When it is not possible to hold the infant upright, we recommend an infant seat that maintains an open hip angle and prevents increased abdominal pressure (eg, bouncy seat). Parents are advised to avoid using the car seat for purposes other than travel as this position has been found to exacerbate GER/GERD.[11,30,55,59,60]

Another positioning concern we have identified is related to minimizing flexing the infant to reduce the incidence of GER/GERD. Using a wedge and rolling the infant to the side for diaper changes and choosing an upright infant carrier over a sling style carrier may decrease GER/GERD.

Parents should position their infant supine for sleep. Prone and side-lying (lateral) positions are not advised because of the associated risk of Sudden Infant Death Syndrome (SIDS).[5,61,62] For infants from birth to 12 months with GERD, the risk of SIDS generally outweighs the potential benefits of prone and lateral positions for sleep.[5]

Infants with dysphagia are at risk for aspiration of refluxate.[31,49] Minimizing the risk of aspiration by limiting the migration of refluxate up the esophagus is the clinical reasoning for considering an elevated head-of-bed position for sleeping. However, this

FIGURE 4.



Gastroesophageal reflux (GER) and gastroesophageal reflux disease (GERD) management and referral. Reprinted with permission from the Alberta Health Services, 2013.

strategy has not been evaluated in the literature. In our clinical practice, because of concerns of maintaining safe head-of-bed elevation at home, meeting current SIDS sleep protocol, and the lack of validated research for elevated supine position, any exception to supine flat sleeping position is by physician order only. Further research is needed to evaluate the safety and efficacy of elevated supine sleeping position to prevent aspiration and reduce discomfort from GERD in this population.

Scheduling Strategies

Scheduling strategies during and between feedings are used to manage reflux. Clinical observations suggest that less gulping during feedings can decrease the frequency of regurgitation. Scheduling imposed breathing breaks using external pacing during feeding prevents gulping. Large feeding volumes placed at infrequent intervals may lead to gastric distension and delayed gastric emptying, which may worsen reflux.[39] Smaller, more frequent feeding is a common recommendation for infants with frequent regurgitation.[9,39,51] Smaller volume feedings decrease both the total duration and the length of the longest episode of acid reflux.[63] In addition, burping the infant during feeding after every 1 to 2 ounces may help reduce reflux symptoms.[7]

COLLABORATIVE CONSERVATIVE STRATEGIES

If first-line conservative strategies resulted in minimal to no improvement, then it is recommended to proceed

with collaborative conservative strategies. These strategies include investigation of growth faltering (or failure to thrive), altering caloric density, and considering alternate formula. A multidisciplinary team consultation is needed to facilitate collaborative strategies.

Growth Faltering

Infants with growth faltering are referred to our clinical dietitians for a nutrition assessment. The assessment involves careful review of feeding and growth history, serial monitoring of growth, and collaboration with the infant's pediatrician to investigate organic and nonorganic causes of growth faltering. A team feeding observation is also considered. In our practice, the feeding team may include occupational therapists, dietitians, nurses, physicians, and psychosocial support. Interventions for growth faltering aim to provide adequate nutrient intake to support appropriate growth, which may include the use of EBM fortified with infant formula or high-calorie infant formula, high-calorie foods for infants eating solids, and the use of enteral tube feeding as needed. These guidelines are consistent with the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition/the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition recommendations for infants with recurrent regurgitations and poor weight gain.[5] Educating families on positive feeding interactions is paramount for management of growth faltering.[25]

Caloric Density

Changes to caloric density are considered for infants with poor growth caused by energy and nutrient loss from regurgitation. Increasing the caloric density of the feeding is an appropriate strategy for volume sensitive infants.[5,39,64] However, some infants respond to higher caloric density with increased regurgitation, abdominal discomfort, constipation/infrequent stooling, or reduced intake. Higher caloric density increases the osmolality of the formula, which can be associated with worsening GER.[32,65] Therefore, infants already on a higher caloric density formula experiencing worsening GER symptoms may benefit from a trial of lower caloric density. Any changes to caloric density require careful monitoring of growth, feeding volume, and hydration status.

Formula Changes

An alternate postdischarge preterm formula may be considered, despite evidence suggesting that symptoms of GER do not decrease with a change from one cow's milk formula to another for most infants.[5,7,25,39] Clinically, parents reported reduced irritability, gassiness, and regurgitation in a subset of infants trialed on an alternate postdischarge preterm formula. For this reason, we consider this intervention and continue to monitor outcomes.

Formula change may be advised in cases where CMPA-associated GER is suspected.[5,25,35,36] Cow's milk protein allergy and GER share many of the same symptoms, epidemiology, and natural history, which present a challenge in distinguishing the conditions.[5,36] In 16% to 59% of cases, CMPA and GER coexist.[35,66-69] Given this association, there is strong evidence for implementing a 2- to 4-week trial of hypoallergenic formula (extensively hydrolyzed or amino acid formula).[5,68] A hypoallergenic formula eliminates coexisting allergy as a contributor to both crying and regurgitation in infants with GERD.[35,55,66,70] Cow's milk protein allergy-associated GER may be transient in nature, and hypoallergenic formulas may not be nutritionally adequate for preterm infants; therefore, future reintroduction of cow's milk protein (CMP) with symptom evaluation is warranted. Symptom recurrence following reintroduction of CMP affirms CMPA-associated GER.[35,66,71] For infants receiving breast milk, a trial of a maternal CMP-free diet is considered.[5,68] Mothers providing breast milk need teaching and support for a nutritionally adequate CMP-free diet.[68] If CMPA is ruled out, it is recommended that infants go back to using more nutritionally adequate postdischarge preterm formula and have mothers discontinue the CMP-free diet.

Thickened Feedings

Thickened feedings have been shown to improve symptoms of regurgitation and vomiting but did not affect the occurrence of reflux episodes.[5,59,72-74] However, the efficacy of thickened feedings, the type of thickener, and the safety of thickened feedings in the treatment of GER/GERD in preterm infants remain unclear. The use of thickeners may be associated with necrotizing enterocolitis.[75-77] Commercially thickened formulas are not nutritionally adequate for the preterm infant because of calorie, protein, and mineral composition.[74] We have excluded the use of thickened feedings as a reflux management strategy, pending further investigations into the efficacy and safety of this practice.

Pharmacologic Therapy

Pharmacologic therapies may be considered for persistent complications of GERD to buffer gastric acid, reduce gastric acid secretion, or alter gastrointestinal motility.[5,7] Relative risk, benefits, and indications for pharmacologic therapy are unclear in preterm infants.[5] Pharmacologic treatment in the preterm population should be used with caution and is reserved for those who fail conservative management and have significant GERD.[3,6,7,50,78] There are 3 basic classes of medications used in the treatment of GERD—H_2-receptor antagonists, proton pump inhibitors, and prokinetic agents.[5] Acid suppression (H_2-receptor antagonists or proton pump inhibitors) is associated with necrotizing enterocolitis in preterm

infants, increased incidence of acute gastroenteritis, and in some cases increased risk of sepsis, pneumonia, and other infections.[5,79,80] The impact of chronic use of acid suppressants on vitamin and mineral absorption in infants and children has not yet been evaluated.[3] If conservative strategies fail to improve symptoms, pharmacologic therapy should be considered. A therapeutic time-limited medication trial with reassessment every 2 to 3 weeks is recommended.[5] Families should be encouraged to report changes in symptoms of visible and silent reflux to their physician to determine the impact of medication on the child's intake, growth, feeding refusal, and sleep.

GASTROENTEROLOGIST REFERRAL

Gastroenterologist consultation may be valuable when severe symptoms do not resolve with conservative treatment or pharmacological therapy. The referral should include feeding history, growth charts, results of an upper gastrointestinal study (if available), and the outcome of any conservative or collaborative strategies trialed. In our practice, the dietitian is available to partner with the gastroenterologist to monitor enteral feeding regimens, alternate formula trials, and caloric density adjustments. Between visits to the gastroenterologist, our team members may liaise between the family and gastroenterologist to communicate concerns regarding growth and impact of GERD on intake or feeding behaviors. Team members continue to provide family support and monitor for new or escalating symptoms.

APPLICATION OF THE ALGORITHM: BABY SARA'S CASE STUDY

Baby Sara (Figure 5) was born at 28 weeks' gestation and 1200 g and discharged home at 38 weeks. Postdischarge, she presented with multiple moderate to large regurgitations per day. Her mother described Sara as irritable and uncomfortable after feeds with multiple dry swallows, squirming, and arching. Sara's family was challenged and stressed with feedings. A consistent evidence-based approach was needed to assist Sara and her family.

On completion of the algorithm screening, the nurse ruled out overfeeding, forced feeding, constipation, and family history of allergies. She determined that Sara demonstrated good feeding coordination and had no evidence of flooding during feedings. The nurse suggested the first-line conservative measures, which included parent education, positioning management, well paced feeds, burp breaks, and symptom monitoring.

Over the next month, Sara continued to regurgitate frequently and started to become very fussy at the sight of the bottle and during positioning attempts for feeding. She adamantly turned her head away or placed her hands in front of her face to disengage.

FIGURE 5.

Baby Sara at 4 months adjusted age.

Sara's mother would desperately offer the bottle until Sara tired of refusing, gave up, and fed part of the bottle. Sara fed best when drowsy or asleep. Feedings were taking more than an hour. Sara's family began to dread feeding and often shed tears after she regurgitated a full feeding they had worked so hard to achieve. Despite the family's persistent efforts, Sara's weight gain and weight to length ratio dropped.

With these new symptoms, the nurse recognized the need for multidisciplinary collaboration; the dietitian and occupational therapist became involved and the pediatrician was notified. The team suggested a trial of an alternate postdischarge preterm formula; however, regurgitation and feeding refusal continued. The next step was a 2- to 4-week trial of a hypoallergenic formula and maternal cow's milk-free diet. Within 2 weeks of a CMP-free diet, regurgitation decreased to occasional wet burps and no major spit ups. It took an additional 5 weeks for Sara and her family to begin to enjoy feeding.

In this case study, the algorithm guided the practitioners through a stepwise approach to treating GER/GERD symptoms. Cow's milk protein allergy was identified as the underlying cause. With CMP elimination and parent support, positive feeding behaviors (good hunger cues and eagerness to feed) returned, resulting in improved weight gain.

IMPLICATIONS FOR PRACTICE

This stepwise approach will assist clinicians to identify reflux symptoms to determine the most appropriate management strategy and to identify timing of medical consultation for preterm infants following discharge. Although the algorithm was developed for the postdischarge preterm population, it has implications for use in other settings. The algorithm lends itself to assessment and conservative management of

GER/GERD symptoms of the infant in the NICU. In our NICUs, occupational therapists use the algorithm for team collaboration when consulting for infants with GER-like symptoms impacting feeding. Use of this algorithm in the NICU and postdischarge in the community would provide infants with GER-like symptoms consistent and seamless evidence-based care. The algorithm is used with term infants in our outpatient clinics. Pediatricians will also find this algorithm beneficial. Formal evaluation of the algorithm management approach is pending.

CONCLUSIONS

The algorithm is a tool that equips healthcare professionals with a consistent stepwise approach for assessment and early management of infants with GER-like symptoms to minimize the negative impact on growth and the feeding relationship. A number of factors can contribute to regurgitation, irritability, poor weight gain, and feeding refusal in VLBW infants.

The algorithm screens for these factors so infants will not be misdiagnosed with GER/GERD and unnecessarily prescribed reflux medications in a population, where the use of these medications is not well understood. For infants who have GER/GERD, the algorithm provides a progression from conservative therapy to referral for medical management.

Optimal management of reflux-like symptoms in VLBW infants should employ a multidisciplinary team to ensure seamless coordinated care for these infants and their families.[16,81] Healthcare professionals each play an important role in the assessment and ongoing monitoring and management of GER/GERD. Each profession brings a unique body of knowledge and skill set, which is essential in the management of reflux-like symptoms.

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