



# Pediatric Feeding and Dysphagia

## Dear Fellow Feeders;

Dear Fellow Feeders,

Welcome to our 4th year! I want to thank all those resubscribers for your support and welcome new readers. We have a jam packed issue this quarter with articles by some of the experts in the field!. Joan Sheppard Ph.D. writes about saliva control, Lynn Wolf

MOT, OTR and colleague Nan Street PT discuss a personal GI experience, and Betsy Clawson Ph.D. provides an interesting case and explanation of the psychologists role in feeding management. Hope you enjoy. Feel free to contact me with suggestions or comments at Kbracket@unch.unc.edu .

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**Salivation and Saliva Control in Children, More than Just Drooling**  
 Justine Joan Sheppard, Ph.D., Teachers College, Columbia University  
[www.nutritionalmanagement.org](http://www.nutritionalmanagement.org)

The association between salivation and swallowing is an important one. Saliva facilitates swallowing during eating by reducing bolus viscosity and ‘lubricating’ the bolus. Saliva is alkaline and has a buffering effect on acidity in the mouth and in the esophagus. It prevents caries and gum disease, assists in clearing debris from the mouth and reduces mouth odor. Activities that increase the frequency of swallowing, such as, chewing gum, have been found to reduce the level of acidity in the esophagus in people with gastroesophageal reflux disease and, to reduce discomfort following meals. The saliva film that is maintained on the oral mucosa lubricates the tissue, thus providing for comfort and ease of movement during swallowing and speech.

Saliva flows into the mouth primarily from the parotid, sublingual and submandibular glands. Approximately one liter per day is discharged and swallowed (Arvedson and Brodsky, 2001). The rate of saliva swallowing varies depending on the rate with which saliva flows into the mouth, the faster the flow, the higher the frequency of swallowing (Rudney and Larson, 1995). In studies in which saliva swallowing frequency in children have been measured, rates of 1.60 to 3.00 swallows per minute have been observed at rest (Kapilla, Dodds, Helm and Hogan, 1984; Sheppard, Guglielmo, Burke, Leone and Gross, 2003; Watanabe and Dawes, 1990). The rates also vary depending on the presence of stimuli that may increase the saliva flow. Higher rates are observed in children and adults during nasopharyngeal intubation, sucking on a peppermint lozenge, sucking on a dummy lozenge and following completion of a snack (Kapilla, et al., 1984; Sheppard, et al 2003). Saliva swallowing rate is higher when awake as compared to sleeping (Lear, Flanagan and Morrees, 1965). When salivation is reduced by medications, there is a reduction in the frequency of saliva swallows (Kapila, et al., 1984).

Differences have been observed between the rate of swallowing in typically developing children and developmentally disabled children. My colleagues and I found that children with disability swallow significantly less frequently at rest and significantly more frequently following completion of a snack (Sheppard, et al., 2003). Senner and colleagues (2002) and Sochaniwskyj and colleagues (1986) have also found that children with disability swallow less frequently at rest than do typically developing children. In addition, these two studies

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### Special Points of Interest:

- Current information
- New products
- Research and publications
- Education

Editorial assistance provided by Elizabeth Crais Ph.D. CCC SLP , Division of Speech and Hearing Sciences, UNC-Chapel Hill and Cathy Fox MS OTR/L, Private Practice, Frederick , MD

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Salivation and Saliva Control in Children, More than Just Drooling  
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www.nutritionalmanagement.org

found that children who are disabled and drool swallow less frequently than do those who are disabled but do not drool. The question of whether a child drools because of reduced frequency of swallow, or swallows less because of drooling is an important one for determining the correct treatment.

Difficulties with saliva control occur when there is deficient control of saliva in the mouth, deficient initiation of swallowing as saliva accumulates in the mouth, and/or deficient pharyngeal clearance of the saliva. Sensory, neuromuscular, praxic and anatomical abnormalities may be contributing causes. Conditions or situations that increase saliva flow, or reduce the child's capabilities for managing it, may overwhelm the child with marginal capabilities for saliva swallowing. The most readily apparent sign of deficient saliva control is drooling, Wet/congested, pharyngeal, breath sounds and coughing on secretions also signal deficient swallow for saliva. . Functional scales have been developed that describe severity and frequency of drooling. These are useful for assessment and for tracking progress during treatment. See Arvedson and Brodsky (2001) for a good review of the causes and consequences of abnormalities in saliva production and control.

When evaluating swallowing, it is advisable to keep in mind that drooling may have different causes that may require different treatment approaches. Differential diagnosis is the key to developing efficient and effective treatment programs that address each child's problem specifically. Children with persistent and severe drooling problems benefit from an interdisciplinary team assessment and a multi-faceted approach to treatment.

Treatments may involve any combination of dental, medical, surgical or behavioral-therapeutic interventions. When the problems are grounded in deficient neuromuscular competency or skill, behavioral/exercise strategies are appropriate for inclusion in the treatment program. The strategies selected will differ depending on the phase of swallow that is the focus of the problem. If the issue is pharyngeal phase clearance, appropriate exercises are those that will strengthen the muscles involved in swallowing, and develop skills for voluntary swallowing and coughing. If the issue is initiation of the swallowing reflex, appropriate exercises are those that reduce the latency between the stimulus for swallow and the response, that is facilitate more prompt swallows. In instances where oral initiation and pharyngeal phase deficiencies are primary, underlying sensory or motor competencies may be involved and drooling may be a secondary issue. In some children, drooling serves the purpose of reducing the stresses on oral initiation and pharyngeal swallow. These children may or may not have impairments in cheeks, lips, tongue and mandible that affect containment, transport and saliva bolus formation. When the focus is in the oral preparatory phase, the contributing causes may involve neuromuscular issues or the sensory-motor synergies associated with praxis, sensory perception, or, rarely in children, sensory acuity.

Whatever the cause or the severity, managing saliva control disorders is important for health, safety, well-being and for social and educational relationships. As such, they should be addressed in the treatment program.

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# Learning From Experience: Sensory and Emotional Responses to Non-Oral Feeding

Nan Street, PT & Lynn S. Wolf, MOT, OTR

As feeding specialists in pediatric settings, we commonly see children who require months of non-oral feeding due to various medical conditions. Some of these children have intact oral skills, yet when given the opportunity to return to oral feeding, show little interest. Some may have had aversive oral experiences, such as prolonged NG tube placement or oral/nasal suction, that would explain reluctance to engage in oral feeding activity. Others, however, have had gastrostomy tube feeding or TPN since birth, with little obvious negative oral experience. We speculate that they may have missed critical periods of development in relationship to feeding, or that important early learning about the relationship between hunger, satiety and oral activity (eating) has been disrupted.

As we try to help these children resume oral feeding, they communicate their level of tolerance or intolerance for oral activity, but can give no direct information on how their experiences have impacted their sensory and emotional responses to eating. Our infant and toddler population will never be able to articulate their reactions to these early experiences, but perhaps we can gain some insight from the experience of an adult who recently experienced a similar period of non-oral nutrition. Being a pediatric therapist, she was acutely aware of her responses to a situation very similar to that of patients she has worked with throughout her career.

"I recently experienced significant eating disruptions due to complete bowel obstruction and subsequent complications. After an initial laproscopic procedure, I was on a full liquid diet for four weeks (foods like yogurt, cream of wheat, cream soups and smoothies were included). This offered enough variety to be satisfying, but it was challenging to get enough calories and protein to maintain my weight. Prior to bowel resection, a PICC line was placed and I was moved to NPO status. TPN was required for four weeks after surgery. During the first week of TPN, my saliva thickened and I developed an unpleasant "slimy" feeling in my mouth. I was allowed to brush my teeth several times a day (without swallowing water), but this did not help. I was not allowed to suck ice or hard candy, for concern of triggering the gastro-colic reflex. I was, however, required to drink one ounce of Boost (a high calorie, high protein drink) per day in an attempt to maintain function of the villi in the small intestine. This meager amount of oral feeding activity was not enough to keep my mouth "alive." There was a significant dulling of the normally acute sensory awareness we have in our mouths."

"As an adult who has always enjoyed eating, the removal of food from my life had a dramatic impact. It quickly became clear how much of our life revolves around food. During this time I had to mentally and emotionally eliminate food as part of my daily routine, although I continued to prepare meals for my family."

"At the end of four weeks, I moved to clear liquids. Within one week, the slimy feeling in my mouth disappeared and it felt more alive. I then began a full liquid diet, but found texture and flavor to be overwhelming. For about one week, two or three spoonfuls or sips was all I could tolerate from a sensory standpoint. Once I moved to a soft diet, it took

an additional 2 weeks before flavor and texture were a positive aspect of eating. In addition to being easily overwhelmed by the sensory experiences of eating, my stomach felt full quickly and became upset easily. Mentally, I did not "trust" food – it was not worth the risk of pain and discomfort to eat. Hunger signals were disrupted and I would forget to eat. I was not interested in food, and had little intrinsic motivation to eat. I found this surprising, having previously *enjoyed* eating and preparing food. "

"Learning to "trust" food has been a very difficult part of the recovery process, and not a smooth progression. Physically, it took several months for my stomach and intestines to tolerate normal types and amounts of food. This greatly affected the quantity I could eat, weight gain, and my confidence in the whole process. It has taken much longer for me to mentally and emotionally re-embrace food. Even 6 months after this experience my motivation toward eating is quite low, and is significantly impacted by variable GI function."

"Dealing with the very dramatic sensory changes I experienced, and the even more dramatic changes in my emotional feelings about food and eating, has been much more difficult than I expected. It has taken more time than I anticipated, and has required large amounts of both persistence and patience. I have found that being "in control" of the process has been a key element for me. So many things have been out of my control, that it has been very important to take control of those aspects of the process where I am able. This includes food choices, quantity, and timing of eating. I would have anticipated that by this point in the process internal motivation to eat and confidence in tolerating food would have returned. Instead, I continue to need cognitive strategies to maintain adequate nutrition and at the first sign of GI discomfort eating is the first thing that I eliminate. Eating has still not returned to a reliably comfortable and enjoyable experience."

This is a single experience, from an adult perspective, but it provides some interesting insights into the sensory and emotional sequelae of non-oral feeding – experiences that young pediatric patients are not able to describe. In hearing this story, several elements are particularly striking, and may be relevant when considering the situations of some of our clients.

The uncomfortable intra-oral changes (thick secretions and "slimy" feeling) were not expected, and it is not clear if they were the result of having no food in the mouth, and/or no food in the digestive tract. Would the experience be similar if tube feeding to the stomach or intestine had been possible? In this case, there were no feeding tubes to cause negative oral stimulation, but the lack of oral feeding in itself seemed to lead to an aversive oral sensory experience. Small amounts of oral activity and oral care did not seem to improve the situation significantly.

After just 4 weeks of non-oral feeding, the sensory overload from the return to normal tastes and textures of food was a surprisingly large hurdle to overcome. While we see non-orally fed children become orally hypersensitive and reject all offers of food tastes (even when they should be "hungry"), this experience points out the potential magnitude and speed of

*(Continued on page 6)*

# Case by Case... INTENSIVE FEEDING THERAPY FOR TUBE WEANING AND ORAL MOTOR SKILL DEVELOPMENT

Carol Elliott, OTP/L, Betsy Clawson, Ph.D., LCP, Lisa Fletcher, M.Ed., SLP/CCC

**Medical History:** X is a 4 y/o former pre-term (30 week) male with history of repaired ileal atresia, right diaphragmatic hernia, and a significant ASD. He was discharged home on oral formula feedings at 4 months of age. He developed gastroesophageal reflux associated with aspiration and exacerbation of his lung disease. This resulted in a Nissen fundoplication and gastrostomy tube placement at 7 months old. Subsequently, he lacked interest in oral feedings.

**Therapy History:** X had received speech therapy for feeding since infancy. He has had ongoing PT and OT to address gross motor delays and SI dysfunction including poor modulation, tactile defensiveness and dyspraxia. X tolerated being touched on his face after two years of outpatient speech therapy and only recently had some decrease in his oral hypersensitivity, taking very small amounts orally without significant gagging. X displayed significant resistance to tooth brushing and face washing.

**Initial assessment:** X was admitted to the Day Patient Feeding Program at Children's Hospital in Richmond, Virginia. The program included 4 therapeutic meals per day for 8 weeks. X had remained 100% dependent on gastrostomy feedings of Peptamen Junior with Duocal, receiving 235 cc bolus three times a day and 125 cc twice a day and 2 oz at bedtime. X had not had a spoon or food in his mouth for several years. Prior attempts at MBS had been unsuccessful due to severe oral aversion. Testing for food allergies was recommended and results showed allergy to milk, egg, wheat, tomato, green peas, beef, chicken, pork and malt. These foods were eliminated from his diet.

**Oral motor:** Initially, oral motor assessment could not be completed because X would not tolerate being touched on his face. Therefore, X's first three treatment days were characterized by working on Beckman Oral Motor Exercises (OME) and "dry" spoon/squeeze bottle-to-mouth trials in timed sessions with reinforcement (video, toys and verbal praise) after each trial. Within 2 days, the Beckman Oral Motor Assessment was completed and he tolerated all necessary exercises. Unproductive patterns included: bilateral cheek range of motion and strength, jaw strength, tongue lateralization, midblade and tongue tip elevation. Emerging patterns were seen in lip range of motion and strength (upper and lower). Consistent functional patterns were noted in jaw and tongue alignment, as well as formation of his palate. OME combined with reinforcement were performed prior

to each feeding session throughout the course of treatment.

## **TREATMENT PROGRESSION**

**Baselines:** Assessment sessions focused on evaluating current feeding responses. During baselines, X was presented with a variety of crunchy foods, applesauce and a drink in a cup. X would tap chips on his face and when presented with the spoon or cup, X immediately batted it away. He consumed 0 grams during all baselines.

**Week 1:** Once he tolerated the exercises and kept his hands down (see oral motor above), calorie boosted soy yogurt and soy milk were introduced. A small Playtex spoon was used to "swipe" yogurt on the inside of his less defensive cheek. The drink was presented in a squeeze straw bottle (flexible hair dye bottle with tubing straw). X was provided with positive reinforcement with video, toys and verbal praise after each bite. Reinforcement was used throughout his admission.

**Week 2:** X demonstrated an increase in interrupts requiring blocking towards the end of the week. X exhibited more avoidance behaviors during presentations including hyperextending his neck to escape the bite and covering his face with his hands. Blocking involved the therapist placing her arm across X's arms as a tactile cue to keep his hands down. This is also a negative reinforcement strategy because the blocking was removed each time X took his bite. MBS was performed: the anatomy of the oropharyngeal swallow structure was normal with a normal oropharyngeal swallow and excellent airway protection was noted.

**Week 3:** Calorie boosted smooth purees were introduced. X required blocking initially and he only tolerated small amounts placed in the cheek pocket. Initially he responded with gagging and trying to wipe his mouth out with his bib, however he began adjusting to the purees after several sessions.

**Week 4:** Expels had increased and the treatment was changed to address this. Expels were represented with a cue of "no spitting" and he did not receive positive reinforcement until he kept the bite in and swallowed. Shaping continued for lip closure around the spoon and straw. X was changed to a larger spoon and he tolerated larger amounts of liquids and solids in his mouth without gagging. X's mother was trained OME and he tolerated this well at home. He began to accept tooth brushing and face

# Case by Case...:by Richmond's feeding program

washing without resistance.

**Week 5:** Mom continued to perform OME before each meal and was trained in how to present the drink using the squeeze bottle. X continued to progress by accepting larger boluses of yogurt and puree with only intermittent gagging. Some adjustments were made in the technique for presenting the spoon, placing slight pressure on the left side of the tongue. X tolerated this well and demonstrated a decrease in expels.



**Week 6:** Mom remained in the room so that she could better observe placement and feeding techniques. X had difficulty tolerating this change in his meal and demonstrated an increase in crying and interrupts during those days. A decrease in total volume consumed and slight increase in gags was noted secondary to Mom learning feeding skills.

**Week 7:** Dad was trained in OME and X's feeding protocol. X's parents reported he was consuming larger volume of food and drink at home (only required water in his G-tube) however, they also noted a pattern of X not taking bites in order to have Dad come in the room and block him. The parents were instructed to not feed X together as to not reinforce negative attention seeking behaviors.

**Week 8:** Due to the increase in negative attention seeking behaviors from parents, the treatment protocol was changed for him to have a "time out" via the parent leaving the room. He was allowed 2 verbal cues to keep his hands down and take his bite and if he did not do so, the feeder would leave the room for 30-60 seconds. An immediate improvement was noted for accepts (from 39% to 95%) as well as volume (from 153g to 234g). X began receiving higher textured purees during his meals. He was also introduced to chewing on food placed in fabric mesh as part of the oral motor component of his meal and additional reinforcement was provided for shaping this skill. Biting and releasing was targeted to shape consecutive chewing patterns. X was introduced to the open cup and after adjusting to it, he readily accepted drinks and consumed equal amounts to that presented in the squeeze bottle. Upon discharge, X was able to meet his caloric needs by mouth. Parents were trained in food preparation, calorie boosting, and texture grading. Written protocol and training video was provided for ongoing outpatient therapy in his home state.

## SUMMARY OF DAY PATIENT DATA

KEY: Ex-Expel, MCI-Mouth Clean, Pck-Packing, NV-Negative Vocalizations, Inap-Total Inappropriate (any bite with Physical

COND.	Liq.TI	Slid.TI	Tl.Grams	Accept	%Ex	%MCI	%Pck	%Gg	%NV	%Inap	%IPC
baseline	0	0	0	0	0	0	0	0	13	100	N/A
Wk1Tx1	13.4	13.8	25.8	96	9	100	1	9	8	19	N/A
Wk2Tx1	26.1	26.0	48.8	95	15	100	0	4	0	24	N/A
Wk3Tx1	28.8	27.7	52	86	16	99	0	2	1	30	N/A
Wk4Tx2	34	44.6	72	85	21	99	0	9	2	37	N/A
Wk5Tx2	60	55	109.6	91	18	100	0	9	1	32	N/A
Wk6Tx2	60	61	114.7	82	19	98	0	12	6	40	94
Wk7Tx2	63	82	140	76	9	98	0	12	3	37	95
Wk8Tx2	70	88	153	39	8	100	0	8	15	68	99
Wk8Tx3	88	150	234	95	6	100	0	7	0	13	98

Reference: Beckman, Debra. Oral Motor Assessment and Interventions. Longwood, FL. Oralmotor.com  
 Contact: Carol Elliott at Children's Hospital, 2924 Brook Road, Richmond, VA 23220 celliot@chva.org 804-228-5972

# Learning From Experience: Sensory and Emotional Responses to Non-Oral Feeding

Nan Street, PT & Lynn S. Wolf, MOT, OTR

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these changes.

The emotional response to food during this process was striking. The adjustment to the elimination of food for an adult is not unexpected, but the difficulty in re-embracing food after just 4 weeks is noteworthy. The description of this process as “having a lack of trust in food” is what we sense in many of our young clients. Bringing food into the mouth brings unpredictable and/or unpleasant associations, leading to a lack of trust and suppressing the motivation to eat. As in the case of this adult, many of our clients seem to cope with “distrust” of food by developing the need for significant control over oral and feeding activities. External motivation often must be provided to make progress with oral feeding.

The experiences of one adult clearly cannot reflect the varied experiences of the many children we see, and the multiple paths that have lead to their non-oral feeding situations. It is striking, however, to hear this experience articulated and note the parallels to observations we make with our clients. It validates the type of responses we often see, increases our sensitivity to the significance of the changes that occur, and may provide insight to help us plan treatment strategies.

## Glossary

**Gastrocolic reflex:** When food enters an empty stomach, this reflex triggers an increase in peristaltic contraction in the gastrointestinal tract.

**NG Tube:** A tube placed in the nose that extends into the stomach. A method for feeding, when food can not be given by mouth.

**NPO:** Technically means “nothing by mouth.” This may mean food is given through a tube into the stomach, or that no food is given at all.

**PIC Line:** Peripherally Inserted Central Line. A PIC line is a long, soft, flexible tube, or catheter, that is inserted through a vein in the arm. The PIC catheter is designed to reach one of the larger veins located near the heart.

**Parental feeding:** Nutrition is not given into or through the digestive system. It is given through a vein.

**TPN:** Total Parental Nutrition. All nutrition is given directly into the blood stream using a special solution containing all required nutrients, which is delivered through a line into vein. For long term TPN a central venous catheter is used.



## Recommendations: Nutrition Focus for Children with Special Health Care Needs Newsletter

Nutrition Focus for Children with Special Health Care Needs This newsletter is published 6 times yearly and is designed for health care professional who work with children with special health care needs. Each issue focuses on a certain nutrition problem or disorder and offers practical suggestions, along with case studies and some excellent resources on the particular topic for further review. The newsletter is published by the Nutrition Section of the Center for Human Development and Disability at the University of Washington. Cost for the 1 year subscription (6 issues) is 30.00 and back issues are also available for purchase.

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## Question & Answer:

### Is crumbling crackers into purees an effective way to work on chewing?

Answered by Cathy Fox MS OTR/L, Private Practice, Frederick, MD

No! If you watch normal children you will see that preparation for chewing occurs before the skill of chewing is put to use during eating. The key to therapeutic chewing interventions is to develop the movement skills that the child needs before expecting them to be used functionally. This means that during therapy you must work on getting 1) graded jaw opening and closure, 2) jaw shift (right & left), 3) separation of the tongue and jaw in a flexed and extended posture, 3) Controlled movement of the tongue base which is necessary to keep the food over the molar surface, 4) Bolus manipulation, collection and transport.

Readiness for chewing follows the same movement progression that occurs in the trunk. Extension and flexion control of the jaw and tongue are followed by lateral and eventually rotational movements. As with every other movement pattern, the components must develop before they can be refined and used in functional skill.

Like every other motor pattern there are a number of different things that can interfere with skill progression. It is the therapist's job to figure out what is interfering with this progression and what movement components are missing. Facilitating movement patterns in the mouth is difficult but not impossible. It requires that the therapist break the skills apart and help the child develop and refine each component before putting it to functional use. All too often due to a lack of understanding of the chewing process therapist crumble cracker into purees, assuming that the appropriate movement pattern will appear in response to this new stimulus. However, if a movement pattern and its' components are not present prior to the stimulus presentation, they will not suddenly appear. Particularly during and activity that requires graded control and refinement for the skill and for airway protection. Because airway protection is required during chewing and swallowing the task will be completed using an existing pattern that is safe. Thus chunks in a puree will be managed as a puree and will either be suckled or transported back for a single bolus swallow.



Therapists working on chewing must get the muscle elongation followed by controlled contraction and movement of the cheeks, lips and tongue. This is best developed outside the meal time. Once the movement components are present they can be integrated into a functional chewing pattern, refined and eventually introduced into a meal once the skill is consistent.

As children explore their world with their mouths they receive a lot of elongation and manipulation of the tongue that will provide the basis for chewing control. This is paired with finger feeding experiences using biscuits and cheerios that help the child learn to maneuver the tongue and shift the jaw in an attempt to maintain control over the food and refining the tongue base control. Providing that the child has a stable GI system gagging is a very normal means of moving an object back into the mouth from the pharynx. However, for children with GI issues this can prove disastrous and prove to be a major reason why chewing skills are not progressing. Also rotation of the tongue is not possible if rotation is not present in the trunk.

Ultimately grinding cracker into purees may be teaching a child how to handle a thicker texture but this is not chewing.

# The Role of Behavioral Psychology on the Feeding Team: Enhancing Compliance and Skill Development

By Betsy Clawson, Ph.D., LCP and Donna Purcell, Psy.D., LCP , Children's Hospital, Pediatric Feeding Program, Richmond, Virginia

Multidisciplinary treatment teams for feeding are becoming more common and research is showing that patients have better outcomes when treated by a team. As more understanding is gained of the complex nature of feeding difficulties, the need for help from behavioral psychology in treating these difficulties has become more apparent. Further, feeding treatments which include a psychological approach are generating more positive outcomes. Therefore, it is becoming more frequent for feeding teams to include psychology as part of their multidisciplinary team. But what specifically does the Psychologist add to the treatment model?

Feeding problems are complex and often involve a learned/conditioned component. Many severe feeding problems begin as a medical based problem (Figure 1), such as reflux, resulting in food avoidance because the child experiences pain when eating. Consequently, the caregiver responds to the child's distress and negative behaviors by withdrawing the food, ending the meal, becoming frustrated, etc. During this process the child is learning that feeding is unpleasant and that they can manipulate the situation by food avoidance behaviors. This develops a pattern whereby the child's negative behavior is rewarded by expectations being removed.

Once the medical problem is addressed and under control (Figure 2), the child, however, has learned "if I do not want to eat, I will cry, gag, etc. and my caregiver will stop the feeding". The child has now established a strong avoidance pattern that continues back and forth between the child and the caregiver whenever food is presented. It then becomes very important for the treatment to include behavioral principles which reward positive behaviors and decrease the negative behaviors so that the child can then eat and grow normally.

## **Figure 1.**

Gastroesophageal Reflux & esophagitis



Food Avoidance → Crying, Fighting, Turning Head, Pushing Food Away, Gagging, Vomiting, Spitting Out Food, Tantrums, Throwing Food, Trying To Climb Out Of The Chair



Caregiver Responses → Frustration, Stops the Meals, Feeds Only Preferred Foods, Feeds Inappropriate Textures, Attending to Negative Behaviors During The Meals

## **Figure 2.**

Food Avoidance → Crying, Fighting, Turning Head, Pushing Food Away, Gagging, Vomiting, Spitting Out Food, Tantrums, Throwing Food, Trying To Climb Out Of The Chair



Caregiver Responses → Frustration, Stops the Meals, Feeds Only Preferred Foods, Feeds Inappropriate Textures, Attending to Negative Behaviors During The Meals

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Psychologists are able to design behavioral feeding techniques to increase appropriate feeding responses, decrease inappropriate feeding behaviors, and also improve compliance with therapeutic interventions. Behavioral protocols are also useful with children who have oral motor skill deficits to improve skill acquisition via rewarding successive approximations and motivating the child to try something new. The table below describes some typical behavioral strategies that are successful with treating patients with feeding

<b>Underlying Principle:</b>	<b>Description of Application:</b>	<b>Examples:</b>
Positive Reinforcement	The purpose is to provide positive consequences for desired behaviors. Reinforcement is given immediately following desired behavior. This should be something that the child only has access to during meal sessions.	When the desired behavior occurs, give verbal praise, tangible rewards, toys, or turn on the TV/video. Positive reinforcement can be provided for compliance with oral motor exercises as well as for learning new feeding skills. Start with a level where the child will be most successful so that they are able to gain access to the reward and learn the rules.
Shaping	The purpose is to reinforce successive approximations toward the desired outcome. This involves gradually making changes so that the child is achieving the goal.	For a highly anxious child it may be necessary to begin by praising 1) looking at food, 2) touching food, 3) food to lips, 4) opening mouth, 5) accepting food in the mouth, 6) chewing and swallowing the food. For a child who only accepts smooth foods, slowly adding a new texture into a texture the child already accepts and gradually increasing to fork mashed. For a picky eater, taking a food that is preferred and gradually changing it into a new food. I.E.) peanut butter sandwich → peanut butter and jelly → bread with jelly → toast with jelly → bagel with jelly → bagel with cream cheese & jelly → bagel with cream cheese.
Fading	The purpose is to gradually remove assistance and reinforcement needed to maintain the newly established behaviors.	Decrease extent of guidance and rewards as child gains new skills so that they can eat in a more normal setting. For example, providing reinforcement after 1) every bite, 2) every two bites, 3) three bites, 4) a full rotation of a bite of each food and drink in the meal.
Escape Avoidance	The purpose is to encourage compliance and not allow the child to get away with not having to follow through with your request.	Prolonged presentation involves holding the food in front of the child's lips until child opens the mouth and food is accepted (do not force the food or spoon into the mouth or they will not learn to open their mouth for the bite). This is also a negative reinforcement strategy whereby the reward is the removal of the spoon for compliance with accepting the bite.
Extinction	The purpose is to selectively ignore inappropriate meal behaviors. This is often paired with positive reinforcement for an alternative appropriate behavior.	Ignore hand waving/ batting and pushing while performing oral motor exercises and immediately reward the child after each exercise is completed. The meal is not terminated for inappropriate behavior (i.e., gagging, emesis). Instead the feeder ignores these behaviors and continues feeding until the timer rings.
Response Cost	The purpose is to remove rewarding stimulus contingent upon undesired behavior	For example, remove toys/video for food refusal and return them when the child accepts the bite being presented.
Systematic Desensitization	The purpose is to combine something the child does not like with the absence of aversive events along with the presence of positive events so that the child is no longer afraid of the situation.	The child learns that eating a new food is associated with a reward instead of a negative event (i.e., gagging). For example, a child who is a picky eater learns that eating the new foods will not cause something he does not like, but instead he is rewarded for eating the new food and his anxiety decreases.
Environmental Interventions/ Meal Characteristics	The purpose is to provide a consistent mealtime environment which would include: schedule, positioning, Setting, routine.	Limit meals to 10-20 min., depending on child's cooperation (increase gradually to a goal of 20 minutes). Seat child in supported position for meals. Reduce distractions. Provide consistent meal times, location, and feeding strategies at every meal.
Feeder Reliability	The purpose is the training of all caregivers to promote consistency of feeding strategies including communication about changes with feeding interventions.	Caregivers, teachers, babysitters, etc. should all feed the child using the same strategies with every feeding. Regularly communicate with child's caregivers about changes to feeding strategies. Have parents watch and participate in therapy sessions for hands-on training/coaching.

*This material is provided for informational and educational purposes only; it does not contain specific medical advice. If you have specific health questions or problems, consult a health care professional for personal medical advice. To reach Patient Services at Children's Hospital of Richmond, call (804) 228-5818. To reach the authors by e-mail: [bclawson@chva.org](mailto:bclawson@chva.org) or [dpurcell@chva.org](mailto:dpurcell@chva.org)*

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Questions, comments, submissions, and suggestions are all welcome. Please be vocal, the hope is that this forum will be educational and will help to connect us as professionals working together.



**Wenzl, T.G., Schneider, S., Scheele, F., Silny, J., Heinmann, G., and Skopnik, H. (2003), Effects of thickened feeding on gastroesophageal reflux in infants: a placebo-controlled crossover study using intraluminal impedance. *Pediatrics*, vol. 111, no.4., April, pg. 355-359. ([www.pediatrics.org/cgi/content/full/111/4/e355](http://www.pediatrics.org/cgi/content/full/111/4/e355))**

The goal of this study was to examine the influence of formula thickened with carob (St. John's bread) bean gum on acid and nonacid GER. Infants with recurrent regurgitation were fed alternately with thickened and non-thickened formula. GER episodes were documented by simultaneous intraesophageal impedance measurement (intraluminal technique, IMP) and pH monitoring. The IMP technique is able to detect bolus movements inside a luminal organ. The use of multiple measuring segments on a single catheter allowed the analysis of direction, height, and duration of the bolus transport. Results indicated that 14 infants were examined during 6 feeding intervals. A total of 1183 GER episodes and 83 episodes of regurgitation were registered. Regurgitation frequency (15 vs. 68 episodes) and amount (severity score 0.6 vs 1.8) were significantly lower after feedings with thickened formula. Although not statistically significant, height reached by reflux in the esophagus was decreased after thickened feedings. Mean GER duration and the frequency of acid (pH < 4) GER were not altered. The authors conclude that thickened feeding has a significant effect on the reduction of regurgitation frequency and amount in otherwise healthy infants .

**Bahr, D. H. (2003), Typical versus atypical oral motor function in the pediatric population: beyond the checklist. *Perspectives on Swallowing and Swallowing Disorders*, American Speech -Language – Hearing Association, Division 13 Newsletter, vol. 12, number 1, March, pg. 4-12.**

It is important for therapists to understand typical oral motor development in order to identify atypical issues. This is an excellent article that reviews the basics of typical oral motor function. The author reviews and discusses oral reflexes, critical learning periods, neural development, cranial nerve function, and specific muscle function. It is thorough and detailed in its explanation and is an excellent resource for clinicians. It would be good required reading for students as well!

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