



Pediatric Feeding and Dysphagia

Dear Fellow Feeders,

October already! First, I would like to thank all who subscribed for supporting this endeavor. It's been a lot of hard work and a true learning experience. Clinically, I have expanded my knowledge researching topics and reviewing articles. It's been a challenge to try and meet the needs of various professionals, work environments, and skills levels working in this field. However, I also find myself wearing many hats and gaining all sorts of other skills such as marketing, accounting, and advertising. I know the people at Kinko's better than I did in grad school.

The feedback I have received has been very positive and informative. Suggestions have been made to define technical vocabulary used throughout the newsletter, to offer an online version (especially for the folks down under in Australia), and to recruit the experts in our field to share

their expertise. I am working on all of these valuable comments.

I have expanded this issue to eight pages to allow the freedom to explore topics in more depth without feeling like I'm trying to squeeze an elephant into my living room. I plan to continue this and hope you, as readers, find it more enjoyable.

I would like to put out a request to the readers for topics, research, etc. that you're interested in hearing about or case studies that you would like feed back on. Feel free to email me at:

Kbracket.nsh1@mail.unch.unc.edu or write to Hiro Publishing (1205 N. Greensboro St., Carrboro, NC 27510). For those of you attending the Dysphagia Research Society meeting (described p.2), see you in Vermont! -Krisi .

Cervical Auscultation: Improving the clinical exam

Clinicians who work outside of the hospital setting must rely heavily on the clinical dysphagia exam because instrumental procedures are often difficult to obtain. Linden et al (1993) reported that the presence of aspiration in the adult population can be predicted 66% of the time by trained clinicians. Thus, for the other 1/3, errors are likely to exist when conducting an assessment. Comparable

pediatric data are not yet available.

According to Zenner (1993) "Methods used to assess the pharyngeal phase of swallowing include visual observation of laryngeal movement, observation of coughing behavior, palpation of laryngeal movement, and cervical auscultation." Wet vocal quality and breath sounds, congestion, and throat

(Continued on page 2)

Pediatric Feeding and
Dysphagia Newsletter
Hiro Publishing

Volume 1, Issue 2

October, 1999

Special points of interest:

- ☺ New information
- ☺ Research articles
- ☺ Web sites
- ☺ Ask the experts

Editorial assistance provided by Elizabeth Crais, Ph.D. CCC-SLP, Division of Speech and Hearing Sciences, UNC -Chapel Hill

Inside this issue:

| | |
|-------------------------|-----|
| Cervical auscultation | 1-2 |
| Conference highlight | 2 |
| GER Testing | 3 |
| Case History | 4 |
| Aha, FYI Stuff Research | 5-8 |
| Pyloric Stenosis | 6 |
| Interview | 6-7 |

Cervical Auscultation: Improving the clinical exam

(Continued from page 1)

clearing may be added to this list. In an attempt to improve the sensitivity of the feeding evaluation, some clinicians have added cervical auscultation with a stethoscope to their repertoire.

Cervical auscultation (CA) is a general term that describes several techniques which yield different acoustic information. For us, this involves placing the flat diaphragm of the stethoscope against the lateral side of the neck near the larynx, adjusting placement until cervical breath sounds can be easily heard.

Using CA, the pharyngeal phase of swallowing is considered normal if ; the swallow occurs quickly after oral transit, an apneic period occurs during the swallow, an exhalation occurs directly after the swallow and clear breath sounds are heard after the swallow. Vice et al (1990) report that the feeding and respiratory actions of the pharynx and larynx are associated with characteristic sounds which are audible by stethoscope. The use of CA with a stethoscope narrows the spectral range of sound for enhanced detection of breath sounds. (Zenner, 1993)

"Tracheal aspiration is suspected when the flushing sound of material (usually liquids) is heard prior to the initiation of the pharyngeal swallow or when breath sound wetness, vocal stridor, coughing or throat clearing are heard after the swallow" (Zenner, 1993). Preliminary studies are finding that the use of CA increases the sensitivity and detection of aspiration.

Limitations to this procedure include nomenclature difficulties, observer variability, inadequate understanding of sound production, and lack of adequate data studying the technique. The use of CA requires practice and the willingness to develop your ear.

The use of CA is also being used successfully with the pediatric population. Dr. Eicher (1998) wrote about the use of CA to identify when a swallow occurs, if the child is aspirating, and for nasopharyngeal reflux. It is easily applied to therapy as well as assessment.

The quality of information obtained depends not only on the perceptual skills of the listener, but on the use of appropriate equipment and technique (Hamlet et al, 1994). The type of stethoscope selected can be important for accuracy. Stethoscopes are best suited for transmitting low frequencies, below 1000 Hz. In 1994, Hamlet et al. studied various stethoscopes and found that the Littman Cardiology II and the Hewlett-Packard Rappaport-Sprague Bell (medium bell small diaphragm) were found to have the best overall acoustical performance for use in CA.

To get started, borrow or buy a stethoscope and listen to normal swallows paying particular attention to breath sounds, the swallow with apnea, and exhalation and more

Conference Highlight: Dysphagia Research Society

The annual Dysphagia Research Society meeting will be held in Burlington, Vermont from October 17 - 19. For those of you unfamiliar with this meeting, it is a forum dedicated to discussion and debate surrounding the latest research and clinical practice in dysphagia.

Physicians, allied health professionals, nutritionists, and others from around the world dedicated to this area of study will present papers orally, followed by discussion and via

breath sounds. Listen to patients before they go for a swallow study and compare your CA results with those of the study. As your ear develops, you will feel more comfortable incorporating it into your exam and trusting this information to help with clinical decisions.

Eicher P. CA in Feeding Children with Comparison with Videofluoroscopy. *Swallowing and Swallowing Disorders (SID 13 Newsletter)*, July, 1 1998.

Hamlet S, Penney DG, Formolo J. Stethoscope Acoustics and Cervical Auscultation of Swallowing. *Dysphagia* 9, 63-68, 1994.

Hamlet, S, Nelson RJ, Patterson RL. Interpreting the Sounds of Swallowing: Fluid Flow through the Cricopharyngeus. *Annals of Otorhinolaryngology* 99, 749-752, 1990.

Linden P, Kuhlemeier, KV, and Patterson, C. The Probability of Correctly Predicting Subglottic Penetration from Clinical Observations. *Dysphagia* 8 :170-179, 1993.

Vice FL, Heinz JM, Giuriati G, Hood M, Bosma JF. Cervical Auscultation of Suckle Feeding in New born Infants, *Developmental Medicine and Child Neurology*, 32, 760-768, 1990.

Zenner, P. Cervical Auscultation, Presentation at Future Direction in Dysphagia, Raleigh, NC, (September/22- 24/1993).

poster sessions. Although, It's usually heavy on the adult side of dysphagia don't think you won't benefit. We have a lot to learn from our "adult" colleagues, after all, many good ideas have filtered into pediatrics this way. Plus, there are always clinicians dedicated to pediatrics attending. It's a good place to meet and discuss issues! If interested, call International Meeting Managers to get a brochure 1-713-965-0566 or get on their mailing for next year.

Gastroesophageal Reflux: Diagnostic Testing

There are many options for evaluation of suspected reflux. Pros and cons exist for each procedure, and you'll find the choice of procedure varies across physicians. It is important to become familiar the various procedures, to better assist our patients.

The most common testing includes an upper GI series (or barium swallow in some facilities) and the pH probe. An upper GI is a radiological procedure that involves the patient drinking barium (to fill the stomach) and the use of fluoroscopy (moving x-ray) to assess anatomy and physiology of the digestive tract. If the child won't drink the barium and a nasal gastric tube is placed or if the child has a g-tube, these tubes can be used to fill the stomach.

Anatomy is assessed for structural defects. The radiologist observes the barium moving through the digestive tract, thus, evaluating the swallow (briefly), esophageal peristalsis, entry to and exit from the stomach, and transit through the small intestine. Most facilities will place the patient in a supine position to alleviate the effect of gravity on the esophageal transit. The patient is then rocked from side to side and is observed for reflux. Reflux episodes are observed for severity and whether material is aspirated.

Advantages of the upper GI are that it defines anatomic defects, dysmotility, and mucosal abnormalities. Disadvantages include a short monitoring time (test takes 30-60 minutes) and only a 50% sensitivity for GER. The poor sensitivity may be related to the fact that regular formulas and food take longer to digest than the barium.

The pH probe is considered the "gold standard" of reflux testing. This involves placing a small catheter transnasally into the esophagus just above the lower esophageal sphincter (LES) where a sensor will record levels of acidity in the esophagus. The child will wear the probe for 16 - 24

hours depending on the facility, and most require an over night stay. Caregivers are asked to keep a log of the positions, activities, and signs of GER to later correlate with the probe data.

GER is defined as a pH of 4 or less for 7% of the time (under 3 months) or 10% of the time (3 months and up). Data collected consists of number of GER episodes, the longest episode, and number of episodes while sleeping. This data is tabulated and a GER score is given signifying severity.

Advantages of the pH probe are the long monitoring time, temporal relationship of GER and symptoms, and assessment of severity in terms of quantity and length of episodes. Disadvantages involve the expense, invasiveness, and the fact that post-prandial GER and alkaline reflux will not be detected (formulas are not acidic). Monitoring may be necessary for probe placement and it does not assess how high the reflux went.

In a recent study, Bowman Gray Medical School found that using a double sensor probe, with a sensor placed near the upper esophageal sphincter (UES) and one above the LES, was more sensitive for evaluation of reflux. This provides information on how much GER is threatening the airway.

Scintigraphy, also called the gastric emptying scan or a milk scan is a nuclear radiology test that evaluates for aspiration, GER and quantifies gastric emptying time. Protocols may vary between hospitals. It involves placing a small amount of a radioactive substance into the child's drink and taking pictures to evaluate for aspiration, and then once a minute for the first hour, and follow up shots at 2 and 3

hours. Advantages are that it can identify reflux, repetitive episodes, and it quantifies emptying time. Therefore, assessing if delayed gastric emptying is contributing to GER. Disadvantages are the short monitoring time.

The only test that will confirm esophagitis is an endoscopy. A Gastroenterologist will pass an endoscope into the esophagus to assess mucosa and anatomic defects, and often tissue samples are taken and studied. The advantages are the confirmation of esophageal tissue and anatomic defects. Disadvantages include sedation and the invasiveness of the procedure.

Esophageal manometry should be mentioned for its usefulness in assessing motility. A catheter with sensors is swallowed and pulled through the esophagus measuring pressure changes. This is very difficult to perform with children, and is therefore not used often. Ultrasound has also been used but has not proven to be overly helpful.

These tests all prove to be useful to varying degrees when evaluating for GI difficulty, however, they each have specific limitations. It is important to combine test results and follow-up treatment with what caregivers and we, as therapists, are seeing clinically to best serve our patients.

Billeaud C, Guillet J, Sandler, B. Gastric Emptying in Infants with or without Gastroesophageal Reflux According to the Type of Milk. *European Journal of Clinical Nutrition*, 44: 577-583, 1990.

Hart J. Pediatric Gastroesophageal Reflux. *American Family Physician*, 54:2463 - 2571, 1996.

Little JP, Matthews BL, Glock MS, Koufman, JA, Rehousin, DM, Loughlin CJ,

(Continued on page 5)

Case by Case...

Kiki is a three year old female with the following medical history: she was the 5 pound product of a 36 week gestation, twin pregnancy. Diagnoses include hypoxic ischemic encephalopathy and bulbar palsy. She received a nissen fundoplication and g-tube shortly after birth.

She receives all nutrition via g-tube and is fed pediatric Vivonex in 3 bolus feeds of 9 oz. Her mother also gives her juice and some cereal through the tube. (Vivonex was selected a year ago because of allergies, it is an amino acid based formula). She has been receiving oral-motor therapy weekly from a local speech therapist.

Initial oral motor exam: Kiki presented with an open mouth posture with very low tone in her cheeks, lips and jaw musculature. There was frequent and severe drooling. Labial movements were positive for opening wider and occasional move toward closure, no lateral spread. Tongue was large and flaccid, held in midline, sometimes against the palate. A high narrow palate was observed.

Modified barium swallow study: Revealed poor bolus formation and transit secondary to low facial tone, severely delayed swallow initiation up to 1 - 2 minutes, with several incomplete swallow attempts, 2 successful swallows, no aspiration of purees (they pooled in pyriforms and valleculae), and trace aspiration of liquids.

Therapy Exercises: goals are to increase active movement of facial and lip muscles, improve swallow initiation, and pharyngeal contraction. Kiki is followed weekly and her Mom works with her daily at home.

- a. For increased pharyngeal contraction, a modified version of the Shakir exercise (developed by Reza Shakir, MD and presented at Dysphagia Research Society Meeting 1996/1996, no references yet) is used; Kiki is placed in supine and with minimal support pulls herself up similar to a sit up. Assistance is given to prolong the contraction.
- b. Oral stimulation is provided; to increase lingual movement, using a gloved finger, stretching is provided under the tongue and facilitation is used for lateral movement. To increase facial tone, rapid deep pressure tapping is used on her cheeks and lips.
- c. Swallowing; practice of controlled swallowing is provided by using a catheter tip syringe and placing it in the posterior oral cavity (to bypass oral transit). (see reference for Eicher under cervical auscultation article for use of this technique) Small to medium boluses (1-3cc) of cold, thick, sour puree are placed, followed by assistance for mouth closure, chin tuck, and pressure places behind mandible to enhance posterior tongue movement.
* SEMG (surface electromyography) or Cervical auscultation is used in conjunction with syringe boluses to monitor when swallowing occurs. *this technique will be explained in a future issue.
- d. Spoon placement - in between syringe boluses and at the end of the session, trials of a dry spoon or a spoon with a taste are used to activate lip closure and to reinforce the relationship of the spoon and feeding.

Progress: Both Kiki's mom and I feel that she is doing well in therapy. Activities have been advanced slowly to include all of the above over the last 4 - 5 months. Because of Kiki's past oral-motor therapy she has had no trouble accepting the oral stim activities and even imitates the intra-oral exercises. She has also learned to open her mouth for the syringe and usually follows by chin tucking independently to assist with mouth closure. She is beginning to produce a speech sound (/n/) easily and is protruding her tongue past her lips. She is also achieving some upper lip movement (nasal elevators) more spontaneously. Her mother reports that there is significantly less drooling for several hours after each session.

- Because of Kiki's severe dysphagia and her obvious risk for aspiration, syringe swallows were initiated slowly and under careful observation. Her Doctor feels that her lungs are clearer than ever and after 5 months, she has remained healthy without any clinical signs of aspiration or infection.
- A follow-up MBSS (modified barium swallow study), revealed no change in her swallow initiation. While disappointing, clinically she does appear to be making changes based on observation and through parent report. The lack of evidence on the MBSS may be due to environment, lack of sufficient warm-up time and absence of her mother who is pregnant and could not participate during the procedure.

Aha! FYI Stuff...

Web Resources: The World Wide Web is an excellent resource for information and it seems like new sites are appearing daily. It actually can be quite overwhelming, and a quick search can turn into several hours before you know it. Here are a few favorite resources for neonatal and pediatric feeding information.

- neonatal.peds.washington.edu/ - NICUWeb from the University of Washington provides information and links to other related sites
- www.neonatology.org/ - Neonatology on the web contains teaching files, guidelines, and links
- members.home.net/cotton/neoweb.html - Robert Cotton's hot neonatology website
- www.new-vis.com/ - Suzanne Evans Morris' very comprehensive site containing educational, product, and workshop information
- www.pedinfo.org/ - online information for pediatricians and others interested in children's health
- Dysphagia@cyberport.com - is a discussion forum about dysphagia, to subscribe send the message, subscribe dysphagia, to majordomo@cyberport.com. Phyllis Palmer is the moderator.
- www.dysphagia.com - Phyllis Palmer's Dysphagia Resource page.
- www.feeding.com - Carolina Pediatric Dysphagia's new site includes articles, information, and ordering info for a pediatric dysphagia poster for your office
- gtube@gospel.iinet.net.au - to subscribe www.iinet.net.au/~scarrfam/gtube/subbing.html - this is a very active parent list-serve concerning tube feeding, medication, reflux, and surgery

On the Research Front... Feeding the Child with a Disability

Ellen Trier and Adrian Thomas, MD co-authored this article which appears in *Nutrition*, vol. 14, No. 10, 1998. Recent literature estimates that 40-50% of children with cerebral palsy (CP) have feeding problems. This review addresses the cause and effect of feeding problems as well as an approach to assessment and management.

Several factors contribute to reduced food intake including anorexia, secondary to recurrent infections, learned food aversions, constipation, oral-motor deficits, dysphagia, and gas-

trointestinal problems. The effect of feeding problems may include stressful mealtimes, chronic aspiration, and malnutrition. Feedings may take up to 15 times longer than in a typically developing child. Malnutrition has been reported in 13-52% of children with a disability. The authors state that chronic malnutrition is not the only cause of growth failure but it may be the most important.

Assessment of feeding problems is best performed by a multidisciplinary team. Accurate feeding and dietary histories are essential. Nutritional status, oral-motor and swallowing evaluations should be conducted. This article suggests, "as many disabled children have linear growth failure, a measure of body weight alone is of limited value in nutritional assessment and it is probably better to use weight for height as an indicator of malnutrition."

Estimating the energy requirements for children with a disability

is complicated. Most studies have shown that the energy requirements for children with CP are less than those for normal children of the same age. After discussing several methods, the authors conclude that trial and error is the most common using different feeding volumes and monitoring body weight. Protein and micronutrient intake should also be monitored.

Efforts should be made to optimize oral intake through the use of positioning, diet changes, feeding equipment, and therapy. Non-oral feedings should be considered when oral feedings are unsafe, inadequate, or time consuming. Careful dietetic supervision is recommended to ensure nutritional adequacy and that weight gain is not excessive.

Data indicates that this problem will increase as more low weight infants survive. Life expectancy will also increase with better care. The authors suggest early identification matched with early intervention utilizing a multidisciplinary approach to assessment and treatment.

GER: Diagnostic Testing

(Continued from page 3)

McGuirt WF. Extraesophageal Pediatric Reflux: 24-Hour Double Probe Monitoring in 222 Children. *Annals of Otolaryngology*, 106: 1-16, 1997.

Putnam, PE, Gastroesophageal Reflux Disease and Dysphagia in Children. *Seminars in Speech and Language*, 18: 25-37, 1997.

Congenital Pyloric Stenosis

Pyloric stenosis is the narrowing of the part of the stomach (the pylorus) that leads into the small intestine. In infants, this condition is caused by a thickening of the musculature of the pylorus, which prevents the stomach from emptying into the duodenum and small intestine. The cause of the thickening is unknown although genetic factors may play a role. Alternative names include gastric outlet obstruction or congenital hypertrophic pyloric stenosis.

Congenital pyloric stenosis can affect both sexes but is more common in first born males. It occurs in approximately 3 in 1,000 live births, with boys affected 5 times more often than girls. The condition usually begins between 2 and 5 weeks of age, but it can occur as late as 4 months. There is no known prevention.

During the initial stage, signs and symptoms of pyloric stenosis are similar to those of severe gastroesophageal reflux. Some physicians use an elevated serum bicarbonate level or decreased serum chloride level to help decide how to proceed.

Common symptoms include projectile (forceful vomiting), particularly after eating, which becomes increasingly forceful, loose green diarrhea stools, failure to gain weight normally, abdominal fullness (prematurely) after feeding, belching, and abdominal pain. The infant is typically always hungry because of frequent vomiting. During vomiting episodes, bile is not seen, but blood may be due to esophagitis. In some children, a muscular mass in the upper abdomen can be detected. Constipation, gradual weight loss and dehydration are also seen.

Evaluation includes a medical history and physical examination. This typically reveals a distended abdomen and palpable mass. A barium swallow and upper GI series typically reveals the narrowed pylorus. Abdominal ultrasound has been used to

evaluate some infants more non-invasively. Blood tests including electrolytes will be done to exclude chemical imbalance from vomiting.

About 2/3's of infants will have the typical metabolic abnormality of hypochloremic alkalosis. This must be corrected with IV fluids prior to surgery. Treatment is surgical and involves having a pyloromyotomy, this surgery has been used for over 80 years. The muscle fibers of the pylorus are cut, allowing for improved gastric emptying. Small, frequent feedings are usually well tolerated after surgery. The complete relief of symptoms occurs after surgical repair.

Davenport, M. ABC of General Surgery in Children: Surgically Correctable Causes

of Vomiting in Infancy. *British Medical Journal*. 312, 1996.

Healthgate. Pyloric Stenosis, Congenital. Web site:www.healthgate.com.

Home Medical Advisor. Pyloric Stenosis. Medical Library on CD ROM, 1997.

Koop, Dr. Pyloric Stenosis. Medical Encyclopedia. Web site:www.drkoop.com.

Smith GA, Mihalov, L, Shields, BJ.

Diagnostic Aids in the Differentiation of Pyloric Stenosis From Severe Gastroesophageal Reflux During Early Infancy: The Utility of Serum Bicarbonate and Serum Chloride. *American Journal of Emergency Medicine*, 17, 1, 1999.

Texas Pediatric Surgical Associates. Pyloric Stenosis. Web site:www.pedisurg.com.

Interview with Dr. Margaret Leigh, Pediatric Pulmonologist, UNC Hospitals

Dr. Margaret Leigh is the Director of UNC Hospital's pediatric pulmonary division. She answered questions surrounding the topic of aspiration on 9/10/99.

1. Explain the effect of aspiration on the lungs?

Chronic aspiration causes chronic inflammation in the airway, increased mucus production, and a change in airway epithelium. Increased mucus leads to coughing and the chance of mucus plugging or infection. Infections can result from aspiration of oral secretions or food items, if the child is not able to clear the lungs well, they are at risk for chronic infections such as bronchitis. A one time aspiration event may not cause a problem if the lungs were cleared of the material.

2. What influences how well a child handles aspiration?

The most important factor is overall health and nutrition. If the child is active, they will have good defense mechanisms such as deep breathing and a productive cough. It's not age related. The patients who are malnourished with decreased activity have weakened resistance.

3. What about the patients who aspirate and never get sick?

Many have good cough reflexes and are able to protect their lungs. The greatest risk is when the patient does not respond to aspiration as in silent aspiration

4. What does a bronchoscopy evaluate? *It assesses for anat-*

(Continued on page 7)

Interview with Dr. Leigh Continued

omic problems such as floppiness of the airway, inflammation or redness, and increased mucus. The latter two might indicate aspiration. Saline is squirted into the airway and aspirated back with secretion which are then evaluated for infection. This is sometimes referred to as the lipid laden macrophage test which assesses for infection which may indicate aspiration, although, there is no consensus on the reliability of this test for aspiration.

**In a letter to the Dysphagia listserve Dr. Colin Rudolph stated, The use of the lipid laden macrophage test is well described (Nussbaum E et al 1987, Association of lipid laden macrophages and GER in children. J Pediatr 110:190-194), but the specificity and sensitivity are not well established and there is a high rate of false positives (Staugas R et al., 1985, The significance of fat filled macrophages in the diagnosis of aspiration associated with GER, Aust Pediatr J, 21:275-277). Rudolph suggests this is just one piece of the puzzle.*

5. Is aspiration from gastroesophageal reflux worse than prandial (or oral) aspiration?

Yes, because of acid irritation.

6. What do you see on an x-ray that indicates aspiration?

Diffuse streakiness or atelectasis (airlessness, or consolidation in part of the lung) which may indicate infection, bronchitis, or pneumonia.

7. Where does aspiration appear in the lungs?

It depends on the position of the patient; with an infant who is supine for feedings, it may show up in the upper lobes while a child who is fed upright may have infections in the lower lobes.

8. How is aspiration commonly treated?

Antibiotics, chest PT to clear mucus, and possibly with bronchodilators if the child is wheezing.

9. What are the most obvious clinical signs of aspiration (GER and Prandial)?

Recurrent pneumonias, fevers, congestion, requirement of O₂, coughing and choking with meals, wet vocal quality, regurgitation, coughing and spitting up at night.

10. Are kids with bronchopulmonary dysplasia (BPD) more susceptible to aspiration?

**BPD is a chronic lung disease generally seen in neonates after positive pressure ventilation.*

BPD improves over time. These patients are not necessarily more prone to reflux and aspiration, however, we want to protect their lungs so they can heal. You make normal new lung tissue from the ages of 4 - 8 years. Also, if the child has an impaired pattern of breathing such as pushing hard during the expiratory

phase, the pressure change between lungs and abdomen might make the child reflux.

11. What causes congestion in children?

Irritation of the airway from increased mucus production, irritants such as a viral infection, or possibly cigarette smoke. I would be reluctant to call it allergy.

12. Explain why some children require supplemental oxygen.

Children who require O₂ have inadequate ventilation. There is a mismatch between ventilation and perfusion, some areas of the lung are not getting perfused. For example, some blood picks up oxygen while some does not, this is circulated and leads to overall low body O₂. We give supplemental O₂ to increase overall body oxygen. To a range of 90-92% or above saturation levels. This is monitored in most patient with a pulse oximeter.

On the Research Front : Nutritional Assessment & Management in Pediatric Dysphagia

Nutritional Assessment and Management in Pediatric Dysphagia was written by Amy J. Kovar and appears in Seminars in Speech and Language, vol. 18, 1, Feb. 1997, 39-49.

Children who have swallowing problems are at risk for developing nutrition related problems. A child's growth (height and weight) provides an overall indicator of the degree to which his nutritional needs are being met. Measurements that fall within the 5th to 95th percentiles for a child's age are considered normal.

Growth patterns should be plotted for height, weight, and weight for height (ratio of growth parameters for an individual child). These will be

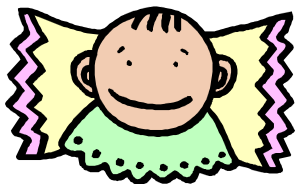
used to determine a weight goal. Malnutrition occurs when a child fails to ingest the macronutrients and micronutrients in the quantities needed. Both inadequate and excessive nutrient intake fall within this classification. Malnutrition is classified as mild, moderate or severe based on ideal and actual body weight. Nutritionists should be consulted as soon as a child falls below his ideal weight range or fails to follow a usual growth curve.

Nutritional goals include meeting caloric needs and taking in a balanced diet which will affect growth,

(Continued on page 8)

Hiro Publishing
1205 North Greensboro Street
Carrboro, NC 27510

Special for Feeding Therapists and
Professionals!



Nutritional Assessment & Management in Pediatric Dysphagia

(Continued from page 7)

strength and development. Nutritional needs are estimated in several ways. The Recommended Dietary Allowances (RDA) is the most common, and estimates needs for 95% of the population. Many children with developmentally disabilities have impaired function and actually have lower calorie needs. Other techniques involve using the child's height or basal or resting energy expenditures to determine caloric goals.

According to Ms. Kovar, feeding guidelines for the pediatric patient with dysphagia include using the food guide pyramid for oral feeders, increasing calories can be accomplished by adding calorically dense foods (e.g., margarine, oil, whole milk, sour cream) and commercial enhancers (Polycose, Promod, MCT Oil). Common household foods that can double as supplements include Carnation instant breakfast, milkshakes, and pudding. Decreasing calories can be done by using foods with lower caloric content (fruit, rice cakes). Texture alternation can be achieved by using thickened liquids with commercial thickeners, infant cereal, yogurt, or applesauce, and pureeing. A pediatric multivitamin is usually recommended to assure micronutrient adequacy.

Non-oral feeding options involve the use of enteral feedings via tube (nasal-gastric tube (NG), gastrostomy (GT), or jejunum (NJ or JT)). Bolus or continuous feeds are options with NG or GT feeding, while a continuous feeding is required with jejunal feeding because a portion of the digestive process has been bypassed. Parental (or IV) feedings are indicated when gastrointestinal function is impaired.

Various formula are discussed including those for infants, toddlers, and homemade versions. Formulas may be adjusted to meet a child's higher needs. Lastly, fluid requirements and adequate hydration is recommended especially for those children on thickened liquid diets and concentrated formulas.

To request a copy of this article contact: Amy J. Kovar, Office of the Maryland WIC Program, 201 W, Preston St., Baltimore. MD 21201.

Next Issue in January....See you in 2000 !