

Dysphagia in Children with Neurodevelopmental (and Acquired) Disorders

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Disclosures

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Relevant Financial Relationships:

- Employed at the University of Arizona
- Receives a Speaker's fee for today's presentation

Relevant Nonfinancial Relationships:

- Member, ArSHA
- Member, ArSHA Pediatric Feeding and Swallowing Committee that developed survey



At the Arizona Speech-Language-Hearing Association's (ArSHA) 2014 Annual Spring Conference in Tucson, the new Pediatric Feeding and Swallowing special committee was announced. In our effort to identify a community of providers and facilitate professional development /advocacy in this service area, we invite you to participate in the following short survey. The results from this committee project will be presented at the ArSHA 2015 Spring Conference with no individual identities associated with the data.

Committee Members:

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Executive Director, Feeding Matters

Survey results

Biggest mentorship needs:

- **Developing a safe swallowing plan**
- Work environment that supports addressing feeding and swallowing issues
- Compensatory strategies

Refresher



Neurodevelopmental Disorders

The neurodevelopmental disorders are a group of conditions with onset in the developmental period. The disorders typically manifest early in development, often before the child enters grade school, and are characterized by developmental deficits that produce impairments of personal, social, academic, or occupational functioning.

DSM 5

Examples

- Intellectual Disabilities
- Global Developmental
- Communication Disorders
- Motor Disorders
- Childhood-Onset Fluency Disorder (Stuttering)
- Social (Pragmatic) Communication Disorder
- Autism Spectrum Disorder
- Attention-Deficit/Hyperactivity Disorder
- Specific Learning Disorder

Swallow Development



- Fetal Period (9 wks>)
- 10-11 weeks
 - Pharyngeal swallow
- 18-24 weeks
 - Suckling begins
- 26-29 weeks
 - Lungs
- 34 weeks
 - Suckle & swallow can sustain nutritional needs

Development of Chewing



- Four Patterns of Development
 - Stereotypical vertical pattern
 - Nonstereotypical vertical pattern (6 mo)
 - Diagonal rotary pattern (15 mo)
 - Circular rotary pattern (3-6 yrs)
- Biting and chewing accomplished with no teeth during transitional period using the “molar tables”
 - Described as “munching”
- Sensory input of teeth may contribute to development of CNS control of feeding process

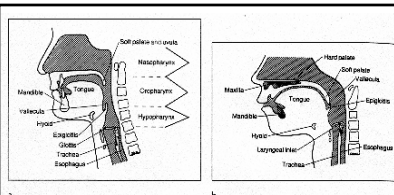
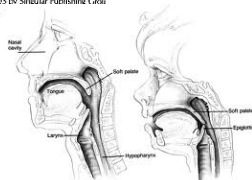


Figure 7-3. Views of the adult (a) and pediatric (b) upper airways. Note the size differences and descent of larynx in the adult. (From *Pediatric Swallowing and Feeding: Assessment and Management* by J. C. Avedon and Brodsky, 1993, p. 6. San Diego, CA: Singular Publishing Group, Inc. Copyright 1993 by Singular Publishing Group Inc. Reprinted with permission.)



12 Cranial Nerves

- I: Olfactory: smell (S)
- II: Optic: vision (S)
- III: Oculomotor: eye (M)
- IV: Trochlear: eye (M)
- V: Trigeminal: speech (M&S)
- VI: Abducens: eye (M)
- VII: Facial: speech (M&S)
- VIII: Vestibulocochlear: hearing & balance (S)
- IX: Glosso-pharyngeal: speech (M&S)
- X: Vagus: speech (M&S)
- XI: Accessory: speech (M)
- XII: Hypoglossal: speech (M)

Dysphagia: characterized by dysfunction in the oral, pharyngeal, and esophageal phases of the swallow.

Arvedson, et al, 1994

25-45% of all children will have feeding and/or swallowing difficulties

33-80% of children who are developmentally delayed will have feeding and/or swallowing difficulties

ASHA

Feeding Red Flags in Young Children

1. refusing food or liquid
2. failure to accept different textures of food (e.g., only pureed foods or crunchy cereals)
3. long feeding times (e.g., more than 30 minutes)
4. difficulty chewing coughing or gagging during meals
5. excessive drooling or food/liquid coming out of the mouth or nose
6. difficulty coordinating breathing with eating and drinking
7. increased stuffiness during meals
8. gurgly, hoarse, or breathy voice quality

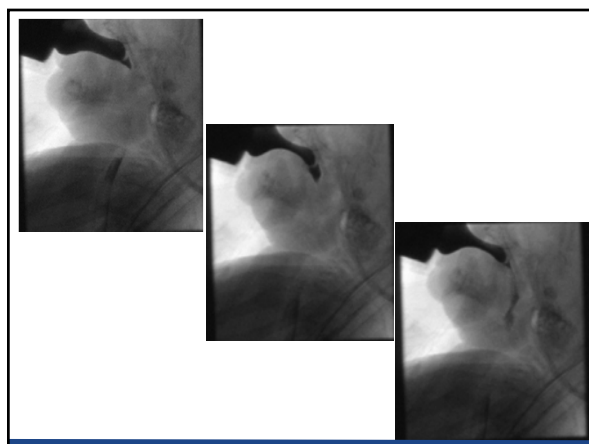
Feeding Red Flags in School Age

1. prolonged and/or stressful mealtimes
2. coughing and throat clearing when eating and drinking or from accumulation of saliva
3. wet breath sounds and/or gurgly voice quality associated with swallowing
4. spillage of food and liquid from the mouth
5. drooling

Videofluoroscopic Swallow Study

- Defines oral and pharyngeal phases
- Defines esophageal transit time and basic motility
- Delineates aspiration related factors
 - Before, during and after swallows
 - Texture specificity
 - Physiologic reasons for aspiration
 - Estimate of risk

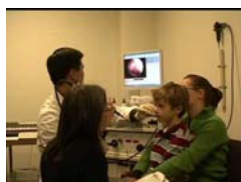
Arvedson, 2012



FEES in children

- Make bedside evaluations possible
- Define some aspects of pharyngeal physiology
- Can evaluate handling of secretions
- Can complete sensory testing

Arvedson, 2012



DeMatteo et al, 2005

Speech-language Pathologists: Clinical assessments were correlated with VFSS in identifying aspiration on liquids but not solids.



Weir et al, 2011

Cohort of 300 children with feeding difficulties:

- 34% had oropharyngeal aspiration. Of those, 81% had silent aspiration
- Children with neurologic impairment more likely to have silent aspiration compared to children with just GI or metabolic issues

Gosa et al, 2011

- There is no good research to show that thickening liquids and thicker solids is the best way to support children with oropharyngeal dysphagia.



Survey results

Biggest mentorship needs:

- Developing a safe swallowing plan
- **Work environment that supports addressing feeding and swallowing issues**
- Compensatory strategies

Work Environment

ASHA 2014 Schools Survey

14% of the school (SLPs) polled serve students who have dysphagia.

25.2% of SLPs who serve preschoolers work with children with dysphagia

ASHA 2015 Health Care Survey: Private Practice

12% of time in peds feeding swallowing

ASHA 2015 Health Care Survey: Peds Hospitals

31% of time in peds feeding swallowing



Roles and responsibilities in the school setting include, but are not limited to:

- (a) identifying and treating students with dysphagia,
- (b) writing IEP dysphagia goals
- (c) developing accommodations,
- (d) consulting with medical professionals, and
- (e) collaborating with teachers, caregivers, paraprofessionals, and cafeteria staff.
- (f) The SLP typically serves as the lead on a feeding and swallowing team (ASHA, 2007).

IDEA 2004

Regulations: Part 300 / A / 300.8 / c / (9) Other health impairment means having limited strength, vitality, or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment, that--

- (i) Is due to chronic or acute health problems such as asthma, attention deficit disorder or attention deficit hyperactivity disorder, diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, sickle cell anemia, and Tourette syndrome; and
- (ii) Adversely affects a child's educational performance.

AZ Dept of Ed Health and Nutrition Services Special Dietary Needs Manual

1. Students must be safe while consuming food and drinks at school. This means access to appropriate programming, personnel, food, and procedures that promote safe swallow.
2. Proper nourishment and hydration is needed in order for students to access the curriculum.
3. Keeping students healthy (free from aspiration pneumonia or other illness related to poor nutrition) maximizes their school attendance.
4. Students must develop skills for eating efficiently during meals and snack times so that they can complete these activities with their peers safely and in a timely manner (ASHA).

Interprofessional or Interdisciplinary team model



Arvedson and Homer, 2006

5 areas that you want to assess prior to starting:

- Airway
- Nutrition and hydration status
- Gastrointestinal status
- Neurodevelopmental status
- Responsiveness to oral feeding attempt

Arvedson and Homer, 2006

Intervention can include:

- Posture and positioning
- Dietary changes
- Utensil modifications
- Oral sensorimotor therapy
- Broad-based sensory approaches
- Caregiver education and training
- (Environment)

Down Syndrome

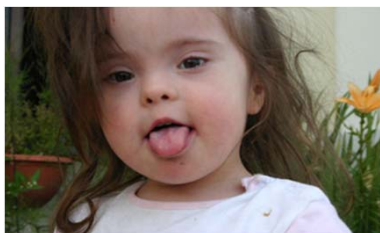


Photo credit: chokole/Source/CC BY-NC-ND

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Speech, Language
& Hearing Sciences

ONEILL and Richter, 2014

- 57% (116/201) of children in their cohort with DS had pharyngeal dysphagia, many demonstrated silent aspiration.
- Upper aerodigestive anomalies common:
 - Adenotonsillar hypertrophy
 - Laryngomalacia
 - Upper airway upstruction

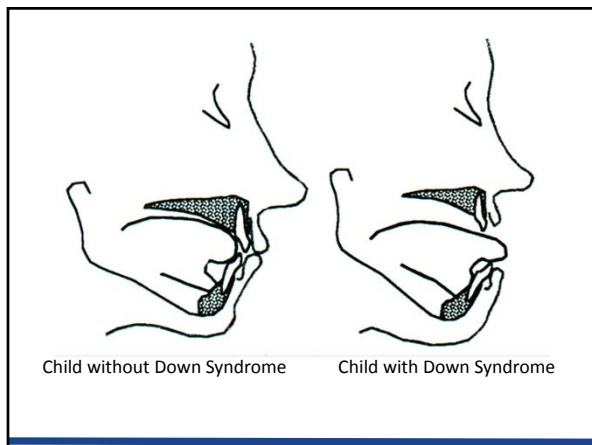


Table 2. Feeding Problems in Down syndrome

Cause	Result	Feeding problem
Periodontal disease	Tooth loss	Poor chewing; pain
Reduced saliva Production	Dry mouth	Poor feeding
large tongue	Oral food loss	Difficulties swallowing
small oral cavity	Poor chewing	Incomplete chewing of food choking
narrow, short palate	Nasal aspiration	Pain; sneezing, choking
Severe lacerations	Dental damage	Pain; poor feeding
oral hypotonia	Poor suck	Choking, poor feeding
abnormal tongue movement	Pocketing of food	Retention of food; choking
uncoordinated suck and swallowing	Poor swallowing	Choking; aspiration; emesis

Ref: Van Dyke et al., 1990; Sterling et al., 1992.

Contributors to dysphagia

- Delayed initiation, poor coordination, poor sequencing of oral motor movements
- Grading jaw movements
- Low tone
- Weak lips and tongue
- Delayed initiation of pharyngeal swallow
- Big tongue compared to small jaw
- Esophageal motor problems: decreased peristalsis along with LES opening

Arvedson and Homer, 2006

Intervention can include:

- **Posture and positioning**
- **Dietary changes**
- **Utensil modifications**
- Oral sensorimotor therapy
- Broad-based sensory approaches
- Caregiver education and training
- (Environment)



What works for you?

Autism Spectrum Disorder

UNIVERSITY OF MICHIGAN
Speech, Language & Hearing Sciences

In children with ASD, "food refusal based on texture, food neophobia, and rigidity around mealtimes were the most common problematic behaviors reported."

ASHA

Martins, Young, and Robson, 2008

When matching for same age peers and siblings, small statistical increase in chance of feeding difficulties seen. Behaviors are somewhat similar between ASD and typical. It's more the **frequency of the behaviors**.

- Biggest problem: adapting to change

Schreck and Williams, 2006

- Found that many of the children in their study had families with food selectivity

Twachtman-Reilly et al, 2008

Type of system	Hypersensitive	Hyporesponsive
Auditory	Overly sensitive to sound in the mealtime environment <i>Possible symptoms:</i> Cover ears, anxious, aggression, cry, yell, withdrawn, distressed	Unaware of sounds in the mealtime environment <i>Possible symptoms:</i> Daydreaming, "spacey," lengthy meal times
Visual	Overly sensitive to light and movement in the environment <i>Possible symptoms:</i> Shield eyes, squint, avert gaze, withdrawn, anxious, distracted resulting in a reduction in food intake	Unaware of relevant or changing visual input in the environment <i>Possible symptoms:</i> Overfocused on irrelevant visual features of the food or plate, inattentive to complete meal
Gustatory	Overly sensitive to a variety of tastes <i>Possible symptoms:</i> Picky eater, prefer bland flavors, food refusal, gagging	Poor taste discrimination <i>Possible symptoms:</i> Crave strong flavors (sour, spicy, etc.), lick or taste inedible objects
Olfactory	Overly sensitive to smells that others do not notice <i>Possible symptoms:</i> Picky eater, distressed, anxious, withdrawn	Unaware of even strong environmental odors <i>Possible symptoms:</i> Disinterested in eating without the enhancement of smell
Tactile	Overly sensitive to tactile input to the skin and/or oral areas <i>Possible symptoms:</i> Thrillie movements around mouth, prefer neutral temperatures, food refusal	Unaware of touch and differences in food textures <i>Possible symptoms:</i> Unaware of noxious around mouth, over-stuffing or pocketing food, mouthing inedibles
Vestibular	Overly sensitive to movement or change in head position <i>Possible symptoms:</i> Poor coordination for utensil use, fearful in unsupported seating	Seeks high levels of movement input <i>Possible symptoms:</i> Poor posture, high activity level, fidgety
Proprioceptive	Poor body awareness and grading force <i>Possible symptoms:</i> Messiness, poor gradation of jaw and hand to mouth movements	Poor body awareness and grading force <i>Possible symptoms:</i> Messiness, poor gradation of jaw and hand to mouth movements

Twachtman-Reilly et al. (2008): Addressing Feeding Disorders

Twachtman-Reilly et al, 2008

Addressing Feeding Disorders:

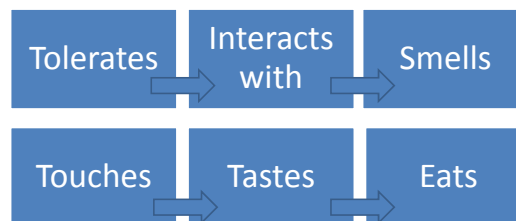
- Enhance predictability with social story
- Define task expectations, time, how much
- Target repetitive behavior patterns, decrease food selectivity by allowing choices, give specific instruction on eating process to decrease oral stuffing

Twachtman-Reilly et al, 2008

Addressing Feeding Disorders

- Oral desensitization
- Child friendly foods
- Combining new foods with familiar ones
- Selecting new foods that look/feel like familiar
- Peer modeling
- Seating
- Follow eating with preferred activity

Work by Kay Toomey, PhD



What works for you?

Cerebral Palsy

Gross Motor Function Classification System

GENERAL HEADINGS FOR EACH LEVEL

LEVEL I	- Walks without Limitations
LEVEL II	- Walks with Limitations
LEVEL III	- Walks Using a Hand-Held Mobility Device
LEVEL IV	- Self-Mobility with Limitations; May Use Powered Mobility
LEVEL V	- Transported in a Manual Wheelchair

Rogers, Arvedson, et al, 1994

- Both oral and pharyngeal phase of swallow significantly affected in children
- Texture plays a part, can be different for each child
- One study, of the children who aspirated, 97% had silent aspiration

Benfer et al, 2015

67% of preschool aged children across levels and types of CP showed clinical signs of pharyngeal dysphagia reported by parents and clinicians:

- Coughing: single cough not discriminatory
- Multiple swallows
- Gurgly voice
- Gagging

Calis et al, 2008

In children with CP at Levels IV and V and lower IQ scores, 76% of students showed signs of moderate to severe dysphagia. Interestingly, parents did not report much feeding difficulty.

Oropharyngeal dysphagia in kids with neurological impairment

Cochrane Reviews:

... is currently insufficient high-quality evidence from randomized controlled trials or quasi-randomized controlled trials to provide conclusive results about the effectiveness of any particular type of oral-motor therapy for children with neurological impairment.

Cerebral Palsy and drooling

Cochrane reviews:

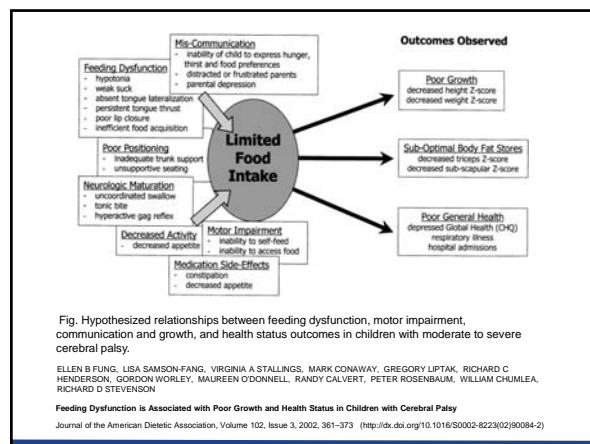
...insufficient evidence to determine which is the best way to address drooling; more research is needed.

Rogers, 2004

Table 1.

Considerations for oral feeding of children with cerebral palsy

1. Dysphagia is more common in children with severe motor impairment
2. Aspiration is a common complication of dysphagia and is usually silent
3. Feeding history is important but often misleading
4. Feeding interruptions, duration of individual feedings, and consumed food textures are useful historical estimates of feeding efficiency
5. Observation of oral feedings is important
6. Weight gain is a good measure of oral feeding efficiency
7. Even though oral feedings may be difficult, they are important to children and families
8. Malnutrition usually presents in early infancy and is rarely resolved by continued oral feedings
9. Chronic lung disease is the most common sequela of aspiration
10. Gastroesophageal reflux is very common and can complicate oral feeding, appetite, growth, and respiratory status



What works for you?

Traumatic Brain Injury



TBI - CDC stats

Causes:

- Falls account for about 40% of all TBIs; disproportionately affect children and older adults
- Unintentional blunt trauma is second leading cause
- MVAs are third

Scale:

- GCS score of 3-8: Severe TBI
- GCS score of 9-12: Moderate TBI
- GCS score of 13-15: Mild TBI

Modified Glasgow Coma Scale for Infants and Children

	Child	Infant	Score
Eye opening	Spontaneous	Spontaneous	4
	To speech	To speech	3
	To pain only No response	To pain only No response	2 1
Best verbal response	Oriented, appropriate	Coos and babbles	5
	Confused	Irritable cries	4
	Inappropriate words	Cries to pain	3
	Incomprehensible sounds	Moans to pain	2
	No response	No response	1
Best motor response*	Obeys commands	Moves spontaneously and purposefully	6
	Localizes painful stimulus	Withdraws to touch	5
	Withdraws in response to pain	Withdraws to response in pain	4 3
	Flexion in response to pain	Abnormal flexion posture to pain	2
	Extension in response to pain	Abnormal extension posture to pain	1
	No response	No response	1

*If patient is intubated, unconscious, or preverbal, the most important part of this scale is motor response. Motor response should be carefully evaluated.

Morgan et al, 2003; Morgan at al, 2009

- Incidence of dysphagia in pediatric patients:
 - Across all levels of injury: 3.8-5.3%
 - 68-76% for severe (GCS score of 3-8)
 - 15% for moderate (GCS score of 9-12)
 - 1% for mild (GCS score of 13-15)

What works for you?

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