Oral Motor Development in Down Syndrome: 

Impacts on Speech and Feeding

Presentation Goals

1. Oral motor development in Down syndrome:
   - What is different?
   - How does it affect feeding and speech?
2. Supporting optimal development
3. Available resources
1. What does an SLP do?

- SLP = Speech-Language Pathologist
- Prevent, assess, diagnose, and treat disorders in infants, children, and adults
Key Concepts

- **Oral-motor skills**
  - Ability to use the lips, cheeks, jaw, tongue, and palate
  - Includes oral exploration, feeding, and sound play

- **Feeding**
  - Gathering food and preparing to suck, chew, and swallow it

- **Speech**
  - Communicating verbally
  - Consists of articulation, voice, and fluency

The Educator’s Guide: Chapter 1; ASHA
Oral-Motor Skills

Movement of the muscles of the Face

Muscle tone & strength
Range of motion
Speed
Coordination
Dissociation

Lips
Jaw
Tongue
Cheeks

Genetic differences in Down syndrome result in:

Intellectual delay
Health issues
Physical differences

Developmental delay
Speech & language issues

Kumin, n.d.
Healthy mouth development supports quality of life

Healthy mouth experiences *from birth*

- Eating, breathing, and nutrition
- Information about the world
- Speech
- Stress reduction
- Jaw and facial development
Speech Development

Health

Sensory

Learning opportunities

Feeding

Physical & Motor Development
Health issues *directly* impact learning capacity

“Physical well-being influences children’s overall emotions, attitudes, and openness to new experiences. When they are even marginally unwell, children are not as available for learning and may reject new experiences or expectations because they lack the energy or ability to handle anything else.”

Morris and Dunn Klein, 2000 pg. 23
**Health Issues**

- Hypotonia
  - “low muscle tone” – natural tension of a muscle at rest
- Sleep apnea (50 – 79%)
- Congenital heart abnormalities (50%)
- Thyroid disease (4-18%)
- Digestion issues
- Celiac disease (5%)
- Diabetes
- Seizures (1 – 13%)
- Leukemia (1%)
- Vision and eye muscle problems (“lazy eye”)

Bull et al., 2011

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**With parent education and careful monitoring, we can prevent or reduce complications like:**

- Hearing loss (75%)
- Ear infections (50-75%)
- Gastroesophogeal reflux (heartburn)
- Eczema
- Tooth decay
- Frequent respiratory and sinus problems
- Respiratory infections
- Mental health or behavioural issues

**Health Watch Table — Down Syndrome**

Forster-Gibson and Berg 2011

<table>
<thead>
<tr>
<th>CONSIDERATIONS</th>
<th>RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>HEENT (HEAD, EYES, EARS, NOSE, THROAT)</strong></td>
<td></td>
</tr>
<tr>
<td>Children and Adults: Vision: -16% have cataracts; -20% - 70% have significant refractive errors</td>
<td>□ Neonatally: refer immediately to an ophthalmologist if the red reflex is absent or if strabismus, nystagmus or poor vision is identified</td>
</tr>
<tr>
<td>5% - 15% of adults have keratoconus</td>
<td>□ Arrange ophthalmological assessment: first by 6 months for all; then every 1-2 years, with special attention to cataracts, keratoconus, and refractive errors</td>
</tr>
<tr>
<td>Hearing: 50% - 80% have a hearing deficit</td>
<td>□ During childhood: screen vision annually with history and exam; refer as needed</td>
</tr>
<tr>
<td></td>
<td>□ Arrange auditory brainstem response (ABR) measurement by 3 months if newborn screening has not been done or if results were suspicious</td>
</tr>
<tr>
<td></td>
<td>□ During childhood: screen hearing annually with history and exam; review risks for frequently occurring serious otitis media</td>
</tr>
<tr>
<td></td>
<td>□ Undertake auditory testing: first at 9 – 12 months, then every 6 months up to 3 years, annually until adulthood, then every two years</td>
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</tbody>
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**Health Care Guidelines**

from the American Academy of Pediatrics
(Bull, et al. 2011)

[http://www.healthychildren.org/English/health-issues/conditions/developmental-disabilities/Pages/Children-with-Down-Syndrome-Health-Care-Information-for-Families.aspx](http://www.healthychildren.org/English/health-issues/conditions/developmental-disabilities/Pages/Children-with-Down-Syndrome-Health-Care-Information-for-Families.aspx)

**Health Care Information for Families of Children with Down Syndrome**

**Child’s Age: 1 Month to 1 Year**

- **Regular well-care visits (check-ups)**
  While infants with Down syndrome might need multiple special visits to their doctor and specialty physicians, it is very important that they get regular well-care visits (check-ups). These visits will include checking your child’s health, giving immunizations (shots), and building the relationships between the doctor and the family. Developing these relationships will help support the medical and other needs of the child and the family.

- **Monitor growth**
  It is important to check growth at every visit. Measurements include height, weight, weight for height, and head circumference. Discuss your child’s diet, activity level, bowel and urine patterns, and growth. Your child’s doctor can help with questions about any need for vitamins or supplements.

- **Immunizations (shots)**
  Your child’s doctor should follow the same shot schedule as for any other child. This includes yearly influenza (flu) shots. It may include other shots, too, depending on your child’s health history.
Sensory Differences

Vision (60%)

Hearing (65-80%)

Touch
Examples: how middle ear fluid distorts hearing

<table>
<thead>
<tr>
<th>What was said</th>
<th>What the child heard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give her a treat</td>
<td>Give her three</td>
</tr>
<tr>
<td>I need something to read</td>
<td>I need something to eat</td>
</tr>
<tr>
<td>Let’s go get Kathy</td>
<td>Let’s forget Kathy</td>
</tr>
<tr>
<td>Daisy</td>
<td>Baby</td>
</tr>
<tr>
<td>Pizza with sausage</td>
<td>Pizza with dog spit</td>
</tr>
</tbody>
</table>

For Parents:

- Request and attend frequent hearing check ups – **every 3-6 months**!
- Checkups should be done by an experienced audiologist or pediatric ENT because of structural differences (smaller, narrower ear canals)
- Consistency with hearing aids is crucial for hearing and language development
Tactile Skills:
Touch helps with learning and development

People with DS often experience difficulties with:

- Processing touch
- Tactile feedback
- Responsiveness to touch
  (may be under/over/mixed)
- Tactile defensiveness can develop
Clues there might be a sensory issue

Response or reaction to sensory input is ‘mismatched’ with type of input

- Intolerance of smells, sights, sounds, textures, temperatures, colors

Overland, Merkel-Walsh, 2013
Picture from: http://www.lexistential.com/

Clues there might be a sensory issue

- Inability to tell when they’re hungry or full
- Swallows food that isn’t chewed well enough
- Puts non-food items in mouth (after a certain age)
- Stores or pockets food
- Gagging or choking
- Lots of drool
- Very messy eaters

Overland, Merkel-Walsh, 2013
Picture from: http://www.intelligentdental.com/
Sensory differences can result in:

- Very limited food repertoire
- Erratic ability to process sensory information → discomfort at meal time
- Food refusal
- Poor weight gain
- Decreased nutritional status
- Tooth decay

Children may need sensory preparation in order to sit at the table and participate in the mealtime.

Overland, Merkel-Walsh, 2013
Picture from: http://reecesrainbow.org

So how can we help to conquer sensory issues?

- Make a ‘touch book’ with different textures
- Opportunities for sensory and exploratory play
- Infant massage
- Face and mouth massage
- Exploring toys with mouth
Sensory Preparation Activities – ‘Wake ups’

Infa-dent finger Massage

Hands-together tapping

Lip Tapping
Hold your fingers together, and tap or clap the fingers on your child’s lips in a playful fashion. This is especially effective if your child opens and closes the mouth while you are doing it.

From: Dunn-Klein & Delaney, 1998
Knowledge = prevention!
Be prepared and start early
Physical Differences

- Upward slanting, widely spaced eyes
- Extra eye folds
- Flat nose bridge
- Small ear canals

Common Mouth Differences in Down Syndrome

- Low tone
- Open mouth at rest
- Misaligned bite
- Small jaw
- High, arched palate
- Lax ligaments
- Larger tongue relative to mouth space
“Oral Motor Myths of Down Syndrome”
– Sara Rosenfeld Johnson, R.SLP

Oral Motor Myths of Down Syndrome
... or....
Problems we can prevent!

Prevention starts with education
We can monitor a child’s health and use safest possible feeding methods
Example: Nose vs. Mouth Breathing

#1: Tongue protrusion

- Infants: milk comes too fast = uses tongue to stop milk flow
- Lax muscles
- Open mouth at rest

Rosenfeld-Johnson, 1997
#2: Tongue too big for its mouth

- When mouth is open, tongue lies flat and flaccid at bottom of mouth
- Flaccidity and protrusion makes tongue look bigger
- High roof of mouth makes mouth area look smaller
- Poor mid-face development

Rosenfeld-Johnson, 1997

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#3: A high narrow palate (roof of mouth)

- Fusion occurs later in Down syndrome (2 years)
- Tongue shapes the palate as it fuses
- If tongue is not resting in the closed mouth, palate will fuse misshapen.

Rosenfeld-Johnson, 1997
#4: Mild to moderate conductive hearing loss

- Low tone also affects Eustachian tube closure
- High milk flow and baby lying on her back means milk flows into ear canal
- Leads to recurrent infections in ear canal -> fluctuating hearing loss

Rosenfeld-Johnson, 1997

#5: Chronic upper respiratory infections

- Infection in middle ear circulates through ear-nose-throat system
- Low tone may create weak cough and inability to blow nose.
- Upper respiratory health and mouth breathing cycle begins
- GERD may also contribute

Rosenfeld-Johnson, 1997
#6 Mouth breathing ->
#7 Habitual open mouth posture

- Narrowed nasal passage (from high palate vault) and chronic respiratory infections make nose breathing difficult
- Low tone and lax ligaments can make jaw support and lip closure difficult
- Enlarged tonsils/adenoids or nasal congestion may block the airway too
- Habitual mouth breathing begins

Rosenfeld-Johnson, 1997

Airway obstruction → mouth breathing → affects face and jaw development
Is an open mouth a problem?

Mouth breathing → Sinus and respiratory health problems

Jaw muscles and ligaments pulled down by gravity

Open mouth at rest

Oral Motor Myths of Down Syndrome

Summary article is available on the Talk Tools website here:

http://www.talktools.com/content/TheOral-MotorMythsofDownsyndromeREVISED.pdf
Importance of Eating

- Health & growth
- Sensory-motor skill development
- Social, relationships
- Family time
- Culture & traditions
Physical Skills for Feeding

- Chewing
- Sucking
- Swallowing
- Breathing
Breathing is important for feeding

Physical Skills for Feeding

- Breathing
- Swallowing
- Sucking
- Chewing
What happens when we eat?

- Accept the food
- Chew the food
- Move the food to the back of your mouth
- Swallow with a protected airway
- Keep the food down
What happens when we eat?

✓ Accept the food
   Sensory development, skill, and learned behaviour.
   ❏ Chew the food
   ❏ Move the food to the back of your mouth
   ❏ Swallow with a protected airway
   ❏ Keep the food down

What happens when we eat?

✓ Accept the food
   Sensory development, skill, and learned behaviour.
✓ Chew the food
   Jaw and teeth mash the food; Cheeks, lips, and tongue position the food.
   ❏ Move the food to the back of your mouth
   ❏ Swallow with a protected airway
   ❏ Keep the food down
### What happens when we eat?

- **Accept the food**
  - Sensory development, skill, and learned behaviour.
- **Chew the food**
  - Jaw, teeth, cheeks, lips, and tongue
- **Move the food to the back of your mouth**
  - The tongue and sides of the mouth help push the food back
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### What happens when we eat?

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- **Move the food to the back of your mouth**
  - The tongue and sides of the mouth help push the food back
- **Swallow with a protected airway**
  - Muscles in your throat work together to cover the airway while food goes down into the stomach through the esophagus. *Timing is essential.*
- **Keep the food down**
When to be concerned about aspiration:

• Gurgly voice
• Wet sounding cough
• Long lasting cough
• Frequent respiratory issues
• Aversion to feeding

= Refer to pediatrician; may do swallowing study!

Link to complex feeding disorders program at Sunny Hill:
http://www.bcchildrens.ca/Services/SunnyHillHealthCtr/TeamsServices/FeedingNutrition/default.htm

What happens when we eat?

✓ Accept the food
  Sensory development, skill, and learned behaviour.
✓ Chew the food
  Jaw, teeth, cheeks, lips, and tongue
✓ Move the food to the back of your mouth
  The tongue helps push the food back
✓ Swallow with a protected airway
  Muscles in your throat, esophagus. *Timing is essential.*
✓ Keep the food down
  The stomach and esophagus work to keep the food from going back up into the esophagus or throat (reflux).
Other health concerns that can affect feeding

- Food sensitivities
- Tooth decay
- Fatigue, low arousal
- Heart complications
- GERD
- Constipation
- Additional Diagnoses (eg. ASD, OCD)

Positioning for Bottle feeding

From: Dunn-Klein & Delaney, 1998
Positioning for Bottle feeding

- **This**
  - Ears above mouth

- **Not this**
  - Ears at same level as mouth

Positions for Breast Feeding

- **This**
  - Modified football hold
  - Ears above mouth

- **Not this**
  - Ears at same level as mouth
Alignment: 90° 90° 90°

No noodles please!

“What you see in the body is what you get in the mouth”

Supportive seating throughout life

Back straight

Non-slip seat

Feet flat

90° between neck and chin

Hips bent 90°

Knees bent 90°
Gastroesophageal Reflux Disease: GERD

- Associated with sinus, middle ear, and respiratory problems
- Symptom: heartburn
- Children with GERD refuse more food and parents have more negative feelings around meal time.

Symptoms of GERD

- Irritability during feedings.
- Sleep issues
- Chronic vomiting
- Pulling knees into the chest
- “Colic”
- Wet burps
- Frequent coughing
- Hoarseness
- Wheezing
- Chronic hiccups
- Sour breath
- Food refusal
Tips for Managing GERD

• Positioning
  – Upright for at least 30 minutes
• Medication
• Change amount or frequency of feeding
• Change in diet

*See your Dr. or GI specialist!

A Feeding Team

• Respiratory specialist
• Nutritionist
• OT
• PT
• SLP
• Gastroenterologist
• Otolaryngologist (ENT)
• Psychologist
• Family supports
• Others?
Sunny Hill Complex
Feeding Team

What happens at a feeding evaluation
http://www.bcchildrens.ca/Services/SunnyHillHealthCtr/Teams/Services/FeedingNutrition/Your+Feeding+Appointment.html

Feeding team resources: Sunny Hill Pamphlet

Feeding Therapy

1. Improving sensory-motor skills
2. Modifying food characteristics and mealtime for current skills/needs = safety
Speech

"Speaking is one of the most refined fine motor functions in the body, and we are often judged by our basic speaking abilities."

Bahr 2010, pg 216

Speech and Down syndrome

• Speech intelligibility is generally moderately to severely reduced, continuing into adulthood

• This can be an additional disability.

• The lasting effects of genetics on functioning are thought to be mitigated with early intervention 😊
Speech and Down syndrome

Speech sounds are affected by differences in:

- Brain and nervous system
- Structure
- Function

Brain and nervous system

- Motor planning problems
- Hearing problems
- Auditory processing difficulties
- Sensory processing differences
Structure

- Shape of the oral cavity
- Teeth misalignment
- Low tone in mouth
- Lax ligaments in jaw
- Airway blockages

Function

- Mouth movement
  - Speed
  - Strength
  - Range of motion
  - Coordination
  - Timing
  - Dissociation
- Increased nasal airflow
Speech: What to work on

• Every child needs an individually tailored therapy plan
• Assessments should look at all aspects of communication (including language and speech intelligibility)
• Goals should be functional (most bang for your buck)

Setting goals

Speech goals might include:
• Exercises to support oral motor function
• Imitation practice (learn to do what I do)
• Specific sounds to practice
• Sequences of movements or sounds
Articulating

“mmmm”

Articulating

“sss”
Articulating

“g”

Process of Articulation Therapy
Activity: Changing a Habit

"Oh the places you’ll go!
There is fun to be done!
There are points to be scored.
There are games to be won.
And the magical things you can do with that ball will make you the winning-est winner of all."  
Dr. Seuss

Breathing

bubbles, horns, sustained sounds, raspberries, tummy time in infants
Vocalization Practice and Play

- Interactions and spontaneous vocalizations should be encouraged!
- Promote vocal play, babbling, and sound production.
- Use movement and noise to get vocalizations going.
Helping your child learn

• Make activities as fun and motivating as possible
  – Use games or toys to keep the child’s attention
  – Engaging attention = Engaging the brain!
• Incorporate movement wherever possible
• Practice speech sounds through music and song
  – Also a great way to release excess energy!

Practicing Sounds in Songs

Slippery fish...
  oM oM oM

Ring Around the Rosie....
  huSHa huSHa
Practicing Sounds in Stories

Yummy Yucky
Leslie Patricelli

mmm mmmm mmm!
Yum!
Yuck!

Practicing Sounds in Stories

Little Blue Truck
Alice Schertle
Illustrated by Jill McDonald

What sound does the truck make?
Practicing Sounds in Stories

Beep Beep Beep!

Practicing Sounds in Play

Mmmmm!

Shhhhhh!
Practicing Sounds in Play

1, 2, 3, GO!

Vrrooom!

Weee oooo weee ooo!

Helping your child learn

• Repeat, repeat, repeat!
• Engage all of the senses
• Reward effort vs. accuracy
• Giving processing (“thinking”) time

...1..2..3..4..5..
Making Speech Flashcards (more) Fun

Take Home Messages

- Oral-motor and sensory challenges are common in Down syndrome.
- Health challenges can further compromise development.
- We can positively affect developmental outcomes through intervention.
**Who can help?**

- **SLP:** BCASLPA private practice listings
  - www.bcaslpa.ca; school, Centre for Ability, SHARE, local health unit

- **OT:** COTBC private practice listings

- Audiologist
- Doctor
- Dentist
- ENT
- Optometrist
- PT
- Dietician/nutritionist

**Resources: Mouth Development and Feeding**

- Nobody Ever Told Me (or my Mother) That!: Everything from Bottles and Breathing to Healthy Speech Development, Diane Bahr, 2010
- A Sensory Motor Approach to Feeding by Lori Overland, Robyn Merkel-Walsh, 2013
Resources: Nutrition

- Down Syndrome and Vitamin Therapy Paperback, Kent MacLeod, 2003

Resources: Sensory Processing

The Out of Sync Child – Carol Kranowitz
The Out of Sync Child Has Fun – Carol Kranowitz
Pathways to Play: Combining Sensory Integration and Integrated Play Groups – Glenda Fuge and Rebecca Berry
Resources: Gross and Fine Motor Development

• Gross Motor Skills In Children With Down Syndrome, Patricia C. Winders, 2013
• Fine Motor Skills in Children with Down Syndrome, Maryanne Bruni, 2006

Resources: Speech & Language Development

• Early Communication Skills for Children with Down Syndrome, Libby Kumin, 2012
• Helping Children with Down Syndrome Communicate Better, Libby Kumin, 2008
• Teach Me to Talk!: The Therapy Manual, Laura Mize, 2011
• Building Verbal Imitation in Toddlers, Laura Mize, 2012
• It Takes Two To Talk: A Practical Guide For Parents of Children With Language Delays, by Jan Pepper and Elaine Weitzman, 2004
Resources: New Parents

- Road Map to Holland: How I Found My Way Through My Son's First Two Years With Down Syndrome, Jennifer Graf Groneberg, 2008
- Gifts, Kathryn Lynard Soper, 2007
- Babies with Down Syndrome, Susan Skallerup, 2008
- (DVD) Down Syndrome: The First 18 Months, Blueberry Shoes Productions, Will Schermerhorn, 2004

References


References


