DEVELOPMENTAL RED FLAGS 
IN THE DENTIST’S CHAIR

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Board Certified, Developmental Behavioral Pediatrics,
Professor of Pediatrics, UVA
OBJECTIVES

“The most common presentation of a developmental disability is failure to achieve age-appropriate developmental milestones.”

Part 1:
How common are developmental delays?
How does one recognize early childhood developmental differences?
What are some developmental “red flags” not to miss during a dental office visit?
What about children with history of high risk infancy?

Part 2:
Can one “anticipate” developmental or behavioral problems?
How can one adapt the office visit for children with DD?
CYSHCN DEFINED

• The American Academy of Pediatric Dentistry (AAPD) defines special health care needs as “any physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs.” Spec Care Dentist. 2019;39:20–27

• The Maternal Child Health Bureau (MCHB) defines CSHCN those “who have or at risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally”. Pediatrics, 1998: 102:137-40.
DENTAL NEEDS OF CYSHCN

• **22.6%** of CA CYSHCN did not have a preventive dental visit in the past year compared to:
  • 16% of CYSHCN nationwide
  • 19-21% of non-CYSHCN

• **17%** of CA CYSHCN had decayed teeth or cavities in the past year compared to:
  • 15% of CYSHCN nationwide
  • 11-12% of non-CYSHCN

childhealthdata.org  NSCH 2017-8
78.4% of CYSHCN report one of the following:

<table>
<thead>
<tr>
<th>Health Issue</th>
<th>%</th>
<th>Health Issue</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Disability</td>
<td>27</td>
<td>Speech problems</td>
<td>16</td>
</tr>
<tr>
<td>ADHD</td>
<td>32</td>
<td>Tourette Syndrome</td>
<td>.2</td>
</tr>
<tr>
<td>Depression</td>
<td>8.5</td>
<td>Asthma</td>
<td>30</td>
</tr>
<tr>
<td>Anxiety</td>
<td>13</td>
<td>Diabetes</td>
<td>1.4</td>
</tr>
<tr>
<td>Behavioral problems</td>
<td>14</td>
<td>Epilepsy</td>
<td>3</td>
</tr>
<tr>
<td>Developmental Delay</td>
<td>15</td>
<td>Hearing impairment</td>
<td>4</td>
</tr>
<tr>
<td>Intellectual Disability</td>
<td>5</td>
<td>Vision Impairment</td>
<td>3</td>
</tr>
<tr>
<td>Autism Spectrum Disorder</td>
<td>8</td>
<td>Bone, joint muscle issues</td>
<td>8</td>
</tr>
<tr>
<td>Cerebral Palsy</td>
<td>1</td>
<td>Brain Injury</td>
<td>1</td>
</tr>
</tbody>
</table>
# PREVALENCE OF DD

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Per 1000</th>
<th>Age (mo)</th>
<th>Is HCP 1st?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“GDD”</td>
<td>100</td>
<td>24</td>
<td>30%</td>
</tr>
<tr>
<td>ID (mild)</td>
<td>14</td>
<td>39</td>
<td>60%</td>
</tr>
<tr>
<td>ID (mod-severe)</td>
<td>4</td>
<td>12</td>
<td>90%</td>
</tr>
<tr>
<td>Autism</td>
<td>17.7</td>
<td>36-48</td>
<td>30%</td>
</tr>
<tr>
<td>CP</td>
<td>3</td>
<td>12-14</td>
<td>99%</td>
</tr>
<tr>
<td>VI</td>
<td>1</td>
<td>Improving from 40</td>
<td>60%</td>
</tr>
<tr>
<td>HI</td>
<td>10</td>
<td>Improving from 40</td>
<td>40%</td>
</tr>
<tr>
<td>LD</td>
<td>140</td>
<td>69</td>
<td>12%</td>
</tr>
<tr>
<td>ADHD</td>
<td>90</td>
<td>60</td>
<td>40%</td>
</tr>
</tbody>
</table>
**AGES FOR EARLY DIAGNOSIS**

<table>
<thead>
<tr>
<th></th>
<th>0-12 mo.</th>
<th>1-2 yr.</th>
<th>2-3 yr.</th>
<th>3-4 yr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID, mod/sev.</td>
<td>ID, mod</td>
<td>ID, mild</td>
<td>ID, mild</td>
<td>ID, mild</td>
</tr>
<tr>
<td>VI/HI</td>
<td>HI</td>
<td>HI</td>
<td>HI</td>
<td></td>
</tr>
<tr>
<td>CP</td>
<td>CP</td>
<td>CP mild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autism</td>
<td>Autism/LD</td>
<td></td>
<td>LD/ADHD</td>
<td></td>
</tr>
</tbody>
</table>
AN INFANT BRAIN

• The human brain at 30 weeks weighs $\frac{1}{2}$ of term infant!

• 3rd trimester 40,000 new synapses/min

• At birth, 1 million synapses/second are being formed to support the 100 billion neurons present.
Early experiences activate synapses, strengthen existing pathways, create new pathways.

Lack of experience increases synaptic pruning and apoptosis (cell death).
STREAMS OR DOMAINS OF DEVELOPMENT

- Gross motor
- Fine motor
- Language
  - Expressive
  - Receptive
- Problem solving
- Social-emotional
- Adaptive
DEFINITIONS

• Surveillance vs. Screening
• Delay vs. Deviance

LOOK FOR PATTERNS!
Developmental Quotient

DQ = Developmental Age / Chronologic age x 100

DQ < 70  Delay
DQ 70-85  Monitor
DQ > 85  Typical range

*Perform for each stream of development
## Patterns in Development

<table>
<thead>
<tr>
<th></th>
<th>Motor</th>
<th>PS</th>
<th>RL/EL</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>V</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>CP</td>
<td>D</td>
<td>V-T</td>
<td>V-T</td>
<td>D</td>
</tr>
<tr>
<td>VI</td>
<td>D</td>
<td>D</td>
<td>T</td>
<td>D</td>
</tr>
<tr>
<td>HI</td>
<td>T</td>
<td>T</td>
<td>D</td>
<td>T-N</td>
</tr>
<tr>
<td>ASD</td>
<td>T</td>
<td>V-T</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>
Any time there is a history or exam consistent with **LOSS of SKILLS (regression)**

THINK......metabolic, genetics w/u, need for neuroimaging, seizures, hydrocephalus, toxin exposure, autism
MOTOR DELAY: **RED FLAG**

- Any boy not walking by 15 months should get a CPK to r/o MUSCULAR DYSTROPHY

- The most common cause of gross motor delay is global developmental delay.
MUSCULAR DYSTROPHY

- 3/10,000 boys
- Absent dystrophin gene, Xp21.2
- 30% no family history
- CPK is > 20 x normal, even at birth
- DNA blood test can make diagnosis in majority of cases.
LANGUAGE: DEFINITIONS

• **Language** - a system of verbal, written, or gestured symbols used to communicate information or feelings.
  • Components: phonology, morphology, syntax, semantics, pragmatics

• **Speech** - the physical production of spoken language.
  • Components: articulation, phonology, voice quality, pitch, loudness, resonance, fluency, rate, rhythm
TYPICAL LANGUAGE DEVELOPMENT

• Expressive: two phases

Social smile 5 wk
Coos 6-8 wk
Laughs 3-4 mo
Raspberry 4-5 mo
Squeals 5 mo
Babbles 6 mo
UNTIL 6-8 mo!

1st word 11 mo
Immature jargon 12 mo
4-6 words 15 mo
2 words 21 mo
Pronouns indiscrim 2 y
Tells stories 4 years,
100% intelligible
TYPICAL LANGUAGE DEVELOPMENT

• Receptive

Infant
- Alerts to voice 1 mo
- Regards speaker 3 mo
- Listen then vocalizes 5 mo
- Enjoys gesture games 9 mo
- Understands “no” 9 mo
- Orient to name 8-10 mo
- Command, with gesture 12mo

Toddler
- 1 step command, without gesture 14 mo
- 1 body part 15 mo
- Fetches on command 16 mo
- Points to picture 18 mo
- 4 body parts 20 mo
- 2 step command 24 mo
RED FLAG

- All children with language delay should be referred for hearing assessment.
- Infants who are deaf may have typical pre-linguistic expressive language until 6-9 months of age.
- 6-15% of kids who have PHL missed identification at newborn screening.
A BIFID UVULA is evidence of a submucous cleft in the palate and warrants evaluation if associated with recurrent OM, speech delay, or velo-pharyngeal insufficiency. 

CONSIDER VCFS (del 22q.11)
LANGUAGE DELAY: **RED FLAG**

- Typical Pattern is for RL>EL.
- Expressive language that significantly exceeds receptive language is “deviant”.

**THINK:**

1. AUTISM, with echolalia
2. Hydrocephalus, syndromes like Williams
3. Parental attribution
IDENTIFY EARLY!

• 15% of two year olds do not have 50 single words and/or two word combinations.
• 5-8% of all young children have developmental language disorder
• Delayed language may be a marker of other developmental disorders (ID, Autism, HI)
• Delayed language is highly associated with problem behaviors.
• Language is the BEST predictor of later cognitive function
• Early intervention yields best outcomes
Joint Attention Skills*

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Typical</th>
<th>ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-10 months</td>
<td>Gaze monitoring</td>
<td>No eye contact</td>
</tr>
<tr>
<td>10-12 months</td>
<td>Following a point</td>
<td>Does not respond to request “oh look!”</td>
</tr>
<tr>
<td>12-14 months</td>
<td>PIP</td>
<td>Develops advanced self help skills</td>
</tr>
<tr>
<td>14-16 months</td>
<td>PDP</td>
<td>* Consistently absent</td>
</tr>
<tr>
<td>14-18 months</td>
<td>Show and tell</td>
<td>Often brings to parent to obtain repeated action</td>
</tr>
</tbody>
</table>

*Joint attention deficits appear to be specific to ASD and reliably differentiate children with ASD from other developmental disabilities.
SOCIAL DELAY: **RED FLAGS**

- Lack of response to name
- Lack of eye gaze and monitoring
- Lack of gestures (waving, pointing, head nodding)
- Lack of requesting items or attention
- Lack of bringing and showing

https://www.m-chat.org/mchat.php

Free, online MCHAT-R screener with scoring
PROBLEM SOLVING

• Problem solving milestones are evidence of cognitive abilities, or intelligence, without the use of language.

...Patterns.....

• Typical PS=RL>EL...COMMON, often resolves
• Typical PS>RL>EL...less common, often LD
• Low PS, Low RL, Low EL = ID
USING BLOCKS TO GET AT THINKING SKILLS

- Regards 3 mo
- Attains 5-6 mo
- Takes 2nd 6-8 mo
- Releases into cup 12 mo
- Takes a 3rd 12-14 mo
- Builds a tower of 2 13-15 months
- Builds a tower of 4 18 months
- Builds a tower of 6 24 months
- Train 26-30 months
• Early Handedness

Children with handedness before age 15 months usually have an abnormally weak upper extremity on the other side.
"GLOBAL DEVELOPMENTAL DELAY"

• A significant delay (>2 SD) in 2 or more streams

• NOT a diagnosis

• NOT regression or loss of skills

• Can be used for services in health care setting, early intervention and for Public Schools. Can’t be used for services after age 6-9 years.
LEVELS OF ID

• Mild (Intermittent Support) IQ~ 55-69
  • Vast majority 85%
  • More common in boys

• Moderate (Limited Support) IQ ~ 40-54

• Severe (Extensive Support) IQ~ 25-39
  • Rare  .5%
  • Ratio of boys to girls is equal
  • Think about Rett Syndrome in girls

• Profound (Pervasive Support) IQ < 24

DSM-5, 2013
INTELLECTUAL DISABILITY: KNOWN CAUSES

- Prenatal (60-75%)
  - CNS malformation
  - Chromosomal abnormality (Down S)
  - Genetic (Fra X)
  - Toxin (FASD)
  - Fetal Infection
  - Maternal malnutrition

- Perinatal (10%)
  - Hypoxia
  - Neonatal seizures

- Postnatal (1-10%)
  - CNS infection
  - Stroke/Hemorrhage
  - Trauma/Abuse
  - Hypoxia
  - Degenerative
  - Epileptic encephalopathy
  - Metabolic
  - Complications of prematurity
**ID: THE SEARCH**

*The more severe the ID, the more likely to find etiology.*

- Chromosomal microarray (40% + in SEVERE, 10-15% for all)
- DNA for Fragile X (2%)
- ± Neuro-imaging (MRI study of choice)
  - IQ <50, micro/macrocephaly, abnormal neuro exam, seizures, loss of milestones
- ± Metabolic Studies (if regression, family history)
Babies are surviving the NICU (NICHD NRN 2003-2007)

Extremely preterm survival

Stoll BJ, Pediatrics 2010
NEURODEVELOPMENTAL OUTCOMES IN HIGH RISK INFANTS

<table>
<thead>
<tr>
<th></th>
<th>Motor disability, Cerebral Palsy %</th>
<th>Cognitive disability, ID (&lt;2 SD) %</th>
<th>Borderline Cognitive Abilities (&gt;2 SD &lt;1 SD) %</th>
<th>Permanent Hearing Impairment, Deafness %</th>
<th>Vision Impairment, Blindness %</th>
<th>Autism Spectrum Disorder %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;28 weeks</td>
<td>8 -15</td>
<td>12-36</td>
<td>20-31</td>
<td>3-4</td>
<td>1 - 3</td>
<td>2.2-8.0 (24-32wk)</td>
</tr>
<tr>
<td>28-31 weeks</td>
<td>4 -6</td>
<td>12-16</td>
<td>25</td>
<td>1-2</td>
<td>.3 - 3</td>
<td></td>
</tr>
<tr>
<td>32-36 weeks</td>
<td>.7 -.8</td>
<td>5 - 8</td>
<td>15 - 37</td>
<td>.3 -.5</td>
<td>.9 -1.5</td>
<td>2 - 4</td>
</tr>
<tr>
<td>&gt;37 weeks</td>
<td>.01-.014</td>
<td>1 - 3</td>
<td>0.2</td>
<td>0.6</td>
<td>1 - 2</td>
<td></td>
</tr>
</tbody>
</table>
The presence of three or more minor anomalies is highly predictive of a major malformation (19.6%).

Examples: bossing, micro/macrocephaly, absent hair whorl, anteverted nostrils, epicanthal folds, preauricular tags, pits, abnormal pinna of ears, bifid uvula, extra areola, single umbilical artery, umbilical hernia, dimple over sacrum, single palmar creases, syndactyly, overlapping toes, recessed toes…..
STRETCH

• Box breathing-
https://www.bing.com/videos/search?q=youtube+box+breathing+for+kids&view=detail&mid=8499297DC5F3746BCC57499297DC5F3746BCC776&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dyoutube%2Fbox%2Breathing%2Ffor%2FKids%26FORM%3DVTVXX
ANTICIPATING BEHAVIORAL PROBLEMS

- **Due to language or cognitive delays**  
  Curtis PR, 2018
  - Lack of understanding
  - Lack of ability to say “stop” or “wait a minute”

- **Due to social delays/deficits**  
  Mikami AY 2017
  - Inability to understand white coat, masks, strange equipment
  - Stranger
  - ADHD- impulsivity, emotional lability, low frustration tolerance
  - Routine disrupted
  - Invasion of space, especially around face

- **Due to sensory issues (hyper/hypo)**  
  Wan Yunus, 2015
  - Lights, reclining chairs
  - Noise (drills, suction)
  - Tastes and smells, oral aversion
  - Gloved touch, paper gowns, masks
STRATEGIES

- INTAKE Questionnaires
- CSHCN screener for new patients
- Home exercises (Autism Speaks toolkit)
ADAPTING THE OFFICE SETTING FOR CHILDREN WITH DD

• 4 year old Josh, is healthy and experiences ASD. He is able to speak in 3 word sentences. He ‘head bangs’ when frustrated, and has sensory seeking behaviors according to his school OT. He calms with video games. His mother is calling to ask how best to prepare him for his first dental visit...
PREPARING THE PARENT

• Call to discuss visit early
• Pre-visit tour and/or picture story
• Use social stories/story books
• Practice knee-knee, “open”
• Bring comforter, distracter, spoon
• Does child have light and noise sensitivities?
  • Sunglasses for bright lights
  • Earphones with +/- music for sounds
  • DVD options
• Benefits from weighted blanket?
• Minimize triggers: timing, fatigue, hunger

www.cshcn.org
PREPARING THE OFFICE

• Schedule visit when the office is the quietest
• Minimize waiting time (allow car wait with cell phone)
• Let the parent be the child’s advocate
  • Ask parent for stressors and motivators
  • Let parent end the visit if it’s too much for child
• Sensory integration approach
  • Weighted x-ray blanket, dimmed lights, fewer visual stimuli
• Suggest dental team adaptations
  • Upright dental chair if children become anxious when reclining
  • Eliminate or reduce noises, smells, and sensations that trigger problem behaviors
  • Avoid problem textures – paper gowns, masks etc.
  • Have toothpaste and brush options.
• Anticipate and avoid escape
• Book a double time slot

http://www.autismspeaks.org/community/family_services/dental.php
COMMUNICATION

- Visual aids
  - Help children express the need to take a break during visit
  - Can be a single card or a board with several visual symbols
  - Can reduce anxiety and negative behavior.
ORAL AVersion

- Can be due to hyper or hypo sensitivity
- Pre-visit home practice “open” and experience with lights and appliance in mouth
- If child:
  - < 3 yr? Ask if Early Intervention is involved.
  - > 3 yr? Ask if public school Individual Education Plan includes oral hygiene goals.
  - Has Autism? Ask if ABA therapist can work on oral health skills
  - Has sensory issues? Ask if Occupational Therapist can help de-sensitize
“FTT”

- Non oral feeders or liquid-only oral feeders often “graze” on liquids all day.
- Inter-disciplinary team needed (MD, DMD/DDS, SLP, OT, Nutrition, Behavioral support)
- Grazing is a “deviant” oral feeding pattern.
- Goal is to have “batch/bolus” feeding, rinse, allow to get hungry, and feed again for total intake/24 hour volume.
CHILDREN WITH DD AND MEDICATIONS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Side effects in oral cavity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS stimulants (MPH, DAS)</td>
<td>Xerostomia</td>
</tr>
<tr>
<td>Alpha-agonists (Guanfacine, Clonidine)</td>
<td>Xerostomia, dysphagia, sialadenitis</td>
</tr>
<tr>
<td>SSRI (Fluoxetine, Sertraline)</td>
<td>Xerostomia, dysphagia, sialadenitis, stomatitis, gingivitis, glossitis</td>
</tr>
<tr>
<td>Neuroleptics (Risperidone, Aripiprazole)</td>
<td>Xerostomia, dysphagia, sialadenitis, stomatitis, gingivitis, glossitis</td>
</tr>
<tr>
<td>Anticonvulsants (Valproate, Carbamazepine)</td>
<td>Xerostomia, dysgeusia, stomatitis, gingivitis</td>
</tr>
</tbody>
</table>
SPECIAL THOUGHTS ABOUT CHILDREN WITH ASD/DD/ID

• Carries and/or infections
  • may present only as a change in behavior
  • may go unnoticed because of child’s high pain threshold.

• Food over-selectivity usually more behavioral or sensory than an indication of dental pathology

• GER may cause increased tooth erosion.

• Bruxism is common concern, consider multi-vitamin

• Food Pouching prevention

The Center for Children with Special Needs
www.cshcn.org
RESOURCES

RESOURCES

• CSHCN Screener. 1 minute/5 questions/phone or mail/English/Spanish

• To provide parents:
  • Dental Toolkit on Autism Speaks, www.autismspeaks.com
    • Autism Speaks Dental Toolkit
      - video for parents
      - office questionnaire
  • Challenging Behaviors Toolkit on AutismSpeaks, www.autismspeaks.com - *these materials are evidenced based interventions for all CSHCN!*
  • GREAT Handouts on www.cshcn.org, search “dental”
“Find the ability in disability”

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