

DUAL DIAGNOSIS OF AUTISM & DOWN SYNDROME

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Objectives

- I. Overview
- II. Medical concerns
- III. Phenotype
- IV. Interventions
- V. Coordination of care
- VI. Educational programs
- VII. Family support



Autism Spectrum Disorder (ASD)

- Neurodevelopmental condition
 - Deficits in social communication and interaction
 - Reciprocity
 - Nonverbal pragmatics
 - Relationships
 - Isolation
 - Restricted, repetitive patterns of behavior, interests or activities
 - Fixated, intense interests
 - Atypical sensory processing
 - Inflexible, rituals, difficulty with transition
 - Stereotyped motor movements or perseverative, idiosyncratic speech

DIAGNOSTIC & STATISTICAL MANUAL – 5TH EDITION, APA 2013

Down Syndrome (DS)

Trisomy of chromosome 21

Most common form of inherited intellectual disability²

- Moderate ID most common
- Relative strengths in nonverbal learning/memory

1: 700-800 live births with a global incidence of more than 200,000 cases per year¹

Social/Emotional Phenotype²:

- Cheerful, social nature
- Affectionate, kind, empathic
- Lower risk for co-morbid mental health conditions than other children with inherited ID
- Families report lower levels of stress and more positive outlook
- Externalizing behaviors most common concern, if present

1- CONTESTABILE ET AL., 2010;
2- GRIECO ET AL., 2015

Down Syndrome & Autism

- Higher rate of ASD in individuals with DS than by chance
- 5 – 11% of co-morbidity of DS & ASD¹
- More common in males; increased risk if family member has ASD
- Presence of co-morbidity is a cultural shift that was previously believed to be incongruent given phenotypes of DS that include social, friendly nature
- Delay in diagnosis of ASD is more common in DS
- Potential long-term implications of delayed diagnosis include absence of service provision during a critical neurodevelopmental window
- Increased volumes of white matter in cerebellum & brain stem²

1- DIGUISEPPI, 2010, MOLLOY ET AL 2009; LOWENTHAL ET AL., 2007
2- CARTER ET AL., 2008

Neurological Profiles



- ASD- Structural¹ & functional² abnormalities in neurological development
 - Increased whole brain volume in early childhood
 - Abnormal volume corpus callosum, cerebellum, frontal & temporal lobes
 - Differences in ventricles and cerebral spinal fluid
 - Over- & under-connectivity temporal, frontal, & limbic networks
 - High levels of intra-individual variability in connectivity
- DS- Structural³ & functional⁴ abnormalities in neurological development
 - Smaller total brain volume, gray & white matter
 - Reductions in frontal & temporal lobes, cerebellum, & hippocampus
 - Increased cortical thickness
 - Atypical neural organization & activation for language & visual processing of information

1- LEVMAN ET AL., 2018; PAGNOZZI ET AL., 2018; 2-PASCUAL-BELDA ET AL., 2018; FALAHPOUR ET AL., 2016
3- HAMNER ET AL., 2018; BLETSCH ET AL., 2018; 4- JACOLA ET AL., 2011, 2014

ASD in Down Syndrome



- Preserved strengths
 - Play
 - Joint attention
 - Socialization
 - Emotional regulation/coping
- Four key social behaviors help to differentiate children with ASD
 - Direct imitation
 - Affective reciprocity
 - Peculiar behaviors
- Greater cognitive impairment and delay in adaptive skills

FROEHLKE & ZABOREK, 2013
DRESSLER ET AL., 2011

When to be Concerned

- Early Intervention providers- regression or lack of progress
- Regression- 5 years ¹; only occurs in 50%
- Behavior problems
 - Sensory processing problems- dentist, haircut, alarms, crowds
 - Elopement/bolting
 - Sleep problems
 - Meltdowns/severe tantrums
 - Fixation with shadows, dangling objects
 - Aggression to self
 - Difficulty with transitions

1- CASTILLO ET AL., 2008

DS-ASD Phenotype- Social

- Reduced responsiveness
- Anxious or fearful
- Preference for isolation
- Absence of typical social smile
- Often appear serious
- Doesn't respond to name
- Doesn't imitate play or copy others
- Unaware of thoughts and feelings of others
- Difficulty understanding "unwritten" social code



FROEHLKE & ZABOREK, 2013
DRESSLER ET AL., 2011
KENT ET AL., 1999

DS-ASD Phenotype- Communication

- Loss of or limited verbal communication
- Absence of verbal development
- Doesn't use pronouns correctly
- Doesn't greet others
- Voice tone (prosody) atypical
- Extremely literal



FROEHLKE & ZABOREK, 2013
DRESSLER ET AL., 2011
KENT ET AL., 1999

DS-ASD Phenotype- Behavior/ Sensory

- Repetitive & Stereotyped
 - Hand flapping
 - Spinning
 - Rocking
 - Jumping
- Intense interest
 - Strings
 - Lights
 - Fans
 - Mirrors
 - Water
- Play
 - Rigid and repetitive
 - Lining up or sorting objects
 - Ripping paper



FROEHLKE & ZABOREK, 2013
DRESSLER ET AL., 2011
KENT ET AL., 1999

DS-ASD Phenotype- Problematic Behaviors

- Tantrums
- Aggression
- Dropping
- Refusal
- Eloping
- Self-Injury
- Prolonged sleep, eating, toileting issues



FROEHLKE & ZABOREK, 2013

Assessment

- Autism Diagnostic Observation Schedule-2 (ADOS-2)
- Autism Diagnostic Inventory (ADI-R)
- Gillian Autism Rating Scale (GARS-3)
- Social Responsiveness Scale (SRS-2)
- Social Communication Questionnaire (SCQ)
- Behavior Assessment System for Children-3 (BASC-3)
- Aberrant Behavior Checklist (ABC)
- Vineland Adaptive Behavior Scales
- Scales of Independent Behavior



Neuropsychological
Speech-Language
Occupational
Physical

ADOS-2 TEST KIT

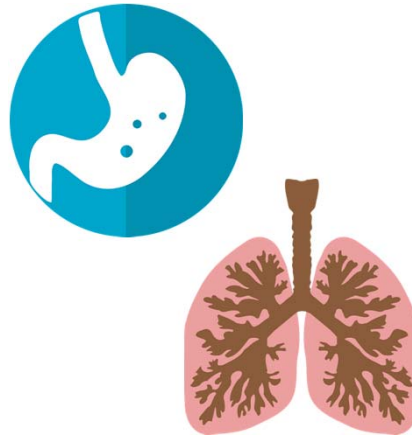
Differential Diagnoses

- Psychiatric
 - Obsessive-Compulsive Disorder
 - Intense interests, obsessions
 - Compulsions likely to be less functional
 - Anxiety
 - Worries that are impacting social interactions
 - Depression
 - Self-absorbed, negative self-talk, isolation
 - Trauma
- Sensory issues
 - Hearing, vision, and occupational therapy evaluations recommended
- Health problems
 - Always screen for any new medical problems or pain
- Down Syndrome Disintegrative Disorder¹

WORLEY ET AL., 2015

DS-ASD Medical Concerns

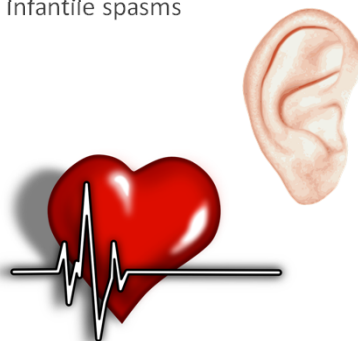
- Gastrointestinal
 - Constipation
 - Food selectivity/preference
 - Celiac disease
 - Gastroesophageal reflux
- Pulmonary
 - Respiratory infections
 - Silent aspiration
- Immune
 - Decrease in lymphocytes (CD4 T cells)
 - More susceptible
 - Immunizations important



FROEHLKE & ZABOREK, 2013
RASMUSSEN ET AL., 2001
DRESSLER ET AL., 2011

DS-ASD Medical Concerns

- Seizures- 7% DS¹; 7- 30 % ASD²: Infantile spasms
- Otitis media
- Hearing loss
- Dysfunctional swallowing
- Severe hypotonia/motor delay
- Ophthalmological disorders
- Congenital heart disease
- Hypothyroidism
- Hirschprung disease



FROEHLKE & ZABOREK, 2013 RASMUSSEN ET AL., 2001 DRESSLER ET AL., 2011
1- GOLDBERG-STERN ET AL., 2001 2- BARBARESI ET AL., 2006

DS-ASD Sleep

- Obstructive sleep apnea
- Snoring & breathing issues
- Teeth grinding
- Initiation, maintenance, duration



FROEHLKE & ZABOREK, 2013

Obstructive Sleep Apnea

- Continuous positive airway pressure (cPAP)
 - Mask adherence
 - Often overestimated by families¹
 - Early and close follow-up important to prevent nonadherence
 - Desensitization
 - Positive reinforcement
 - Counter-conditioning
 - Graduated exposure
 - Utilize behavioral approaches
 - Applied behavior analysis (ABA)
 - Token reward system

1- MARCUS ET AL., 2006
HOPPIN 2018

Interventions- Sleep Hygiene

- Minimize daytime naps
- Use bedroom/bed only for sleep
- Keep consistent bedtime routine, even on weekends
- Use calming activities before bed; relaxation exercises
- Consider using a sound machine, weighted blanket
- Implement morning routine and activities to ensure safety
- Bells can be used to alert nighttime activity

FROEHLKE & ZABOREK , 2013

DS-ASD Medical Workup

- Labs- CBC, Iron, Liver, Lead, Celiac
- Audiology
- Ophthalmology
- Sleep Study
- EEG
- Feeding Evaluation
- Dental Care
- Anesthesia



FROEHLKE & ZABOREK , 2013
RASMUSSEN ET AL., 2001

Interventions for Education

- ❑ Applied Behavior Analysis (ABA)
- ❑ Functional Behavior Analysis (FBA)
- ❑ Visual schedules
- ❑ Augmentative communication
- ❑ Data collection, monitoring, progress



TORCHIA, 2018
FROEHLKE & ZABOREK, 2013

Intervention Goals

- Improve quality of life
- Optimize independence
- Facilitate communication
- Improve social interaction/ relatedness
- Teach attention/ on-task behavior
- Support academic functioning
- Teach adaptive living skills
- Manage behavior
- Improve functioning



TORCHIA, 2018
FROEHLKE & ZABOREK, 2013

Core Program Features

- 1:1-2 staff to student ratio
- Teachers with expertise in ASD
- Family involvement
- Highly structured
- Close monitoring/modification
- Individualized programming
- Delivery of instruction in multiple settings



TORCHIA, 2018
FROEHLKE & ZABOREK, 2013

ASD Education Research

- Importance of early intervention
 - Services should include at least 25 hours/ week for 12 months/ year¹
- Interventions associated with improved IQ, behavior, language, and peer interactions^{1, 2}
 - ABA effective in randomized and observational studies *Rogers et al., 2008, Reichow et al., 2018*
- Most gains observed 30- 40 hours/ week, 1:1, 2+ years, with intervention onset before age 5 *Granpeesheh et al., 2009; Ospina et al., 2008*
- TEACCH- Modify environment to improve skills
 - Improvements in motor skills, cognition, social, communication and adaptive *Tsang et al., 2007; Ospina et al., 2008*
- Early Start Denver Model- intensive ABA & relationship approach
 - Language, cognitive, adaptive gains sustained *Dawson et al., 2010; Estes et al., 2015*

1- NATIONAL RESEARCH COUNSEL, 2001
2- OSPINA ET AL., 2008; NATIONAL AUTISM CENTER, 2009, WARREN ET AL., 2011

DS Education Research

- Systematic approach to reading, starting with identifying whole words selecting and naming games and then moving on to reading short sentences and longer sentences in topic book using matching, pictures, and naming games is effective *(Hughes, 2006, Buckley, 2001)*
- Select, evidence-based reading programs yield improvements in word reading and decoding; however, these have limited ability to generalized to reading fluency *(Lemons et al., 2012)*
- Mathematics approaches need to include integrated step-by-step approaches based on reasoning, patterns, and number relationships rather than memorizing numbers and counting *(Buckley, 2007)*
- Use of ABA behavioral approaches prove beneficial to support engagement with learning process *(Feely & Jones, 2006)*

DS-ASD Education Research

- Limited research specific to ASD-DS
 - Improving communication skills through direct instruction, natural environment, & incidental teaching *(Newman et al., 2003; Kroeger & Nelson, 2006)*
 - Peer-mediated social skill instruction with individuals with ID *(Hughes et al., 2011; Cody Davis et al., 2018)*
 - Reducing challenging behaviors with psychopharmacology *(Capone et al., 2008)*
- Rely on integration of ASD and DS educational strategies, with ASD-DS strategies to create individualized educational plan
- More research is needed!

ABA

- Discrete Trial Training (DTT)¹
 - Instruction in simplified and structured steps
 - Uses antecedents, prompts, reinforcement, correction, and intervals
 - Break down a task to teach and then string together
- Pivotal Response Training (PRT)²
 - Naturalistic model
 - Targets areas of development- motivation, self-management, social initiation
 - Child choice, task variation, maintenance tasks, rewards attempts
 - Intentional attempts at target behavior rewarded with natural reinforcers

1- SMITH, 2001; MILTENBERG, 2008
2- UC SANTA BARBARA, 2014

Visual Schedules

- Objects, pictures, or words
- Teach child how to use, monitor, & adjust
- Picture Exchange Communication System (PECS)
 - Requires symbolic representation



MYERS & JOHNSON ; ADAPTED4AUTISM
STARUPTALENT.COM

Augmentative Communication

- Children with ASD more stimulated to learn speech if they have an understanding of symbolic communication¹
- Does not inhibit speech²



1- MILLAR ET AL., 2006; BONDY & FROST, 2001;
2-MYERS ET AL., 2007

Additional Interventions

- Social skill groups
 - National Autism Center, 2009, 2015; Reichow & Wolery, 2009; Warren et al., 2011; Weitlauf et al., 2014
- Occupational therapy
 - Case-Smith & Arbesman, 2008
- Sensory integration therapy
 - AAP 2012; Rogers et al., 2005; Schaaf et al., 2005
- Cognitive behavioral therapy
 - Weitlauf et al., 2014; National Autism Center, 2015



Interventions for Caregivers

- Preparation time for transitions
- Keep a consistent routine
- Visual cues
- Sensory support
- Be mindful of the setting
- Don't let problem behavior be successful
- Consistency is key
- Preview new environments/ situations
- Deny the preferred object until the desired task is completed
- Reward participation



FROEHLKE & ZABOREK, 2013

Interventions- Social Stories

- Provides a preview of an unfamiliar situation to reduce anxiety
- Helps to expose new environmental stimuli and who may be present
- Teaches theory of mind about others' thoughts and feelings in the situation
- Gives a guideline of expected behavior and how to respond
- Incorporates visual stimuli and photographs where possible

TORCHIA, 2018

Sample Social Story



When I am done eating, the doctors and staff will need to start getting me ready for my sleep study. Nothing that they do will hurt.

First, they will use a red marker to draw small dots on my head. This is where the doctors and staff will put sticky pads that are attached to colorful wires, like a rainbow!

It might feel funny at first. After a few minutes, I will forget the stickies are there!

Then, a staff member will place a small tube in my nose. It might tickle while he or she is putting it in, but it won't hurt.

The staff member will use special tape to make sure the tube stays in place.

MGH DOWN SYNDROME PROGRAM 2015

Interventions for Melt Downs

- Appear calm
- Speak quietly and slowly
- Move people out of the environment
- Turn off the lights



FROEHLKE & ZABOREK, 2013

Psychopharmacology

- Used in adjunct with behavioral approaches
- Indicated to address aggression, disruptiveness, self-injury, stereotypy
- Common Medications:
 - Risperidone, Aripiprazole
 - Irritability, interfering repetitive behaviors
 - Melatonin
 - Sleep
 - Methylphenidate, atomoxetine, guanfacine
 - ADHD



HOWES ET AL., 2018; DEFILIPPIS & WAGNER, 2016; EARLE, 2016

Family Emotions

- Grief is normal and may re-occur at different times
- Anger/frustration with clinicians
- Resentment/jealousy
- Isolation- poor fit in any community

“Caregivers of children with autism spectrum disorders were significantly more likely to report difficulty using services, lack of source of care, inadequate insurance coverage, lack of shared decision making and care coordination and adverse family impact compared to caregivers of children with developmental disabilities, mental health conditions, or both” *Vohra et al., 2014*

FROEHLKE & ZABOREK, 2013
VOHRA ET AL., 2014

Coordination of Care

- Medical home- team approach to healthcare
- Importance of prioritizing needs
- Benefit of social worker or care team to facilitate
- Transition planning- start early and go slow!
- Medical resume- important information in one place
 - Health conditions/ diagnoses
 - List of procedures conducted
 - Medications
 - Preferred method of communication
 - Sensory modifications
 - Behavioral triggers
 - Calming activities



FROEHLKE & ZABOREK, 2013
CHUN ET AL., 2013

Family Support

DS-ASD connection- www.ds-asd-connection.org

National Down Syndrome Congress- www.ndscenter.org

Autism Society of America- www.asa.org

Local organizations

Family therapy

Respite

Developmental services

Residential placements

Social media



Multi-Cultural Factors

- African American and Hispanic children receive later ASD diagnoses¹ & were less likely to receive treatment²
- Limited bi-lingual personnel/ service providers/ educators
- Culturally insensitive forms of treatment
- Minorities not represented in research



1- MANDEL ET AL., 2002; RATTO ET AL., 2015
2- MANDELL ET AL., 2003

Conclusion

- Patients with Down syndrome can also have autism
 - Autism occurs at a higher incidence among people with Down syndrome
- It is important to refer for a comprehensive evaluation for diagnosis
- Comprehensive medical work-up is needed given higher burden of co-morbidities and limitations in communication
- Education planning requires a highly structured, evidence-based approach that is uniquely tailored to each child
- In-home and family support are important to facilitating development and providing care and resources
- Transition planning is essential
- Care collaboration and social work support are highly recommended

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