Dental Care in Children With Developmental Disabilities: Attention Deficit Disorder, Intellectual Disabilities, and Autism

Jane M. Charles, MD

ABSTRACT

The Federal government reports that 13% of Americans between birth and 18 years of old meet the definition of a child with special health care needs. These children and young adults present unique challenges for both pediatric and general dentists to provide access to the oral health care system—establishing a treatment plan for those with unique medical, behavioral and dental needs and maintaining oral health over the lifetime. The purpose of this article was to describe the characteristics of 3 common developmental disabilities and the challenges these issues present to the oral health care practitioner.

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CHILDREN WITH SPECIAL HEALTH CARE NEEDS

The United States Maternal and Child Health Bureau (MCHB), Department of Health and Human Services, defines children with special health care needs (SHCN) as those who have or are at risk for chronic physical, developmental, behavioral, and emotional conditions and who also require health care and related services of a type or amount beyond that required generally by children.1 Currently, it is estimated that 13% of all Americans from birth to 18 years old meet this definition.² This is an extraordinarily heterogeneous group of children that includes those with: chronic medical disorders, such as asthma and diabetes; and lifetime developmental disabilities from learning disorders to combinations of handicapping conditions, such as intellectual disability in conjunction with cerebral palsy. Alarmingly, 13% of SCHN individuals live in poverty and report difficulties accessing health care, particularly for referrals to spe-

Dr. Charles is associate professor of pediatrics, Division of Developmental/ Behavioral Pediatrics, Medical University of South Carolina, Charleston, SC. Correspond with Dr. Charles at charlesj@musc.edu cialists.² The MCHB reports that SHCN children are almost twice as likely to have unmet oral health care needs as their peers without SHCN.³

SCHN children can present with a complex array of unusual health issues and developmental delays, all of which complicate routine oral examinations. Special diets, medications for chronic disorders such as epilepsy, and self-injurious behaviors can cause oral health problems. Behavioral problems interfere with the examination in children who lack language comprehension, are unable to follow directions, have unusual sensory responses or are unable to learn or generalize new information due to intellectual disabilities. Children with chromosomal disorders can present with orofacial abnormalities, resulting in malocclusion and crowding of teeth. Over 80 craniofacial syndromes exist that can affect oral development; 25% are associated with developmental disabilities.³

This article seeks to define and describe behavioral characteristics and common health problems in children with 3 now fairly common SHCN attention deficit hyperactivity disorder (ADHD) intellectual disability (ID) and autism spectrum disorders (AS Ds). While oral

health care for children with developmental disabilities is complicated, costly, and time consuming (especially for those with challenging behaviors), it can be accomplished with: knowledge of the disability; increased awareness and attention to medical and behavioral issues; and flexibility and creativity in the office setting.

ADHD

The American Academy of Pediatrics recognizes **ADHD** as one of the more common chronic conditions of childhood, with a prevalence ranging from 4% to 12%.⁴ Persistence into adolescence is believed to be up to 60% to 80%.⁵ Given the high prevalence of ADHD, those practicing both pediatric and general dentistry are likely to treat children and adolescents with this disorder in their dental practices.

The core symptoms of ADHD are impulsivity, inattention, and hyperactivity. Impulsive behaviors are nearly always seen with hyperactivity and can be manifested by intrusive behaviors, difficulty waiting turns, blurting out answers, and disruptive behaviors. Hyperactivity is seen in young children as restlessness seemingly "always on the go", difficulty staying seated and excessive talking. Inattention and distractibility are usually recognized later in childhood. Inattention is characterized by: forgetfulness; losing clothing and school supplies; disorganization; difficulty completing chores or school work in a timely manner; and underachievement in school.

Unfortunately, there are no specific laboratory or imaging studies to diagnose ADHD and thus, the diagnosis is by a detailed history which includes completion of standardized behavioral checklists by parents and teachers. The core behaviors must be demonstrated across multiple settings and impair daily function. Family history is often positive for ADHD and, occasionally, one or both parents will be diagnosed after the child's diagnosis. ADHD is more frequently diagnosed in boys, although studies show this may be a function of males presenting symptoms of hyperactive impulsive behaviors and females presenting with inattentive distractible behaviors.⁶ The diagnosis of ADHD is confirmed by meeting criteria by the Diagnostic and Statistical Manual-TR 4th Ed7 (DSM-IV-TR)⁷. Three types of ADHD are recognized: (1) ADHD-hyperactive/impulsive type; (2) ADHDinattentive type; and (3) ADHD-combined type. Symptoms must be present prior to age 7 and be present for a minimum of 6 months. Behavioral checklists such as Conner's parent rating scale and Vanderbilt's rating scale help determine the type of ADHD and the degree of impairment.8

Comorbid psychiatric conditions are common among ADHD children. Internalizing disorders (mood, anxiety and depression) are more commonly found in inattentive types, and externalizing disorders (oppositional defiant disorder and conduct disorder) are found in hyperactive/impulsive types^{9,10}. Both cause further acade-

mic and social impairment and complicate treatment. Diagnosis and management of associated disorders is imperative for the successful management of ADHD.

Medical issues are associated with ADHD as well. Sleep disorders¹¹ (initiation and maintenance), encopresis, and enuresis¹² are common. ADHD can be secondary to medical conditions, such as traumatic brain injury,¹¹ fetal alcohol exposure,¹³ lead intoxication,¹⁴ premature birth,¹⁵ epilepsy,¹² and tic disorders.¹² ADHD symptoms are frequently associated with developmental disorders such as intellectual disability, autism spectrum disorders,¹⁶ cerebral palsy,¹⁷ and learning disabilities.¹⁸

The primary care provider should provide the child and the family with a comprehensive management plan which includes behavioral management and consideration of pharmacological intervention. A number of well-controlled studies have demonstrated the efficacy of stimulant medication for ADHD's core symptoms.¹⁹ There are several stimulant medications available on the market, including short-, intermediate-, and long-acting methylphenidate and short- and long-acting dextroamphetamine. The latter 2 are mixed amphetamine salts (75% dextro- and 25% levoamphetamine). A newer form of amphetamine, lisdexamfetamine dimesylate (LDX, Vyvanse), has recently been approved in the United States for 6- to 12-year-olds. LDX is an amphetamine prodrug that is converted to its active form, d-amphetamine, only after ingestion. It is a once-daily drug and has less abuse potential than the other stimulants.²⁰

Stimulants have a long history of safety with few contraindications to their use. Common side effects, anorexia, headache, stomachache, delayed onset of sleep, jitteriness, or subdued behavior are generally managed by dose adjustment or trying another stimulant. Eighty percent of children will respond positively to one of the stimulants.

Nonstimulant medications have less empirical support, but are alternatives for those with stimulant intolerance or are used as adjuncts to stimulant therapy. The alpha-agonist antihypertensives clonidine and guanfacine can be used alone or combined with a stimulant for excessive hyperactivity and impulsivity and to aid in sleep disturbances.²¹ Common side effects of the alpha agonists are sedation and dizziness. Blood pressure should be monitored routinely. Two other nonstimulant medications, bupropion (Wellbutrin) and tricyclic antidepressants, have some empirical support compared to stimulant use. The tricyclics are not often used because of links to sudden cardiovascular death in several children while taking TCAs for treatment of ADHD. Follow up studies sponsored by the FDA, however, found no connection between the TCA and the deaths.²² The first nonstimulant approved for ADHD, atomoxatine (Strattera) is a norepinephrine inhibitor which has shown some efficacy. It is dosed once daily and can be used alone or with a stimulant. Side effects are minimal but include abdominal pain and sleepiness.²³

Along with medication, behavioral therapy and environmental modifications are recommended. Environmental changes in the class and at home include reducing distractions, providing additional structure, schedules, and routines for daily activities. Behavioral intervention involves training parents and teachers in specific techniques for improving behaviors. Providing positive reinforcement for desired behaviors and completed tasks and consequences for incomplete work gradually shapes the child's behavior.²⁴ Suggestions for managing ADHD children in the dental office include giving frequent breaks and providing reinforcement for appropriate behavior.

To reward appropriate behavior, the child might be given the opportunity to earn tokens throughout the visit that can be traded in for a larger reward at the end of the visit. For example, the child may be given a miniature toothbrush to hold following each quadrant of cleaning. Once the child has earned a specific number of brushes, he or she can be given the opportunity to trade in the brushes for a prize. The tokens (in this case, toothbrushes) serve to bridge the gap in time from the behavior (appropriate sitting) to the reward (the prize box). Parents can be a good resource for what types of rewards are salient for the child. ADHD children who are prescribed stimulant medications may be more cooperative with examinations earlier in the day. Extended release medications typically last between 8 and 12 hours and may not provide coverage after school hours.

INTELLECTUAL DISABILITY

The diagnosis of intellectual disability (previously referred to as "mental retardation"), as defined by the American Academy of Intellectual and Developmental Disabilities, requires subaverage functioning (below 70-75 on standardized measures) in 2 or more of the following adaptive skill areas: communication; self-help; home living; social and interpersonal skills; use of community resources; self-direction; health and safety "functional academics," leisure and work. Developmental deficits must be diagnosed prior to 18 years old.²⁵ The overall prevalence of ID is 1% of the population.²⁶ In general, etiology of mild ID is unknown; the lower the cognitive functioning, the more likely an etiology, especially a genetic abnormality, can be identified.

IDs are divided into 4 categories, based on levels of cognitive functioning:

- 1. Mild: IQ=55-70; 85% of ID, functions at the sixthgrade level, may live independently or in supervised setting; can successfully support self, usually no etiology found,
- 2. Moderate: IQ=40-55; 10% of ID; second-grade academic level, adequate self-help care, may need assistance, lives at home or in group home, unskilled or semiskilled work with supervision,

- 3. Severe: IQ=25-40, 3% to 4%, preschool academic abilities-sorting and matching, may be nonverbal or minimally verbal, may use communication device, poor fine motor skills and requires supervision for activities of daily living (ADLs), lives with family or in group homes,
- 4. **Profound:** IQ<25, 1% to 2%, may not ambulate; requires close supervision and assistance with ADLs, may be totally dependent for hygiene.

IDs are associated with a number of medical, behavioral, and psychiatric disorders. Medical and chromosomal disorders (such as Down syndrome) are more commonly diagnosed in infancy or early childhood, while mild ID of unknown origin might not be recognized until school age, when academic difficulties become apparent. Medical issues can be associated with ID due to chromosomal disorders (anatomical defects), epilepsy, cerebral palsy, sensory impairments, and gastrointestinal abnormalities.

Behavioral and psychiatric comorbidities exist in 2 to 3 times greater number than the general population.²⁷ There is controversy in the literature as to the classification of behavioral disorders vs psychiatric disorders in the ID population. Until recently, it was recognized that those with ID were incapable of exhibiting diagnosable mental conditions.²⁷ The exact association between specific psychiatric disorders and behavioral problems is unclear, although is it recognized that there is a great deal of overlap between these 2 forms of psychopathology. Regardless, those with ID have a greater prevalence of externalizing behaviors (aggressive and disruptive) and internalizing behaviors (anxiety and depression) than the general population.

Other common diagnoses in the ID population are: ADHD, pervasive developmental disorders and tic disorders. In general, those with mild intellectual disabilities are more likely to be diagnosed with anxiety and depressive disorders and those with severe to profound ID with agitated, disruptive, or aggressive behaviors.

The IDs due to chromosomal abnormalities are associated with specific medical and behavioral "phenotypes." These are medical and behavioral/psychiatric disorders defined as "the heightened probability or likelihood that people with a given syndrome will exhibit certain behavioral and developmental sequelae relative to those without the syndrome."²⁸ Specific behavioral profiles are seen, among others, in Down, Williams, Prader-Willi, Smith-Magenis, and Lesch-Nyan syndromes.

Regardless of the specific cause, all ID patients have deficits in language comprehension and expression, attention, motor skills, and learning new tasks. Anxiety about new situations is common, resulting in uncooperative behaviors such as crying, aggression, and agitation. Physical challenges may warrant special considerations: cerebral palsy, epilepsy, hearing or vision deficits, and hypotonia. Orofacial anomalies are not uncommon in children with chromosomal defects. One can anticipate abnormal tooth eruption, malocclusions needing orthodontic care, missing/fused teeth, microdontia, abnormal jaw structure, and macroglossia, which, along with poor or inconsistent hygiene and dental care, increases the risk of periodontal disease. Cardiovascular anomalies frequently occur, especially among Down syndrome patients, while latex allergy is commonly seen in spina bifida patients.

Whatever the source of a child's behavior, fairly simple interventions by the health care provider are effective at improving cooperation in the exam setting. A number of children may be medicated for inattention/ hyperactivity, anxiety, and aggressive and/or disruptive behaviors. Ask parents to give medications as usual on the day of the child's visit (this is particularly important for medications that reduce over activity). The exam experience may be made easier if appointments are short and early in the morning to reduce waiting time.

Knowing the child's mental age may help with behavioral expectations. For example, a 15-year-old with a mental age of 48 months may respond to similar management techniques as a typically developing 4-year-old would. To reduce anxiety and improve cooperation, make an effort to communicate on the patient's level or through visuals so that the child understands what is going to happen. Reward cooperative behaviors with frequent verbal reinforcement. Parents or caregivers are great resources for techniques that have successfully managed the child's behaviors in the past. Some children may require significant preparation prior to the visit. One or 2 visits to the office prior to the exam will allow the child to become comfortable with the exam room and office staff. The parent can be asked to review a picture book with the child regarding the upcoming visit. This can be done daily for at least a week prior to the actual visit. Particularly anxious individuals may be comforted by a favorite toy or blanket during the examination.

ASDS

ADSs include: autistic disorder; Asperger syndrome; and pervasive developmental disorder—not otherwise specified, as defined by the DSM-IV-TR.⁷ Recently published studies estimate the prevalence of all ASDs to be in the range of 6.5 to 6.6/1,000.^{29,30} Thus, it is likely that the pediatric dentist will follow ASD children in their practice. ASDs are lifelong neurobiological disorders manifested by a wide range of abilities and outcomes. Despite the broad range of severity, all ASDs share common deficits in 3 areas of functioning:

- 1. language;
- 2. social skills; and
- 3. restricted, repetitive, and stereotyped patterns of behavior, interests, and activities.

The disorders are recognized to be chronic, but with intensive intervention, the core deficits can be minimized and functional independence and quality of life enhanced. Once thought to be nearly all intellectually disabled, the prevalence of ID in those with ASDs is 50% to 60 %.^{29,30} Comorbid medical disorders are common and may result in unique health needs that relate to underlying etiologic conditions or other health conditions. Genetic disorders account for the etiology of only 10% of ASD cases. Fragile X syndrome, Down syndrome, and tuberous sclerosis are associated with ASDs, and all have their own medical issues. Seizures occur in up to 30% of those with ASD, usually presenting in 2 peaks: before 5 years old and during adolescence.

Generally, those with significant ID and motor delays are more like to have epilepsy than higher functioning children without motor delays or underlying genetic disorders.³¹ Clinically, gastrointestinal problems are thought to be frequent. Few surveys have been published, however, with adequate controls to confirm this phenomenon. Constipation and encopresis (involuntary fecal soiling by children already toilet trained, usually caused by constipation and stool withholding) are not uncommon and are treated with bowel protocols and stool softeners.

Sleep disturbance can be a significant issue among ASD patients at all levels of functioning and can cause significant family distress and be difficult to manage.³² Daytime behavior is affected by lack of sleep at night and can interfere with learning and family quality of life. Occasionally, medical disorders can be found and treated, such as obstructive sleep apnea or gastrointestinal reflux. Pharmacological management has little empirical support for individuals with ASD or other developmental disabilities, but providers are compelled to use them to preserve the family. Prescription medications for sleep include the alpha-agonists (clonidine and guanfacine), mirtazipine (Remeron), and trazodone (Desyrel). The latter 2 are antidepressants that can be sedating. Behavioral interventions range from simple sleep hygiene procedures to intensive interventions that require support from behavior therapists knowledgeable in this area.³³

While not part of the diagnostic criteria, difficulty managing sensory input from the environment is nearly universal in ASD patients. Unusual responses to common environmental sounds, textures, tastes, smells, and movement can interfere with many areas of daily functioning, such as eating, hygiene, traveling, and attending school and public activities. They also may cause significant anxiety, resulting in meltdowns and tantrums.

Compared to the general population, ASD children have a higher prevalence of obesity. The prevalence of overweight typically developing in children is approximately 10% among 2- to 5-year-olds and 16% among 6- to 19-year-olds. After reviewing charts in a clinic serving developmentally disabled children, Curtin et al. found that 36% were at risk for overweight (BMI>85%) and 19% were at risk for (BMI>95%).³⁴ Obesity, of course, complicates existing medical conditions and places the child at risk for developing new difficulties.³⁵ ASD children frequently struggle with difficult behaviors and emotional lability, causing significant family distress and disruption or even exclusion from classroom and work attendance. Behaviors common to those with IDs are also common in those with ASDs. These include externalizing behaviors such as self-injurious behaviors, aggression toward others, destructive behaviors, and internalizing behaviors like anxiety and depression. Inattention, hyperactivity, and impulsive behaviors are frequent. Atypical behaviors that are unique to ASDs include the need for rigid routines, stereotypical movements, and seeking unusual sensory input, all of which can cause disruptive behaviors when interrupted.

A number of studies note that challenging behaviors are more prevalent and severe during adolescence than in young adulthood.³⁶⁻³⁸ Certainly, the rapid increase in a child's size and strength that occurs during puberty causes behaviors to be more threatening and difficult to control. Behavioral therapists teach that difficult behavior is a reflection of poor language skills, best remediated by teaching specific communication skills.³⁸ Use of pharmaceuticals to control challenging behaviors in ID/ASD patients, in the absence of specific behavioral interventions, have had disappointing results.³⁸ Murphy et al. studied challenging behaviors in a group of ID and/ or ASD patients at 2 points: adolescence and young adulthood. For all behaviors measured, severity decreased from adolescence to adulthood. Predictors of improved behaviors over time were good communication skills, older age, higher IQ, and better quality social interaction.

An abrupt change or the emergence of new behavior patterns may come from an acute illness. A detailed review of systems is important to rule out any source of discomfort that can be treated and managed medically. Sources of discomfort may include sinusitis or allergic rhinitis, middle or outer ear infections, dental pain, gastroesophageal reflux, constipation, headache, urinary tract infection, and menstrual cramps in females.³¹ Chronic medical conditions should be closely monitored for exacerbations and quickly treated. If the child is medicated for either a medical condition or behavior control, the parents must be aware of the potential for uncomfortable side effects.

Generally, ASD children have good oral health with rates of periodontal disease and caries similar to the general population.³⁹ Side effects from some medications used for behavioral control and poor oral hygiene (refusal to allow the caretaker to brush the child's teeth), however, can cause problems. Bruxism, tongue thrusting, and self-injurious behaviors (SIBs) are common, especially in lower-functioning individuals. SIBs can include chin and jaw hitting, picking at gums and lips, and eating nonfood objects. A mouthguard is protective if the child will tolerate it.³⁹ ASD children are notorious for having limited diets. Unfortunately, they are also often given sweet treats as rewards for cooperative behaviors. Teachers and parents should be encouraged to use nonfood rewards, such as computer-time or other favorite activities, to reduce the risk of caries and obesity.

Psychopharmacological management of disruptive behavior, whether externalizing or internalizing or for associated issues such as sleep disturbance, is most effective when prescribed in addition to behavioral management and environmental accommodations. Chances of successful management are improved if the medication is matched to the specific targeted behavior. When assessing specific medication needs, it is imperative to target behavior that may interfere with living and learning and to check family history for psychiatric disorders such as anxiety disorders, depression, and bipolar illness. Family history can influence the child's behavioral phenotype and result in a diagnosable comorbid psychiatric disorder.

Prevalence studies report that approximately 45% of children and adolescents and up to 75% of adults with ASDs are treated with psychoptropic medicines. In general, ASD patients who are older, possess lower adaptive and communication skills, and have higher levels of difficult behaviors are more likely to be prescribed medication.^{40,41}

Externalizing behaviors-including aggression to others or to self, impulsivity, irritability, and agitationcan be managed with an alpha-agonist (clonidine or guanfacine) or a neuroleptic. The neuroleptics are divided into 2 classes: typical and atypical. The typical neuroleptics are older (thioridazine, chlopromaizine, pimozide, haloperidol, and fluphenazine). The atypicals are a newer class, including risperidone (Risperdal), olanzapine (Zyprexa), quetiapine (Seroquel), zisprasidone (Geodon), and aripiprazole (Abilify). The atypical neuroleptic drugs generally have lower risk for extrapyramidal movements than the typical neuroleptics. Of the neurolepics, only risperidone and aripiprazole are approved for ASD patients. The neuroleptics are effective in relieving disruptive behaviors, but all have side effects that must be monitored closely, such as excessive weight gain, abnormal movements, and increased risk of diabetes.

Irritability and mood lability respond to the moodstabilizing effects of the antiepileptics, valproic acid (Depakote), carbamazepine (Tegretol), and oxcarbamazipine (Trileptal) commonly used today. Again, side effects must be monitored. Internalizing behaviors such as anxiety, depression, and repetitive and self-stimulatory behaviors can be reduced with the selective serotonin reuptake inhibitors. Stimulants are effective for inattention and distractibility issues. ASDs patients can be on psychotropic medication to control behaviors and also take medication for coexisting medical disorders such as epilepsy. Those with severely disruptive behaviors are frequently on more than one psychotropic drug.

A major characteristic of ASD patients is rigid, inflexible adherence to routines. Not surprisingly then, changes in the child's environment may precipitate an aggressive outburst or tantrum. Parents and teachers can proactively accommodate for alterations in schedule, personnel, routine, and sensory input (changes in sounds, room temperature, bright light, etc) by incorporating visual supports into the child's world. One of the core deficits of an ASD is impaired language comprehension and processing verbal information. Visual processing skills are intact, however, and information received visually is comprehended quickly and retained longer than information received verbally.

Visual supports include visual schedules and social stories. Visual schedules break down large tasks into separate steps, allowing the child to perform each task before going on to the next. Schedules can range from showing what activities will happen during the day, to teaching specific tooth-brushing steps.

One of the most powerful visual tools available for teaching ASD children and reducing difficult behaviors is a social story. A social story is a short story that is written from a child's perspective that describes a social situation, person, skill, event, or concept in terms of relevant cues and appropriate social responses.⁴² Each social story teaches the child how to manage his/her behavior during a given social situation by describing where the activity will take place, when it will occur, what will happen, who is participating, and why the child should behave in a certain manner.⁴² The story may include pictures relevant to the situation and simple text. The parent and teacher can read the story repetitively so that it becomes a routine or rule for the child that may be applied to the specific social situation. A social story for visiting the dentist can be found at the end of this article (Figure 1).

Strategies for seeing ASD children in the dental office are similar for those with intellectual disabilities, with some additional accommodations. Dentists should have copies of a dental social story available to send to the family prior to the visit to familiarize the child to the office setting and staff. Scheduling the appointment first in the morning or after lunch may minimize waiting time. It may be necessary to break up the exam into several visits. Discussing specific behavioral problems with caretakers and how they may be helpful. Marshall et al. found that up to 50% of parents of ASD children accurately predicted cooperation for certain procedures.⁴³ Knowing the child's developmental age and how to best communicate with him/her, either verbally or through picture symbols may also be helpful. As well as explaining and demonstrate each step, and show ("tell, show, do") how the instruments are used.³⁹ Praise and reinforce cooperative behavior after each step of a procedure and ignore inappropriate behavior as much as possible⁴³.

Accommodate the need for routine and consistency by having the same staff, appointment time, and exam room to sustain familiarity. Unusual sensory responses may be avoided by reducing extraneous noise, light, odors, and movement. Ask the parent if soft music or a favorite object would comfort the child.³⁹ Use the parents and caretakers as a resource to improve the child's: tolerance of waiting, behavior during doctor's visits; transitions; ability to follow directions; and cooperative behaviors at dental visits in 108 autistic children. Significant factors predicting uncooperative behaviors were: appointment type (routine vs emergency care); comorbid medical diagnoses; nonverbal/minimally verbal abilities; delayed receptive language skills; inability to

Statements for Dental Visit Social Story

Title: My Trip To The Dentist*

- 1. "I go to the dentist to clean my teeth and make them strong."
- 2. "First, I sit in the waiting room, where I can draw on my paper and play with my toys."
- 3. "When the hygienist calls my name, I go with her and sit in a big chair that leans back and goes up and down. My mom sits next to me."
- 4. "There is equipment in the room, and I can ask about the tools and machines, but I do not put my hands on them. I keep my hands folded together in my lap and stay in my seat."
- 5. "There is a light that shines on my mouth so that the hygienist can see everything."
- 6. "The hygienist puts a napkin around my neck to keep my shirt clean and dry."
- 7. "When she says 'open up,' I will open my mouth and she will put tools in there to clean my teeth."
- 8. "Water may splash on my face and in the air when she rinses my mouth. The hygienist will use the napkin on my neck to dry any spills. The hygienist wears a mask on her mouth and nose so she can stay clean."
- 9. "She will use a special vacuum to suck out any water and toothpaste that is left over. When the hygienist says 'close,' I will put my lips around the vacuum until she tells me to open my mouth again."
- 10. "Sometimes, she will put special film in my mouth and take pictures so the dentist can see if anything is broken and fix it. When a tooth is broken, the dentist calls it a cavity."
- 11. "When my mouth is clean, the dentist will come into the room and look at my teeth. She will talk to my mom and give me my own new toothbrush, toothpaste, and floss."
- 12. "Then I get to go in to the treasure box and pick a toy."
- 13. "We will stand at the counter and talk to the lady behind it."
- 14. "Then we will get in the car and go home."

^{*} Figure 1. Provided by Toni Boucher, BSW, Autism Consultant, Coastal Autism Division, South Carolina Department of Disabilities and Special Needs.

follow multistep directions; delayed daily living skills (not toilet trained, parents brushing teeth); special education placement; inability to sit for a haircut; and inability to read at 6 or more years old. Simple questions asked prior to the visit regarding developmental age, coexisting medical issues, language and hygiene skills, and educational placement and achievement can provide insight into the child's ability to tolerate a routine dental examination.⁴

CONCLUSIONS

As the US population of children and adults with special health care needs grows, both pediatric and general practitioners will likely see many more such patients in their practices. Most children with mild to moderate developmental disabilities can be managed in a primary care setting with minor accommodations. Having a knowledgeable team of practitioners, close communication with parents and caregivers regarding challenging behaviors, and awareness of the child's developmental level for language, attention, and daily living skills may help the patient better cope with dental treatment. Good oral health also can make a lifetime difference in the patient's well-being.

REFERENCES

- 1. McPherson M, Arango P, Fox H, et al. A new definition of children with special health care needs. Pediatrics 1998;102:137-40.
- Van Dyck P, Kogan M, McPherson M, Weissaman, M, Newacheck P. Prevalence and characteristics of children with special health care needs. Arch Pediatr Adoles Med 2003;158:884-90.
- 3. National Maternal and Child Oral Health Resource Center. Oral Health Services for Children and Adolescents with Special Health Care Needs Resource Guide. Washington, DC: National Maternal and Child Health Resource Center; 2005.
- 4. American Academy of Pediatrics. Clinical practice guidelines: Treatment protocol of the school-aged child with attention deficit/hyperactivity disorder. Pediatrics 2001;108:1033-44.
- 5. Mannuzza S, Klein R, Bessleer A, et al. Adult psychiatric status of hyperactive boys grown up. Am J Psychiatry 1998;155:493-8.
- 6. Culpepper L. Primary care treatment of attention deficit/hyperactivity disorder. J Clin Psychiatry 2006;67(suppl 8):51-8.
- American Psychiatry Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text revision. Washington, DC: American Psychiatric Publishing; 2000.
- 8. AAP TOOLKIT. Available at: "www.nichq.org/ adhd_tools.html". Accessed December 10, 2009.

- 9. Bowen R, Chavira DA, Bailey K, Stein MT, Stein MB. Nature of anxiety comorbid with ADHD in children from a pediatric primary care setting. <u>Psy</u>chiatry Res 2008;157:201-9.
- 10. Hurtig T, Ebeling H, Taanila A, et al. ADHD symptoms and subtypes: Relationships between childhood and adolescent symptoms. J Am Acad Child Adolesc Psychiatry 2007;46:1005-13.
- 11. Lecendneux M, Cortese S. Sleep problems associated with ADHD: A review of current therapeutic options and recommendations for the future. Expert Rev Neurother 2007;7:799-806.
- 12. Wisniewska B, Baranowska W, Wendorf J. The assessment of comorbid disorders in ADHD children and adolescents. Adv Med Sci 2007;52(suppl 1): 215-7.
- 13. O'Malley KD, Nonsan J. Clinical implications of a link between fetal alcohol spectrum disorder and attention deficit hyperactivity disorder. Can J Psychiatry 2002;47:349-54.
- 14. Nigg JT, Knottnernus GM, Mantell MM. Low blood lead levels associated with clinically diagnosed attention deficit/hyperactivity disorder and mediated by weak cognitive control. <u>Biol Psychiatry</u> 2008;63:325-31.
- 15. Cherkes-Julkowski M. Learning disability, attention deficit disorder, and language impairment as outcomes of prematurity: A longitudinal descriptive study. J Learn Disabil 1998;31:294-306.
- 16. Pliszka S. AACAP Workgroup on Quality Issues: Practice parameters for the assessment and treatment of children and adolescents with attention deficit hyperactive disorder. J Am Acad Child Adolesc Psychiatry 2007;46:894-921.
- 17. Gross-Tsur V, Shaler RS, Badihi N, Manor O. Efficacy of methylphenidate in patients with cerebral palsy and ADHD. J Child Neurol 2002;17: 863-6.
- 18. Jakobson A, Kikas E. Cognitive functioning in children with and without ADHD and without comorbid learning disabilities. J Learn Disabil 2007;40:194-202.
- 19. Ottenbacher KJ. Drug treatment of hyperactivity in children. Dev Med Child Neurol 1983;25:358-66.
- Biderman J, Krishon S, Zhang Y, et al. Eficacy and tolerability of LDX (NRP-104) in children with ADHD: A phase III, multicenter, randomized, double-blind forced dose. Clin Pharmacol Therap 2007;29:450-63.
- 21. Posey DJ, McDougle CJ. Guanfacine and guanfacine extended release: Treatment for ADHD and related disorders. CNS Drug Rev 2007;13:465-74.
- 22. Daly JM, Wilens T. The use of tricyclic antidepressants in children and adolescents. Pediatr Clin North Am 1998;45:1123-35.

- 23. Karatochril CJ, Vaughan BS, Daughton JM, et al. Atomoxetine in the treatment of ADHD. Expert Rev Neurother 2004;4:601-11.
- 24. Pelham WE, Fabian G. Behavior modification. Child Adolesc Psychiatric Clin N Am 2001;9: 671-88.
- 25. American Association of Mental Retardation. Retardation: Definition, Classification, and Systems of Supports. 9th ed. Washington, D.C.: AAMR; 1992.
- 26. Prater CD, Zylstra RG. Medical care of adults with mental retardation. Am Fam Physician 2006;73: 2175-83.
- 27. Cos T, Nezu A, et al. Diagnostic challenges: Investigation of behavioral profiles and psychiatric classification. NAIDD Bull 2006;9:94-9.
- 28. Dykens EM. Measuring behavioral phenotypes: Provocations from the "new genetics." Am J Ment Retard 1995;99:522-32.
- 29. Autism and Developmental Disabilities Monitoring Network Surveillance Year 2000 Principal Investigators; CDC. Prevalence of ASDs: ADDM Network, six sites, US 2000. <u>MMWR Surveill Summ</u> 2007;56:1-11.
- Autism and Developmental Disabilities Monitoring Network Surveillance Year 2002 Principal Investigators; CDC. Prevalence of ASDs: ADDM Network, 14 sites, US 2002. MMWR Surveill Summ 2007;56:12-28.
- 31. Johnson CP, Myers SM, et al. Identification and evaluation of children with autism spectrum disorders. Pediatrics 2007;120:1183-215.
- 32. Oyane NM, Bjorvain B. Sleep disturbances in adolescents and young adults with autism and Asperger syndrome. Autism 2005;9:83-94.
- Durant VM. Sleep Better: A Guide for Improving Sleep for Children with Special Needs. Baltimore, Md: Paul Brookes Publishing Co; 1998.
- 34. Curtin C, Bandini LG, Perrin EC, et al. Prevalence of overweight children and adolescents with attention deficit disorder and autism spectrum disorders: A chart review. BMC Pediatr 2005;5:48.

- 35. Must A, Strauss RS. Risks and consequences of childhood and adolescent obesity. International Journal of Obesity 1999;S2-S11.
- Kiernan C, Kiernan D. Challenging behavior in schools for pupils with severe learning disabilities. Ment Handicap Res 1994;7:177-201.
- 37. Harris P. The nature and extent of aggressive behavior amongst people with learning difficulties (mental handicap) in a single health district. J Intellect Disabil 1993;37:221-42.
- 38. Murphy GH, Beadle-Brown J, Wing L, Gould J, Shah A, Holmes N. Chronicity of challenging behaviors in people with severe intellectual and/or autism: A total population sample. J Autism Dev Disord 2005;35:405-18.
- US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health. Practical Oral Care for People with Autism. NIH publication no. 07-5190. Washington D.C.: US DHHS, NIDCR, NIH; 2008.
- 40. Aman MG, Lam KS, Collier-Crespin A. Prevalence and patterns of use of psychoactive medicines among individuals with autism in the Autism Society of Ohio. J Autism Dev Disord 2003;33: 527-34.
- 41. Witwer A, Lecavalier L. Treatment incidence and patterns in children and adolescents with autism spectrum disorders. J Child Adolesc Psychopharmacol 2005;15:671-81.
- 42. Gray C. Social Stories 101. The Morning News. Mich: Jenison Public Schools; 1998:2-6.
- 43. Marshall J, Seller B, Manci L, Williams BJ. Parental attitudes regarding behavior guidance of dental patients with autism. Pediatr Dent 2008;30:400-7.
- 44. Marshall J, Sheller B, Williams B, Manci L, Cowan C. Cooperation predictors for dental patients with autism. Pediatr Dent 2007;29:369-76.

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