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Attention Deficit Hyperactivity Disorder: Beyond the Practice Parameters

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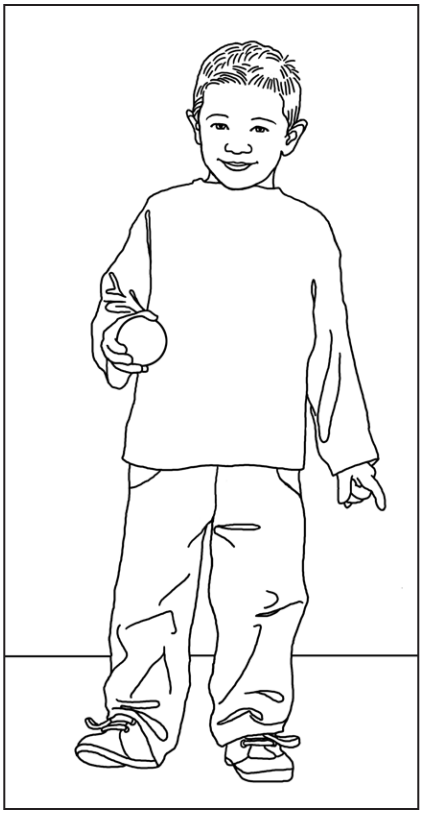
Much has been written about the medical management of ADHD. I've chosen to discuss management beyond the practice parameters established by the American Academy of Pediatrics and the American Academy of Child and Adolescent Psychiatry. This article will address what some of my toughest and easiest patients have taught me.

Before medical treatment begins, the provider should feel confident that an accurate diagnosis of ADHD has been made and determine whether any co-morbid diagnoses, precautions, or contraindications to treatment exist. Stimulant



medications are the drug of choice for most children and will significantly improve a child's impulsivity, hyperactivity, and inattention. Stimulant medications available are either a methylphenidate or an amphetamine derivative. Both groups of medications are equally effective and have the same side effect profile. The stimulants can be grouped into short-acting (about 4 hours), intermediate-acting (6-8 hours) and long acting (10-12 hours). I use them all, as there is value in each. Determining which medication(s), at what dose, will work best in each child without causing

(continues on page 2)

Attention Deficit Hyperactivity Disorder
(continued from page 1)

significant side effects, is the art of this practice, the fun of this practice, and a distressing part of this practice.

The medications are contraindicated and/or to be used with caution in a few situations. The patient and family history, review of systems, and child's physical exam usually provide the information needed to safely prescribe medications. Symptomatic heart disease, drug dependence, concurrent and very recent use of MAOIs, glaucoma, severe hypertension, and hyperthyroidism are contraindications. Patients with marked anxiety, mood disorders, impairing tic disorders, epilepsy, history of substance abuse, and structural cardiac or cardiovascular conditions that may be compromised by increases in blood pressure or heart rate warrant caution when using stimulants.

An EKG should be obtained if the patient's history, family history, or exam indicates increased risk of cardiovascular problems. Refer to cardiology for clearance to safely take a stimulant medication if needed. I have patients with renal disease, hypertension, epilepsy, Tourette disorder, anxiety, depression, history of drug use, and cardiac disorders whose specialty physicians have cleared them for medical treatment of ADHD. In these cases the potential benefits of treatment outweighed the potential risks. Treatment of these populations necessitates more frequent clinic visits, monitoring of vital signs, and collaboration with specialists.

Before beginning medication, get a good history of the child's baseline sleep habits, eating habits, mood, growth history, personality, and any problems with headaches, stomachaches, and motor or vocal tics. The medications can

cause problems with any of these. Dealing with the medication side effects can be the most challenging aspect of medical management. Appetite suppression and sleep disturbance, the most common side effects, can be profound. Baseline documentation allows the provider to clearly identify whether prescribed medications create new problems for the child. ADHD is chronic. Kids deserve to feel good and should not be chronically bothered by a medication they take daily. Switch medications if side effects interfere with the child's quality of life.

The goal is to find the right medication(s) and dosage(s) that promote success by obtaining reasonable control of the child's symptoms without causing significant side effects. References to specific medications are included in the ADHD Medication Chart (pages 5 and 6). The chart is not all-inclusive, but does list primary medications on a single page. It does not include the tricyclic antidepressants, as I refer to child psychiatry for that treatment.

(continues on page 7)

Early Identification of Learning Disabilities

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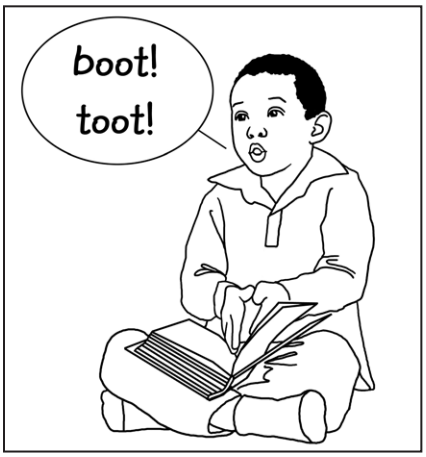
Rather than waiting for indications of trouble to become major problems, the field of learning disabilities today focuses on early identification and prevention. In the 1970's and 1980's, learning disabilities (LD) were defined by the discrepancy between achievement and intellectual ability. This led to a stringent use of test scores, with arbitrary cut-off points determining diagnoses. Focusing only on a discrepancy often results in delayed treatment as these discrepancies often don't show up until mid-elementary school, past the optimal time for adequate development of skills required for reading and math.

Recently, the focus has shifted to identifying and providing early treatment and prevention in younger children who may be at risk for LD. In younger children, neurocognitive skills and learning patterns are still developing, leading to great variability in skills. This makes testing somewhat difficult. For children younger than 6 or 7 years old, screening for risk of learning difficulties and global delays is most reliable. Therefore, evaluation of LD at this age should focus on specific prerequisite skills and not necessarily a full neuropsychological evaluation.



Most research on LD in children in early elementary has been on reading. New research indicates that the best time to screen and start treatment to prevent reading LD is in kindergarten or early 1st grade. In addition to screening at school, it is helpful when primary care physicians also screen these children for learning difficulties, enabling parents to use early intervention resources.

Specific skills in kindergarten and 1st grade that are predictive of later reading skills include: phonological awareness (knowledge of the auditory patterns and structure of language); graphonomic knowledge (knowledge of the relationship between printed letter and sounds); letter knowledge; picture naming and vocabulary; rapid automatic naming; and phonological memory. Tasks that can help assess these skills include a child's ability to identify rhymes, tap the number of syllables or phonemes heard in a spoken word, blend sounds together to generate a word, and delete a sound to form a new word. In addition, basic alphabet identification and rapid naming of letters can be a good screen for these difficulties.

Children with difficulties in the prerequisite skills of reading are at risk for developing reading disabilities as they progress through school and need additional, specific instruction in kindergarten and 1st grade. There are three components of instruction for children at risk for reading disabilities. First, instruction needs to be very systematic and explicit, typically using a phonics-based

(continues on page 4)

Early Identification of Learning Disabilities
(continued from page 1)

approach. Second, instruction needs to be intensive, with many learning opportunities throughout the day. Third, instruction should be supportive and include positive feedback, encouragement, and the scaffolding of skills. For these younger children with LD, school is the best referral source. Parents seeking additional support may wish to obtain private testing and screening by a psychologist.

In addition to achievement-based LD, children may have difficulties not related to a cognitive delay that interfere with their overall classroom learning and performance. For example, children with attention or memory problems may have difficulty following directions at school, leading to more global academic concerns. When determining whether mid-elementary to high school students are dealing with learning difficulties, physicians can ask questions regarding problems with work completion, not turning in assignments, inability to do well on timed tests, difficulty following directions, poor reading fluency, and difficulty with comprehension or test performance. If children are having these types of difficulties, regardless of achievement scores, further neuropsychological testing can be helpful to identify underlying strengths and weakness

that can help in the development of intervention and strategies to help improve overall academic success.

While not all children need neuropsychological testing, testing is warranted when children do not respond to early prevention or basic instruction to determine whether there is an underlying neurocognitive-based learning difficulty. This testing should focus on a variety of cognitive skills and identify patterns of strength and weakness. In the Division of Pediatric Psychology at the University of Iowa Children's Hospital, neuropsychological testing focuses on the skills of verbal comprehension, expressive language, visual-spatial-motor skills, memory, attention, and processing speed. The goal is to gain an understanding of the child's strengths and weaknesses so that specific accommodations can be recommended to parents and teachers. Neuropsychological testing is valuable because it goes beyond academic performance, providing specific information that can guide intervention, rather than focusing strictly on overall scores.

In summary, it is important to screen young children, starting in kindergarten, for specific prerequisite skills that lead to adequate development of academic skills, particularly reading. Neuropsychological testing at this age can be helpful for identifying skills that should be monitored or for global delays, but specific neurocognitive LD are difficult to identify due to the wide variability of children's behavior and skills. After a child reaches 6 or 7 years of age, or if more global or broad learning concerns are noted, referral for neuropsychological testing may be warranted to assist with the development of specific interventions and school accommodations for the child.

Resources

Fletcher, J.M., Foorman, B.R., Boudousquie, A., Barnes, M.A., Schatschneider, C., & Francis, D.J. (2002). Assessment of reading and learning disabilities: A research-based intervention-oriented approach. *Journal of School Psychology, 40,* 27-63. doi: 10.1016/S0022-4405(01)00093-0.

Torgesen, J.K. (2002). The prevention of reading difficulties. *Journal of School Psychology, 40,* 7-26. doi: 10.1016/S0022-4405(01)00092-9.

ADHD Medication Chart (Stimulants)

	Drug	Dosage Form	Dosing Range	Duration of Action
Short Acting	**Ritalin** (methylphenidate)	Tablets 5, 10, 20 mg	Increase by 5-10 mg at weekly intervals as needed, with a maximum daily dose of 60 mg. BID to TID dosing.	3-5 hours
	Methylin (methylphenidate) **Methylin Chewable** (methylphenidate)	Tablets 5, 10, 20 mg Chewable tablets 2.5, 5, 10 mg	Increase by 5 mg at weekly intervals as needed, with a maximum daily dose of 60 mg. BID to TID dosing.	3-5 hours
	Focalin (dexmethylphenidate)	Tablets 2.5, 5, 10 mg	Increase by 2.5 to 5 mg at weekly intervals as needed, with a maximum daily dose of 20 mg. BID to TID dosing.	6 hours
	Dexedrine (dextroamphetamine)	Tablets 5, 10 mg	Increase by 2.5 mg at weekly intervals as needed in younger children and 5-10 mg increments in older children, with a maximum daily dose of 40 mg. BID to TID dosing.	3-6 hours
	Dextrostat (dextroamphetamine)	Tablets 5, 10 mg	Increase by 2.5 mg at weekly intervals in younger children and 5-10 mg increments in children 6 and older, with a maximum daily dose of 40 mg. BID to TID dosing.	3-5 hours
	Adderall (mixed salts of amphetamine product)	Tablets 5,7.5, 10, 12.5, 15, 20, 30mg	Increase by 5 mg at weekly intervals, with a maximum daily dose of 40 mg. BID dosing.	4-8 hours
Intermediate Acting	**Ritalin SR** (methylphenidate)	Tablets 20mg	Increase by 20 mg at weekly intervals, with a maximum daily dose of 60 mg. Q day dosing.	3-8 hours
	Ritalin LA (methylphenidate)	Capsules 10, 20, 30, 40mg	Increase by 10 mg increments at weekly intervals, with a maximum daily dose of 60 mg. Capsule may be swallowed whole or opened and sprinkled onto teaspoon of applesauce. Q day dosing.	6-8 hours
	Metadate ER (methylphenidate)	Tablets 10, 20 mg	Increase by 10 mg at weekly intervals, up to a maximum daily dose of 60 mg. Q day dosing	3-8 hours
	Methylin ER (methylphenidate)	Tablets 10, 20 mg	Increase by 10 mg at weekly intervals, up to a maximum daily dose of 60 mg. Q day dosing	3-8 hours
	Metadate CD (methylphenidate)	Capsules 10, 20, 30, 40, 50, 60 mg	Increase by 10-20 mg increments at weekly intervals, with a maximum daily dose of 60 mg. Capsule may be swallowed whole or opened and sprinkled onto teaspoon of applesauce. Q day dosing.	6-10 hours
	Dexedrine (dextroamphetamine)	Spansule capsules 5, 10, 15 mg	Increase by 2.5 mg increments for younger children and in 5-10 mg increments for older children at weekly intervals, with a maximum daily dose of 45 mg. Capsule may be swallowed whole or opened and sprinkled onto a spoonful of applesauce. Q day dosing.	6-8 hours
Long Acting	**Concerta** (methylphenidate)	Tablets 18, 27, 36, 54 mg	Increase to next tablet size at weekly intervals, with a maximum daily dose of 72 mg. (Non-FDA max. daily dose: 108 mg.)	8-12 hours
	Focalin XR (Dexmethylphenidate)	Capsules 5, 10, 15, 20 and 30 mg	Increase by 5 mg increments at weekly intervals, with a maximum daily dose of 30 mg. Capsule may be swallowed whole or opened and sprinkled onto teaspoon of applesauce. Q day dosing.	10-12 hours
	Daytrana Patch (methylphenidate transdermal system)	Patch 10, 15, 20, 30 mg	Apply to hip area in AM, wear patch for 9 hours. Individualized (shorter) wear time may be appropriate. Increase by 1 patch size at weekly intervals, as needed, up to a 30 mg patch. Maximum daily dose is 30 mg. *Persists for 3-4 hrs after patch removal*	12 hrs.
	Adderall XR (Mixed salts of a single-entity amphetamine product)	Capsules 5, 10, 15, 20, 25, 30 mg	Increase by 10 mg increments at weekly intervals, with maximum daily dose of 40 mg. Capsule can be opened and sprinkled onto teaspoon of applesauce. Q day dosing.	10-12 hours
	Vyvanse This is a prodrug of dextroamphetamine	Capsules 20, 30, 40, 50, 60 and 70 mg	Increase by 10 mg increments at weekly intervals, up to maximum daily dose of 70 mg. Can be swallowed whole or opened and dissolved in about 15 cc of juice. Remaining sediment is inert ingredients.	12 hours

Stimulant contraindications — Symptomatic heart disease, drug dependence, use of MAOIs, glaucoma, hypertension (severe), and hyperthyroidism.
Stimulant precautions — Use cautiously in patients with marked anxiety, motor tics, mood disorders, Tourette syndrome, history of substance abuse, structural cardiac abnormalities, or cardiovascular conditions which may be compromised by increases in blood pressure or heart rate.
Stimulant Black Box warning — Potential for abuse, misuse can cause death or serious cardiovascular events. Chronic abuse can lead to marked tolerance and psychic dependence with varying degrees of abnormal behavior including psychotic episodes.
Stimulant side effects — Insomnia, decreased appetite, weight loss, headache, irritability, stomachache, tremor, dysphoric mood, euphoria, nervousness, and restlessness.

Disclaimer: This chart is not intended to serve as a totally comprehensive resource. Please utilize Physicians Desk Reference for complete information.

With all the stimulant ADHD medications, start with the lowest available dose, and work upwards as needed to get desired effect without causing significant side effects.

ADHD Medication Chart (Non-Stimulants)

Drug	Dosage Form	Side Effects & Precautions	Dose Range Comments	Doses /Day
Tenex (guanfacine) α_2 – Adrenergic agonist	Tablets 1mg, 2 mg	Orthostatic hypotension, palpitations, bradycardia, depression, dizziness, fatigue, headache, somnolence, anorexia, constipation, acid indigestion, liver toxicity. Avoid with significant liver, kidney, or cerebrovascular disease. Avoid abrupt withdrawal (to avoid rebound hypertension).	Start with 0.5 mg in the evening and increase by 0.5 mg every 7 days as indicated to no more than 1mg/kg with a maximum daily dose of 4 mg. Divided into BID to TID dosing. Don't skip doses (to avoid rebound hypertension). Need to taper off. Helpful for sleep disturbance, tics, modulating mood, and ADHD symptoms.	1 - 4
Intuniv (Long acting guanfacine) α_2 – Adrenergic agonist	Tablets 1, 2, 3, and 4 mg	Orthostatic hypotension, palpitations, bradycardia, depression, dizziness, fatigue, headache, somnolence, anorexia, constipation, acid indigestion, liver toxicity. Avoid with significant liver, kidney, or cerebrovascular disease. Avoid abrupt withdrawal (to avoid rebound hypertension).	Start with 1 mg/day in the evening and increase by 1 mg every 7 days as indicated. Once a day dosing. Daily dose range 1-4 mg/day with a maximum daily dose of 4 mg. Don't skip doses (to avoid rebound hypertension). Need to taper off. Helpful for sleep disturbance, tics, modulating mood and ADHD symptoms.	1
Catapres (clonidine) α_2 – Adrenergic agonist	Tablets 0.1, 0.2, 0.3 mg	Dizziness, sedation, confusion, nausea, vomiting, constipation, local reaction to patch, hypotension, weakness, somnolence, impotence, pancreatitis, agranulocytosis, electrolyte imbalance. Avoid abrupt withdrawal (to avoid rebound hypertension). Contraindication: 1)allergy, 2)conduction disturbances, 3)chronic renal failure, 4)severe coronary insufficiency, 5) cerebrovascular disease (Not approved by the FDA for ADHD)	Start with a dose of .025-.05 mg/day in evening. Titrate in 0.05mg increments no faster than every 7 days. Given in divided doses 2-4 times per day. Daily dose range 0.1-0.3 mg/day. Do not skip doses (to avoid rebound hypertension). May not see effects for 4-6 weeks. Need to taper off. Helpful for sleep disturbance, tics, modulating mood, and ADHD symptoms.	1-4
Strattera (atomoxetine) Selective norepinephrine reuptake inhibitor	Capsules 10, 18, 25, 40, 60, 80, 100 mg	Decreased appetite, weight loss, nausea, vomiting, (take with food), sedation, mood swings, and lightheadedness. Use cautiously in patients with hypertension, hypotension, tachycardia, cardiovascular or cerebrovascular disease (monitor vitals), hepatic or renal insufficiencies (can increase blood pressure and heart rate), and urinary retention. Use cautiously in patients with poor metabolizer CYP2D6 phenotype or aggressive behaviors. Do not use if currently using, or have used within 2 weeks any MAOI. Do not use with narrow angle glaucoma. Not indicated in patients with a seizure disorder or with a current or previous diagnosis of bulimia or anorexia. May worsen tics. Black Box Warning: Increased risk of suicidal ideation in short-term studies in children or adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD). Monitor patients closely for suicidality (suicidal thinking and behavior), clinical worsening, or unusual changes in behavior.	Initial dose 0.5 mg/kg given as single dose in AM. (Increase up to 1.2 mg/kg after 4-7 days). Targeted clinical dose is approximately 1.2 mg/kg/day with a maximum daily dose of 100mg. Given in AM and **must** be used each day. If the higher doses are needed, can be divided into AM and PM doses. When switching from stimulant to Atomoxetine, continue the stimulant for at least 4 weeks after starting Atomoxetine.	1-2

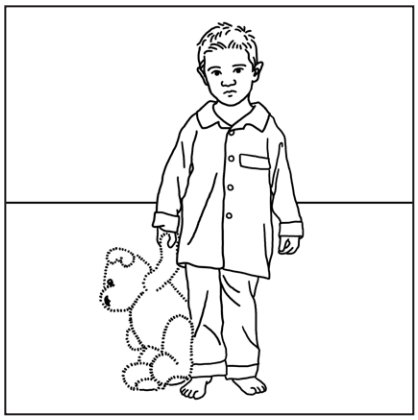
Disclaimer: This chart is not intended to serve as a totally comprehensive resource. Please utilize Physicians Desk Reference for complete information.

Attention Deficit Hyperactivity Disorder
(continued from page 1)

For an electronic version of the chart, visit http://iowaepsdt.org/EPSDTNews/index.htm.

Always start medication with the lowest dose available, in a formulation that is easy for the child to take (sprinkles, chewable, patch, tablet, or powder mixed with juice), and of a duration in which you want the symptoms controlled. These issues are more important than whether you choose a methylphenidate or an amphetamine as there is no way to predict which medication will work best in each child, without causing significant side effects.

Next, assess the response to the medication and evaluate for side effects. Increase to the next available strength if symptoms are still significant,



as long as there are not significant side effects. Each of the stimulant medications has an FDA recommended maximum dose. Some providers increase beyond those dosages with discretion. One might assume it is best to choose the longest acting (10- to12-hour long) medication for all kids. The very young (4 to 7 years) though, have many fewer side effects on the intermediate-acting medications (6- to 8-hour long) than the longer acting medications. Combination therapy is useful in obtaining control of symptoms with few to no side effects. A little of this and that is less likely to cause side effects than a lot of this and none of that.

In addition to stimulants, guanfacine, Intuniv, clonidine, Strattera, melatonin, and cyproheptadine can be helpful additional medications for better symptom control and treatment of side effects, or for baseline problems with sleep, tics, anger, and poor appetite.

It can be helpful for parents to fill out tools such as the Vanderbilt Assessment Scale or Conners Rating Scale. I ask parents to call our nurses with an update within one to three weeks after starting medication, sooner if there are worrisome side effects. I adjust med-

ication over the telephone as needed and see the child again within one to three months, and then two to four times per year. Excellent secretarial and nursing staff members assist parents by phone with fine tuning medications in a timely manner.

Educational accommodations, behavioral interventions, and support from a multitude of health and community providers combine to create the best treatment plan for children with ADHD. In the best of situations, these children require a lot of energy: remember to support the parents. As a provider, watching and helping these kids achieve success is worth all the energy they require.

CARE FOR KIDS
Early & Periodic Screening, Diagnosis & Treatment

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