Mental Health Care in the Pediatric Clinic

ADHD, Part 1

Course Objectives

By the end of this chapter, you will be able to:

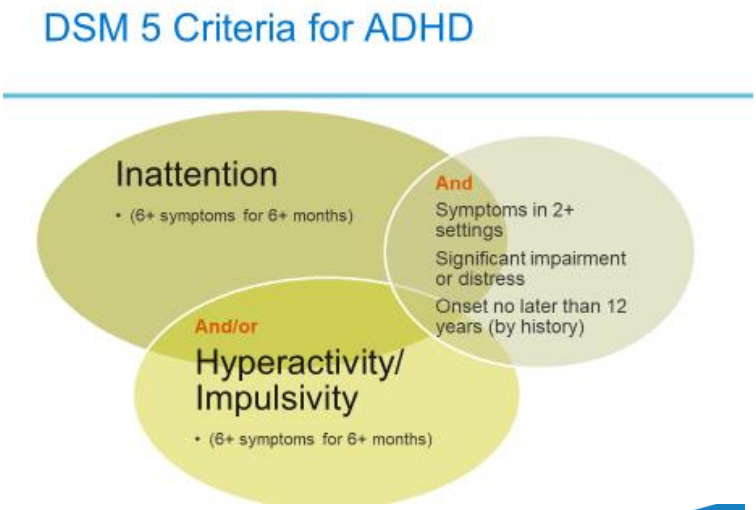
- discuss core features of ADHD
- describe the diagnosis and treatment options for ADHD.

This chapter and the following 2 take a case-based approach to the diagnosis and management of ADHD, focusing on practical aspects of educating families and patients about the disorder and addressing problems in treatment. We will cover diagnosis and evidence base for treatment of ADHD in this chapter, then more details about the stimulants in Chapter 2, and the non-stimulants in Chapter 3.

Caleb

Caleb is here in August for his 6-year well child check. He is healthy, tall for his age, BMI 85 percentile. He has always been a cheerful, engaging, and very active child. He zips around the exam room, up on the table and under the table more quickly than you can keep track. He demonstrates some karate moves.
Mother says that kindergarten was rough: there were many phone calls and notes from the teachers about Caleb's behavior. She is worried about how he will do in 1st grade. She says that she was treated for ADHD as a child.

The key features of ADHD are inattention and/or hyperactivity that cause significant distress or impairment in at least 2 settings, which for children is generally home and school. The major change in DSM-5 is the caveat that onset must be no later than age 12 years, later than the age of onset of 7 years required in earlier editions of the DSM.



Inattentive symptoms

- Fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
- Has difficulty sustaining attention in tasks or play activities.
- Does not seem to listen when spoken to directly.
- Does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
- Has difficulty organizing tasks and activities.
- Avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework).
- Loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools).
- Easily distracted by extraneous stimuli.
- Forgetful in daily activities.

Hyperactivity/Impulsivity Symptoms

- Fidgets with or taps hands or feet or squirms in seat.
- Leaves seat in situations when remaining seated is expected
- Runs about or climbs in situations where it is inappropriate
- Unable to play or engage in leisure activities quietly.
- Is often "on the go," acting as if "driven by a motor"
- Talks excessively
- Blurts out an answer before a question has been completed has difficulty waiting his or her turn
- Interrupts or intrudes on others

Additional Features of ADHD

- Deficit in rule-governed behavior
- Unable to modulate arousal
- Seek immediate reinforcement
- Poor motivation when bored or sustained effort required
- Social skills deficits
- Low frustration tolerance
- Emotional dysregulation

Additional features seen in many children and adolescents with ADHD include difficulties following rules, modulating arousal, limited capacity to defer gratification, and a tendency to become bored or to give up easily. Some, but not all, children with ADHD have poor social skills. Social skills are learned implicitly throughout childhood simply by paying attention to and responding to social cues. Kids with ADHD may be missing these cues because they are not paying attention.

Academic Impairment

- Poor school performance
- Reduced productivity
- Low academic achievement (or below child's potential)
- Often comorbid with learning disabilities

- Reading
- Spelling
- Math
- Handwriting

ADHD is often associated with academic impairment, especially when co-morbid with learning disorders. Treating ADHD will not resolve the learning disorder, but it will allow the child to better use learning tools offered in interventions or individualized education plans.

Epidemiology

ADHD Prevalence

Age 6-12 years

Up to 5% girls

Up to 10% boys

Adults 2-7%

Many children with symptoms and impairment (meeting criteria for ADHD) are never diagnosed or treated

Caleb

You finish up Caleb's exam and address other health and anticipatory guidance issues. You give mother a copy of parent and teacher Vanderbilt scales and ask her to come back with them after the first month of school, once the teacher has gotten to know Caleb better.

Diagnosing ADHD

Clinical diagnosis

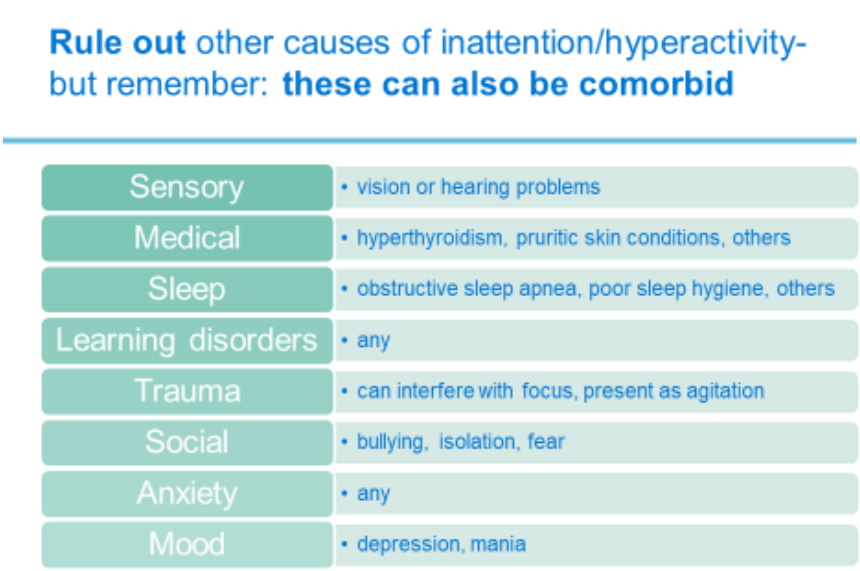
No evidence that neurological testing or imaging contributes to the diagnosis

Diagnosis is a combination of

History (family history, child's symptom history, child's academic history, child's medical history)

Rating scales

Rule out other causes of inattention/hyperactivity



There are many conditions which can present as inattention and/or hyperactivity. A complete physical exam including vision and hearing screening is indicated before making a diagnosis. Enlarged tonsils, obesity or adenoidal facies should prompt questions about obstructive sleep apnea. Treatment of obstructive sleep apnea can resolve or mitigate inattentive or disruptive behavior symptoms. Children with learning disorders may appear inattentive if they simply don't understand what is going on. Traumatized or bullied children may be distracted by memories or fears about their safety. Anxiety is distracting: it's hard to focus on one thing if you are worried about another. Depressed children may appear inattentive,

detached, or restless. While any of these conditions may be in the differential diagnosis for inattention or hyperactivity, they are all conditions which occur together with ADHD.

Here are some commonly used rating scales to assess ADHD symptoms and response to treatment. The standard is to get rating scales from both parents and teachers at each step of treatment. We will be discussing the Vanderbilt Scales here, as they are widely used and available for free. Drawbacks of the Vanderbilt include its being designed only for children aged 6-12, although it is often used for children outside that age range, and not having fully developed psychometrics.

ADHD rating scales

Instrument	Age range (years)	Parent/child /teacher	# items	free
Vanderbilt Scales (inattention, hyperactivity, oppositional behavior)	6-12	parent teacher	55 43	yes
SNAP-IV-C	6-18	parent teacher	90 90	yes
ADHD Rating Scale	5-17	parent teacher	18 18	no

The main rules for scoring the Vanderbilt follow the DSM criteria for ADHD: that is, 6 out of 9 inattentive symptoms, and/or 6 out of 9 hyperactivity symptoms, where a symptom is considered positive if rated as a 2 or 3 on the scale. Furthermore, there must be some evidence of impairment in at least 2 settings, usually home and school. Impairment is assessed with the performance questions at the end of the scale.

Rating scales: scoring the Vanderbilt

ADHD-inattentive:

- must score a 2 or 3 on 6 out of 9 items on questions 1-9

ADHD-hyperactive/impulsive:

- must score a 2 or 3 on 6 out of 9 items from questions 10-18.

ADHD-combined: requires the criteria on both the inattentive AND the hyperactive/impulsive presentations

- For ANY ADHD diagnosis, must also score 4 on at least 2, or 5 on at least 1, of the performance questions (48-54 on parent scale, 36-43 on teacher scale)
- must score a 2 or 3 on 4 out of 8 items on questions19-26 (parent form) OR must score a 2 or 3 on 3 out of 10 items on questions 19-28 (teacher form)

Conduct disorder (CD)

- Must score a 2 or 3 on 3 out of 14 behaviors on questions 27-40 (parent form) OR must score a 2 or 3 on 3 out of 10 items on questions 19-28 (teacher form)

For either ODD or CD, must also score 4 on at least 2, or 5 on at least 1, of the performance questions (48-54 on parent scale, 36-43 on teacher scale

The Vanderbilt also includes questions about disruptive behaviors, including symptoms of oppositional defiant disorder (ODD) and conduct disorder (CD). These also require evidence of impairment. While DSM does not specify that ODD symptoms must be present both at home and school, it typically diagnosed only if problems are present in both settings.

Norms for ADHD scales are age- and gender-specific

The Vanderbilt has not been psychometrically normed, but the first 18 questions on the Vanderbilt that cover inattention and hyperactivity are similar enough to another scale, the ADHD Rating Scale, that norms from the ADHD-RS can be reasonably applied to the Vanderbilt Scales. Note that scores for inattention and hyperactivity vary between boys and girls, from younger to older children, and according to the informant, parent or teacher.

The chart below shows scores for the top of the average range in inattention and hyperactivity for boys and girls in 4 age groups, and according to parent and teacher ratings. You can see that top average boys' scores are

higher than those of girls, that scores tend to decrease with age, especially for hyperactivity, and that teachers tend to rate higher than do parents.

Top, average range	**Parent**			**Teacher**		
Boys	**Total score**	**Inattention**	**Hyperactivity**	**Total score**	**Inattention**	**Hyperactivity**
5-7 year old boys	22.5	11	12.2	31.5	16.4	16
8-10 year old boys	22	12	10.8	34.3	18.8	16.5
11-13 year old boys	22.8	13	10.3	28.8	17.4	12.7
14-18 year old boys	18.3	11.1	8	24.8	15.5	10.5
Girls						
5-7 year old girls	17.7	9	9.5	25.9	13.9	13
8-10 year old girls	15.1	8.5	7.2	22.5	13.3	10
11-13 year old girls	15.3	9.7	6.4	21	12.7	9.2
14-18 year old girls	15.1	8.6	7.1	14	9.4	5.4

Table courtesy of John Lavigne, PhD

Caleb

Caleb and his mom return in late September with the completed Vanderbilt scales. They are clearly above average for a 6-year-old boy.

Parent: inattentive: 20 hyperactive: 24

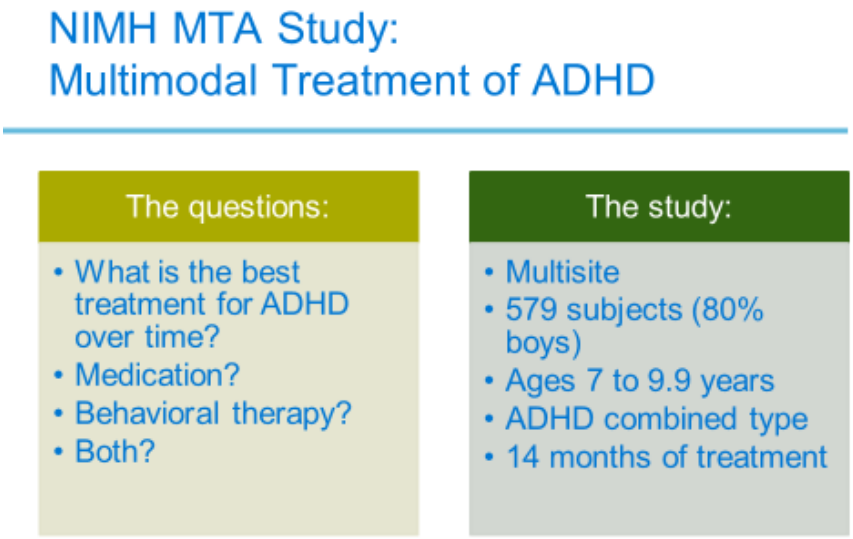
Teacher: inattentive: 19 hyperactive: 26

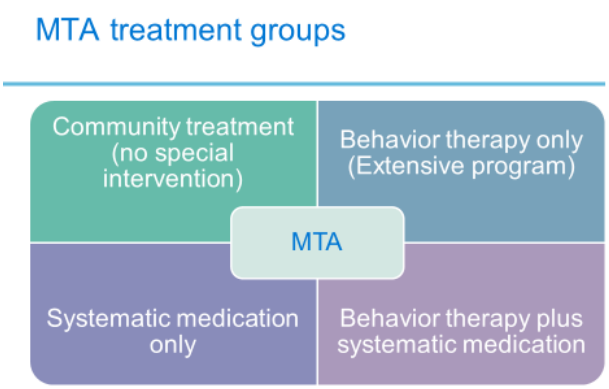
You review other possible causes of inattention and hyperactivity. Caleb has no medical problems, does not snore, passed his hearing and vision screens, has no trauma history, and is a sunny, unworried child.

Mother is concerned that Caleb is getting put on the "orange and purple colors" on the behavioral chart at school, and that he is not able to attend long enough to complete the worksheets he has for homework.

She would like to know about treatment. She took medication for ADHD as a child, but she wonders if Caleb is too young, and if there are behavioral therapies or diet changes that might work better.

We will discuss treatment options, but first let's review the evidence base for the big questions about best treatment for ADHD. The NIMH-funded Multimodal Treatment of ADHD Study, or MTA, was a large-scale, multisite study that addressed treatment for ADHD combined type in children aged 7 up to 10 years over 14 months. The box below shows the 4 treatment arms of the MTA.





MTA Systematic Medication Treatment

- Included parent guidance and support
- Individually titrated stimulant medication

Children assigned to the medication management arm of the MTA received aggressively managed stimulant medication treatment. All medication was immediate release, starting with methylphenidate, administered morning, noon, and after school, 7 days weekly. They had monthly medication checks and doses were adjusted based on clinical assessment and parent and teacher reports.

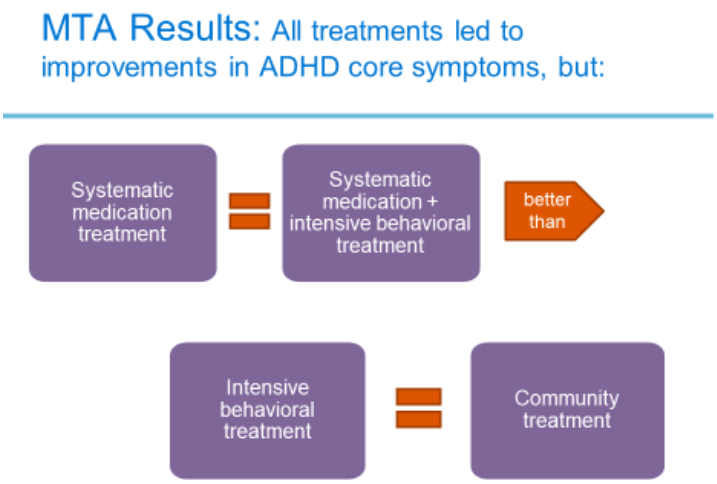
MTA Behavioral Treatment

- Parent training: 27 group and 8 individual sessions per family.
- Child-focused treatment: summer treatment program: 8-week day camp with intensive behavioral interventions delivered in group-based recreational settings as well as individualized academic skills practice and reinforcement of appropriate classroom behavior.
- School-based treatment: 10 to 16 sessions of biweekly teacher consultation focused on classroom behavior management strategies and 12 weeks of a paraprofessional aide working directly with the child, and a daily report card that linked home and school.

MTA Community Comparison

- Assessed in the same way as the treatment groups
- Treatment as usual in community (with pediatricians or child psychiatrists)
- 2/3 in community comparison group received stimulant medication

The **MTA results** are summarized in the graphic at right.

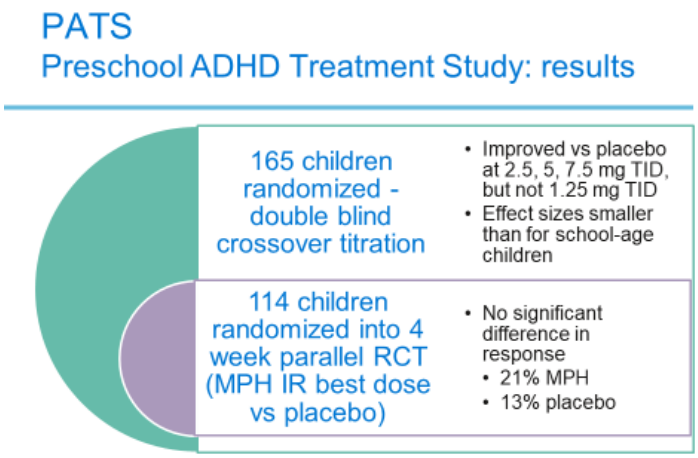


The take-home message for the MTA is that assertively managed stimulant medication works better than intensive behavioral therapy and better than community treatment for the core symptoms of ADHD.

What about treating ADHD in children younger than 6?

The NIMH-funded Preschool ADHD Treatment Study (PATS) had 2 phases. In the first, 165 children aged 3-5.5 years with ADHD were randomized to double-blind crossover titration comparing placebo to methylphenidate immediate release dosed tid at doses ranging from 1.25 mg to 7.5 mg. Children had improved ADHD symptom control vs placebo at doses of 2.5 mg, 5 mg and 7.5 mg tid, but not at 1.25 mg tid. The effect sizes for improvement were smaller in these younger children than were seen in the MTA. In the second phase, 114 children were randomized to receive the dose of methylphenidate to which they had responded best in the first

phase, or to placebo. The response rate in this phase was 21% for methylphenidate and 13% for placebo, a difference which was not statistically significant.



PATS-Methylphenidate Side Effects

Qualitatively the same as in older kids -
But more common and severe in preschoolers:

- Emotional outbursts
- Trouble falling asleep
- Repetitive behaviors/thoughts
- Decreased appetite
- Irritability

PATS: parent management lead-in

All parents in the PATS study were required to complete parent management training prior to a medication trial for the children. About 25% of children responded to parent management training (PMT) lead-in with reduced ADHD symptoms.
This has led to recommendations to require parent training before starting ADHD meds in younger children.
BUT:

- No firm data on how long to do PMT
- Not clear what constitutes effective PMT
- No assessment of cost/benefits of providing 75% of families with up to 12-16 sessions of treatment they from which they won't benefit.

Therefore: Consider parent management training as a first or concurrent step if parents have marked difficulties in managing oppositional and disruptive behavior in their children with ADHD.

Medication management for ADHD- summary of the current evidence base

- Short-term efficacy of stimulants for treating ADHD
  - 100 randomized clinical trials support the "robust behavioral efficacy" of stimulant medications for ADHD
  - 75% of children with ADHD respond to the first stimulant medication
  - 90% respond after a change to a second stimulant
- No behavioral intervention is superior for core ADHD symptoms, but behavioral intervention and support may be needed for symptoms that accompany ADHD

Treatment for ADHD includes 3 areas of intervention. Medication treats the core ADHD symptoms. Parents can make strategic changes in the ways in which they respond to the child which will improve comorbid or residual symptoms. Examples include creating very predictable schedules, quiet places to work, and rewarding appropriate behavior. Finally, support at the school level, such as a 504 plan, addressing a learning disorder, or formal social skills training can

help get the child functioning at his or her age level academically and socially. We will discuss these components as we go forward.

A few words about Oppositional Defiant Disorder (ODD)

ODD is a pattern of disruptive, oppositional and defiant behavior in at least one setting.
ODD is commonly comorbid with ADHD.
No medication specifically treats ODD.
Treating the ADHD frequently improves ODD by decreasing the hyperactive and impulsive behavior that creates conflict.
Parent management training helps parents learn skills that will elicit better behavior in children, and children can benefit from training in self-regulation and problem-solving.

Caleb

You review what is known about ADHD treatment with Caleb's mom. You let her know that you recommend a balanced diet and would support her doing parent behavioral management training, but that the most effective treatment for Caleb's core ADHD symptoms is medication treatment.
You and Caleb's mom discuss treatment options. You review risks, benefits, and side effects of stimulant medication, and write a prescription for methylphenidate (MPH) 5 mg to take morning, noon, and 3 pm.
You tell mother she can give a test dose of ½ tab on Saturday morning. If he does not have any problems with it, give the full tab as the next dose.

Here is a dot phrase template for a school nurse note, which Caleb will need to take the medication at school. If the school wants the information on their own form, they can fax it to you.
Re: name, date of birth
Date: ***
Dear School Nurse:
The above-named student will need to take the following medication at school for the duration of the school year:
Medication: ***
Instructions: ***
Anticipated side effects: decreased appetite, possibly small increase in blood pressure or pulse, headaches, stomachaches
Sincerely, ****

Caleb

You check in by phone with Caleb's mother 2 weeks later.
Caleb is taking the MPH 5 mg 3 times daily.
He is still inattentive, out of his seat, disrupting circle time.
He is eating less and "a little emotional."
You recommend increasing the morning and noon doses to 7.5 mg each, keeping the after school dose at 5 mg, and write a new prescription and nurse note for mom to pick up.

You see Caleb back 4 weeks after the first visit.
Vanderbilt scales:
Parent: inattentive: 14 hyperactive 16
Teacher: inattentive 13 hyperactive 18

Mother notes that Caleb won't eat during the day. He is often tearful; the tiniest disappointment provokes crying, which is not like him.
She thinks the MPH is helping but does not like the way Caleb has changed.
You note that emotional side effects with stimulants are more common in younger children, and that Caleb may be able to take MPH in the future without problems.

For now, you will switch over to amphetamine-dextroamphetamine (AMP) starting at 2.5 mg morning and noon with the option to increase to 5 mg morning and noon after the first few days.

Caleb returns in 4 weeks. He is back to his sunny self. He is able to sit for a few minutes before getting up to move around the room. When asked, he shows you his newest karate move. Mom reports good appetite, normal sleep, and positive reports from school- on "green" most days' behavioral charts, and learning.

You write for a 3-month supply of the amphetamine-dextroamphetamine (AMP) 5 mg morning and noon.

Tips for managing Schedule 2 prescriptions
Stimulants are Schedule II medications. They must be written or printed on tamper-proof paper.
Each month supply requires a separate prescription. No refills allowed on a prescription.
You can write for a 2- or 3- month supply:

- all rx dated today
- fill date added: 30 or 60 days from today
- Add the following instruction: "This prescription to be filled today's date plus 30 (60) days."

Parents can come pick up prescriptions from your office, or you can mail them to parents' address.
Train parents to call for prescription refills at least 5 days before they need them.
Look into electronic prescribing.

Caleb
Caleb does really well through first grade, and is working at grade level. You see him over the summer for his 7- year well child check. His BMI has dropped to 70%. His mood is cheerful. He has been in a summer rec program and in the past month he has been increasingly impulsive and off task.
Parent Vanderbilt scale: inattention: 18 hyperactivity: 24

Mother says that she really does not want Caleb to have to take medication at school this year. It was a lot of work to get medication to the school nurse every month.
Because of the breakthrough ADHD symptoms on amphetamine-dextroamphetamine (AMP) 5 mg am and noon, you decide to increase the dose before Caleb starts school.
You want to convert over to a long-acting formulation.
AMP XR dose = combined am and noon doses of AMP IR
Caleb's current dose is equivalent to AMP XR 10 mg. You prescribe AMP XR 15 mg po q am (generic form- you checked whether his insurance prefers brand or generic).
This dose works well for Caleb through 2nd grade.