

## How is ADHD Treated ?

*This supplemental handout provides information on current evidence-based treatments for ADHD.*

Psychosocial interventions and medications are the mainstays of treatment for ADHD. The brain-focused treatments discussed in the presentations and in a separate pdf are not considered standard treatments at this time.

- Psychosocial treatments include parent training in behavior therapy techniques, behavior therapy-based interventions in schools, educational interventions and accommodations, behavioral peer interventions (covered in the presentations on social functioning), skills training, (covered in the presentations and other pdfs), and cognitive behavior therapy (primarily for older teens and adults).

Behavioral parent training is the best-studied psychosocial treatment for ADHD and has the most evidence for effectiveness for school-aged children (Pelham & Fabiano, 2008; Pfiffner & Haack, 2014).

- It is based on social learning theory which proposes that behavior can be changed by modifying what happens before (antecedent) and after (consequence) the behavior occurs.
- For children with ADHD, it is important that a limited number of clearly-defined behaviors that can be described in concrete, developmentally-appropriate language are addressed, rather than trying to address everything that could be improved at the same time.
- It is also important that target behaviors be described in terms of what you want the child to do (example “hold mom or dad’s hand in the parking lot and when crossing the street” rather than “don’t run off in the parking lot or across the street”).
- Antecedents should be planned to set the child up for success. For example, if a target behavior is to follow a parent or teacher’s instruction the first time, a useful antecedent would be to make sure the adult has the child’s attention before giving the instruction. Another example might be to have a list or visual schedule of the steps the child must complete to follow the direction, for example, a picture list of the steps in getting dressed.
- Consequences should primarily be positive, meaning a reward for desired behavior rather than punishment for absence of the desired behavior. Rewards should be immediate and motivating (praise, tokens that can be traded for desired items or privileges, units of allowance, etc.). There should be only occasional use of negative consequences, usually for the most serious negative target behavior.

- Adult attention, whether positive or negative, typically acts as a positive reinforcer, so negative versions of target behaviors that are not part of the active target behaviors should be ignored when it is safe to do so.
- When the desired version of a particular target behavior being addressed becomes “a habit”, it can be dropped from the current list being actively worked on, while being maintained with continued occasional reinforcement, and a new, or “next level” behavior can become a new target to be actively worked on.
- Common target behaviors might include following a command or direction the first time, using nice words, using words/not hands, completing homework, and completing a chore. Multi-step tasks such as the last 2 examples can seem overwhelming to a child who loses track of multiple steps, and it is likely that the first step can be worked on in this way until it becomes a habit, while providing help for the rest of the steps, and then the second step can be added to the reinforcement plan, etc. (See the pdf entitled Parent-Focused Strategies for more information about behavior management)
- Behavior therapy-based interventions in the school setting (DuPaul, Gormley, & Laracy, 2014; Evans, Owens, & Bunford, 2014; Pelham & Fabiano, 2008) use the principles and procedures described above but they are implemented by teachers.
- Ideally, a therapist engaged in behavioral parent training with a family will provide consultation to the child’s teacher for the reinforcement of desired target behaviors with consistency across settings. Alternatively, a school-based behavioral health provider or consultant may develop a behavior plan for the school setting with parent involvement to insure consistency across settings. In some cases, the rewards will be given at home; in others, rewards may be provided at school (examples- time for a favorite activity or privilege or an item from the prize box).

Behavior therapy is likely to be more effective when similar language, target behaviors, and expectations are in place at home and at school. In the accompanying presentations, coordinated intervention with parents and teachers is typically a component of effective interventions for executive end point skills in children with ADHD. Thus, home school communication, often in the form of a home-school note, is a key component that informs parents how well a child met their target behavior goals in school that day. This allows parents to provide reinforcement at home when target behaviors are achieved at school.

- Behavior therapy for adolescents typically requires modifications from the practices used for younger children, and there is much less research in older students with ADHD (Evans, Langberg, Egan, & Molitor, 2014).
- Finding concrete rewards for teens can be challenging, and their need for independence may render direct training or school-based interventions more successful than those implemented by parents (Evans, Langberg, Egan, & Molitor, 2014; Evans, Owens, &

Bunford, 2014). Parents and teens may need to work with a therapist to establish a plan.

Finally, parent and child characteristics may affect the success of parent training. When parents are less engaged in the treatment, have fewer resources and more psychosocial stressors, are single, or have mental health conditions such as ADHD or depression, their children are less likely to benefit to the same degree as other children from families without these challenges (Groenman, et al., 2022; Pfiffner & Haack, 2014). Children with slow processing speed and those with very high levels of ADHD or conduct disorder symptoms may have a reduced response to therapy (Adalio, et al., 2018; Groenman, et al., 2022), though in general, co-existing conditions do not appear to limit the effectiveness of behavior therapy (Pfiffner & Haack, 2014).

- Other interventions at school:
  - School-based organizational skills training is an evidence-based intervention that is the subject of some of the accompanying presentations and therefore will not be discussed further in this pdf.
  - Many students with ADHD have impairments in academic skills, and addressing core symptoms of ADHD alone may not address academic impairments. Academic interventions such as clear, step-wise (explicit) teaching, computer-assisted learning, and peer tutoring are helpful for students with ADHD.
  - Finally, teaching students to self-monitor (ie monitoring attention or task completion) is a promising, but not proven intervention (DuPaul, Gormley, & Laracy, 2014).
  - There is also some, but limited, evidence that actual intervention such as organizational skills training, self-management, and note-taking instruction (that can be provided through an Individualized Education Plan) result in improvement in the skills being trained in contrast to providing accommodations such as extra time, a copy of the teacher's notes, and organizational help (that can be provided by a Chapter 15 agreement/ 504 Plan) (Harrison, et al., 2020). Although there is limited study of their benefits, accommodations are commonly provided to students with ADHD.
  - In these presentations related to executive and social functioning, we advocate for interventions to address skill deficits to increase the chance that students will learn, and use, end point skills that have been shown to improve school functioning. Accommodations for core ADHD symptoms may continue to be needed when medication does not fully address core symptoms. (See pdfs entitled Medication Effects on Executive Functioning and Medication Effects on Social Functioning).

- Skills training: Three types of skills training have been discussed in the accompanying presentations- the end point skills based on executive functions that are needed for school and life success, skills needed for positive social functioning, and the brain-focused methods that may help executive skills and social functioning. The first two are the primary subjects of the presentations and will not be discussed further here. The third is discussed in the pdf entitled “Update on Brain-Focused Treatment”.
- Cognitive Behavior Therapy (CBT): CBT is a type of talk therapy with the goal of helping the individual recognize and change faulty or distorted thinking that leads to unhelpful or unproductive behavior.
  - CBT can promote a better understanding of the behavior and motivations of others, and foster the use of problem-solving skills, rather than faulty thinking, to deal with difficult situations (<https://www.apa.org/ptsd-guidelines/patients-and-families/cognitive-behavioral-therapy>). It has been used in the treatment of a wide variety of mental health disorders, but its use in ADHD treatment is relatively recent. It is not typically considered for children due to the requirement for a certain level of insight and language to directly engage in this type of therapy.
  - There is evidence in adults (Guo, et al., 2022; Knouse, et al., 2017; Young, et al., 2020) and college students (Anastopoulos, et al., 2021) that CBT can be helpful for the core symptoms of ADHD and resulting impairments.
  - Studies in adolescents show inconsistent results (Sibley, et al., 2023), though parent involvement in the therapy may benefit this age group (Haugan, et al., 2022).
- Medication: Medications for ADHD have been in common and increasing use since the 1960s. There are two broad categories, known as stimulants and non-stimulants. Stimulants are considered controlled substances by the Drug Enforcement Agency (DEA) because they are considered abusable medications, but in the doses used for treating ADHD, and when given by mouth, they are very rarely addictive, although they can be misused, typically by individuals for whom they are not prescribed.
- There are also two categories of stimulants- those made from the chemical (or generic name) methylphenidate and those made from the chemical (or generic name) amphetamine.
- Each of these categories can be further subdivided into the single isomer (dextro-) or mixed (dextro- and levo-) forms. The dextro- isomer is more specific for the chemical reaction that makes ADHD medications effective, so it is sometimes more effective and

smaller doses may be used. The prefix “dex” can be found in the generic name of these dextro-isomer medications (examples dexamethylphenidate and lisdexamfetamine).

- Medications in each of the two main stimulant categories are available that last 3-4 hours, 6-8 hours, and 10-12 hours, though an individual’s medication absorption and break-down characteristics can affect these estimates of duration.
- Amphetamine is generally considered somewhat stronger and more effective than methylphenidate, but also tends to have more side effects, thus young children are most often prescribed methylphenidate, whereas teens and adults may have a better effect/ side effect ratio with amphetamines.

Chemicals that carry messages from one nerve cell to the next in the nervous system are called neurotransmitters. Medications that are effective for ADHD share the characteristic of increasing the effect of the neurotransmitters dopamine and/ or norepinephrine, which are active in the networks involved in attention, executive function, motivation, and alertness or vigilance. Stimulants work and stop working the same day they are taken, though some effects on neurotransmitter systems may last longer. Unlike antidepressants or anti-seizure medications, they do not need to “build up” to have an effect.

- Side effects are the same for the two stimulant categories, though they may differ between categories for an individual.
- Roughly 30 % of children with ADHD will do better on one category than the other, but there is no way to know which will be best in advance.
- Common side effects include decreased appetite while the medication is in effect, initial weight loss, insomnia, and irritability, emotionality, or worsening of ADHD symptoms when the medication wears off (sometimes called “rebound”). Less common side effects include feeling tense or withdrawn, mood changes, slowing of linear growth and tic onset or worsening, and rare side effects include depression and psychosis-like effects including hallucinations or paranoia.
- Most of the common and less common side effects can be managed with changes in dose, timing or medication category, but the rare side effects may lead to discontinuing stimulant use.

Children who are at higher risk of side effects include preschoolers, and those with additional diagnoses such as autism spectrum disorder, intellectual disability, and possibly anxiety/depression, but a higher risk for side effects does not mean that they cannot be treated for ADHD. Many will tolerate stimulants, especially with additional interventions for other diagnoses, or they may have a better profile of effects and side effects with a non-stimulant.

- Thousands of studies document the effectiveness of stimulant medication for core ADHD symptoms, with most studies using methylphenidate.
- Some also show increased academic productivity, improved parent-child interactions, decreased aggression, improved measures of executive function, and fewer auto

accidents. But only a few studies find improvements in broader outcome measures such as educational attainment and quality of life. Positive outcomes are typically based on parent and teacher ADHD rating scales; some studies include neuropsychological tests, other behavior rating scales, and end point skills such as grades or measures of functional impairments.

- Most studies of medication for ADHD are short-term, typically 6-12 weeks long. A few have followed children for up to 2 years or more, but most of the research that follows children forward does not include ongoing medication management, so over time, there is usually variability and drop-off in medication usage.
- Medication benefits are generally only observed when the medication is in effect.

Not surprisingly, long-term studies do not show the high level of positive treatment effects that short-term studies show (Pelham, et al., 2022; Swanson, et al., 2008). At this time, we do not have definite evidence that medication treatment in childhood has a long-term positive impact on educational or occupational achievement, though there may be a reduction in risk for depression, suicide, sexually-transmitted diseases and teen pregnancy (Faraone, et al., 2021).

- There does not appear to be increased risks for later conditions, such as cardiac conditions or substance abuse (Faraone, et al., 2021; Krinzinger, et al, 2019; Man, et al., 2023) though cardiac monitoring is recommended.
- Also, there very limited information about long-term positive or negative effects of medications other than methylphenidate.
- Other important areas where there is still insufficient information about medication use for ADHD include potential tolerance to the medication with chronic long-term use, and risks after exposure during pregnancy.

There are also two categories of non-stimulants- the alpha-2 adrenergic agonists (A2A agonists) and the selective norepinephrine reuptake inhibitor (SNRI)-like medications. Both groups affect primarily the neurotransmitter norepinephrine while stimulants affect dopamine and norepinephrine.

- The A2A agonists guanfacine and clonidine long-acting forms are FDA-approved for use in ADHD.
- They can be used alone, or with stimulants.
- These medications can reduce hyperactivity, impulsivity, reactivity, and tics, but are less effective than stimulants for inattention.
- Side effects include sleepiness, (usually minor) decreases in pulse or blood pressure, orthostatic hypotension (low blood pressure and dizziness when standing quickly), irritability, and occasionally, headache, constipation, or difficulty urinating.

The SNRI-like medications include atomoxetine and viloxazine ER.

- Their primary chemical effect is to increase the availability of the neurotransmitter norepinephrine, but viloxazine also has effects on serotonin receptors (Yu, et al., 2020), a neurotransmitter related to anxiety, depression, and sleep.
- These medications have more complex timing effects, often taking several weeks to show their best effects, and losing positive effects over a few weeks rather than by the end of each day.
- Like the A2A agonists, these medications are less effective than stimulants when effectiveness is measured by ADHD rating scales, but they may be preferable for a subset of patients, particularly those for whom stimulant use is limited by irritability, tics, or anxiety.
- Side effects include sleepiness, stomach upset, increases in pulse and blood pressure, and irritability. Like antidepressants, they can increase the risk of mood swings, mania, and suicidal ideation.

(Medication information above is reviewed in Faraone, et al., 2021; Glanzman & Sell, 2019; Man, et al., 2023; Posner et al., 2020; Storebø, et al., 2023; Wolraich et al., 2019 unless otherwise referenced).

- Clinical practice guidelines (CPG) from medical professional organizations provide guidance about the diagnosis and treatment of ADHD based on comprehensive reviews of research.
- In terms of treatment, CPG emphasize behavioral and educational treatment, especially in preschoolers and in children and teens with “complex” ADHD, that is with additional diagnoses.

When medication is started, it is typically recommended to start with a stimulant from either category (methylphenidate or amphetamine), and to try a product in the other category if the first choice is not effective or not tolerated. When a co-existing disorder such as anxiety or depression is present, it is suggested to start with a medication to address the diagnosis that is more problematic while employing behavioral and educational treatments for the other disorder, with ongoing monitoring to determine next steps. In the case of a tic disorder, A2A agonists may be used first or in combination with the stimulant. In the case of co-existing substance use disorder, it is recommended to address the SUD before considering a stimulant.

- There is little specific guidance, other than in relation to tics, about when to consider a non-stimulant for primary medication treatment because there is less research available, so the provider’s clinical judgement and parent preference, while always central, are even more important in this situation (reviewed in Barbaresi, et al., 2020 a & b; Wolraich, et al., 2019).
- When starting medication, it is important to “test” a range of doses of each medication in a systematic way to determine the best balance between positive and negative effects. While age and weight may provide some guidance about a reasonable range of

doses to try, they are not the only factors that determine whether a given medication or dose will be effective.

- It is important to start with a clear idea of what symptoms or impairments are most important to address because, unfortunately, some studies suggest that inattention/ distractibility may respond to a lower dose of medication than hyperactivity / impulsivity.
- Other factors that may affect a child's performance (such as psychosocial factors, academic demands, and other interventions) should be kept stable during a medication trial to provide some confidence that changes noticed can be attributed to the medication or dose.
- Feedback, ideally in the form of rating scales, should be collected from parents, teachers and older children, at baseline and on each dose. With this information, the best decision can be made about the benefits and side effects at each dose, and whether to continue the current medication or move on to another option.

Combined treatment: Evidence suggests that combined medication and psychosocial treatments may offer the best chance at improved outcomes, and are particularly important for functional outcomes beyond core symptoms, and in children with co-existing conditions. Combined treatment may allow for the use of lower doses of medication and lower "intensity" of psychosocial treatments. Finally, there is also some evidence that introducing psychosocial treatment first results in better effects overall (Barbaresi, et al., 2020; Pelham & Altszuler, 2020).



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