APPENDIX 7.1. Stimulant Medication Treatment of ADHD: A Teacher Handout

Children with ADHD exhibit significant problems with inattention, impulsivity, and overactivity. One of the most effective interventions for this disorder is the use of central nervous system (CNS) stimulant medications. The latter include Ritalin, Concerta, Metadate, Quillivant (all four are methylphenidate [MPH]), Dexedrine (dextroamphetamine), Adderall (mixed amphetamine), and Vyvanse (lisdexamfetamine). Of these medications, MPH is by far the most commonly prescribed. CNS stimulants purportedly increase the availability of certain neurotransmitters (i.e., dopamine and norepinephrine) in specific parts of the brain. This results in a greater level of CNS arousal, and hence increased attention and behavior control. It was once believed that these medications exerted a paradoxical (i.e., sedating) effect in children with ADHD and that this response was diagnostic. On the contrary, these medications act to stimulate brain activity not only in youngsters with ADHD but most other children and adults as well. Thus, one cannot diagnose a child as having ADHD based on his or her response to stimulant medication.

BEHAVIORAL EFFECTS

The primary behavioral effects of stimulants include enhanced attention, decreased impulsivity, and reduced task-irrelevant motor activity. Students are more likely to complete assigned tasks accurately, are more compliant with classroom rules, and exhibit fewer aggressive behaviors. They may also show improved handwriting and fine motor skills, as well as greater acceptability by their classmates. In fact, some studies have shown that for a majority of treated children, stimulant medication can lead to changes in attention span and academic productivity such that levels of functioning in these areas are no different from those of their peers. It is important to note, however, that these medications do not "cure" ADHD and that a child with ADHD should be expected to evidence the usual "ups and downs" of behavior control even when a positive response has been obtained. Furthermore, these medications are never to be used as the sole treatment for ADHD. Often, when combined with other interventions (e.g., classroom behavioral strategies), medication effects on behavior control are enhanced.

The behavioral effects of short-acting stimulants usually last between 3 and 4 hours after ingestion. Thus, most children take these medications twice per day (i.e., in the morning before school and at lunchtime). This effectively "covers" the school day, but teachers should be aware of a possible dropoff in effectiveness toward the latter stages of the morning. Longer-acting or extended-release stimulants typically are taken once per day, with behavioral effects lasting up to 8 hours. Some children do not respond as well to these sustained-release medications, however.

Approximately 70–80% of children with ADHD between the ages of 5 and 12 years old who receive stimulant medication evidence a positive response. For adolescents, the percentage of positive responders is somewhat lower (i.e., 60%). Thus, it can be assumed that the majority of students with ADHD who are treated with a stimulant will respond positively. Response to these medications varies as a function of the dose. Some children will respond to lower doses, while others will require higher doses to achieve the same effects. Dose–response to stimulants varies widely across individual children and cannot be predicted on the basis of a child's age or body weight. Specifically, the strength of obtained behavioral effects can range across children and doses from mild (i.e., minimal positive change in behavior) to strong (i.e., "normalization" of behavior control). Thus, most physicians will try a range of doses of a specific stimulant in an effort to determine a child's "optimal" dose.

In those instances when a child with ADHD does not respond to a particular stimulant, this is indicated by no change or, in some cases, a worsening of the core characteristics of ADHD (i.e., inattention, impulsivity, and overactivity). Usually, the physician will try an alternative stimulant when this occurs. For instance, some children who do not respond to Ritalin can be successfully treated with Adderall. If none of the stimulants work, some physicians may prescribe other medications such as Strattera (atomoxetine) or antihypertensives like Intuniv (guanfacine). Thus, when a child's behavior is not affected by the first medication prescribed, there are other alternatives.

ADVERSE SIDE EFFECTS

The primary, acute side effects of stimulant medications are insomnia and appetite reduction. One of the latter side effects is likely to occur in about 50% of children treated with MPH, particularly at higher doses and during the initial stages of treatment. In most cases, however, effects on sleep and appetite are quite mild and do not require discontinuing treatment. Other less common adverse side effects include stomachaches, headaches, and increased anxiety or sad mood. Some children treated with MPH will experience a "behavioral rebound" effect in the late afternoon when the medication is wearing off. The rebound effect is indicated by a worsening of the child's behavior and mood to an extent beyond what was evident prior to taking medication. The latter can be dealt with by reducing the dosage or by adding a late-afternoon administration of the medication. A very small number (i.e., less than 5%) of children treated with stimulants will exhibit motor and/or vocal tics (i.e., repetitive motor movements or vocal noises). Usually, these will disappear after reducing the dosage or discontinuing the medication. In some cases, albeit very few, these tics will continue even when treatment is terminated.

One potential side effect that may be most prominent in school settings is an "overfocusing" effect. The latter refers to instances when a child may be exhibiting exemplary behavior control, but appears to be concentrating too hard on tasks with minimal output. In some children, this overfocused effect may be indicated by appearance (e.g., "glassy" eyes, restricted emotional expressions), while in others this may be signaled by a dropoff in academic performance (e.g., reduced amount of work completed correctly). This reaction is usually a result of the child receiving a dose of medication that is too high.

Teachers and other school professionals should be cognizant of the possible side effects of stimulant medications. When these are noted to occur, the child's parents, physician, and/or the school nurse should be informed. This is especially the case when the child begins to exhibit tics or overfocused behavior. Care should be taken to evaluate possible side effects in comparison with the child's behavior without medication. In other words, sometimes what appears to be a side effect of medication is actually a behavior associated with ADHD that was evident prior to the initiation of treatment. For instance, some children with this disorder are prone to irritable moods regardless of whether they are receiving stimulant medication or not.

ROLE OF SCHOOL PROFESSIONALS IN TREATMENT

It is quite important that teachers and other school professionals are in communication with a child's parents and/or physician whenever stimulant medication is prescribed. This is true for at least two reasons. First, these medications are most active in affecting a child's behavior during the school day. In fact, many parents do not have the opportunity to see medication effects on their children's behaviors. Second, children with ADHD evidence their greatest problems in school settings, and thus the success of treatment is determined, in large part, by changes in a child's school performance.

School professionals can play a role in three stages of treatment. First, teacher input should be sought prior to initiating medication treatment. This is necessary to address whether the child has ADHD and, if so, whether medication treatment is needed. If the child's physician does not actively seek this information, then someone from the school should contact the physician to provide school data. Second, changes in the student's behavior control and academic performance should be among the primary measures used to determine the best dose of medication. Objective information (e.g., rating scales completed by the teacher) about the child's classroom performance is invaluable in making medication-related decisions. Third, once a child's dosage is determined, teachers should communicate any significant changes in student performance that may occur during the school year. Although such changes are not always related to medication, sometimes a dropoff in behavior control may indicate that an adjustment in dosage is necessary. Thus, the school and the physician should be communicating throughout the various stages of medication treatment.

APPENDIX 9.1. Suggested Readings on ADHD and Related Difficulties for Parents and Teachers

Barkley, R. A. (2013). *Taking charge of ADHD: The complete, authoritative guide for parents* (3rd ed.). New York: Guilford Press.

Barkley, R. A., & Robin, A. L., with Benton, C. M. (2014). *Your defiant teen* (2nd ed.): *10 steps to resolve conflict and rebuild your relationship*. New York: Guilford Press.

Christenson, S. L., & Sheridan, S. M. (2001). *Schools and families: Creating essential connections for learning*. New York: Guilford Press.

Dendy, C. A. Z., & Teeter Ellison, P. A. (Eds.). (2006). *CHADD educators manual on attention deficit hyperactivity disorder: An in-depth look from an educational perspective*. Plantation, FL: CHADD.

Forgatch, M. S., & Patterson, G. R. (1989). *Parents and adolescents living together: Part 2. Family problem solving*. Eugene, OR: Castalia.

Patterson, G. R., & Forgatch, M. S. (1989). *Parents and adolescents living together: Part 1. The basics*. Eugene, OR: Castalia.

Power, T. J., Karustis, J. L., & Habboushe, D. F. (2001). *Homework success for children with ADHD: A family–school intervention program*. New York: Guilford Press.

Reif, S. F. (2005) *How to reach and teach children with ADD/ADHD: Practical techniques, strategies and interventions*. San Francisco: Jossey Bass.

Weyandt, L. (2007). *An ADHD primer* (2nd ed.) Mahwah: NJ: Erlbaum.

APPENDIX 9.2. Referral Letter to a Physician

Dr. Janet Williams
755 E. 45th Street
Anywhere, USA 99999

Dear Dr. Williams:

We are writing with a referral question regarding one of your patients, Michael Winston. Michael is a first-grade student with us here at Edgars Elementary, and we have concerns as to whether he might be a child with attention-deficit/hyperactivity disorder. Michael's teacher and our school psychologist have completed systematic observations of Michael's classroom behavior. As compared to his peers, Michael was observed to spend significantly less time engaged in assigned classroom tasks and significantly more time out of his seat and fidgeting while in his seat. At this point, Michael is struggling to keep up with his peers academically, and we are concerned that he frequently does not complete in-class assignments or he completes them quite quickly with little attention to detail. Although, as yet, we have not developed a systematic intervention program for Michael, we are considering developing one. Before doing so, however, we would like your professional opinion as to whether Michael might be diagnosable with ADHD, and, if so, we would appreciate your input as to potential directions for intervention. We would be pleased to provide other information at your request. Thank you for your assistance in this matter.

Sincerely,

School Psychologist Teacher School Principal

APPENDIX 9.3. Referral to Physician for Possible Medication Trial

Dr. James Smith
The Anytown Clinic
1162 Willams Street
Anytown USA 99999

RE: Billy Buck

Dear Dr. Smith:

As you are aware, we have been working with the above-named student to address his problems with inattention, impulsivity, and overactivity in the classroom. Previously, you had diagnosed Billy with ADHD. We are writing to provide an update of his progress and to request your input regarding the need for additional intervention (e.g., stimulant medication).

Over the past several months, we have implemented a number of interventions designed to enhance Billy's academic performance and behavior control. These have included a token reinforcement program in the classroom, a home–school communication protocol, and the use of peer tutoring for certain subject areas (e.g., math, spelling). Although these interventions have been helpful, Billy continues to display attentional difficulties throughout the school day and also is very disruptive on the playground and in the lunchroom. We plan to modify and continue these interventions for the remainder of the school year. Nevertheless, we are requesting that you evaluate the need for a stimulant medication trial.

We have discussed the need for this referral with Mr. and Mrs. Buck. They are in agreement with us that further treatment appears necessary. Of course, as with previous cases, we are willing to provide objective data to you regarding Billy's response to stimulant medication.

If you need further information about Billy's school program, please do not hesitate to contact us at any time. We look forward to hearing from you in the near future.

Sincerely,

School Psychologist Teacher School Principal

APPENDIX 9.4. Description of Medication Trial to Physician

Dr. James Smith
The Anytown Clinic
1162 Willams Street
Anytown USA 99999

Dear Dr. Smith:

We are pleased to be working with you and your patient, Thomas Jones, in evaluating the effects of stimulant medication on Thomas's academic and social functioning in school. Enclosed you will find a brief description of the project, its purpose, and goals. I am writing to ask your cooperation in prescribing the medication for the trial. Joan Williams, head pharmacist at the Health Center, has agreed to facilitate packaging of medication for the trial. Joan has agreed to label the separate bottles of medication with a code letter and dates (e.g., methylphenidate, dose A, week of April 14). Of the people involved in administering the medication trial, only you and I will be aware of the actual dose on any medication day. Please write four separate prescriptions as follows, and specify that the prescription is to be filled by the Health Center:

Methylphenidate 5 mg; dispense 6 doses.
Methylphenidate 10 mg; dispense 6 doses.
Methylphenidate 15 mg; dispense 6 doses.

Mrs. Jones will pick up the prescriptions from your office when they are ready. The dates and doses (randomly assigned) of Thomas's medication trial will be as follows:

Dates	Dose	
Week of April 7	Baseline	
Week of April 14	Monday thru Saturday	10 mg
Week of April 21	Monday thru Saturday	5 mg
Week of April 28	Monday thru Saturday	15 mg

We will provide you with a summary of the results of this evaluation upon completion of the trial. We look forward to working with you. Please contact us if you have any questions.

Sincerely,

School Psychologist Teacher School Principal

APPENDIX 9.5. Report of Results of Medication Trial to Physician

Dr. James Smith
The Anytown Clinic
1162 Willams Street
Anytown USA 99999

Dear Dr. Smith:

We have now completed the methylphenidate evaluation trial for your patient, Thomas Jones. The conditions and dates of the trial were as follows:

Dates	Dose
Week of April 7	Baseline
Week of April 14, Monday thru Saturday	10 mg
Week of April 21, Monday thru Saturday	5 mg
Week of April 28, Monday thru Saturday	15 mg

Ongoing measures consisted of Thomas's reading performance in passages sampled from his curriculum, math performance in basic math skill probes, teacher ratings of classroom behavior and performance, parent ratings of behavior, and side-effects ratings completed by Thomas and his mother. A graph of Thomas's reading data is attached. The overall results of the trial are summarized in the table that follows:

Measure	Optimal dose(s)
Daily curriculum-based reading performance	15 mg
Daily math performance	15 mg
Teacher ratings of classroom behavior	10 mg/15 mg
Parent ratings of behavior	15 mg/5 mg

With respect to side effects, some dizziness, irritability, stomachaches, and difficulty sleeping were reported by both Thomas and his mother at both the 10-mg and 15-mg doses. These problems were reported as minor to moderate in severity, and tended to diminish over the course of each of these weeks.

The results of this evaluation indicate that the 15-mg dose of methylphenidate optimally enhanced Thomas's behavior across social and academic performance measures. Should methylphenidate be prescribed for Thomas at this dose, side effects should be carefully monitored. We hope that you find the results of this evaluation to be useful to you in your work with Thomas and his family. If we can be of further assistance with Thomas or other children, please do not hesitate to contact us.

Sincerely,

School Psychologist Teacher School Principal