New Developments in the Treatment of ADHD in Children: How the Pharmacist and Pharmacy Technician Can Impact Care

Post-Test/Rationale

EDUCATIONAL OBJECTIVES
Upon completion of this activity, participants should be better able to:

1. Describe the epidemiology and possible causative factors for attention-deficit/hyperactivity disorder (ADHD);
2. Explain the diagnostic criteria for ADHD;
3. Describe appropriate nonpharmacologic and/or pharmacologic therapy for a specific patient diagnosed with ADHD;
4. Describe the pharmacologic therapies available for ADHD and the differences among the various medications;
5. Discuss safety and side effect concerns associated with pharmacologic treatments for ADHD; and
6. Explore emerging issues regarding therapeutic equivalency for generics and new products approved for the treatment of ADHD.

1. What 2 neurotransmitters are thought to be involved in the pathophysiology of attention-deficit/hyperactivity disorder (ADHD)?
A. Dopamine and Norepinephrine***
B. Dopamine and Serotonin
C. Dopamine and Glutamate
D. Dopamine and GABA

Correct Answer: A
Studies reveal strong associations among ADHD and various genes involved in dopamine and norepinephrine pathways. The other neurotransmitters listed have not been implicated in the pathophysiology of ADHD.
2. Which of the following is a risk factor for developing ADHD:
A. Consuming foods high in additives
B. Consuming foods high in sugar
C. Family history of ADHD***
D. High birth weight

Correct Answer: C
The heritability of ADHD has been estimated at 76%, with multiple studies revealing strong associations between ADHD and various genes. There is currently no data to show that food additives or sugar consumption cause ADHD. Low birth weight is a nongenetic factor, but high birth weight is not.

3. Which of the following patients would meet criteria for at least of 1 ADHD subtype based on the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5 criteria):

A. A girl, 9 years of age, who has had 5 symptoms of inattentiveness consecutively for 6 months at home and at school
B. An boy, 8 years of age, who has had 5 symptoms of hyperactivity/impulsivity consecutively for 5 months at home and at school
C. A girl, 12 years of age, who has had 6 symptoms of hyperactivity/impulsivity consecutively for 6 months at home only
D. A boy, 11 years of age, who has had 6 symptoms of inattentiveness consecutively for 6 months at home and at school***

Correct Answer: D
Per the DSM-5 criteria, patients younger than 17 years of age must present with at least 6 symptoms of inattention or hyperactivity and impulsivity in at least 2 settings; whereas patients older than 17 years of age may present with 5 or more symptoms. The duration of symptoms in both groups needs to be longer than 6 months.
4. According to the guidelines discussed, which of the following is the proper initial treatment for girl, 4 years of age, with ADHD:
A. Stimulant
B. Alpha-adrenergic agent
C. Teacher-administered behavior therapy***
D. Habit reversal therapy

Correct Answer: C
For preschool-aged children (4 to 5 years of age), evidence-based parent/teacher administered behavioral therapy is recommended first-line treatment option. A stimulant is considered second-line treatment in this age group and an alpha-adrenergic therapy is not recommended in this age group. Habit reversal therapy is used for tic disorders.

5. Which of the following is a recommended nonpharmacologic option for the treatment of ADHD:
A. Elimination of artificial coloring
B. Behavioral interventions***
C. Avoidance of exercise
D. Supplementation with fatty acids

Correct Answer: B
Behavioral interventions should be used in all patients alone or in combination with pharmacologic agents. The National Institute for Health and Care Excellence (NICE) guidelines do not recommend the elimination of artificial coloring or supplementation with fatty acids. The NICE guidelines recommend exercise among other things and not an avoidance of exercise.
6. Which of the following side effect is most common during stimulant treatment:
A. Sedation
B. Anorexia***
C. Hypertension
D. Elevated liver function tests

Correct Answer: B
Anorexia is a very common side effect that all patients should be counseled about. Stimulants do not cause sedation, but cause insomnia instead. While stimulants can cause hypertension, it is usually a minimal increase in blood pressure and not as common as anorexia. Elevated liver function tests are not a common side effect of stimulants.

7. Which one of the following stimulants is indicated to be administered once daily:
A. Methylphenidate IR
B. Methylphenidate ER
C. Mixed amphetamine salts ER
D. OROS methylphenidate***

Correct Answer: D
Methylphenidate IR, methylphenidate ER, and mixed amphetamine salts ER are usually dosed 2 to 3 times daily, whereas OROS methylphenidate is dosed once daily.

8. Which of the following stimulants have a U.S. Food and Drug Administration (FDA)-approved indication for ADHD for a child as young as 3 years of age:
A. Lisdexamfetamine
B. Methylphenidate extended-release (OROS MPH)
C. Amphetamine sulfate IR***
D. Dexmethylphenidate ER
The immediate release formulations of dextroamphetamine, mixed amphetamine salts, and amphetamine sulfate are the only products FDA approved to be used in children as young as 3 years of age. All other stimulants are approved for children aged 6 years and older.

9. Which of the following is a common side effect of Clonidine ER:
   A. Tachycardia
   B. Insomnia
   C. Atrial fibrillation
   D. Orthostatic hypotension

Correct Answer: D
The most common side effects of clonidine ER are orthostatic hypotension, bradycardia, and drowsiness.

10. Which one of the following nonstimulant medications does not have an FDA-approved indication for the treatment of ADHD:
   A. Atomoxetine
   B. Clonidine ER
   C. Guanfacine IR
   D. Guanfacine ER

Correct Answer: C
Although guanfacine IR is often used, it does not have an FDA-approved indication for ADHD. The 3 FDA-approved nonstimulant medications for the treatment of ADHD are atomoxetine, clonidine ER, and guanfacine ER.
11. Which medication is recommended if there is a concern regarding misuse of prescription stimulants?
A. Lisdexamfetamine***
B. Methylphenidate IR
C. Mixed amphetamine salts XR
D. Dexmethylphenidate

Correct Answer: A
Lisdexamfetamine must be ingested orally to be activated; it cannot be snorted or injected because of its delivery system. Also, it has less risk for abuse because of its slow release mechanism.