Module #5. Optional Training

Psychotropic Medications and Children and Adolescents

The following training provides information on psychotropic medications, their use with children and adolescents in general and with children and adolescents in foster care in particular, and specific types of psychotropic medications. There are eight sections in this training:

Section #1: What are Psychotropic Medications?

Section #2: Psychotropic Medication and Children and Adolescents

Section #3: Psychotropic Medications and Children in Foster Care

Section #4: Psychotropic Medications and Anxiety Disorders (Including PTSD)

Section #5: Psychotropic Medication and ADHD

Section #6: Depression and Psychotropic Medications

Section #7: Psychotropic Medication and Bipolar Disorder

Module #8: Psychotropic Medication and Schizophrenia

Section #9: Resources on Psychotropic Medications

Here are the learning objectives for this training. At the conclusion of this training, you will be able to:

#1. State why psychotropic medications are generally used.

#2. Name two critical issues that must be taken into account in using psychotropic medications with children and adolescents.

#3. Identify four concerns about the current usage of psychotropic medications with children and adolescents in foster care.

#4. Identify three major types of psychotropic medications used to treat anxiety disorders, including PTSD.

#5. Name three very common side effects of psychotropic medications used for the treatment of ADHD.

#6. Describe the FDA warning regarding the use of antidepressants in the treatment of children and adolescents.
#7. Identify two major types of psychotropic medications used in the treatment of bipolar disorder

#8. Define an “atypical antipsychotic” and list two benefits of this type of drug for the treatment of schizophrenia.

At the conclusion of this training, there is a test that you can take to assess your learning. The answers follow the test so that you can check yourself on your knowledge!
Section #1: What are Psychotropic Medications?

A psychoactive drug, psychopharmaceutical or psychotropic drug or medication is a chemical substance that crosses the blood-brain barrier and acts primarily upon the central nervous system where it affects brain function, resulting in changes in perception, mood, consciousness, cognition, and behavior.

Psychotropic medications are prescribed for the management of mental and emotional disorders. There are 6 major classes of these medications:

1. **Antidepressants**, which are used to treat disparate disorders such as clinical depression, dysthymia, anxiety, eating disorders and borderline personality disorder.

2. **Stimulants**, which are used to treat disorders such as attention deficit disorder and narcolepsy and to suppress the appetite.

3. **Antipsychotics**, which are used to treat psychosis, schizophrenia and mania.
Mood stabilizers, which are used to treat bipolar disorder and schizoaffective disorder.

Anxiolytics, which are used to treat anxiety disorders.

Depressants, which are used as hypnotics, sedatives, and anesthetics.

Psychotropic medications treat the symptoms of mental disorders but they cannot cure the disorder. These medications work differently for different people. Some people get excellent results from medications and only need them for a short time. A person with depression, for example, may feel much better after taking a medication for a few months, and may never need it again. People with disorders like schizophrenia or bipolar disorder or people who have long-term or severe depression or anxiety may need to take medication for a much longer time.

Some people have side effects from psychotropic medications and other people do not. Doses can be small or large, depending on the medication and the person. In general, factors that can affect how psychotropic medications work in people include the following (specific information on the side effects of different types of psychotropic medications are listed in the following modules):

- Type of mental disorder, such as depression, anxiety, bipolar disorder, and schizophrenia
- Age, sex, and body size
- Physical illnesses
- Habits like smoking and drinking
- Liver and kidney function
- Genetics
- Other medications and herbal/vitamin supplements
Section #2: Psychotropic Medication and Children and Adolescents

The past five years have been a time of rapid changes in the field of child and adolescent mental health as providers and caregivers have struggled to determine the appropriate treatments for children adolescents, particularly with respect to the use of psychotropic medications. Psychotropic treatments and combined treatments that incorporate both psychosocial and psychotropic interventions have been studied in connection with a range of disorders, including:

- Attention deficit/hyperactivity disorder (ADHD)
- Oppositional defiant disorder (ODD)
- Tourette and tic disorder
- Obsessive-compulsive disorder (OCD)
- Anxiety disorders
- Depression and suicidality
- Bipolar disorder
- Schizophrenia spectrum disorder
- Autism spectrum disorder
- Elimination disorders
The use of psychotropic medications with children and adolescents must be informed by two critical issues:

1. **Safety.** Within childhood populations, there are vast developmental differences that influence physiological, cognitive, behavioral and affective functioning. The unique issues in child and adolescent psychopharmacology must be considered when prescribing and monitoring medication effects at home and at school. Recent safety concerns about antidepressants in the pediatric population illustrate the issues that can arise.

2. **Diversity.** Issues of diversity, including gender, race/ethnicity, sexual orientation, physical disability, socioeconomic status, culture, and religious preference may moderate response to treatment and influence treatment choice and adherence. There is, however, little data about these possible moderators.

Most medications used to treat young people with mental illness are safe and effective. However, many medications have not been studied or approved for use with children. Researchers are not sure how these medications affect a child’s growing body. Still, a doctor can give a young person an FDA-approved medication on an "off-label" basis. This means that the doctor prescribes the medication to help the patient even though the medicine is not approved for the specific mental disorder or age.

For these reasons, it is important to watch young people who take these medications. Young people may have different reactions and side effects than adults. Also, some
medications, including antidepressants and ADHD medications, carry FDA warnings about potentially dangerous side effects for young people.

More research is needed on how these medications affect children and adolescents. NIMH has funded studies on this topic. For example, NIMH funded the Preschoolers with ADHD Treatment Study (PATS), which involved 300 preschoolers (3 to 5 years old) diagnosed with ADHD. The study found that low doses of the stimulant methylphenidate are safe and effective for preschoolers. However, children of this age are more sensitive to the side effects of the medication, including slower growth rates. Children taking methylphenidate should be watched closely.

In addition to medications, other treatments for young people with mental disorders should be considered. Psychotherapy, family therapy, educational courses, and behavior management techniques can help everyone involved cope with the disorder. Later modules provide specific information on the medications used to treat ADHD, anxiety, depression, schizophrenia and bipolar disorders.

Questions that Parents Should Ask Physicians about Psychotropic Medications for their Children

1. What is the name of the medication? Is it known by other names?
2. What is known about its helpfulness with other children who have a similar condition to my child?
3. How will the medication help my child? How long before I see improvement? When will it work?
4. What are the side effects which commonly occur with this medication?
5. Is this medication addictive? Can it be abused?
6. What is the recommended dosage? How often will the medication be taken?
7. Are there any laboratory tests (e.g. heart tests, blood test, etc.) which need to be done before my child begins taking the medication? Will any tests need to be done while my child is taking the medication?
8. Will a child and adolescent psychiatrist be monitoring my child’s response to medication and make dosage changes if necessary? How often will progress be checked and by whom?

9. Are there any other medications or foods which my child should avoid while taking the medication?

10. Are there interactions between this medication and other medications (prescription and/or over-the-counter) my child is taking?

11. Are there any activities that my child should avoid while taking the medication? Are any precautions recommended for other activities?

12. How long will my child need to take this medication? How will the decision be made to stop this medication?

13. What do I do if a problem develops (e.g. if my child becomes ill, doses are missed, or side effects develop)?

14. What is the cost of the medication (generic vs. brand name)?

15. Does my child’s school nurse need to be informed about this medication?

**Source:** American Academy of Child and Adolescent Psychiatrists. *Psychiatric Medication For Children And Adolescents Part III: Questions To Ask.*

http://aacap.org/cs/root/facts_for_families/psychiatric_medications_for_children_and_adolescents_part_iii_questions_to_ask

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**Section #3: Psychotropic Medications and Children in Foster Care**

Concerns about the use of psychotropic medications with children and youth in foster care have continued to grow. Over the past decade, psychotropic medication use in the...
general youth population has more than doubled. Estimated rates of psychotropic medication use in foster care youth, however, are much higher (ranging from 13-52%) than those in the general youth population (4%).

In 2010, the Tufts Clinical and Translational Science Institute (CTSI) issued a landmark report from a multi-state study on psychotropic medication oversight in foster care. Led by Laurel K. Leslie, MD, MPH at Tufts CTSI, Christopher Bellonci, MD at Tufts Medical Center and Justeen Hyde, PhD at Cambridge Health Alliance, the study examined state policies and practices in 47 states, regarding the use of medication for treating behavioral and mental health problems in foster care children and adolescents ages 2 to 21 years.

The Tufts CTSI multi-state study, which began in 2009, concluded that while oversight of psychotropic medication is a high priority of the state child welfare agencies, there is also great variability among the state policies and practices governing such oversight. The Study Report calls for a national approach and resources for medication oversight for youth in foster care. A more detailed national look at which state policies and practices are the most effective for improving the mental health of these youth is also needed. Without a national approach, crossing a state border could mean the difference between a youth in foster care being appropriately treated with medications or not. The report also stresses the need for youth-serving organizations and state agencies to work together, and for more informed decision-making and appropriate medication monitoring for youth in foster care.

The majority of states in the multi-state study reported an increasing trend in the use of psychotropic medications among youth in foster care, specifically regarding: Increased use of antipsychotics, antidepressants, and attention-deficit hyperactivity disorder (ADHD) medications; increased polypharmacy (the use of more than one psychotropic medication at the same time); increased medication use among young children; and increased reliance on giving medications "as needed" and "blanket authorizations" for such drug use in residential facilities.
Officials in some states felt that this increase partially reflected demand by foster parents, schools, and other stakeholders. Others felt that reimbursement and time pressures in the healthcare system encouraged medication use. A few states, however, indicated a decrease in medication use in their states and thought that these changes reflected policy and practices implemented over the last several years.

Many child welfare officials understood that medication plays an important role in addressing mental health problems. However, officials were concerned that medications were being used to manage problems that might respond as well, or better, to psychosocial treatments.

More information on the Study Report and specific tools developed by states are available online at [http://www.tuftsctsi.org/About-Us/CTSI%20Components/Community-Engagement.aspx](http://www.tuftsctsi.org/About-Us/CTSI%20Components/Community-Engagement.aspx).

Section #4: Psychotropic Medications and Anxiety Disorders (Including PTSD)

What medications are used to treat anxiety disorders?

Anxiety disorders include:

- Obsessive compulsive disorder (OCD)
- Post-traumatic stress disorder (PTSD)
- Generalized anxiety disorder (GAD)
Antidepressants, anti-anxiety medications, and beta-blockers are the most common medications used for anxiety disorders.

1. **Antidepressants**

Antidepressants were developed to treat depression, but they also help people with anxiety disorders. SSRIs such as fluoxetine (Prozac), sertraline (Zoloft), escitalopram (Lexapro), paroxetine (Paxil), and citalopram (Celexa) are commonly prescribed for panic disorder, OCD, PTSD, and social phobia. The SNRI venlafaxine (Effexor) is commonly used to treat GAD. The antidepressant bupropion (Wellbutrin) is also sometimes used. When treating anxiety disorders, antidepressants generally are started at low doses and increased over time.

Some tricyclic antidepressants work well for anxiety. For example, imipramine (Tofranil) is prescribed for panic disorder and GAD. Clomipramine (Anafranil) is used to treat OCD. Tricyclics are also started at low doses and increased over time.

MAOIs are also used for anxiety disorders. Doctors sometimes prescribe phenelzine (Nardil), tranylcypromine (Parnate), and isocarboxazid (Marplan). People who take MAOIs must avoid certain food and medicines that can interact with their medicine and cause dangerous increases in blood pressure.

2. **Benzodiazepines (anti-anxiety medications)**

The anti-anxiety medications called benzodiazepines can start working more quickly than antidepressants. The ones used to treat anxiety disorders include:

- Clonazepam (Klonopin), which is used for social phobia and GAD
- Lorazepam (Ativan), which is used for panic disorder
- Alprazolam (Xanax), which is used for panic disorder and GAD.

Buspirone (Buspar) is an anti-anxiety medication used to treat GAD. Unlike benzodiazepines, however, it takes at least two weeks for buspirone to begin working.
Clonazepam, listed above, is an anticonvulsant medication.

3. Beta-blockers

Beta-blockers control some of the physical symptoms of anxiety, such as trembling and sweating. Propranolol (Inderal) is a beta-blocker usually used to treat heart conditions and high blood pressure. The medicine also helps people who have physical problems related to anxiety. For example, when a person with social phobia must face a stressful situation, such as giving a speech, or attending an important meeting, a doctor may prescribe a beta-blocker. Taking the medicine for a short period of time can help the person keep physical symptoms under control.

What are the side effects?
The most common side effects for benzodiazepines are drowsiness and dizziness. Other possible side effects include:

- Upset stomach
- Blurred vision
- Headache
- Confusion
- Grogginess
- Nightmares.

Possible side effects from buspirone (BuSpar) include:

- Dizziness
- Headaches
- Nausea
- Nervousness
- Lightheadedness
- Excitement
- Trouble sleeping.
Common side effects from beta-blockers include:

- Fatigue
- Cold hands
- Dizziness
- Weakness.

In addition, beta-blockers generally are not recommended for people with asthma or diabetes because they may worsen symptoms.

**How should medications for anxiety disorders be taken?**

People can build a tolerance to benzodiazepines if they are taken over a long period of time and may need higher and higher doses to get the same effect. Some people may become dependent on them. To avoid these problems, doctors usually prescribe the medication for short periods, a practice that is especially helpful for people who have substance abuse problems or who become dependent on medication easily. If people suddenly stop taking benzodiazepines, they may get withdrawal symptoms, or their anxiety may return. Therefore, they should be tapered off slowly.

Buspirone and beta-blockers are similar. They are usually taken on a short-term basis for anxiety. Both should be tapered off slowly. Talk to the doctor before stopping any anti-anxiety medication.

**Section #5: Psychotropic Medication and ADHD**

**What medications are used to treat ADHD?**

Attention deficit/hyperactivity disorder (ADHD) occurs in both children and adults. ADHD is commonly treated with stimulants, such as:

- Methylphenidate (Ritalin, Metadate, Concerta, Daytrana)
• Amphetamine (Adderall)
• Dextroamphetamine (Dexedrine, Dextrostat).

In 2002, the FDA approved the nonstimulant medication atomoxetine (Strattera) for use as a treatment for ADHD. In February 2007, the FDA approved the use of the stimulant lisdexamfetamine dimesylate (Vyvanse) for the treatment of ADHD in children ages 6 to 12 years.

What are the side effects?
Most side effects are minor and disappear when dosage levels are lowered.

The **most common side effects** include:

• Decreased appetite. Children seem to be less hungry during the middle of the day, but they are often hungry by dinnertime as the medication wears off.
• Sleep problems. If a child cannot fall asleep, the doctor may prescribe a lower dose. The doctor might also suggest that parents give the medication to their child earlier in the day, or stop the afternoon or evening dose. To help ease sleeping problems, a doctor may add a prescription for a low dose of an antidepressant or a medication called clonidine.
• Stomachaches and headaches.

**Less common side effects.** A few children develop sudden, repetitive movements or sounds called tics. These tics may or may not be noticeable. Changing the medication dosage may make tics go away. Some children also may appear to have a personality change, such as appearing "flat" or without emotion. Talk with your child's doctor if you see any of these side effects.
How are ADHD medications taken?

Stimulant medications can be short-acting or long-acting, and can be taken in different forms such as a pill, patch, or powder. Long-acting, sustained and extended release forms allow children to take the medication just once a day before school. Parents and doctors should decide together which medication is best for the child and whether the child needs medication only for school hours or for evenings and weekends too.

ADHD medications help many children and adults who are hyperactive and impulsive. They help people focus, work, and learn. Stimulant medication also may improve physical coordination. However, different people respond differently to medications, so children taking ADHD medications should be watched closely.

Are ADHD medications safe?

Stimulant medications are safe when given under a doctor’s supervision. Some children taking them may feel slightly different or "funny." Some parents worry that stimulant medications may lead to drug abuse or dependence, but there is little evidence of this. Research shows that teens with ADHD who took stimulant medications were less likely to abuse drugs than those who did not take stimulant medications.

FDA warning on possible rare side effects

In 2007, the FDA required that all makers of ADHD medications develop Patient Medication Guides. The guides must alert patients to possible heart and psychiatric problems related to ADHD medicine. The FDA required the Patient Medication Guides because a review of data found that ADHD patients with heart conditions had a slightly higher risk of strokes, heart attacks, and sudden death when taking the medications. The review also found a slightly higher risk (about 1 in 1,000) for medication-related psychiatric problems, such as hearing voices, having hallucinations, becoming suspicious for no reason, or becoming manic. This happened to patients who had no history of psychiatric problems.
The FDA recommends that any treatment plan for ADHD include an initial health and family history examination. This exam should look for existing heart and psychiatric problems.

The non-stimulant ADHD medication called atomoxetine (Strattera) carries another warning. Studies show that children and teenagers with ADHD who take atomoxetine are more likely to have suicidal thoughts than children and teenagers with ADHD who do not take atomoxetine. If a child is taking atomoxetine, it is important to watch his or her behavior carefully. A child may develop serious symptoms suddenly, so it is important to pay attention to your child's behavior every day. A doctor should be contacted immediately if a child shows any of the following symptoms:

- Acting more subdued or withdrawn than usual
- Feeling helpless, hopeless, or worthless
- New or worsening depression
- Thinking or talking about hurting himself or herself
- Extreme worry
- Agitation
- Panic attacks
- Trouble sleeping
- Irritability
- Aggressive or violent behavior
- Acting without thinking
- Extreme increase in activity or talking
- Frenzied, abnormal excitement
- Any sudden or unusual changes in behavior

While taking atomoxetine, a child should see a doctor often, especially at the beginning of treatment.
What medications are used to treat depression?

Depression is commonly treated with antidepressant medications. Antidepressants work to balance some of the natural chemicals in the brain. These chemicals are called neurotransmitters, and they affect mood and emotional responses. Antidepressants work on neurotransmitters such as serotonin, norepinephrine, and dopamine.

The most popular types of antidepressants are called selective serotonin reuptake inhibitors (SSRIs). These include:

- Fluoxetine (Prozac)
- Citalopram (Celexa)
- Sertraline (Zoloft)
- Paroxetine (Paxil)
- Escitalopram (Lexapro).

Other types of antidepressants are serotonin and norepinephrine reuptake inhibitors (SNRIs). SNRIs are similar to SSRIs and include venlafaxine (Effexor) and duloxetine (Cymbalta). Another antidepressant that is commonly used is bupropion (Wellbutrin). Bupropion, which works on the neurotransmitter dopamine, is unique in that it does not fit into any specific drug type.
SSRIs and SNRIs are popular because they do not cause as many side effects as older classes of antidepressants. Older antidepressant medications include tricyclics, tetracyclics, and monoamine oxidase inhibitors (MAOIs). For some people, tricyclics, tetracyclics, or MAOIs may be the best medications.

What are the side effects?
Antidepressants may cause mild side effects that usually do not last long. Any unusual reactions or side effects should be reported to a doctor immediately.

The most common side effects associated with SSRIs and SNRIs include:

- Headache, which usually goes away within a few days.
- Nausea (feeling sick to your stomach), which usually goes away within a few days.
- Sleeplessness or drowsiness, which may happen during the first few weeks but then goes away. Sometimes the medication dose needs to be reduced or the time of day it is taken needs to be adjusted to help lessen these side effects.
- Agitation (feeling jittery).
- Sexual problems, which can affect both men and women and may include reduced sex drive, and problems having and enjoying sex.

Tricyclic antidepressants can cause side effects, including:

- Dry mouth.
- Constipation.
- Bladder problems.
• Blurred vision, which usually goes away quickly.
• Drowsiness. Usually, antidepressants that make you drowsy are taken at bedtime.

People taking MAOIs need to be careful about the foods they eat and the medicines they take. Foods and medicines that contain high levels of a chemical called tyramine are dangerous for people taking MAOIs. Tyramine is found in some cheeses, wines, and pickles. The chemical is also in some medications, including decongestants and over-the-counter cold medicine.

Mixing MAOIs and tyramine can cause a sharp increase in blood pressure, which can lead to stroke. People taking MAOIs should ask their doctors for a complete list of foods, medicines, and other substances to avoid. An MAOI skin patch has recently been developed and may help reduce some of these risks. A doctor can help a person figure out if a patch or a pill will work for him or her.

How should antidepressants be taken?
People taking antidepressants need to follow their doctors' directions. The medication should be taken in the right dose for the right amount of time. It can take three or four weeks until the medicine takes effect. Some people take the medications for a short time, and some people take them for much longer periods. People with long-term or severe depression may need to take medication for a long time.

Once a person is taking antidepressants, it is important not to stop taking them without the help of a doctor. Sometimes people taking antidepressants feel better and stop taking the medication too soon, and the depression may return. When it is time to stop the medication, the doctor will help the person slowly and safely decrease the dose. It's important to give the body time to adjust to the change. People don't get addicted, or "hooked," on the medications, but stopping them abruptly can cause withdrawal symptoms.
If a medication does not work, it is helpful to be open to trying another one. A study funded by NIMH found that if a person with difficult-to-treat depression did not get better with a first medication, chances of getting better increased when the person tried a new one or added a second medication to his or her treatment. The study was called STAR*D (Sequenced Treatment Alternatives to Relieve Depression).

FDA warning on antidepressants and children and adolescents
Antidepressants are safe and popular, but some studies have suggested that they may have unintentional effects, especially in young people. In 2004, the FDA looked at published and unpublished data on trials of antidepressants that involved nearly 4,400 children and adolescents. They found that 4 percent of those taking antidepressants thought about or tried suicide (although no suicides occurred), compared to 2 percent of those receiving placebos (sugar pill).

In 2005, the FDA decided to adopt a "black box" warning label—the most serious type of warning—on all antidepressant medications. The warning says there is an increased risk of suicidal thinking or attempts in children and adolescents taking antidepressants. In 2007, the FDA proposed that makers of all antidepressant medications extend the warning to include young adults up through age 24.

The warning also says that patients of all ages taking antidepressants should be watched closely, especially during the first few weeks of treatment. Possible side effects to look for are depression that gets worse, suicidal thinking or behavior, or any unusual changes in behavior such as trouble sleeping, agitation, or withdrawal from normal social situations. Families and caregivers should
report any changes to the doctor. To find the latest information visit the FDA website at http://www.fda.gov/

Results of a comprehensive review of pediatric trials conducted between 1988 and 2006 suggested that the benefits of antidepressant medications likely outweigh their risks to children and adolescents with major depression and anxiety disorders. The study was funded in part by NIMH.

Finally, the FDA has warned that combining the newer SSRI or SNRI antidepressants with one of the commonly-used "triptan" medications used to treat migraine headaches could cause a life-threatening illness called "serotonin syndrome." A person with serotonin syndrome may be agitated, have hallucinations (see or hear things that are not real), have a high temperature, or have unusual blood pressure changes. Serotonin syndrome is usually associated with the older antidepressants called MAOIs, but it can happen with the newer antidepressants as well, if they are mixed with the wrong medications.
What medications are used to treat bipolar disorder?

Bipolar disorder, also called manic-depressive illness, is commonly treated with mood stabilizers. Sometimes, antipsychotics and antidepressants are used along with a mood stabilizer.

Mood stabilizers

People with bipolar disorder usually try mood stabilizers first. In general, people continue treatment with mood stabilizers for years. Lithium is a very effective mood stabilizer. It was the first mood stabilizer approved by the FDA in the 1970's for treating both manic and depressive episodes.

Anticonvulsant medications also are used as mood stabilizers. They were originally developed to treat seizures, but they were found to help control moods as well. One anticonvulsant commonly used as a mood stabilizer is valproic acid, also called divalproex sodium (Depakote). For some people, it may work better than lithium. Other anticonvulsants used as mood stabilizers are carbamazepine (Tegretol), lamotrigine (Lamictal) and oxcarbazepine (Trileptal).

Atypical antipsychotics

Atypical antipsychotic medications are sometimes used to treat symptoms of bipolar disorder. Often, antipsychotics are used along with other medications.
Antipsychotics used to treat people with bipolar disorder include:

- Olanzapine (Zyprexa), which helps people with severe or psychotic depression, which often is accompanied by a break with reality, hallucinations, or delusions
- Aripiprazole (Abilify), which can be taken as a pill or as a shot
- Risperidone (Risperdal)
- Ziprasidone (Geodon)
- Clozapine (Clorazil), which is often used for people who do not respond to lithium or anticonvulsants.

Antidepressants

Antidepressants are sometimes used to treat symptoms of depression in bipolar disorder. Fluoxetine (Prozac), paroxetine (Paxil), or sertraline (Zoloft) are a few that are used. However, people with bipolar disorder should not take an antidepressant on its own. Doing so can cause the person to rapidly switch from depression to mania, which can be dangerous. To prevent this problem, doctors give patients a mood stabilizer or an antipsychotic along with an antidepressant.

Research on whether antidepressants help people with bipolar depression is mixed. An NIMH-funded study found that antidepressants were no more effective than a placebo to help treat depression in people with bipolar disorder. The people were taking mood stabilizers along with the antidepressants. This study is called STEP-BD (Systematic Treatment Enhancement Program for Bipolar Disorder).

What are the side effects?

Treatments for bipolar disorder have improved over the last 10 years. But everyone responds differently to medications. Different medications for treating bipolar disorder may cause different side effects. Some medications used for treating bipolar disorder have been linked to unique and serious symptoms, which are described below.

Lithium can cause several side effects, and some of them may become serious. They include:
• Loss of coordination
• Excessive thirst
• Frequent urination
• Blackouts
• Seizures
• Slurred speech
• Fast, slow, irregular, or pounding heartbeat
• Hallucinations (seeing things or hearing voices that do not exist)
• Changes in vision
• Itching, rash
• Swelling of the eyes, face, lips, tongue, throat, hands, feet, ankles, or lower legs.

If a person with bipolar disorder is being treated with lithium, he or she should visit the doctor regularly to check the levels of lithium in the blood, and make sure the kidneys and the thyroid are working normally.

Some possible side effects linked with valproic acid/divalproex sodium include:

• Changes in weight
• Nausea
• Stomach pain
• Vomiting
• Anorexia
• Loss of appetite.

Valproic acid may cause damage to the liver or pancreas, so people taking it should see their doctors regularly.

Valproic acid may affect young girls and women in unique ways. Sometimes, valproic acid may increase testosterone (a male hormone) levels in teenage girls and lead to a condition called polycystic ovarian syndrome (PCOS). PCOS is a disease that can affect fertility and make the menstrual cycle become irregular, but symptoms tend to go away after valproic acid is stopped. It also may cause birth defects in women who are pregnant.
Lamotrigine can cause a rare but serious skin rash that needs to be treated in a hospital. In some cases, this rash can cause permanent disability or be life-threatening.

In addition, valproic acid, lamotrigine, carbamazepine, oxcarbazepine and other anticonvulsant medications (listed in the chart at the end of this document) have an FDA warning. The warning states that their use may increase the risk of suicidal thoughts and behaviors. People taking anticonvulsant medications for bipolar or other illnesses should be closely monitored for new or worsening symptoms of depression, suicidal thoughts or behavior, or any unusual changes in mood or behavior. People taking these medications should not make any changes without talking to their health care professional.

Other medications for bipolar disorder may also be linked with rare but serious side effects. Always talk with the doctor or pharmacist about any potential side effects before taking the medication.

How should medications for bipolar disorder be taken?
Medications should be taken as directed by a doctor. Sometimes a person's treatment plan needs to be changed. When changes in medicine are needed, the doctor will guide the change. A person should never stop taking a medication without asking a doctor for help.
There is no cure for bipolar disorder, but treatment works for many people. Treatment works best when it is continuous, rather than on and off. However, mood changes can happen even when there are no breaks in treatment. Patients should be open with their doctors about treatment. Talking about how treatment is working can help it be more effective.

It may be helpful for people or their family members to keep a daily chart of mood symptoms, treatments, sleep patterns, and life events. This chart can help patients and doctors track the illness. Doctors can use the chart to treat the illness most effectively.

Because medications for bipolar disorder can have serious side effects, it is important for anyone taking them to see the doctor regularly to check for possibly dangerous changes in the body.
What medications are used to treat schizophrenia?

Antipsychotic medications are used to treat schizophrenia and schizophrenia-related disorders. Some of these medications have been available since the mid-1950's. They are also called conventional "typical" antipsychotics. Some of the more commonly used medications include:

- Chlorpromazine (Thorazine)
- Haloperidol (Haldol)
- Perphenazine (generic only)
- Fluphenazine (generic only).

In the 1990's, new antipsychotic medications were developed. These new medications are called second generation, or "atypical" antipsychotics.
One of these medications was clozapine (Clozaril). It is a very effective medication that treats psychotic symptoms, hallucinations, and breaks with reality, such as when a person believes he or she is the president. But clozapine can sometimes cause a serious problem called agranulocytosis, which is a loss of the white blood cells that help a person fight infection. Therefore, people who take clozapine must get their white blood cell counts checked every week or two. This problem and the cost of blood tests make treatment with clozapine difficult for many people. Still, clozapine is potentially helpful for people who do not respond to other antipsychotic medications.

Other atypical antipsychotics were developed. All of them are effective, and none cause agranulocytosis. These include:

- Risperidone (Risperdal)
- Olanzapine (Zyprexa)
- Quetiapine (Seroquel)
- Ziprasidone (Geodon)
- Aripiprazole (Abilify)
- Paliperidone (Invega).

The antipsychotics listed here are some of the medications used to treat symptoms of schizophrenia.
What are the side effects?

Some people have side effects when they start taking these medications. Most side effects go away after a few days and often can be managed successfully. People who are taking antipsychotics should not drive until they adjust to their new medication. Side effects of many antipsychotics include:

- Drowsiness
- Dizziness when changing positions
- Blurred vision
- Rapid heartbeat
- Sensitivity to the sun
- Skin rashes
- Menstrual problems for women.

Atypical antipsychotic medications can cause major weight gain and changes in a person's metabolism. This may increase a person's risk of getting diabetes and high cholesterol. A person's weight, glucose levels, and lipid levels should be monitored regularly by a doctor while taking an atypical antipsychotic medication.

Typical antipsychotic medications can cause side effects related to physical movement, such as:

- Rigidity
- Persistent muscle spasms
- Tremors
- Restlessness.
Long-term use of typical antipsychotic medications may lead to a condition called tardive dyskinesia (TD). TD causes muscle movements a person can't control. The movements commonly happen around the mouth. TD can range from mild to severe, and in some people the problem cannot be cured. Sometimes people with TD recover partially or fully after they stop taking the medication.

Every year, an estimated 5 percent of people taking typical antipsychotics get TD. The condition happens to fewer people who take the new, atypical antipsychotics, but some people may still get TD. People who think that they might have TD should check with their doctor before stopping their medication.

How are antipsychotics taken and how do people respond to them?
Antipsychotics are usually pills that people swallow, or liquid they can drink. Some antipsychotics are shots that are given once or twice a month.

Symptoms of schizophrenia, such as feeling agitated and having hallucinations, usually go away within days. Symptoms like delusions usually go away within a few weeks. After about six weeks, many people will see improvement.

However, people respond in different ways to antipsychotic medications, and no one can tell beforehand how a person will respond. Sometimes a person needs to try several medications before finding the right one. Doctors and patients can work together to find the best medication or medication combination, and dose.
Some people may have a relapse—their symptoms come back or get worse. Usually, relapses happen when people stop taking their medication, or when they only take it sometimes. Some people stop taking the medication because they feel better or they may feel they don’t need it anymore. **But no one should stop taking an antipsychotic medication without talking to his or her doctor.** When a doctor says it is okay to stop taking a medication, it should be gradually tapered off, never stopped suddenly.

How do antipsychotics interact with other medications?

Antipsychotics can produce unpleasant or dangerous side effects when taken with certain medications. For this reason, all doctors treating a patient need to be aware of all the medications that person is taking. Doctors need to know about prescription and over-the-counter medicine, vitamins, minerals, and herbal supplements. People also need to discuss any alcohol or other drug use with their doctor.

To find out more about how antipsychotics work, the National Institute of Mental Health (NIMH) funded a study called CATIE (Clinical Antipsychotic Trials of Intervention Effectiveness). This study compared the effectiveness and side effects of five antipsychotics used to treat people with schizophrenia. In general, the study found that the older medication perphenazine worked as well as the newer, atypical medications. But because people respond differently to different medications, it is important that treatments be designed carefully for each person.
Section #9: Resources on Psychotropic Medications

The following charts were developed by the National Association for Mental Illness. Additional resources are provided after the chart.
## Commonly Prescribed Psychotropic Medications

*Source: National Association of Mental Illness [http://www.nami.org/Template.cfm?Section=Policymakers_Toolkit&Template=/ContentManagement/HTMLDisplay.cfm&ContentID=18971]*

### Antipsychotics (used in the treatment of schizophrenia and mania)

<table>
<thead>
<tr>
<th>Typical Antipsychotics</th>
<th>Tricyclics</th>
<th>Anti-depressants</th>
<th>Anti-obsessive Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haloperidol</td>
<td>Anafranil</td>
<td>Anafranil (clomipramine)</td>
<td></td>
</tr>
<tr>
<td>Loxapine</td>
<td>Luvox</td>
<td>Loxapine (loxapine)</td>
<td></td>
</tr>
<tr>
<td>Thioridazine</td>
<td>Elavil</td>
<td>Elavil (amitriptyline)</td>
<td></td>
</tr>
<tr>
<td>Molindone</td>
<td>Paxil</td>
<td>Paxil (paroxetine)</td>
<td></td>
</tr>
<tr>
<td>Navane</td>
<td>Prozac</td>
<td>Prozac (fluoxetine)</td>
<td></td>
</tr>
<tr>
<td>Pimozide</td>
<td>Zoloft</td>
<td>Zoloft (sertraline)</td>
<td></td>
</tr>
<tr>
<td>Sulpiride</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ziprasidone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Antidepressants

- Anafranil (clomipramine)
- Luvox (fluvoxamine)
- Elavil (amitriptyline)
- Paxil (paroxetine)
- Prozac (fluoxetine)
- Zoloft (sertraline)

### Anti-depressants

### Anti-obsessive Agents

- Anafranil (clomipramine)
- Luvox (fluvoxamine)
- Elavil (amitriptyline)
- Paxil (paroxetine)
- Prozac (fluoxetine)
- Zoloft (sertraline)

### Antianxiety Agents

- Anafranil (clomipramine)
- Luvox (fluvoxamine)
- Elavil (amitriptyline)
- Paxil (paroxetine)
- Prozac (fluoxetine)
- Zoloft (sertraline)

### Mood Stabilizers (used in the treatment of bipolar disorder)

- Depakene (valproic acid)
- Depakote (levomepromazine)
- Eskalith (lithium)
- Lithoid (lithium)
- Lithobid (lithium)
- Lithonate (lithium)
- Lithotabs (lithium)
- *Lamictal (lamotrigine)*
- *Neurontin (gabapentin)*
- *Tegretol (carbamazepine)*
- *Topamax (topiramate)*

### Mood Stabilizers (used in the treatment of bipolar disorder)

<table>
<thead>
<tr>
<th>Mood Stabilizers</th>
<th>Anti-Panic Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depakene (valproic acid)</td>
<td>Klonopin (clonazepam)</td>
</tr>
<tr>
<td>Depakote</td>
<td>Paxil (paroxetine)</td>
</tr>
<tr>
<td>Eskalith</td>
<td>Xanax (alprazolam)</td>
</tr>
<tr>
<td>Lithobid (lithium)</td>
<td>Zoloft (sertraline)</td>
</tr>
<tr>
<td>Lithoid (lithium)</td>
<td><em>Antidepressants are also used in treatment of panic disorder.</em></td>
</tr>
<tr>
<td>Lithotabs</td>
<td><em>Ritalin (methylphenidate)</em></td>
</tr>
<tr>
<td><em>Lamictal (lamotrigine)</em></td>
<td><em>Antidepressants with stimulant properties,</em></td>
</tr>
<tr>
<td><em>Neurontin (gabapentin)</em></td>
<td><em>such as Norpramin and</em></td>
</tr>
<tr>
<td><em>Tegretol (carbamazepine)</em></td>
<td><em>Wellbutrin, are also used in the treatment of ADHD</em></td>
</tr>
</tbody>
</table>

### Antianxiety Agents

- Anafranil (clomipramine)
- Luvox (fluvoxamine)
- Elavil (amitriptyline)
- Paxil (paroxetine)
- Prozac (fluoxetine)
- Zoloft (sertraline)

### Stimulants (used in the treatment of ADHD)

- Adderall (amphetamine)
- Cylert (pemoline)
- Dextedrine

### Antianxiety Agents

- Anafranil (clomipramine)
- Luvox (fluvoxamine)
- Elavil (amitriptyline)
- Paxil (paroxetine)
- Prozac (fluoxetine)
- Zoloft (sertraline)

### Mood Stabilizers (used in the treatment of bipolar disorder)

- Depakene (valproic acid)
- Depakote (levomepromazine)
- Eskalith (lithium)
- Lithobid (lithium)
- Lithoid (lithium)
- Lithotabs (lithium)
- *Lamictal (lamotrigine)*
- *Neurontin (gabapentin)*
- *Tegretol (carbamazepine)*
- *Topamax (topiramate)*

### Mood Stabilizers (used in the treatment of bipolar disorder)

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- Depakote (levomepromazine)
- Eskalith (lithium)
- Lithoid (lithium)
- Lithotabs (lithium)
- *Lamictal (lamotrigine)*
- *Neurontin (gabapentin)*
- *Tegretol (carbamazepine)*
- *Topamax (topiramate)*

### Mood Stabilizers (used in the treatment of bipolar disorder)

- Depakene (valproic acid)
- Depakote (levomepromazine)
- Eskalith (lithium)
- Lithoid (lithium)
- Lithotabs (lithium)
- *Lamictal (lamotrigine)*
- *Neurontin (gabapentin)*
- *Tegretol (carbamazepine)*
- *Topamax (topiramate)*

*Listed above are the brand names, followed by the generic in parenthesis. A second chart below provides cross-referencing by generic name.*

*Although this medication has been approved by the FDA for the treatment of other disorders, it has not been approved for this particular use. Some evidence of this medication’s efficacy for such use does exist however. This type of medication use is referred to as “off label.”*

*Remember, always consult your doctor or pharmacist with any specific medication questions*
## Generic and Brand Names for Common Psychotropic Medications and Current Uses

*Source:* National Association of Mental Illness  
([http://www.nami.org/Template.cfm?Section=Policymakers_Toolkit&Template=/ContentManagement/HTMLDisplay.cfm&ContentID=18971](http://www.nami.org/Template.cfm?Section=Policymakers_Toolkit&Template=/ContentManagement/HTMLDisplay.cfm&ContentID=18971))

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Current Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alprazolam</td>
<td>Xanax</td>
<td>anxiety, panic</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>Elavil, Endep</td>
<td>depression (tricyclic)</td>
</tr>
<tr>
<td>Amoxapine</td>
<td>Asendin</td>
<td>psychotic depression</td>
</tr>
<tr>
<td>Amphetamine</td>
<td>Adderall</td>
<td>ADD</td>
</tr>
<tr>
<td>Aripiprazole</td>
<td>Abilify</td>
<td>schizophrenia (atypical)</td>
</tr>
<tr>
<td>Bupropion</td>
<td>Wellbutrin</td>
<td>depression, ADD</td>
</tr>
<tr>
<td>Buspirone</td>
<td>BuSpar</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Tegretol</td>
<td>bipolar disorder</td>
</tr>
<tr>
<td>Chlorazepoxide</td>
<td>Librium</td>
<td>anxiety</td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>Thorazine</td>
<td>schizophrenia (typical)</td>
</tr>
<tr>
<td>Citalopram hydrobromide</td>
<td>Celexa</td>
<td>depression (SSRI)</td>
</tr>
<tr>
<td>Clomipramine</td>
<td>Anafranil</td>
<td>OCD, depression (tricyclic)</td>
</tr>
<tr>
<td>Clonazepam</td>
<td>Klonopin</td>
<td>anxiety</td>
</tr>
<tr>
<td>Clozaepate</td>
<td>Tranxene</td>
<td>anxiety</td>
</tr>
<tr>
<td>Clozapine</td>
<td>Clozaril</td>
<td>schizophrenia (atypical)</td>
</tr>
<tr>
<td>Desipramine</td>
<td>Norpramin</td>
<td>depression (tricyclic), ADD</td>
</tr>
<tr>
<td>Dextroamphetamine</td>
<td>Adderall, Dexedrine</td>
<td>ADD</td>
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<tr>
<td>Diazepam</td>
<td>Valium</td>
<td>anxiety</td>
</tr>
<tr>
<td>divalproex sodium</td>
<td>Depakote</td>
<td>bipolar disorder</td>
</tr>
<tr>
<td>Doxepin</td>
<td>Adapin, Sinequan</td>
<td>depression (tricyclic)</td>
</tr>
<tr>
<td>Escitalopram</td>
<td>Lexapro</td>
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</tr>
<tr>
<td>Fluoxetine</td>
<td>Prozac</td>
<td>depression (SSRI), OCD, panic</td>
</tr>
<tr>
<td>Fluvoxamine</td>
<td>Luvox</td>
<td>OCD, depression (SSRI)</td>
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<td>Haloperidol</td>
<td>Haldol, Haldol Decanoate</td>
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</tr>
<tr>
<td>Imipramine</td>
<td>Tofranil</td>
<td>depression (tricyclic), panic</td>
</tr>
<tr>
<td>Lithium carbonate</td>
<td>Eskalith, Lithobid</td>
<td>bipolar disorder</td>
</tr>
<tr>
<td>Lithium citrate</td>
<td>Cibalith S</td>
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</tr>
<tr>
<td>Lorazepam</td>
<td>Ativan</td>
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</tr>
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<td>Loxapine</td>
<td>Loxitane</td>
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<td>Ludomil</td>
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<td>Ritalin</td>
<td>ADD</td>
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<td>Mirtazapine</td>
<td>Remeron</td>
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<tr>
<td>Molindone</td>
<td>Moban</td>
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</tr>
<tr>
<td>Nefazodone</td>
<td>Serzone</td>
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<td>Panelor</td>
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<td>Olanzapine</td>
<td>Zyprexa</td>
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<tr>
<td>Oxazepam</td>
<td>Serax</td>
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<tr>
<td>Paroxetine</td>
<td>Paxil</td>
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</tr>
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<td>Pemoline</td>
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<td>Perphenazine</td>
<td>Triafed</td>
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<tr>
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<td>Nardil</td>
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</tr>
<tr>
<td>Prazepam</td>
<td>Centrax</td>
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<tr>
<td>Prochlorperazine</td>
<td>Compazine</td>
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</tr>
<tr>
<td>Protriptyline</td>
<td>Vivactil</td>
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<tr>
<td>Quetiapine</td>
<td>Seroquel</td>
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<tr>
<td>Risperdone</td>
<td>Risperdal</td>
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<tr>
<td>Sertraline</td>
<td>Zoloft</td>
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</tr>
<tr>
<td>Thioridazine</td>
<td>Mellaril</td>
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<td>Thiothixene</td>
<td>Navane</td>
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</tr>
<tr>
<td>Drug Name</td>
<td>Brand Name</td>
<td>Condition</td>
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<tr>
<td>---------------------------</td>
<td>------------</td>
<td>-----------------------------</td>
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<tr>
<td>tranylcypromine sulfate</td>
<td>Pramate</td>
<td>depression (MAOI)</td>
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<tr>
<td>Trazodone</td>
<td>Desyrel</td>
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<tr>
<td>Trifluoperazine</td>
<td>Stelazine, Vesprin</td>
<td>schizophrenia (typical)</td>
</tr>
<tr>
<td>Trimipramine</td>
<td>Surmontil</td>
<td>depression (tricyclic)</td>
</tr>
<tr>
<td>Valproic acid</td>
<td>Depakene</td>
<td>bipolar disorder</td>
</tr>
<tr>
<td>Venlafaxine</td>
<td>Effexor</td>
<td>depression</td>
</tr>
<tr>
<td>Ziprasidone</td>
<td>Geodon</td>
<td>schizophrenia (atypical), bipolar</td>
</tr>
</tbody>
</table>

Other Resources

American Academy of Child and Adolescent Psychiatrists.

*Psychiatric Medication For Children And Adolescents Part I-How Medications Are Used.*
http://aacap.org/page.ww?name=Psychiatric+Medication+For+Children+And+Adolescents+Part+I-How+Medications+Are+Used&section=Facts+for+Families

*Psychiatric Medication For Children And Adolescents: Part II - Types Of Medications*


National Institute of Mental Health.  *Mental Health Medications.*

Self Assessment: Can you answer the following questions based on your completion of this training?

Psychotropic Mediations and Children and Adolescents

1. Psychotropic medication acts primarily on:
   A. The cardiovascular and respiratory system
   B. The central nervous system
   C. The endocrine system
   D. None of the above

2. Which of the following is not a class of psychotropic medication?
   A. Antidepressants
   B. Stimulants
   C. Mood stabilizers
   D. Anticholinergics

3. True or False: Most medications used to treat young people with mental illness are safe and effective.

4. The percentage of young people in the general population who use psychotropic medication is ___%; the percentage of young people in foster care who use psychotropic medication is ___%.
   A. 10%; 15%
   B. 5%; 30 – 50%
   C. 4%; 13-52%
   D. 2%; 5-10%

5. The Tufts Multi-State Study of the use of psychotropic medication with children and youth in foster care found which of the following in states across the country:
   A. Increased use of antipsychotics
   B. Increased use of more than one psychotropic medication at the same time
   C. Increased use of psychotropic medication among young children
   D. All of the above

6. Which of the following is NOT a common side effect of psychotropic medications for ADHD?
   A. Decreased appetite
B. Sudden, repetitive movements (tics)
C. Sleep problems
D. Headaches

7. True or False: Research shows that teens with ADHD who take stimulant medications are more likely to abuse drugs than those who do not take stimulant medications.

8. The FDA requires that patients who are treated with psychotropic medication for ADHD receive a Patient Medication Guide to alert them to:
   A. Possible heart and psychiatric problems related to ADHD medication
   B. Possible respiratory and cardiovascular problems related to ADHD medication
   C. Possible orthopedic and psychiatric problems related to ADHD medication
   D. Possible neurological problems related to ADHD medication

9. Which of the following is NOT a common type of medication for anxiety disorder?
   A. Antidepressants
   B. Anti-psychotics
   C. Anti-anxiety medication
   D. Beta-blockers

10. Factors that affect how psychotropic medications work in people (and whether they will experience side effects) include all of the following EXCEPT:
    A. Body size
    B. Genetics
    C. Cardiovascular functioning
    D. Diet

11. The neurotransmitters that antidepressants work to balance include which of the following:
    A. Serotonin
    B. Norepinephrine
    C. Dopamine
    D. All of the above
12. The most popular types of antidepressants are:
   A. Serotonin and norepinephine inhibitors (SNRIs)
   B. Monoamine oxidase inhibitors (MAOIs)
   C. Serotonin reuptake inhibitors (SSRIs).
   D. Trycyclics

13. The FDA study that looked at published and unpublished data on trials of antidepressants that involved nearly 4,400 children and adolescents found that what percentage of those taking antidepressants thought about or tried suicide (although no suicides occurred) compared to what percentage of those receiving placebos (sugar pill)?
   A. 1%; 0%
   B. 4%; 2%
   C. 6%; 8%
   D. 10%; 15%

14. A “black box warning” label on a medication is warning of increased risk of:
   A. Dizziness
   B. Hallucinations and other thought disorders
   C. Trembling and shaking of legs and arms
   D. Suicidal thinking or attempts

15. True or False: Results of a comprehensive review of pediatric trials suggests that the benefits of antidepressant medications likely outweigh their risks to children and adolescents with major depression and anxiety disorders.

16. Which of the following is not a mood stabilizer that is used in the treatment of bipolar disorder?
   A. Lithium
   B. Depakote
   C. Abilify
   D. Tegretol
17. The NIMH study, **STEP-BD (Systematic Treatment Enhancement Program for Bipolar Disorder)**, found that:
   A. Antidepressants were no more effective than a placebo to help treat depression in people with bipolar disorder.
   B. Antidepressants are far more effective than a placebo to help depression in people with bipolar disorder.
   C. Mood stabilizers are more effective than antidepressants to help treat depression in people with bipolar disorder.
   D. Antipsychotics are more effective than antidepressants to help treat depression in people with bipolar disorder.

18. The new antipsychotics developed in the 1990s are called:
   A. Typical antipsychotics
   B. Atypical antipsychotics
   C. New generation antipsychotics
   D. Level II antipsychotics

19. Which of the following is NOT a possible side effect of antipsychotic medications?
   A. Drowsiness
   B. Rapid heartbeat
   C. Skin rashes
   D. Bone thinning

20. Tardive dyskinesia caused by the long-term use of typical antipsychotics is:
   A. Muscle movements that a person cannot control
   B. Memory loss
   C. Pervasive skin rashes
   D. Neuropathy (tingling and numbness in hands and feet)
Here are the answers!

1. B.
2. D.
3. True
4. C.
5. D.
6. B.
7. False
8. A.
9. B.
10. C.
11. D.
12. C.
13. B.
14. D.
15. True
16. D.
17. A.
18. B.
19. D.
20. A.