ADHD - Let’s focus on focus
What is new in psychiatric medication

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SACN Pharmacology update
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Disclosure: No relevant financial/non financial affiliations to disclose
Objectives

- Review ADHD
  - Prevalence
  - Risk factors/symptoms
  - Assessment/diagnosis/differential diagnosis
  - Treatment options

- Review new psychiatric medication
  - Esketamine (Spravato)
  - Dextromethorphan-bupropion (Auvelity)
  - Brexanolone (Zulresso)
  - Zuranolone (Zurzuva)
  - Caplyta/Lybalvi
  - Misc.: serotonin syndrome, tardive dyskinesia
ADHD

• “Thought to be biological and most often genetic, ADHD takes place very early in brain development. Adults with ADHD may exhibit the same symptoms they had as children, and although hyperactivity often diminishes by adulthood, inattentiveness and impulsivity may persist.” Cleveland clinic, 2023

• Functional and psychosocial impairment
  • Impacts self-esteem
  • Ability to maintain friendships
  • Relationships with parents, siblings, teachers
DSM-5 ADHD

- Disorder class: Neurodevelopmental Disorder

- Definition: A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development characterized by inattention and/or hyperactivity-impulsivity.
DSM-5 ADHD Criteria

• Several inattentive or hyperactive-impulsive symptoms
  • Present prior to age 12 years old.
  • Present in 2 or more setting (home/work/school/with friends/with relatives/other activities)
  • Clear evidence that symptoms interfere with quality of social/academic/occupational functioning
  • Symptoms do not occur exclusively during course of schizophrenia or better explained by another mental disorder: mood/personality/dissociative disorder; anxiety; substance intoxication or withdrawal.
Diagnosing ADHD Inattentive

- Requires 6 or more symptoms for children and 5 or more symptoms for adolescents/adults:
  - Lack of attention to detail (careless mistakes/inaccurate work)
  - Lack of attention in work or play (lack of focus)
  - Does not seem to listen when spoken to directly (mind seems elsewhere)
  - Lack of follow through (fails to finish school work/chores, easily side tracked)
  - Difficulty organizing tasks/activities (fail to keep materials in order/messy)
  - Avoids/dislikes tasks requiring sustained attention (schoolwork/completing forms)
Hallmark ADHD Inattentive Symptoms

- Often loses things (school materials/wallet/keys/paperwork/mobile phone)
- Easily distracted by stimuli
- Often forgetful in daily activities (chores/activities/returning calls/keeping appointments)
Diagnosing ADHD Hyperactive

• Requires 6 or more symptoms for children and 5 or more symptoms for adolescents/adults:
  • Often fidgets or taps hands/feet and/or squirms in seat
  • Often leaves seat inappropriately (during time in classroom/office/work place or situations in which remaining seated is appropriate)
  • Often runs about/climbs inappropriately (adolescent/adults may feel restless)
  • Unable to play quietly
  • “on the go” acting as if powere “by a motor” (perceived by others as being restless)
  • Talks excessively
Hallmark ADHD Hyperactivity and Impulsivity Symptoms

• Blurts out answer prior to question being completed: completes other peoples sentences/cannot wait for their turn in conversation
• Difficulty taking turns.
• Interrupts/intrudes on others: butts into conversations/games; may use other people’s things without asking /receiving permission. Adolescents/adults may intrude into/take over what others are doing.
ADHD Prevalence in children

- Estimated number of children aged 3–17 years ever diagnosed with ADHD is 6 million (9.8%) per CDC 2016-2019 data.
  - 3–5 years: 265,000 (2%)
  - 6–11 years: 2.4 million (10%)
  - 12–17 years: 3.3 million (13%).

CDC, 2023
Comorbid mental health conditions are common in children

*About 50% of the children with ADHD had a behavior or conduct problem.  
*About 30% of children with ADHD had anxiety.

**Other conditions affecting children with ADHD: depression, autism spectrum disorder, and Tourette syndrome.

CDC, 2023
Comorbid conditions in children

- Any mental, emotional, or behavioral disorder: 64%
- Behavior or conduct problem: 52%
- Anxiety: 33%
- Depression: 17%
- Autism spectrum disorder: 14%
- Tourette syndrome: 1%
ADHD Prevalence in Adults

- About **60%** of children with ADHD in the US become adults with ADHD.

- About **4%** of American adults experience ADHD behaviors = **8 million** adults.

- **<20%** of American adults with ADHD have been diagnosed and only about **1/4** of those adults seek help.

Cleveland clinic, 2023
Comorbid mental health conditions in adults

- As many as 80% of adults with ADHD have at least one coexisting psychiatric disorder including mood and anxiety disorders, substance use, and personality disorders.

- The National Comorbidity Survey reported that adults with ADHD
  - 3 times more likely to develop major depressive disorder
  - 6 times more likely to develop dysthymia
  - > 4 times more likely to have any mood disorder
  - 2 times as likely to experience substance abuse or dependence
When to screen for ADHD

• AAP recommends to evaluate children/adolescents ages 4 -18 years experiencing academic/behavioral problems and show inattention, hyperactivity, or impulsivity.

• Adults can be screened for ADHD anytime *Remember symptoms must be present prior to age 12
ADHD Assessment & Screening tools

- Gold-standard diagnostic procedure is interview and physical exam to identify ADHD symptoms/other potential mental and physical health conditions
<table>
<thead>
<tr>
<th>Rating scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retrospective</strong></td>
<td></td>
</tr>
<tr>
<td>Childhood Symptom Scale by Barkley and Murphy</td>
<td>Retrospective assessment of the 18 DSM-IV criteria</td>
</tr>
<tr>
<td>Wender Utah Rating Scale (<a href="http://www.venturafamilymed.org/Documents/Wender_Utah%20Rating%20Scale.pdf">http://www.venturafamilymed.org/Documents/Wender_Utah%20Rating%20Scale.pdf</a>)</td>
<td>Also includes items concerning functional disabilities, oppositional-defiant disorder, and conduct disorder</td>
</tr>
<tr>
<td>Wender Utah Rating Scale: Long version</td>
<td>Retrospective assessment of childhood ADHD symptoms from ages eight to 10 years</td>
</tr>
<tr>
<td>Wender Utah Rating Scale: Short version</td>
<td>Regular version contains 61 questions, short version contains 25</td>
</tr>
<tr>
<td><strong>Current symptom</strong></td>
<td></td>
</tr>
<tr>
<td>Adult ADHD Rating Scale-IV</td>
<td>Long version and quick screen</td>
</tr>
<tr>
<td>Adult ADHD Self-Report Scale Symptom Checklist v1.1 (<a href="http://webdoc.nyumc.org/psych/attachments/psych_adhd_checklist.pdf">http://webdoc.nyumc.org/psych/attachments/psych_adhd_checklist.pdf</a>)</td>
<td>Originally designed for children and adolescents, but has been used successfully in adults</td>
</tr>
<tr>
<td>Brown Attention-Deficit Disorder Rating</td>
<td>18-item questionnaire intended for use in patients who are at risk of ADHD; a quick six-item screening version also available</td>
</tr>
<tr>
<td>Scale and Diagnostic Form</td>
<td>Available in multiple languages</td>
</tr>
<tr>
<td>Brown Attention-Deficit Disorder Rating</td>
<td>Asks about clinical history, early schooling, family history, physical health, substance use, sleep habits; physician also obtains data from an observer/significant other</td>
</tr>
<tr>
<td>Scale and Diagnostic Form</td>
<td>Contains 40 items</td>
</tr>
<tr>
<td>Connors Adult ADHD Rating Scales</td>
<td>Scale is primarily concerned with inattentioan</td>
</tr>
<tr>
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<td>Long, short, and screening versions; self-reports and observer reports; eight scales</td>
</tr>
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<td>Asks patients about childhood and adult histories</td>
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<td>Allows for diagnosis of ADHD by DSM-IV criteria, as well as by measuring emotional lability</td>
</tr>
<tr>
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<td>Good interrater reliability between self-report and physician ratings</td>
</tr>
<tr>
<td>Current Symptoms Scale by Barkley and Murphy</td>
<td>Self-report scale of 18 symptoms that correspond to DSM-IV criteria</td>
</tr>
<tr>
<td>Wender-Reimherr Adult Attention-Deficit Disorder</td>
<td>Measures the severity of symptoms in adults with ADHD using the Utah criteria</td>
</tr>
<tr>
<td>Scale</td>
<td>Useful to assess mood lability symptoms</td>
</tr>
</tbody>
</table>

*ADHD = attention-deficit/hyperactivity disorder; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th ed.*

Information from references 14 through 16.
Vanderbilt ADHD Assessment also assess ODD, conduct disorder, anxiety, depression.
Interview questions for inattention

- Do often make careless mistakes at work, school, or home?
- How often do you have difficulty paying close attention to details?
- How often is it difficult for you to concentrate on 1 thing for a long time?
- Is it hard to focus on a task for a long time?
- How often to have problems focusing on what others say to you even when they are speaking directly to you?
- Is being organized difficult for you?
- Do you often avoid or put off doing a task that requires a lot of concentration?
- Do you misplace or lose things like her wallet, keys, cellphone, books etc. more than most people do?
- Is it difficult to keep her mind on things he want to do because your easily distracted?
- Are you forgetful with running errands, keeping appointments, returning phone calls, paying bills etc.?

* How common is this? * Is this away you normally are?

* Have you been this way most of your life? * Were you like this as a child also?
Interview questions for hyperactivity

• Is it hard for you to sit still? Are you fidgety?
• Is it difficult for you to sit a long time even in situations in which she or expected to remain seated such as a classroom or meeting?
• Do you often feel restless inside?
• Do you tend to be a loud or noisy person? Do other people tell you to quiet down or lower your voice?
• Are you constantly moving and on the go? Is it hard to slow down/stop even when you want to?
• Do you talk more than most people you know? Has anyone commented on this or told you to stop talking?
• Do often answer someone’s question before they finish asking it?
• Is it difficult for you to wait in line or wait your turn when the situation calls for it?
• Do often interrupt people when they are busy or talking with others? Do you butt into conversations?

• * How common is this? * Is this away you normally are?
• * Have you been this way most of your life? * Were you like this as a child also?
ADHD risk factors

- Genetics: ADHD runs in families and children are more likely to have ADHD if their mother or father have it.
- In addition to genetics possible causes being researched are
  - Brain injury
  - Exposure to environmental risks (e.g. lead) during pregnancy/young age
  - Alcohol and tobacco use during pregnancy
  - Premature delivery
  - Low birth weight
Differential Diagnosis

- Developmental variations
- Neurologic/developmental conditions (Autism, developmental disability, fetal alcohol syndrome) *consider neuropsychiatric testing if appropriate.
- Emotional/behavioral disorders Psychosocial/environmental factors (child abuse, environmental stress)
- Psychiatric conditions: (oppositional defiant disorder, conduct disorder)

- Medical:
  - Hearing impairment, thyroid disease, seizures, lead toxicity, hepatic disease, sleep apnea, and drug interactions (American Family Physician)
  - Iron deficient anemia, infection of central nervous system
Psychiatric Differential Diagnosis

*Symptom overlap  *Differences in symptoms

• Mood disorders...e.g. bipolar disorder difficulty with focus/increased energy
  • *episodic mood impairment, severe anger/irritability, grandiosity, decreased need for sleep, hypersexual, racing thoughts
• Anxiety disorders hyperactive, fidgeting, inattentive
  • *anxiety is accompanied with fear/worry
• Substance use/withdrawal poor focus, anxious, fidgeting
• Antisocial personality disorder impacts social acceptance
  • *antisocial behavior: lying, cheating, stealing, arrests/legal issues
• Borderline personality disorder impulsive, angry outbursts
  • *usually ADHD impulse/anger are thoughtless & brief and BPD behavior is goal-directed and intense conflicted relationships
• Developmental disabilities/mental retardation limited focus/productivity * rarely is initial presentation in adulthood
  • (National Institute of Health)
Pathophysiology

- Hyper-impulsive and inattentive symptoms are associated with reduced inhibitory functioning of the prefrontal cortex related to downregulation of norepinephrine and dopamine. Neuroimaging and positron emission tomography studies reveal reduced glucose metabolism in the premotor cortex and superior prefrontal cortex and inhibited activation of the anterior cingulate in adults with ADHD.
Pathophysiology

- The corpus striatum impacts the filtration of perceived stimuli and linking with response from the frontal lobes via the frontostriatal pathway.
- The corpus striatum (main center of dopamine activity in the brain) seems to have an effect on the willingness to work in order to achieve a reward.
- Corpus striatum reduced function is likely associated with reduced volume (of Corpus striatum) resulting in distractibility & emotional response to stimuli and motivation.
Pathophysiology

• Other brain regions have been implicated in the executive function and attentional impairments observed in ADHD:
  parietal cortex, inferior parietal lobe, superior temporal sulcus, and reticular activating system.

Epocrates, 2023
Pathophysiology and how treatment works

- Immediate response to simulants occurs due to activation of dopamine pathways within the corpus striatum and catecholamine/dopamine activation within the frontal lobes (children treated with stimulants may show an increase in the growth of the structure although no maturational effect is found in the frontal lobes of frontostriatal pathway).
ADHD and the brain

How ADHD Affects The Brain

- **Prefrontal Cortex**: Responsible for organization, cognitive flexibility, self-control, and maintaining attention.
- **Basal Ganglia**: Helps regulate communication within the brain. Responsible for motor control, facilitating movement, and inhibiting competing movements.
- **Reticular Activating System**: Major relay system among the many pathways that enter & leave the brain that is responsible for arousal & consciousness. A deficiency in this region can cause inattention, impulsivity, or hyperactivity.
- **Limbic System**: Responsible for regulating emotions. A deficiency in this region might result in restlessness, inattention, or emotional volatility.

How ADHD affects the brain

- **Prefrontal Cortex**: Functions as an intersection for attention, behavior, and emotional responses. For people with ADHD, attention is switched easily.
- **Basal Ganglia**: Neural circuit system that regulates communication within the brain. In the ADHD brain, a “short-circuit” can cause inattention or impulsivity.
- **Limbic System**: Regulates emotions. Deficiency of dopamine in the ADHD limbic system may result in restlessness, inattention or emotional volatility.
- **Reticular Activating System**: The major relay system between the brain’s pathways. A dopamine deficiency may cause impulsivity and hyperactivity.
ADHD and brain structure

ADHD CAUSES BRAIN CHANGES

Healthy Brain

Brain with ADHD

www.PhilaHolisticClinic.com
Neurotransmitters impact attention
Neurotransmitter function impact with ADHD
American Academy of Pediatrics ADHD treatment guideline

• Preschool (age 4-5 years): Evidence based parent training in behavior management (PTMB) and/or behavior classroom interventions; may consider methylphenidate if no improvement

• Elementary (age 6-11 years): FDA approved medication along with PTBM and or behavioral classroom interventions

• Adolescents (12-18 years) FDA approved medication is preferred treatment; evidence based training interventions and/or behavioral interventions should be encouraged.
Additional recommendations

• American Psychological Association working group on psychoactive medications for children and adolescents recommends psychosocial therapy 1st followed by medication if insufficient.

• Multimodal Treatment of ADHD Cooperative Group found starting with medication 1st was better than behavioral treatment.

• Pelham et al. multi-randomized study concluded that starting behavioral intervention 1st line showed better results than beginning with medication and adding behavioral therapy.
Non-pharmacologic treatment

1. Psychosocial treatment: Behavior management interventions (parent training, classroom interventions, peer-based interventions.

2. Training interventions (cognitive training, neurofeedback, organization, cognitive behavior therapy)

3. Physiologic treatments (physical activity)
Integrative Medicine

- 1. Biologically based systems: herbal products and dietary supplements
- 2. Mind body practices: art/music/pet/aromatherapy, biofeedback, hypnotherapy, meditation/mindfulness, prayer, yoga etc.
- 3. Manipulative and body based systems: osteopathy, chiropractic
- 4. Alternative whole medical systems homeopathy, naturopathy, traditional Chinese medicine
- 5. energy/biofield therapies: acupuncture, healing touch.
- About 50% to 64% of parents of children with ADHD report using integrative medicine to treat ADHD symptoms
Pre-treatment testing considerations

• Urine Drug Screen
• EKG
• Sleep study
• HTN management
• Cardiology Consultation
Treatment Recommendations

• Stimulant medication (methylphenidate, amphetamine derivatives) are 1st-line treatment. * increased amount of dopamine and norepinephrine available to the brain ** may increase energy, alertness, and attention.

• Non-stimulant medications SNRI (Strattera/Qelbree) are 2nd line treatment. * SNRI keeps more norepinephrine available in the brain ** may improve focus and concentration

• For ages 6-17 Non-stimulant extended release clonidine or guanfacine (Kapvay or Intuniv). * stimulates alpha 2 adrenergic receptors in the brain which regulates release of norepinephrine. ** may improve attention and impulse control
ADHD Stimulants vs. Non-Stimulants

**Stimulants**
- Increases dopamine and norepinephrine
- Boosts energy, attention and alertness
- Either amphetamine or methylphenidate based drugs
- Immediate or extended release
  - Extended release is less likely to be abused

**Non-stimulants**
- Doesn’t work as quickly as stimulants
- Different side effects than stimulants
- Less likely to be abused than stimulants
- May be able to treat ADHD as well as other conditions like a tic disorder

Verywell
<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage/Notes</th>
<th>Mechanism/Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate-release dextroamphetamine/amphetamine (Adderall)</td>
<td>of 0.3 to 1.5 mg per kg per day; maximal dosage of 60 mg per day</td>
<td>dopamine in synaptic cells, thus increasing the synaptic concentration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$101 ($234) based on 10 mg twice per day</td>
</tr>
<tr>
<td>Extended-release dextroamphetamine/amphetamine (Adderall XR)</td>
<td>20 to 60 mg per day</td>
<td>A mix of 75% dextroamphetamine and 25% levoamphetamine May be used in patients with mild hypertension controlled with an antihypertensive medication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$165 ($238) based on 20 mg per day</td>
</tr>
<tr>
<td>Lisdexamfetamine (Vyvanse)</td>
<td>Start at 30 mg per day; can increase dosage by 10 to 20 mg per day weekly until optimal effect; maximal dosage of 70 mg per day</td>
<td>Therapeutically inactive molecule Following oral ingestion, it is converted to l-lysine and active D-amphetamine Although a small amount is hydrolyzed to D-amphetamine in the gastrointestinal tract, the conversion into active D-amphetamine occurs primarily in the blood Duration of action of 12 to 14 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NA ($174) based on 40 mg per day</td>
</tr>
<tr>
<td>Immediate-release methylenphedidate (Ritalin)</td>
<td>Start at 10 mg per day; recommended dosage of 0.3 to 1.5 mg per kg per day; maximal dosage of 100 mg per day</td>
<td>Can be dissolved and injected as a form of abuse Metabolically similar to cocaine Functions by binding to dopamine transport proteins and blocking presynaptic dopamine reuptake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$48 ($44) based on 10 mg twice per day</td>
</tr>
<tr>
<td>Extended-release methylenphedidate (Concerta)</td>
<td>18 to 108 mg per day</td>
<td>Oral osmotic release system decreases potential for abuse and allows for 10 to 12 hours of activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$180 ($195) based on 36 mg per day</td>
</tr>
<tr>
<td>Nonstimulants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atomoxetine (Strattera)</td>
<td>Start at 40 mg per day; can increase up to 100 mg per day over two to four weeks; can take once or twice per day</td>
<td>Selective norepinephrine reuptake inhibitor Only nonstimulant approved by the U.S. Food and Drug Administration for treatment of ADHD in adults Duration of action up to 24 hours Can take up to two months to stabilize symptoms First-line treatment in those with concerns about drug abuse or diversion Patients who also take medications that inhibit cytochrome P450 (e.g., fluoxetine [Prozac], paroxetine [Paxil]) may experience significant adverse effects, even with small doses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NA ($200) based on 60 mg per day</td>
</tr>
</tbody>
</table>
Treatment selection

• 1st line Treatment school age children/adolescent/adult:
  • Ritalin (methylphenidate) dose is product dependent
    • OR
  • Vyvanse (lisdexamfetamine) therapeutic dose 30-70mg Q AM
  • 2nd option is Adderall (Dextroamphetamine) extended release 5-60mg Q AM
  • *Methylphenidate and amphetamines should be started low and titrated gradually based on therapeutic response
Treatment selection

- Intuniv (Extended release Guanfacine) or Kapvay (Extended release Clonidine: approved for ADHD in children age 6-17 years old.
- Acts on alpha-2 adrenergic receptor agonists which affect norepinephrine
- *may improve tic disorders * May help with anxiety and PTSD * helps with ODD
- Not FDA approved for adults with ADHD
Newer ADHD Medications

- Azstarys (serdexmethylphenidate/dexmethylphenidate) FDA recently approved for ADHD treatment for age 6 and older. Has immediate release (dexmethylphenidate) and extended release (serdexmethylphenidate).

- Jornay (methylphenidate delayed release) FDA recently approved for ADHD for 6 years and older dose 20-100mg to be taken @ night due to delayed release *schedule II medication

- Xelstrym (dextroamphetamine transdermal) Norepinephrine-dopamine reuptake inhibitors. Apply 2 hrs prior to desired effect remove in 9hrs
Off Label Treatment Option for Adolescent or Adults

- Adults and Adolescents: Wellbutrin XL 300mg Q am

- **contraindicated with history/current seizure disorder and eating disorder.**
Pre school age Treatment Recommendations

- ***pre school age children:
- Parent training in behavioral management is 1st line treatment and adjunct treatments may include:
- Methylphenidate can be added off-label as adjunct. *Consult specialist for guidance on dose. *may exhibit more irritability/tearfulness than school age children with methylphenidate.
Treatment selection

- Long acting stimulants should be selected if there has been any substance use in the last year. Long acting stimulants have less potential for misuse.
- Cardiac history should be reviewed including family history of sudden death or arrhythmia, syncope, dyspnea with exertion should be obtained. If positive history EKG and/or cardiology consultation should be obtained prior to stimulant medication use.
Ongoing monitoring

- Assess mood, focus, sleep, and appetite
- Stimulants are associated: sleep problems, decreased appetite
- Psychosis has been associated with stimulants
- Stimulant medication use should last as long as clinical benefit outweighs the risks.
Patient advocacy and support

- RAMP (Winnebago, Boone, Stephenson, Ogle, and DeKalb Counties)
- The ARC (Winnebago, Boone and Ogle Counties)
- https://www.additudemag.com/
- www.aap.org
- www.chadd.org
- www.add.org
Clinician tools

- ADHD medication guide for stimulant medication can be found at: http://www.adhdmedicationguide.com/
Clinician Tools

• ADHD med calculator (there is a free app)
  • https://www.adhdmedcalc.com/
## ADHD Medication Calculator/Converter

For Healthcare Professionals Only

### Current Medication vs. New Medication

<table>
<thead>
<tr>
<th>Name:</th>
<th>Ritalin (methylphenidate)</th>
<th>Adderall (dextroamphetamine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose:</td>
<td>20 mg</td>
<td>10mg</td>
</tr>
<tr>
<td>Duration Of Action:</td>
<td>3-4h, dosed bid-tid</td>
<td>5-6h, dosed qd-tid</td>
</tr>
<tr>
<td>Time to Peak Effect:</td>
<td>30-60 min</td>
<td>45-60 min</td>
</tr>
<tr>
<td>Recommended Starting Dose:</td>
<td>&gt;6yo: 2.5-5mg, Adult: 5-10mg</td>
<td>3-5yo: 2.5mg, &gt;6yo: 5mg</td>
</tr>
<tr>
<td>Titration Recommendation:</td>
<td>&gt;6yo: increase 5-10mg/day weekly, Adult: increase 10mg/day weekly</td>
<td>3-5yo: increase 2.5 weekly, &gt;6yo: increase 5mg weekly</td>
</tr>
<tr>
<td>Maximum Recommended Dose:</td>
<td>2mg/kg/day up to 60mg (total mg per day)</td>
<td>40mg</td>
</tr>
<tr>
<td>Off Label Maximum Dose:</td>
<td>&lt;50kg: 60mg &gt;50kg: 100mg</td>
<td>&gt;50kg 60mg</td>
</tr>
<tr>
<td>Dosage forms available:</td>
<td>5, 10, 20</td>
<td>5, 7, 5, 10, 12.5, 15, 20, 30</td>
</tr>
</tbody>
</table>

### How To Use

1. Read the Terms of Use
2. Choose your patient's existing medication (e.g. Adderall) in the left column
3. Enter your patient's current dosage
4. Choose your patient's new medication (e.g. Vyvanse) in the right column
• genesight testing identifies individualized genotype and phenotype pharmacokinetics..... How the body processes the medication.

• may be helpful when a patient experiences many side effects to various medications. Medications that are resulted include Focalin, Ritalin, Concerta, Strattera, Calgary, guanfacine, clonidine, Adderall, dextroamphetamine, and Vyvanse.

• ** testing does not indicate that medication will improve symptoms**
Newest antidepressants in 2023

- **Esketamine (Spravato) Schedule III nasal spray**
  - Indicated in conjunction with an oral antidepressant for treatment resistant depression in adults that has not responded to at least 2 antidepressants.
  - Targets the brain’s glutamate system.
  - **SPRAVATO REMS program (Risk Evaluation and Mitigation Strategy)** because of serious adverse outcomes from sedation, dissociation, and abuse and misuse.
  - Medication can only be dispensed in healthcare setting that is certified REMS program and patient must be enrolled in program.
  - Administered by patient under observation of a healthcare provider
Antidepressant: Esketamine (Spravato)

- antagonizes N-methyl-D-aspartate (NMDA) receptor
- MDD acutely suicidal patients 84mg intranasally 2X/wk X4wk
- Use with an oral antidepressant
- Evaluate benefit after 4 weeks
- Maintenance 56-84 mg intranasally q 1-2 weeks use with oral antidepressant
- Black box warning sedation/dissociation/abuse or misuse/suicidality
- Not safe for pregnancy/breastfeeding due to potential neurotoxicity
Antidepressant: Dextromethorphan-Bupropion (Auvelity)

- Dextromethorphan-bupropion (Auvelity)-combined cough suppressant with antidepressant. Dextromethorphan modulates the NMDA receptors involved with depression while bupropion acts on norepinephrine and dopamine receptors targeting multiple pathways associated with depression with goal to potentially enhanced efficacy and reduce side effects.
- 45mg tab start 1 tab QAM: Max 2 tabs /day
- Black box warning: suicidality
- Avoid in pregnancy/breastfeeding
Antidepressant post partum: Brexanolone (Zulresso)

- postpartum depression administered intravenously neuroactive steroid provides positive allosteric modulation of GABA-A receptors which regulate mood and alleviates depression symptoms in post partum depression
- Restricted distribution program (REMS) due to risk of serious harm from sedation/sudden loss of consciousness
- Black box warning excessive sedation and sudden loss of consciousness
Antidepressant: Zuranolone (Zurzuvae)

- FDA approved for postpartum depression August 2023
- Neuroactive steroid provides positive allosteric modulation of GABA-A receptors
- Prescribing information will come after drug is available for prescribing. Capsule form 20mg, 25mg, 30mg
- Neuroactive steroid
A sprinkle of other psychiatric meds

- **Lybalvi**=Olanzapine/Samidorphan combined to reduce weight gain risk with Olanzapine alone. Olanzapine is an atypical antipsychotic and Samidorphan is an opioid antagonist. Treats schizophrenia and bipolar 1 disorder mixed/manic. Lybalvi blocks the effects of opioids (heroin, methadone, opioid pain medication). Black box warning: not approved for dementia-related psychosis.

- **Caplyta**=Lumateperone which is a 2nd generation antipsychotic for bipolar disorder. Black box warning: increased suicidality in <24 year old; not approved for dementia-related psychosis.
Serotonin Syndrome

• A drug reaction caused by high levels of serotonin which can be life threatening.
• Signs/symptoms usually begin within 6-24 hours of taking a new drug/new dose and may last up to 5 weeks after drug is stopped.
• Mild cases resolve without treatment within 1-3 days.
• Severe cases are treated at the hospital with benzodiazepines, Cyproheptadine, IV fluids
Serotonin syndrome risk increases with:

- prescription medication to treat depression, seizures, migraines, pain, vomiting, and Parkinson disease (can occur even when meds are taken as directed)
- Saint John’s Wort, cocaine, ecstasy, and cough syrup containing dextromethorphan
- interactions of 2 or more drugs
- overdose of a drug that raises serotonin levels
Tardive Dyskinesia

• Involuntary repetitive movements such as grimacing or eye blinking
• may develop with use of certain medications such as Tramadol, Reglan, Haldol, primidone, chlorpromazine, trifluoperazine, MAOIs (Nardil), SSRIs (Prozac), tricyclic antidepressants (Trazodone), Anxiolytics (Alprazolam), anti epileptics (Tegretol), and various anticholinergics prescribed for COPD, bladder control, and Parkinson’s disease
Tardive Dyskinesia

- abnormal involuntary movement scale (AIMS) should be conducted to evaluate abnormal movement of face/oral, extremity movements, trunk movements, and global judgment of movement

- Treatment with VMAT2 inhibitor (Ingrezza or Austedo) which reduces dopamine stimulation without blocking D2 receptors
References


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