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Child Medication Fact Book *for* Psychiatric Practice

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—Fred R. Volkmar, MD

Child Study Center, Yale University School of Medicine

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Introduction

HOW TO USE THIS BOOK

Medication information is presented in three ways in this book.

Chapter introductions: These are guides to general therapeutic categories of child psychopharmacology. There is natural overlap between these areas; however, we hope that our groupings are convenient for quick reference in everyday office practice.

Medication fact sheets: In-depth prescribing information for select medications (not all psychiatric medications are covered). There are 70 medication fact sheets in this book. Medications that fall into more than one category are included in each applicable chapter table, but each medication has only one fact sheet (placed in the chapter where we believe the medication is most commonly used). We have included most of the commonly prescribed and newer medications for which there are data and experience in children. These fact sheets include dosing, indications and common uses (both on and off label), side effects, mechanisms of action, recommendations for clinical monitoring, evidence, clinical pearls, and fun facts.

Quick-scan medication tables: These are located after the chapter introduction for each therapeutic category and list the very basics: generic and brand names, FDA-approved indications, strengths available, starting doses, and target doses. These tables contain most of the commonly prescribed psychiatric medications in pediatric practice.

CATEGORIES OF MEDICATIONS

We did our best to categorize medications rationally. However, in some cases a medication can fall into more than one category. In such cases, we placed the medication's fact sheet in the therapeutic category for which it is most often used. If you're having trouble finding a medication in a particular section, look in the index to find its page number.

MORE ON THE MEDICATION FACT SHEETS

The goal of these fact sheets is to provide need-to-know information that can be easily and quickly absorbed during a busy day of seeing patients. An important goal, therefore, is that all the information should fit on a single page. Please refer to the *PDR (Physicians' Desk Reference)* when you need more in-depth information.

- For the most part, each fact shee
- Both the brand and
- Generic avai
- FDA-a
- C

ins *Book*
we list p
- $: Inexpensi
- $$: Moderate: $50–$
- $$$: Expensive: $100–$200/mon
- $$$$: Very expensive: $200–$500/month
- $$$$$: Extremely expensive: >$500/month

Many patients have some type of insurance and are therefore not going to pay retail price, but rather a co-pay, which is usually less expensive. However, off-label uses of medications in child psychiatry are often not covered by insurance. Also, even when covered, the co-pays for medication can be high, particularly for high-deductible insurance plans. With no clear source for accurately predicting a co-pay, you can use the retail price as a clue. Meds that are very inexpensive may

General Tips on Child and Adolescent Psychopharmacology

Over the course of a career, most of us realize that pediatric psychopharmacology is more art than science, and that much of the knowledge we've acquired over the years has come from our work with patients after completing residency and fellowship. Here are some hard-won tips and pearls that you might find useful in your practice.

ASSESSMENT, DIAGNOSIS, AND CASE CONCEPTUALIZATION

- **Target symptoms are king.** Most patients come to us with mixed symptoms from several diagnostic categories. Depression, for example, takes on myriad shapes in different patients, with the result that this one diagnosis can seem like many. While formal diagnosis is helpful for insurance and school advocacy, for treatment it is usually more practical to list and prioritize target symptoms. During the workup and ongoing follow-up, it is very helpful to have a running list of all the presenting and ongoing target symptoms, circling the ones that are the current focus. For instance, in one patient you might be targeting substance use, mood instability, and impulsivity, circling all three, while leaving issues of poor grades, tics, and peer relationships on the list but uncircled—intending to focus on them a bit down the line. Another patient with the same set of symptoms might have different issues to target.
- **Meds are the tail, not the dog.** Medications can be very helpful at times, even life-saving, but they cannot make up for an inadequate overall plan or placement. If a child is laboring under challenging or outright abusive situations at home or school, pills do not fix that. For instance, a teen with moderate autism spectrum disorder was brought in for a medication evaluation for irritability and "acting out." On evaluation, his treatment plan included "training for pre-vocational skills"—and his acting out turned out to be in part a rebellion from years of being subjugated to tasks such as sorting silverware. The answer in this case was to rethink the goals that had been imposed on the patient as part of the treatment plan, and not to provide chemical restraint.
- **Informed consent is your friend.** Use informed consent—diagnosis, target symptoms, discussion of options, etc—to guide rational treatment. See the appendices for additional tips on this process.
- **Good care demands time.** You know this, and you are probably fighting for time—time to see the patient; talk to family, therapists, and teachers; review records; call labs; and whatever else you need to do to care for your patient. When we are taken to task about care, we are asked such [illegible]?" "Did you call the lab?" We need time to do these things, and we de[illegible]lements of patient care.
- **Keep develop[illegible]** [illegible]f changes that occur dev[illegible]mple, an activ[illegible]
- **A[illegible]**

c[illegible]
patie[illegible]

MEDICATION [illegible]

- **One change at a time.** Try to ma[illegible]dications at once, for example, can make it hard to tell which one is easing symptoms and which one is causing side effects. There will be exceptions, particularly in more urgent situations; however, it is best to try to be parsimonious and patient.
- **Start low and go slow.** While making small changes may take patience and reassurance, rapid or large changes in medications often lead to untoward side effects and aborted medication trials. It is helpful to tell families, especially if they are hesitant about medication, that we want to use the lowest dose that is effective; therefore, the best first result is to see no change in symptoms and no side effects, because we've used so little medication. From here, we bring up the dose gradually so we can see the results.
- **Take it down (slowly) if it doesn't work.** There is little point in keeping a medication at a robust dose if it is not having a clear positive impact. We often see people who have stayed on medications more out of habit than anything else. Get

ADHD Medications

Generally, in treating kids with ADHD, you should start with psychostimulants, since they are the most effective options. Second-line agents include atomoxetine, bupropion, and alpha agonists.

STIMULANT RECOMMENDATIONS

When choosing a stimulant, the first decision is between an amphetamine or methylphenidate preparation. Methylphenidates are often the go-to as they tend to be more easily tolerated and are as effective as amphetamines for most patients. The second decision is choosing between a long-acting or short-acting stimulant.

For kids who don't like swallowing pills, there are various options. Some long-acting stimulants can be opened and sprinkled on food. There are also short- and long-acting liquid, chewable, and disintegrating brand-name options—though they are expensive and often require pre-authorization. Finally, another option for the pill-phobics is the Daytrana patch.

The case for long-acting stimulants

- More practical: It's easier to take a single dose that lasts through the duration of a school day.
- Addresses acute tachyphylaxis: Response to stimulants diminishes rapidly, but most newer long-acting stimulants release an increasing amount of drug over the 6–12 hour course of the dose, which most people need for the medication to be effective. This avoids the need for multiple short-acting dosage bursts to maintain continued response.
- Decreased stimulant rebound: People sensitive to rebound irritability or worsening of ADHD symptoms often report a more attenuated rebound with long-acting stimulants.

The case for short-acting stimulants

- For situations where a child only requires a few hours of effect, such as a half day of school, an afternoon of completing homework, or a weekend activity.
- Minimizes appetite suppression during meals.
- May be less likely to interfere with sleep.

DOSE EQUIVALENTS

Some kids may [illegible] best for them. Th[illegible]

1. [illegible]

2. **Fr[illegible]**
   - With [illegible]y.
   - Concerta, bec[illegible] amount you prescribe. The usua[illegible] of Concerta in methylphenidate equivalents. Thus, Conce[illegible]ylphenidate 15 mg, 36 mg is equivalent to 30 mg, and so on.
   - Focalin is the dextro-isomer of methylphenidate, which is twice as potent as methylphenidate. Thus, use about half the dose when using Focalin.

3. **From methylphenidate to an amphetamine (or vice versa)**
   - Methylphenidate is roughly half as potent as amphetamine, so Ritalin 10 mg = Dexedrine 5 mg, etc. Consistent with this equivalency, child psychiatrists often dose methylphenidate at 1 mg/kg, whereas they dose amphetamine at 0.5 mg/kg. Conversely, if you're switching from Dexedrine to Ritalin, you would need to double the dosage.

TABLE 1: ADHD Medications

Brand Name (Generic Name, if different than heading) Year FDA Approved *[G] denotes generic availability*	Available Strengths (mg except where noted)	Usual Pediatric Dosage Range (starting–max) (mg)	Duration of Action (hours)	Can It Be Split?	Ages Approved for ADHD	Delivery System/Notes (IR = immediate release, CR = controlled release, DR = delayed release, ER = extended release)
Methylphenidates						
Short-acting						
Focalin [G] (Dexmethylphenidate) 2001	2.5, 5, 10	2.5 BID–10 BID	3–4	Yes (not scored)	6–17	Tablet; D-enantiomer of Ritalin; 2x more potent than methylphenidate
Methylin CT [G] 2003	2.5, 5, 10	2.5 BID–20 TID	3–4	Yes	6–17, adults	Chewable, grape-flavored tablet
Methylin oral solution [G] 2002	5 mg/5 mL, 10 mg/5 mL	2.5 BID–20 TID	3–4	NA	6–17, adults	Clear, grape-flavored liquid
Ritalin [G] 1955	5, 10, 20				adults	IR tablet
Intermediate-acting						
Metadate ER [G] Branded generi 1999						redictable because of wax
Meth Br						ssibly more
						ax
						5%
D (Met 2006						ed by cts may oval
Focalin XR [G] (Dexmethylphenid 2005						ds & 50% DR beads; g; 2x more potent than idate
Jornay PM 2018						ER capsule of DR beads; taken in evening between 6:30–9:30 pm

AMPHETAMINE (Adzenys XR-ODT, Dyanavel XR, Evekeo) Fact Sheet

PEDIATRIC FDA INDICATIONS:
ADHD (Adzenys XR-ODT and Dyanavel XR: children >6; Evekeo: children >3).

ADULT FDA INDICATIONS:
ADHD (Adzenys XR-ODT); narcolepsy (Evekeo); obesity (Evekeo).

OFF-LABEL USES:
Treatment-resistant depression.

DOSAGE FORMS:
Tablets (Evekeo): 5 mg, 10 mg (scored).
ER orally disintegrating tablets (Adzenys XR-ODT): 3.1 mg, 6.3 mg, 9.4 mg, 12.5 mg, 15.7 mg, 18.8 mg.
ER oral suspension (Dyanavel XR): 2.5 mg/mL.

PEDIATRIC DOSAGE GUIDANCE:
- Tablets (Evekeo):
  - Children 3–5: Start 2.5 mg QAM, increase in 2.5 mg/day increments weekly to maximum of 40 mg/day in divided doses.
  - Children 6–17: Start 5 mg QAM, increase in 5 mg/day increments weekly to maximum of 40 mg/day in divided doses.
- ER ODT (Adzenys XR-ODT):
  - Start 6.3 mg QAM, increase in 3.1–6.3 mg/day increments weekly. Maximum of 18.8 mg/day (ages 6–12) or 12.5 mg/day (ages 13–17).
- ER oral suspension (Dyanavel XR):
  - Start 2.5 mg–5 mg QAM, increase in 2.5–10 mg/day increments every 4–7 days. Maximum 20 mg/day.

MONITORING: Weight, hei

COST: $$$$

SIDE

- Divide
- Approximate e . 3.1 mg = 5 mg, 6.3 mg = 10 mg, 9.4 mg
- Shake Dyanavel XR oral suspension for exte mg of mixed amphetamine salts.
- Amphetamines are not interchangeable on a mg:mg basis. When switching, use a lowered dose and adjust.

FUN FACT:
The term "amphetamine" is the contracted form of the chemical "alpha-methylphenethylamine." Its first pharmacologic use was when pharmaceutical company Smith, Kline and French sold amphetamine under the trade name Benzedrine as a decongestant inhaler.

BOTTOM LINE:
Newer formulations of an old drug come with a high price tag. Stick to the usual amphetamine products like mixed amphetamine salts unless liquid or ODT dosing is absolutely necessary.

Antidepressants

In contrast to the data available for adults, the evidence for efficacy and safety of antidepressants in children is less robust. Nonetheless, some studies, specifically the TADS (The Treatment for Adolescents With Depression Study) and TORDIA (Treatment of Resistant Depression in Adolescents), have shown that SSRIs can work for depression in adolescents, especially when combined with cognitive behavioral therapy.

In general, when faced with a child or adolescent with depression who has not responded to psychotherapy, we recommend starting with fluoxetine, because it has the most evidence for efficacy and safety. Other first-line options include sertraline and escitalopram. Paroxetine has fallen out of favor due to concerns about suicidality as a possible side effect and significant withdrawal symptoms.

If the first SSRI trial fails, rotate to a different SSRI. An SNRI trial (either venlafaxine or duloxetine) is reasonable after 2 failed SSRIs. SNRIs tend to have more side effects than SSRIs and potentially severe discontinuation symptoms.

Try bupropion for patients that have comorbid depression and ADHD, but remember that in patients with eating disorders, this drug causes a lowered seizure threshold. Mirtazapine and trazodone can be helpful for depressed and anxious patients with insomnia—but mirtazapine can cause substantial weight gain.

When antidepressants are not working well enough on their own, you can use augmenting agents, including atypical antipsychotics, lithium, and thyroid supplementation. However, there is very little research evidence supporting this practice in the pediatric population.

We rarely use tricyclics in kids, because of possible cardiac toxicity and other side effects. Nonetheless, consider them for particularly severe and unresponsive cases, or for patients with comorbid OCD, enuresis, insomnia, migraines, or poorly controlled headaches.

SIDE EFFECTS AND CLASS WARNINGS

- Black box warning of suicidality: All antidepressant medications come with a black box warning based off of a meta-analysis that demonstrated a 2-fold increase in suicidal thinking or behaviors in patients under 25 years of age. No completed suicides were demonstrated, and the suicidal parameters encompassed a broad range of definitions, including parasuicidal thoughts and behaviors. While the black box warning is a significant consideration, the pros of antidepressant treatment outweigh the cons in the majority of patients. Prior to the black box warning in 2004, the rate of suicide in the adolescent and young [illegible] of SSRI prescriptions was rising. After the war[illegible]ide rate increased. That [illegible]essant
  - Grad[illegible]
    symptoms, wh[illegible]e can be extremely uncomfortable and may include [illegible]tability, to name a few symptoms.
- SNRIs:
  - Given their potential to increase blood pressure, closer blood pressure monitoring is required.
  - Gradual tapers are also required, in light of SNRIs' significant withdrawal symptoms.
- Other side effect considerations:
  - Serotonin syndrome can occur, particularly when using multiple serotonergic agents or serotonergic supplements such as St. John's wort or SAMe; if it occurs, it will require discontinuation of offending medications or supplements. Symptoms often present within a day of starting medication and can include sweating, GI symptoms, hyperthermia, tachycardia, increased blood pressure, confusion, and tremors, and can be life threatening; they will require immediate assessment and supportive care.
  - Risks of hypomania and mania need to be considered.
  - Sexual side effects can occur, including delayed orgasm/ejaculation and decreased sexual drive, which may be of concern to some adolescents—bupropion and mirtazapine are less likely to cause these problems.

TABLE 2: Antidepressants

Generic Name (Brand Name) Year FDA Approved *[G] denotes generic availability*	Relevant FDA Indication(s) (Pediatric indications in bold)	Available Strengths (mg)	Usual Dosage Range (starting–max) (mg) Pediatric unless specified
Selective serotonin reuptake inhibitor (SSRI)			
Citalopram [G] (Celexa) 1998	MDD	10, 20, 40, 10/5 mL	10–40
Escitalopram [G] (Lexapro) 2002	**MDD (12+ yrs)**, GAD	5, 10, 20, 5/5 mL	5–20
Fluoxetine [G] (Prozac) 1987	**MDD (8+ yrs)**, **OCD (7+ yrs)**, panic disorder, bulimia, PMDD (as Sarafem)	10, 20, 40, 60, 20/5 mL 10, 20 (Sarafem)	10–60
Fluoxetine DR [G] (Prozac Weekly) 2001	MDD maintenance	90 DR	90 Qweek (adults)
Fluvoxamine [G] Luvox brand dis 1994			200
Fluvo (L			
De (Khed 2008			
Duloxetine [G] (Cymbalta) 2004			
Venlafaxine [G] 1993 Effexor brand discontinued; generic only		50, 75, 100	37.5–75
Venlafaxine ER [G] (Effexor XR) 1997	MDD, GAD, social anxiety disorder, panic disorder	37.5, 75, 150, 225 ER	37.5–225
Tricyclic antidepressant (TCA)			
Amitriptyline [G] Elavil brand discontinued; generic only 1961	MDD	10, 25, 50, 75, 100, 150	25–200
Clomipramine [G] (Anafranil) 1989	**OCD (10+ yrs)**	25, 50, 75	25–200
Desipramine [G] (Norpramin) 1964	MDD	10, 25, 50, 75, 100, 150	25–150

BUPROPION (Wellbutrin) Fact Sheet [G]

PEDIATRIC FDA INDICATIONS:
None.

ADULT FDA INDICATIONS:
Major depression; seasonal affective disorder; smoking cessation (as Zyban).

OFF-LABEL USES:
ADHD; sexual dysfunction; bipolar depression.

DOSAGE FORMS:
- **Tablets (G):** 75 mg, 100 mg.
- **SR tablets (G):** 100 mg, 150 mg, 200 mg.
- **ER tablets (G):** 150 mg, 300 mg; **Forfivo XL:** 450 mg.
- **ER tablets, hydrobromide salt formulation (Aplenzin):** 174 mg, 348 mg, 522 mg (equivalent to 150 mg, 300 mg, 450 mg, respectively).

PEDIATRIC DOSAGE GUIDANCE:
- Depression (target dose 300 mg/day):
  - IR: Start 37.5 mg or 75 mg BID, ↑ to TID after >3 days; max dose 450 mg/day, 150 mg/dose; separate doses by at least 6 hours to minimize seizure risk.
  - SR: Start 100 mg QAM, ↑ to 100 mg BID as early as fourth day; max dose 400 mg/day, 200 mg/dose; separate doses by at least 8 hours to minimize seizure risk.
  - ER: Start 150 mg QAM, ↑ to 300 mg QAM as early as fourth day; max dose 450 mg QAM.
- Smoking cessation: Start 100 mg SR QAM, titrate as needed.

MONITORING: No routine monitoring recommended unless clinical picture warrants.

COST: IR/SR/ER: $; Forfivo: $$$$; Aplenzin: $$$$$

SIDE EFFECTS:
- Most common: agitation, i… …h, weight loss.
- Serious but ra… …Risk of seizure depend… …mg/day–3… …ed.
- …larg…
- May be a p…
- There are only a few … …upropion provided no benefit when added to nicotine … …owed improved quit rates (though lower than in adults) when combined with counseling vs counseling alone.
- Forfivo XL offers ease of use (1 pill a day) for patients taking 450 mg/day, but it is more expensive. Aplenzin brand could also be a 1-pill-a-day solution (522 mg is equivalent to 450 mg Wellbutrin) but otherwise doesn't offer any real advantage as a different salt (hydrobromide).
- Give ER dose as early in the morning as possible to minimize insomnia.
- Bupropion can cause false-positive urine test results for amphetamines.

NOT-SO-FUN FACT:
There have been case reports of teenagers, prisoners, and others snorting crushed tablets (believing the substance to be a stimulant), with subsequent seizures.

BOTTOM LINE:
Not a first-line antidepressant in kids, but may be useful for kids whose depression is associated with fatigue and poor concentration. Absence of sexual side effects and weight gain make this an appealing option for some. Although not effective for anxiety disorders, it is effective for the anxiety that often accompanies depression. The seizure risk is not a concern for most patients when dosed appropriately.