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ADHD in Adults: Overview and Traditional Treatment Options

Jeffrey Habert, MD, CCFP, FCFP

Introduction

ADHD is a lifelong neurodevelopmental disorder characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that impairs functioning across multiple settings.[1,2] The Diagnostic and Statistical Manual, Fifth Edition, Text Revision (DSM-5-TR) recognizes three presentations, predominantly inattentive, predominantly hyperactive-impulsive, and combined, and requires that several symptoms be present before age 12.[1] For family physicians, the most important fundamental change over the past two decades has been the recognition that ADHD is not a disorder children outgrow. As the saying goes, "*you don't outgrow ADHD, you outgrow the DSM V*."[2] The DSM-5 lowered the adult symptom threshold from 6 to 5 because partial symptom persistence into adulthood is the rule, not the exception.[1]

Global prevalence of ADHD is approximately 5 to 7 percent in children and 2 to 5 percent in adults.[3,4] Approximately 1.8 million Canadians have ADHD.[2] Between 50 and 80 percent of childhood cases persist into adolescence, and more than half persist into adulthood.[2,5] But as indicated above this isn't likely accurate as you "don't outgrow ADHD, but you outgrow DSM V, which suggest they still have ADHD, but may not fully fulfill DSM-V criteria.

The male to female ratio narrows from roughly 3:1 in children to closer to 2:1 in adults, and women in particular remain markedly under-diagnosed.[2,4] In childhood this disparity is due to the underdiagnosis of females who present more with inattentive type ADHD as children, so are often missed.

The most sobering statistic for primary care is that more than 80 percent of Canadian adults with ADHD have never been diagnosed or treated.[2] In a typical family practice roster, this represents a substantial population of patients whose chronic difficulties, including procrastination, missed deadlines, lost objects, forgotten appointments,

emotional dysregulation, and a sense of inner restlessness, are too often attributed to character, anxiety, or burnout rather than to a treatable neurodevelopmental condition.[1,2]

The Burden of Untreated ADHD is Broad and Consequential

Approximately 85 percent of adults with ADHD carry at least one psychiatric comorbidity: lifetime anxiety affects roughly 50 percent, major depressive disorder 30 percent, >2/3 have insomnia and substance use disorders are markedly elevated.[2,4,6,16] Medical comorbidity is equally important. Adults with ADHD have higher rates of obesity, type 2 diabetes, and cardiovascular disease, and are approximately 1.5 times more likely to sustain physical injury.[7,8]

Functional impairment cascades across academic, occupational, social, and legal domains, with the annual societal cost in Canada estimated at approximately CAD 2.5 billion.[2,9] This highlights the importance of treating ADHD, which reduces injury risk by approximately 43 percent, one of the clearest mortality-relevant signals in psychiatry.[8] The diagnosis is associated with an earlier mortality (primarily due to unnatural death).[8]

For the family physician, recognizing ADHD is not a trivial diagnosis, as it significantly changes life outcomes.

Diagnosis in Primary Care is a Clinical Diagnosis: The Author Suggests a Dedicated ADHD Visit as Opposed to a Hand on the Door Discussion

It relies on a structured interview, collateral history where available, and validated symptom rating scales.[2] DSM-5-TR requires five or more inattention symptoms and/or five or more hyperactivity-impulsivity symptoms in patients aged 17 or older, with several symptoms present before age 12, evidence of impairment in two or more settings, clear interference with functioning, and exclusion of other explanatory disorders.[1] Obtaining history before age 12 is important and may rely on collateral information from relatives. **(Figure 1)**

The Adult ADHD Self-Report Scale (ASRS v1.1), a free six-item World Health Organization screener with a sensitivity of 68.7 percent and specificity of 99.5 percent, is well suited to EMR intake forms.[10] Adjunctive tools include the Conners Adult ADHD Rating Scales, the Brown Attention-Deficit Disorder Scales, and the Weiss Functional Impairment Rating Scale.[2] Screening for comorbidities at the time of diagnosis is essential, as their presence and severity often determine which condition to treat first.[2,6]

Traditional treatment is multimodal and stepped. The Canadian ADHD Resource Alliance (CADDRA) framework comprises four steps:
1. setting treatment objectives,
2. selecting medication,
3. titrating and monitoring
4. ongoing follow-up.

Pharmacotherapy sits alongside psychoeducation, environmental changes (Implement structure and routines that are organized and predictable environment), and structured psychological therapy if accessible/available.

A 2025 component network meta-analysis of 113 randomized controlled trials in 14,887 adults reinforced this hierarchy: amphetamine- and methylphenidate-based psychostimulants, along with atomoxetine, remain the only interventions with demonstrated short-term efficacy for adult ADHD core symptoms, while non-pharmacological interventions alone offered limited benefit for symptom reduction, though they remain valuable for function and coping.[11]

First-line Options for Adults are Long-acting Psychostimulants[2,12,13]

These produce large effect sizes with 70 to 80 percent response rates, and offer smoother daytime coverage, reduced rebound, and lower diversion risk than immediate-release formulations.[12,13]

Physiologically, they increase synaptic dopamine and norepinephrine through reuptake blockade at DAT and NET transporters, enhancing prefrontal cortical activation, focus, and impulse control.[13]

Duration of action should be matched to the patient's day: Foquest provides up to approximately 16 hours, Concerta and Vyvanse 12 to 14 hours, Dynavel XR ~13 hours, and Adderall XR and Biphentin 10 to 12 hours; Jornay PM is dosed in the evening with onset on waking, useful for patients who cannot function before their morning dose takes effect.[2]

Common, generally dose-dependent adverse effects include appetite suppression, insomnia, headache, and modest elevations in heart rate

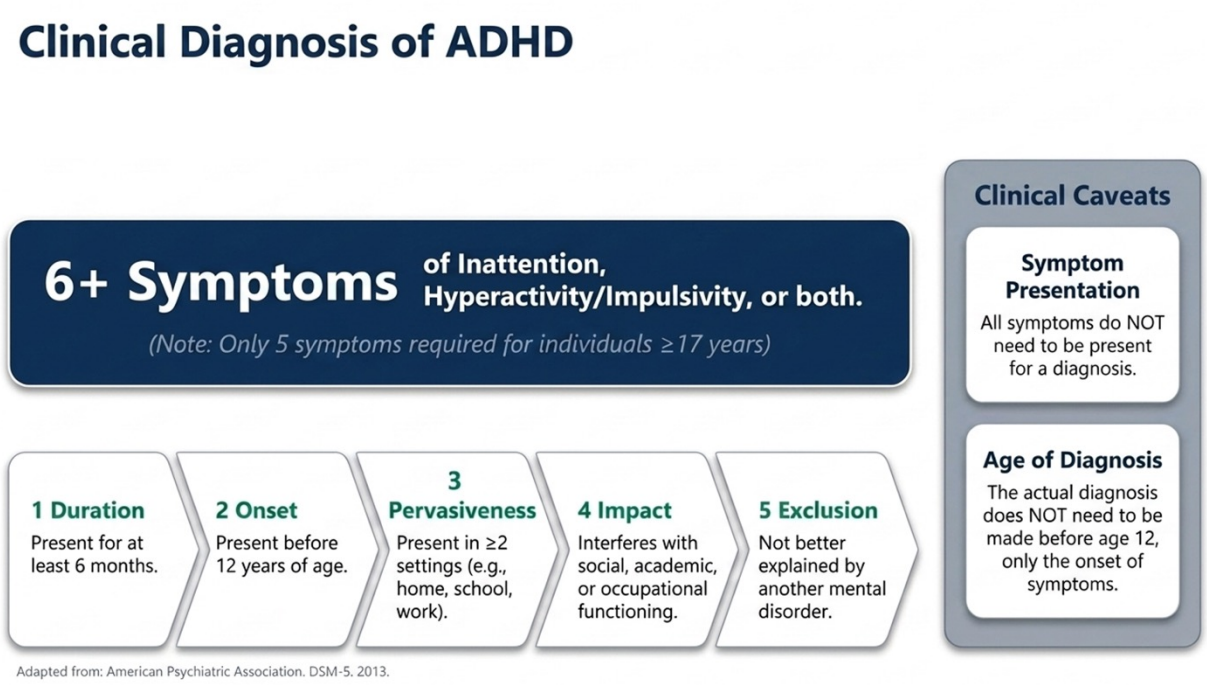

Figure 1. *Adapted from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR).*

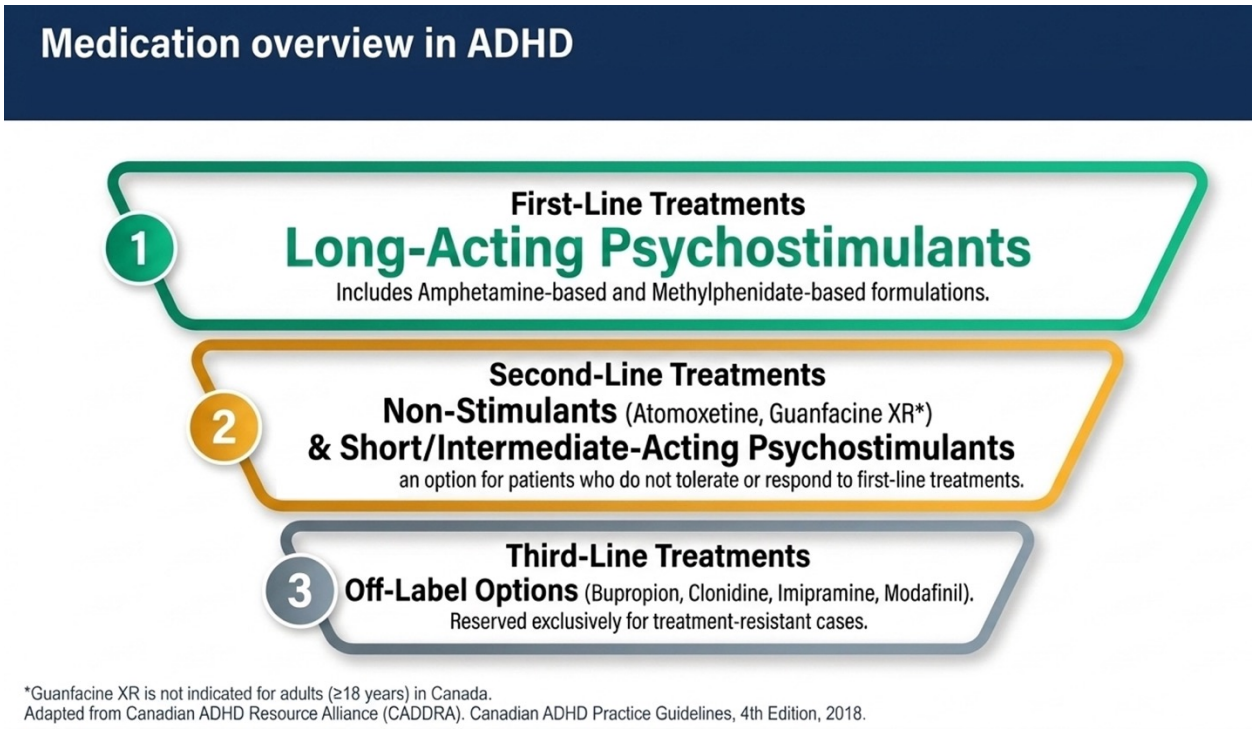

Figure 2. *Adapted from Canadian ADHD Resource Alliance (CADDRA). Canadian ADHD Practice Guidelines, 4th Edition, 2021.*

Brand Name	Dosages (mg)	Comments	Starting Dose (qAM) and **Maximum Dose**	Weekly Titration	Formulation Type (Immediate/ Delayed; %)	Duration of Efficacy
Amphetamine-based						
Adderall XR	Capsules: 5, 10, 15, 20, 25, 30	Granules can be sprinkled	10 mg/ **50 mg (20-30 per PM)**	5-10 mg ↑	50/50	~12 hrs
Vyvanse	Capsules: 10, 20, 30, 40, 50, 60, 70 Chewable tablets: 10, 20, 30, 40, 50, 60	Capsule cannot be diluted in liquid or sprinkled; chewable tablets should be chewed thoroughly	20-30 mg/ **70 mg (60 per PM)**	10-20 mg ↑	Not applicable (prodrug)	~13 hrs
Dynavel XR	Oral suspension: 2.5 mg/mL Oral tablets: 5, 10, 15, 20	Tablets can be chewed or swallowed whole; 5 mg tablet is scored	2.5 mg (peds); 5 mg (adults)/ **20 mg**	2.5-5 mg (every 4-7 days) ↑	IR + ER (LiquiXR)	~13 hrs
Methylphenidate-based						
Biphentin	Capsules: 10, 15, 20, 30, 40, 50, 60, 80	Granules can be sprinkled	10-20 mg/ **80 mg**	5- 10 mg ↑	40/60	~10-12 hrs
Concerta	Extended-Release Tablets: 18, 27, 36, 54	Osmotic-Controlled Release Oral Delivery System (OROS)	18 mg/ **108 mg (72 per PM)**	9-18 mg ↑	22/78	~12 hrs
Foquest	Capsules: 25, 35, 45, 55, 70, 85, 100	Granules can be sprinkled	25 mg/ **100 mg**	10-15 mg ↑	20/80	~13-16 hrs
Qullivant ER	Oral suspension: 5 mg/mL Chewable tablets: 20, 30	Oral suspension or chewable tablets (q AM)	20 mg/ **60 mg**	10-20 mg	20/80	~12 hrs
Journay PM	Capsules: 20, 40, 60, 80, 100	Take in evening (6:30 pm to 9:30 pm); onset at waking	20 mg qPM/ **100 mg**	20 mg	Delayed + Extended Release	~12-16 hrs

Figure 3. First-line stimulants for the treatment of ADHD in Canada; *Adapted from Canadian ADHD Resource Alliance (CADDRA). Canadian ADHD Practice Guidelines, 4th Edition, 2021.*

and blood pressure. Contraindications include uncontrolled hypertension, structural cardiac disease, concurrent MAOI use, and a history of psychosis. Monitoring at each visit should include blood pressure, heart rate, weight, sleep, and appetite.[2]

Second-line Options

Includes non-stimulants and short or intermediate acting stimulants.[2] Atomoxetine, a selective norepinephrine reuptake inhibitor, is taken once daily, provides 24 hour coverage, requires 4 to 8 weeks for full effect, and carries no abuse potential, making it useful when stimulants are contraindicated, poorly tolerated, or when comorbid anxiety or substance use risk is present.[2,14]

Guanfacine XR, an alpha-2A adrenergic agonist, is Health Canada indicated only for ages 6 to 17 and is not approved for adults in Canada, an important caveat when reviewing the literature, as off-label adult use occurs.[2,15]

Third-line and off-label options (bupropion, clonidine, modafinil) are typically reserved for treatment-resistant cases and are generally specialist-driven.[2]

Non-pharmacological Interventions Remain Essential Adjuncts

Psychoeducation for the patient and family, cognitive behavioural therapy adapted for adult ADHD, ADHD coaching, and environmental supports, including consistent routines, visual reminders, timers, reduced screen-based distraction, and electronic management of bills and appointments, together address functional impairment that medication alone does not fully resolve.[2] Yet even with optimal first-line therapy, comorbidities, particularly sleep disturbances, often determine whether patients achieve durable functional recovery, a theme the next section will explore.

Referral to psychiatry is appropriate for diagnostic uncertainty, complex comorbidity, treatment-resistant cases, or concerns about diversion or substance misuse.[2]

ADHD in adults is common, under-recognized, and has significant consequences, yet it is also one of the most treatable conditions in primary care. A dedicated diagnostic visit, validated screening tools, and first-line long-acting stimulants, supported by psychoeducation and environmental supports, can meaningfully change a patient's trajectory across health, function, and even mortality. Long term recovery also depends on ongoing follow-up, adherence and recognizing the frequently occurring comorbidities such as mood disorders, anxiety, insomnia and substance abuse.

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Affiliations: None declared.

Choosing a Therapy for ADHD

Isaac Szpindel, MD

When choosing a therapy for a person with ADHD it is important to consider the whole patient including the entirety of the patient's environment and the resources available to them. As detailed in the section above, long-acting stimulant formulations are the recommended 1st line therapeutic choice according to CADDRA.[1] Once-daily dosing which has become possible through advances in medication delivery systems of the active ingredient provide the added benefit of improved adherence.

The initial choice of pharmacotherapy is dictated by individual needs and environmental factors such as availability or experience with medications taken by other family members, exposure to environments or individuals at risk of abuse, and milieus, occupations or locations where medications are restricted and or unavailable. Comorbidity may direct medication choice as may polypharmacotherapeutic considerations. It should be noted that even within the same family, affected individuals may respond differently to the same or similar medications both within and across classes. As stimulant-naïve patients are at greater risk of side-effects and intolerance, starting low and going slow is a prudent choice. This will reduce side-effect risk and running-over response when reassessing at several week intervals or more as appropriate after stepwise dose titration to optimal response. As methylphenidate formulations are strong dopaminergic and weak noradrenergic neurotransmitter reuptake inhibitors, they may represent a milder starting point for the stimulant-naïve. Comorbidity considerations may similarly suggest amphetamine formulations due to their additional action through vesicular neurotransmitter release for both dopamine and norepinephrine in addition to their action as reuptake inhibitors. As ADHD should be treated to remission rather than simply to response one should consider this as an iterative process in which initial choice is built upon, revised or added to similarly according to response and side-effect.

Due to well established effect sizes, rapid times to response, improvements in response and

reductions in side effects with reduced risk of misuse and abuse, long-acting psychostimulants are typically my first medication choice on patient environment and comorbidity. Commonly this will be an all-day-long-acting, extended-release (ER) methylphenidate or amphetamine. In patients with ADHD I prefer smooth release rather than phasic release and triphasic over biphasic release where such medications are utilized. Smooth long-acting releases are achieved chemically in the amphetamine medication lysdexamphetamine dimesylate and mechanically in the methylphenidate osmotic delivery formulations. This is due to flatter release profiles which may reduce likeability and craving[2] and the combination of all-day-long-acting duration, relative pH immunity and reduced potential for abuse and misuse. pH-altering conditions and medications can be common in adults and may impact release of pH-based delivery system medications.

In Canada where bioequivalent medication substitution is available and in some places, mandated, one should differentiate between similar medications such as bioequivalents and what I consider to be identical bioduplicate medications. While bioequivalent drugs use the same active underlying molecule, the overall dose, delivery mechanisms and systems and accompanying excipients can vary. Dose delivery timing may also vary, including smoothness of delivery and time to peak dose and fall-off. ADHD bioequivalents may not closely simulate the curves of their parent drugs. It is my experience as suggested by the literature that substitution with these products may be associated with loss of effect and/or greater side effects.[3,4,5,6,7] Abuse and misuse potential also increases in formulations that can be crushed and administered by alternate routes. Lysdexamphetamine and polyresin methylphenidate formulations are less prone to such risks, and as such are preferred. Given these factors, the current and growing methylphenidate ER bioequivalent landscape in Canada must be considered. At the time of this writing, it should be noted that one of the available methylphenidate ER bioequivalents is what I consider to be a true bioduplicate that uses the identical base chemical, identical osmotic delivery system, and identical polyresin matrix with identical excipients. Due to the aforementioned vulnerabilities and the current bioequivalent landscape specific to Methylphenidate Extended Release (ER) formulations in Canada I address this topic specifically.

My experience with these medications, consistent with that of clinicians across Canada, the decisions of various provincial regulators, and the 2020 CADDRA Guidelines was that initial generic extended-release methylphenidate bioequivalents at that time that did not employ the osmotic delivery system were different drugs that behaved sufficiently differently that they should not be automatically interchangeable.[1] There is a mounting body of evidence for these claims including the following 3 examples:

Fallu et al. 2016[3]
- Randomized, double-blind, cross-over, phase IV trial,
- 20 adult ADHD patients OROS MPH ER (Concerta®) for at least 3 months and stable
- Patients given OROS MPH ER (Concerta®) or a non-OROS generic for 3 weeks then crossed over treatment for a subsequent 3 weeks.
- Concerta-treated patients treated reported increased satisfaction for efficacy (p=0.0433) and side effects (p=0.0321) vs. non-OROS generic
- Most common adverse event was ADHD exacerbation (59% vs 13%, non-OROS generic vs. Concerta).

Park-Wyllie et al. 2016[6]
- Retrospective cohort of patients receiving OROS MPH ER (Concerta®) or non-OROS MPH ER, (n=41,900)
- Cohort data from Ontario and Quebec private and provincial drug plan databases
- Length of therapy was significantly increased in OROS-treated patients (p<0.0001 vs. non-OROS MPH ER).
- 38% of non-OROS treated patients vs. 11% of OROS treated patients were switched to a different therapy, p<0.0001).

Park-Wyllie et al. 2017[4]
- Canadian pharmacovigilance study reviewed spontaneous adverse event reports
- Non-OROS MPH ER reports had an ~10-fold greater occurrence of therapeutic failure vs. OROS (411.5 vs. 37.5 cases/100,000 patient-years)
- 42.6% of failures were due to shorter duration of effect
- 22.2% of reports were of adverse social or functional outcomes (e.g. poor school/work performance)

In Canada, bioequivalent substitution is often mandated by provincial and private insurance coverage. Currently, there are 3 generic versions of the long-acting methylphenidate ER brand (Concerta®) available in Canada. The recent release of Taro-Methylphenidate ER in Canada represents in my opinion, an available generic option that is what I consider to be bioduplicate in that it uses an identical drug component, identical osmotic delivery system and identical excipients.

Again, once a treatment is chosen, as described previously, dose titration for treatment of ADHD to remission should follow the adage "start low, go slow" independent of medication choice. This allows for effective monitoring of response and any side effects. Blood pressure and heart rate should be monitored following any medication increase or change and at appropriate intervals as indicated on a long-term basis to rule out outlying rare instances of excessive increase. Treatment should be optimized to remission and patients followed along the lifespan as different needs arise, different environments are encountered and as the body and brain mature. Co-morbid physical and psychiatric conditions should be addressed and treated appropriately and prioritized according to severity, need, and associated risk. Overall, ~90% of patients will respond to a stimulant medication from either the methylphenidate or amphetamine class for treatment of their ADHD. Where indicated by partial or incomplete response, stimulant therapy may be combined with non-stimulant therapy as appropriate and tolerated.

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Confidence in Osmotic Delivery Methylphenidate ER Matters in Canadian Pharmacy Practice

Fabio De Rango, B.Sc., Pharm, RPh, CDE

Community pharmacists are among the most accessible health care professionals in Canada. With approximately 95% of Canadians living within five kilometres of a pharmacy[1], pharmacists are often the first point of contact for medication-related concerns and one of the health care providers patients interact with most frequently. Canadians also report a high level of trust in pharmacists and the advice they provide regarding medications and health care decisions.[2]

That trust is central to pharmacy practice. Every recommendation made by a pharmacist reflects a professional responsibility to balance evidence, clinical judgement, patient experience, and system sustainability. While pharmacists strongly support the use of generic medications when appropriate, confidence in therapeutic interchangeability is particularly important for modified-release products, where clinical performance may depend on more than the active ingredient alone.

Methylphenidate provides a useful example. Pharmacists understand that the therapeutic effect of extended-release methylphenidate products is influenced not only by the drug itself but also by the delivery technology used to control the timing and rate of release. For decades, manufacturers have sought to improve symptom control through increasingly sophisticated delivery systems. The osmotic delivery formulation of methylphenidate ER was developed to provide a controlled release profile throughout the day and has become a familiar and trusted treatment option for many clinicians, pharmacists, patients, and caregivers.

In day-to-day practice, pharmacists are often asked whether different modified-release methylphenidate products can be expected

to perform in the same manner. This question is particularly important for patients who have achieved symptom stability after a period of dose titration and clinical monitoring. When considering a substitution, pharmacists look beyond the active ingredient and seek confidence that the alternative product will provide a comparable therapeutic experience.

The consequences of treatment failure are not limited to a change in symptoms. When a patient experiences a loss of symptom control following a switch in therapy, additional follow-up is often required. Pharmacists may need to investigate the issue, communicate with prescribers, counsel patients and caregivers, and support further treatment adjustments. These activities require time and health care resources, but more importantly, they can create frustration and uncertainty for patients and families who believed they had found an effective treatment regimen.

For patients with ADHD, consistency matters. Effective symptom control can influence academic performance, workplace productivity, interpersonal relationships, and overall quality of life. As a result, pharmacists are understandably cautious when evaluating substitutions involving complex modified-release products.

Ultimately, pharmacists strive to make the same decisions for their patients that they would want made for members of their own families. Confidence in product interchangeability is strengthened by clear evidence demonstrating comparable pharmacokinetic performance, clinical effectiveness, and patient outcomes. For modified-release formulations such as osmotic delivery methylphenidate ER, that evidence remains an important consideration in supporting both therapeutic success and the trust that underpins the pharmacist–patient relationship.

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