

# Strategies for improving ADHD medication adherence

To maximize outcomes, understand and address the factors that affect adherence

**A**ttention-deficit/hyperactivity disorder (ADHD) is the most common childhood neurodevelopmental disorder, affecting 8% to 12% of school-aged children in the United States<sup>1-3</sup> with significant impairments that often persist into adulthood.<sup>4,8</sup> Current guidelines recommend stimulant medication and/or behavioral therapies as first-line treatments for ADHD.<sup>9,10</sup> There is a wealth of evidence on the efficacy of stimulants in ADHD, with the most significant effects noted on core ADHD symptoms.<sup>11,12</sup> Additional evidence links stimulants to decreased long-term negative outcomes, including reduced school absences and grade retention,<sup>13</sup> as well as modestly but significantly improved reading and math scores.<sup>14</sup> Other studies have reported that individuals with ADHD who receive medication have decreased criminality,<sup>15,16</sup> motor vehicle accidents,<sup>17,18</sup> injuries,<sup>19</sup> substance abuse,<sup>20-22</sup> and risk for subsequent and concurrent depression.<sup>23</sup> Therefore, the evidence suggests that consistent medication treatment helps improve outcomes for individuals with ADHD.

Adherence is defined as “the extent to which a person’s behavior (eg, taking medication) corresponds with agreed recommendations from a clinician.”<sup>24</sup> Unfortunately, pediatric ADHD medication adherence has been found to be poor (approximately 64%).<sup>25-30</sup> Nonadherence to ADHD medication has been linked to multiple factors, including caregiver/family and child/adolescent factors (*Table 1, page 26*), medication-related factors (*Table 2, page 27*), and health care/system factors (*Table 3, page 28*). Understanding and addressing these factors is essential to maximizing long-term outcomes. In this article, we review the factors

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## ADHD medication adherence

### Clinical Point

Caregivers who view a child's difficulties as a medical disorder that requires a biologic intervention are more likely to accept and adhere to medication



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**Table 1**

## Caregiver/family and child/adolescent factors associated with nonadherence to ADHD medication and strategies to improve adherence

Domain	Predictors of decreased adherence	Strategy to improve adherence
Caregiver/family	Beliefs that symptoms are not due to a neurobiologic disorder	Patient/family education
	Stigmatization of medication	Patient/family education
	Lack of caregiver knowledge about ADHD and treatment	Patient/family education
	Increased caregiver-child conflict	Behavior strategies (eg, BPT, PCIT, Incredible Years, COPE, Triple P-Positive Parenting Program)
	Caregiver mental health diagnoses	Behavior strategies (eg, CBT, Coping with Depression Course for caregivers with depression)
	Lower socioeconomic status	Health disparity-reducing interventions
Child/adolescent	Older age at diagnosis Non-White, Hispanic Female gender Lower baseline severity of ADHD symptoms	
	Child unwilling to take medications	Behavior strategies (eg, BPT, Incredible Years), patient/family education
	Comorbid disorders (oppositional defiant disorder, conduct disorder)	Behavior strategies (eg, BPT, Incredible Years for oppositional defiant disorder, MST for conduct disorder)

ADHD: attention-deficit/hyperactivity disorder; BPT: behavioral parent training; CBT: cognitive-behavioral therapy; COPE: Community Parent Education Program; MST: multisystemic therapy; PCIT: Parent-Child Interaction Therapy

associated with nonadherence to ADHD medication, and outline strategies to improve adherence.

### Caregiver/family characteristics

Caregiver beliefs about ADHD and their attitudes toward treatment have been associated with the initiation of and adherence to ADHD medication. For example, caregivers who view a child's difficulties as a medical disorder that requires a biologic intervention are more likely to accept and adhere to medication.<sup>31</sup> Similarly, caregivers who perceive ADHD medication as safe, effective, and socially acceptable are more likely to be treatment-adherent.<sup>32-35</sup> Other caregiver-related factors associated with improved ADHD medication adherence include:

- increased caregiver knowledge about ADHD<sup>33</sup>

- receiving an ADHD diagnosis based on a thorough diagnostic process (ie, comprehensive psychological testing)<sup>36</sup>

- satisfaction with information about medicine

- comfort with the treatment plan.<sup>34</sup>

Socioeconomic status, family functioning, and caregiver mental health diagnoses (eg, ADHD, depression) have also been linked to ADHD medication adherence. Several studies, including the Multimodal Treatment Study of Children with ADHD,<sup>11</sup> a landmark study of stimulant medication for children with ADHD, have found an association between low income and decreased likelihood of receiving ADHD medication.<sup>2,37-39</sup> Further, Gau et al<sup>40</sup> found that negative caregiver-child relationships and family dysfunction were associated with poor medication adherence in children with ADHD.<sup>9</sup> Prior studies have also shown that mothers of children with ADHD are more likely to have depression and/or

Table 2

## Medication factors associated with nonadherence to ADHD medication and strategies to improve adherence

Domain	Predictors of decreased adherence	Strategy to improve adherence
Medication	Adverse effects	Patient/family education, clinician intervention
	Medication ineffectiveness	Clinician intervention
	Lack of medication titration	Clinician intervention
	Lack of early family-clinician contact after starting medication	Clinician intervention
	Multiple daily doses, burdensome medication regimen	Clinician intervention

ADHD: attention-deficit/hyperactivity disorder

anxiety,<sup>41,42</sup> and that caregivers with a history of mental health diagnoses are more accepting of initiating medication treatment for their children.<sup>43</sup> However, additional studies have found that caregiver mental health diagnoses decreased the likelihood of ADHD medication adherence.<sup>40,44</sup>

### Child characteristics

Child characteristics associated with decreased ADHD medication adherence include older age (eg, adolescents vs school-aged children),<sup>29,30,34,40,45-47</sup> non-White race, Hispanic ethnicity,<sup>29,33,48-51</sup> female gender,<sup>29,33,52</sup> lower baseline ADHD symptom severity,<sup>30,37</sup> and child unwillingness to take medications.<sup>34</sup> However, prior studies have not been completely consistent about the relationship between child comorbid conditions (eg, oppositional defiant disorder [ODD], conduct disorder) and ADHD medication adherence. A few studies found that child comorbid conditions, especially ODD, mediate poor ADHD medication adherence, possibly secondary to an increased caregiver-child conflict.<sup>30,53,54</sup> However, other studies have reported that the presence of comorbid ODD, depression, and anxiety predicted increased adherence to ADHD medications.<sup>37,46</sup>

### Medication-related factors

Adverse effects of medications are the most commonly cited reason for ADHD medication nonadherence.<sup>5,33,54-56</sup> The adverse

effects most often linked to nonadherence are reduced weight/appetite, increased aggressive behavior/irritability, and sleep difficulties.<sup>54,57</sup> Studies comparing methylphenidates and amphetamines, including 2 recent meta-analyses, suggest that amphetamines may be less well-tolerated on average, particularly with regard to emotional lability and irritability.<sup>45,58,59</sup> Therefore, clinicians might consider using methylphenidate-based preparations as first-line psychopharmacologic interventions in children with ADHD, as is consistent with the findings and conclusions drawn by a recent systematic review and meta-analysis of the comparative efficacy and tolerability of ADHD medications.<sup>60</sup>

On the other hand, increased ADHD medication effectiveness has been associated with improved medication adherence.<sup>5,34,54-56</sup> Medication titration and dosing factors have also been shown to affect adherence. Specifically, adherence has been improved when ADHD medications are titrated in a systematic manner soon after starting treatment, and when families have an early first contact with a physician after starting medication (within 3 months).<sup>28</sup> In addition, use of a simplified dose regimen has been linked to better adherence: patients who are prescribed long-acting stimulants are more likely to adhere to treatment compared with patients who take short-acting formulations.<sup>26,40,49,61-63</sup> It is possible that long-acting stimulants increase adherence because they produce more even and

### Clinical Point

**Consider using methylphenidate-based preparations as first-line psychopharmacologic interventions in children with ADHD**



## ADHD medication adherence

### Clinical Point

Pill reminder boxes, smartphone alerts, and setting alarms can effectively prompt caregivers/patients to administer medication

**Table 3**  
**Health care/system factors associated with nonadherence to ADHD medication and strategies to improve adherence**

Domain	Predictors of decreased adherence	Strategy to improve adherence
Health care/system	Lack of mental health providers in the community	Clinician intervention
	Sub-optimal insurance coverage	Health disparity-reducing interventions
	Cost of medication	Health disparity-reducing interventions Clinician intervention
	Clinician lack of knowledge	Clinician intervention
	Distrust of the medical system, lack of a strong working alliance with clinician	Clinician intervention, peer models

ADHD: attention-deficit/hyperactivity disorder

sustained effects on ADHD symptoms throughout the day, compared with short-acting formulations.<sup>64</sup> Furthermore, the inconvenience of taking multiple doses throughout the day, as well as the potential social stigma of mid-school day dosing, may negatively impact adherence to short-acting formulations.<sup>10</sup>

### Health care/system factors

Several studies have investigated the influence of health services factors on ADHD medication adherence. Specifically, limited transportation services and lack of mental health providers in the community have been linked to decreased ADHD medication adherence.<sup>47,65,66</sup> Furthermore, limited insurance coverage and higher costs of ADHD medications, which lead to substantial out-of-pocket payments for families, have been associated with decreased likelihood of ADHD medication adherence.<sup>29,67</sup>

Clinician-related factors also can affect ADHD medication adherence. For example, a clinician's lack knowledge of ADHD care can negatively impact ADHD medication adherence.<sup>68</sup> Two studies have documented improved ADHD medication adherence when treatment is provided by specialists (eg, child psychiatrists) rather than by community primary care providers, possibly because specialists are more likely to provide close stimulant titration and monitoring (ie,  $\geq 3$  visits in the first 90

days) and use higher maximum doses.<sup>62,69</sup> Furthermore, ADHD medication initiation and adherence are increased when patients have a strong working alliance with their clinician and trust the health care system,<sup>31,34,35</sup> as well as when there is a match between the caregiver's and clinician's perception of the cause, course, and best treatment practices for a child's ADHD.<sup>65</sup>

### Strategies to improve medication adherence

A number of strategies to improve ADHD medication adherence can be derived from our knowledge of the factors that influence adherence.

**Patient/family education.** Unanswered questions about ADHD diagnosis, etiology, and medication adverse effects can negatively impact the ADHD treatment process. Therefore, patient/family education regarding ADHD and its management is necessary to improve medication adherence, because it helps families attain the knowledge, confidence, and motivation to manage their child's condition.

Clinicians have an important role in educating patients about<sup>70</sup>:

- the medications they are taking
- why they are taking them
- what the medications look like
- the time of medication administration
- the potential adverse effects

- what to do if adverse effects occur
- what regular testing/monitoring is necessary.

Clinicians can provide appropriate psychoeducation by sharing written materials and trusted websites with families (see *Related Resources, page 30*).

**Behavioral strategies.** Behavioral interventions have been among the most effective strategies for improving medication adherence in other chronic conditions.<sup>71</sup> Behavioral strategies are likely to be particularly important for families of children with ADHD and comorbid conditions such as ODD because these families experience considerable caregiver-child conflict.<sup>72</sup> Moreover, parents of children with ADHD are at higher risk for having ADHD and depression themselves,<sup>73</sup> both of which may interfere with a parent's ability to obtain and administer medications consistently. Thus, for these families, using a combination of psychoeducation and behavioral strategies will be necessary to affect change in attitude and behavior. Behavioral strategies that can be used to improve medication adherence include:

- **Technology-based interventions** can reduce the impact of environmental barriers to adherence. For example, pharmacy automatic prescription renewal systems can reduce the likelihood of families failing to obtain ADHD medication refills. Pill reminder boxes, smartphone alerts, and setting various alarms can effectively prompt caregivers/patients to administer medication. In particular, these methods can be crucial in families for which multiple members have ADHD and its attendant difficulties with organization and task completion.

- **Caregiver training** may assist families in developing specific behavioral management skills that support adherence. This training can be as straightforward as instructing caregivers on the use of positive reinforcement when teaching their children to swallow pills. It may also encompass structured behavioral interventions aimed at training caregivers to utilize rewards and consequences in order to maximize medication adherence.<sup>74</sup>

**Clinician interventions.** Clinicians can use decision aids to help inform families about treatment options, promote shared decision making, and decrease uncertainty about the treatment plan<sup>75</sup> (see *Related Resources, page 30*). Early titration of ADHD medications and early first contact (within months of starting medication treatment) between caregivers and clinicians, whether via in-person visit, telephone, or email, have also been related to improved adherence.<sup>28</sup> Furthermore, clinicians can improve adherence by prescribing a simplified medication regimen (ie, long-acting formulations that provide full-day coverage). To address the negative impact of high out-of-pocket ADHD medication costs on adherence, clinicians can also prescribe generic preparations and/or "preferred" medications options on an individual patient's formulary.

Because clinician knowledge and expertise in ADHD care has been linked to improved patient medication adherence,<sup>68</sup> clinicians are encouraged to use the American Academy of Pediatrics (AAP) guideline for diagnosis and treatment of ADHD, which includes a supplemental process of care algorithm (last published in 2011,<sup>10</sup> with an updated guideline anticipated in 2019), as well as the AAP/National Institute for Children's Health Quality (NICHQ) ADHD Toolkit,<sup>76</sup> which includes items helpful for ADHD diagnosis and treatment. The Society for Developmental and Behavioral Pediatrics is also developing a clinical practice guideline for the diagnosis and treatment of complex ADHD (ie, ADHD complicated by coexisting mental health, developmental, and/or psychosocial conditions or issues), with publication anticipated in 2019. Primary care providers can also improve their expertise in ADHD care by pursuing additional mental health-related trainings (such as those conducted by the REACH Institute).<sup>77</sup>

Because receiving ADHD care from a specialist has been shown to improve medication initiation and adherence,<sup>62,69</sup> other strategies to address the short supply of child psychiatrists include offering incentives to medical students to pursue

### Clinical Point

**Early titration of ADHD medications and early first contact between caregivers and clinicians can help improve adherence**



## ADHD medication adherence

### Clinical Point

Providing culturally-sensitive care can strengthen the clinician-caregiver relationship and promote adherence to treatment

### Related Resources

- Cohen Children's Medical Center Northwell Health. The ADHD Medication Guide. [www.ADHDMedicationGuide.com](http://www.ADHDMedicationGuide.com). Revised December 31, 2017.
- Cincinnati Children's Hospital Medical Center. Decision aids to facilitate shared decision making in practice. [www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/decision-aids](http://www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/decision-aids).
- CHADD. Children and Adults with attention-deficit/hyperactivity disorder. [www.chadd.org](http://www.chadd.org).

#### Drug Brand Name

Methylphenidate • Concerta, Ritalin

a career in child psychiatry (eg, loan forgiveness). Telepsychiatry and co-location of mental health specialists and primary care providers are additional innovative ways in which ADHD specialty care can be delivered to more patients.<sup>64</sup>

Finally, providing culturally-sensitive care can strengthen the clinician-caregiver relationship and promote adherence to treatment. For example, clinicians can partner with local groups to increase their understanding of how different racial/ethnic groups perceive ADHD and its treatment.<sup>64</sup>

**Peer support models.** Peers are credible role models who have a valued role in facilitating the use of mental health services by empowering families and enhancing service satisfaction.<sup>78</sup> In several communities in the United States, peer models using family advocates have been introduced.<sup>79</sup> Family advocates are typically caregivers of children who have special needs or have been involved in the mental health system. Their perspective—as peers and first-hand consumers of

the health care and/or mental health system—can make them powerful and effective coaches to families of children with ADHD. By helping families to navigate ADHD care systems successfully, family advocates can play an important role in enhancing ADHD medication adherence, although further investigation is needed. In addition, the stigma around ADHD medication use, which adversely impacts adherence, can be mitigated if caregivers participate in organized ADHD-related support groups (eg, Children and Adults with ADHD [CHADD]).

#### Health disparity-reducing interventions.

Successful health disparity-reducing interventions—such as those developed to enhance care of other chronic disorders including asthma and diabetes—can be applied to improve ADHD care. These interventions, which include medical-legal partnerships (eg, between clinicians, social workers, legal advocates, and community partners) in primary care centers, have been shown to improve health insurance coverage and therefore health care access.<sup>80,81</sup> Although some hardships linked to nonadherence (eg, low socioeconomic status) may not be amenable to health care-related interventions, screening for these hardships can identify children who are most at risk for poor adherence. This would alert clinicians to proactively identify barriers to adherence and implement mitigation strategies. This might include developing more streamlined, easier-to-follow management plans for these patients, such as those that can be delivered through pharmacist-physician collaborative programs<sup>82</sup> and school-based therapy programs.<sup>83-85</sup>

## Bottom Line

Suboptimal adherence to medications for attention-deficit/hyperactivity disorder (ADHD) can be addressed through patient/family education, behavioral strategies, clinician interventions, peer support models, and health disparity-reducing interventions. By improving ADHD treatment adherence, these interventions have the potential to maximize long-term outcomes.

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## Clinical Point

Family advocates can play an important role in enhancing ADHD medication adherence



## ADHD medication adherence

### Clinical Point

Stigma around ADHD medication use can be mitigated if caregivers participate in organized ADHD-related support groups

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