



Prepared for Child and Youth Mental Health Services - British Columbia Ministry of Children and Family Development

Welcome

Fall 2007 — Addressing Attention Problems in Children

Welcome to the Fall 2007 issue of the *Children's Mental Health Research Quarterly*, produced by the Children's Health Policy Centre at Simon Fraser University. *The Quarterly* provides updates on the best currently available research evidence in children's mental health. This issue's theme is attention problems in children, with particular focus on the assessment and treatment of attention-deficit/hyperactivity disorder (ADHD). Themes for *The Quarterly* are chosen in consultation with Child and Youth Mental Health (CYMH) staff at BC's Ministry of Children and Family Development (MCFD).

In this issue, we:

- Respond to frequently asked questions about ADHD
- Present findings from two large-scale trials on combined psychosocial and medication treatments for ADHD
- Spotlight a clinical and cost-effectiveness review of three commonly prescribed ADHD medications
- Discuss using research to guide clinical practice with Don Duncan, a child and adolescent psychiatrist

We hope you find this issue both enjoyable and useful. Please [email us](#) with your questions, comments and suggestions for future topics.

Next Issue

The theme for our Winter 2008 *Quarterly* will be building on children's resilience with particular focus on programs addressing supportive relationships.

The Quarterly is prepared by an **interdisciplinary team** at the Children's Health Policy Centre.

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We welcome people using *The Quarterly* as a reference source (for example, in preparing educational materials for parents or community groups). Please cite our work as:

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Current Articles

IN COMMENTARY

ADHD: Helping children succeed

ADHD is the second most common mental disorder in children with substantial emotional and social costs. Causes and common features of ADHD are often misunderstood or mislabelled. In responding to questions from policy-makers, practitioners and parents, we highlight the assessment process for determining whether a child has ADHD. We also discuss the challenges children with ADHD and their families face and ways to overcome them.

IN REVIEW

Treating ADHD

Although preventing ADHD is not yet possible, researchers have evaluated many treatments. We highlight two large-scale randomized-controlled trials combining medication and psychosocial treatments. We then discuss how the findings can be applied to help children at home, at school and in the community. We also highlight a review of behavioural parent training programs which can improve children's behaviours and help parents cope.

IN FOCUS

Choosing ADHD Medications

When medication is part of the treatment plan for a child with ADHD, practitioners and families have to decide which medication to choose. In our summary of a recent high-quality systematic review, we provide information on the clinical and cost-effectiveness of three commonly used medications. We then discuss implications for policy and practice.

IN PRACTICE

From the research journals to the practitioner's office

Don Duncan is a child and adolescent psychiatrist based in Kelowna, BC. He is the Clinical Director for the Interior Health Authority's Adolescent Psychiatry Unit and the Medical Director for Mental Health and Addictions, Okanagan Health Services. We spoke to Don about his experiences applying research evidence in his work with children who have ADHD and their families.

ADHD: Helping children succeed



What is ADHD?

All children have at least occasional experiences with inattention and high energy levels. For most children, these occurrences do not interfere with daily life. When difficulties with inattention and hyperactivity are long-standing and cause significant impairment in children’s functioning, there may be a clinically significant concern such as attention-deficit/hyperactivity disorder (ADHD).

ADHD involves a persistent pattern of inattention and/or hyperactivity-impulsivity causing distress and impairing children’s functioning in two or more settings (at home, at school, with peers or in the community). ADHD can be predominately inattentive or predominately hyperactive-impulsive. However, most children with ADHD present with both types of symptoms.¹

ADHD is the second most common mental health problem in children

ADHD symptom criteria adapted from the DSM-IV-TR¹

Inattention	Hyperactivity-impulsivity
Trouble focusing on details or making careless mistakes	Frequent fidgeting
Difficulty sustaining attention	Difficulty remaining seated
Difficulty listening	Excessive running or climbing
Not following through on instructions or tasks	Difficulty being quiet
Difficulty organizing	Often being “on the go”
Avoiding tasks requiring ongoing mental effort	Excessive talking
Losing needed objects	Often blurting out answers
Being easily distracted	Difficulty awaiting turn
Forgetfulness in daily activities	Frequent interrupting/intruding on others
A child must frequently display six or more specific symptoms of inattention and/or hyperactivity/impulsivity to be diagnosed with ADHD	
Such symptoms must be inconsistent with the child’s developmental level and be present before age seven	

How common is ADHD?

ADHD is the second most common mental health problem in children. Approximately 4.8% of children (or about five in 100) have severe problems with inattention, hyperactivity and impulsivity warranting a clinical diagnosis.² This means that at any given time over 33,600 children in BC and 270,800 children in Canada may experience ADHD.³ Boys are four to nine times more likely to be diagnosed with ADHD than girls.¹

What causes ADHD?

Although the exact cause of ADHD is unknown, biological factors play an essential role.⁴ Children with ADHD often have structural and functional variations in their brains including asymmetries and differences in blood flow.⁵

Researchers have also identified specific genes, chromosomes and neurotransmitters associated with this disorder.^{4,6} Although ADHD is recognized as a neurobiological condition, gene-environment interactions also play an important causal role.⁵ Environmental contributors include: maternal smoking and alcohol consumption during pregnancy, perinatal stress, low birth weight, traumatic brain injury and extreme early deprivation.^{4,7} There is no evidence that typical differences in parenting practices cause ADHD.⁴

Biological factors play an essential role in the development of ADHD

How is ADHD assessed?

Assessments should be conducted by a qualified practitioner working with a multidisciplinary child and youth mental health team where possible. There are no definitive laboratory tests for ADHD, such as blood work or brain imaging.⁵ Therefore comprehensive clinical interviews are needed with parents, children and teachers. Practitioners should enquire about the child's school or daycare functioning and should review developmental, social and family histories.⁴

Practitioners also need to carefully determine the onset, duration, severity and frequency of each symptom.⁴

ADHD symptoms must be present in the preschool years and in multiple settings for a diagnosis to be made.

Distinguishing between typical activity and attention levels and clinically significant symptoms is vital. This type of careful assessment prevents children who do not have ADHD from being misdiagnosed, and helps those with the disorder receive the assistance they need.

Because there are effective treatments for ADHD, appropriate diagnoses support children and families receiving effective interventions.

A careful assessment prevents children who do not have ADHD from being misdiagnosed, and helps those with the disorder receive the assistance they need

The importance of not mistaking other issues for ADHD

Because other health problems and stressful events can lead to concentration and hyperactivity symptoms, practitioners must carefully assess the full circumstances of a child's life. Doing so ensures that other health or social problems such as anxiety, learning disabilities or child maltreatment are not misdiagnosed as ADHD. For example, if a child is experiencing undetected neglect or abuse, they may present with


symptoms (such as inattentiveness) stemming from anxiety related to their circumstances. When children in this kind of situation are wrongly labelled as having ADHD, the underlying issues remain unaddressed. ADHD should only ever be diagnosed when all other possible causes for a child's symptoms have been ruled out.

Do other mental health problems co-occur with ADHD?

Children with ADHD often experience additional mental health difficulties. Many will have another disruptive behaviour disorder such as oppositional defiant disorder (characterized by disobedient and hostile behaviour) or conduct disorder (marked by persistent aggressive conduct and significant rule violations).^{4,8} Substance use disorders are also frequent among adolescents with ADHD, while up to one-third of children with ADHD also have anxiety disorders.⁴ A careful assessment is the first step in creating an intervention plan that addresses *all* mental health concerns and underlying issues.

What is the typical course of ADHD?

The most common age of onset for ADHD is between three and four years.⁵ Most children with ADHD continue to have the disorder into adolescence and young adulthood.⁴ Treatment plans need regular updating to address important social, cognitive and physical changes occurring over a child's development. For example, medication dosages often need to be increased as a child grows. As well, children are often able to engage in more complex psychosocial interventions (e.g., self-monitoring) as they develop.



Treatment plans need regular updating to address important social, cognitive and physical changes occurring over a child's development

What challenges do children with ADHD face in school?

Children with ADHD often experience particular obstacles in school settings. They are more likely to have social skills problems and negative interactions with other children and school staff.^{7,9} They are also three to seven times more likely to be expelled, suspended or repeat a grade.¹⁰ Between 25% and 35% of children with ADHD experience learning and language problems.⁴ Given these challenges, educational services must be designed to respond to these children's needs.¹⁰

Reducing the costs of ADHD

There are substantial emotional and social costs for children with ADHD and for their families. Despite considerable efforts to control their actions, children with ADHD are often disorganized and impulsive. These behaviours create frustration and distress for children and for their families, teachers and peers. Also, because children with ADHD function well at times, their difficulties can be mislabelled as intentional misbehaviour. Such misunderstandings often lead to criticism, isolation and lower self-esteem for children. Parents and teachers of children with ADHD may also be incorrectly viewed as causing behavioural problems by failing to provide adequate discipline.



Specialized educational services for children with ADHD promote school success

To help children with ADHD thrive, appropriate interventions must be used. We know no ways to effectively prevent ADHD at this time. Until prevention is possible, early and long-term investments in effective treatments are the best way to reduce the personal and social costs of this disorder.

MCFD staff can access original articles cited in *The Quarterly* from the [Health and Human Services Library](#).

References :

1. American Psychiatric Association. 2000. *Diagnostic and statistical manual of mental disorders: DSM-IV-TR* (4th ed.). Washington: American Psychiatric Association.
2. Waddell et al. 2005. A public health strategy to improve the mental health of Canadian children. *Canadian Journal of Psychiatry*; 50: 226-233.
3. Waddell et al. 2007. Developing a research-policy partnership to improve children's mental health in British Columbia. In LeClair & Foster (Eds.), *Contemporary issues in mental health: Concepts, policy, and practice* (Vol. 41, pp. 183-198). Victoria, BC: Western Geographical Press.
4. Pliszka et al. 2007. Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*; 46: 894-921.
5. Connor. 2002. Preschool attention deficit hyperactivity disorder: a review of prevalence, diagnosis, neurobiology, and stimulant treatment. *Journal of Developmental and Behavioral Pediatrics*; 23: S1-9.
6. Purdie et al. 2002. A review of the research on interventions for attention deficit hyperactivity disorder: What works best? *Review of Educational Research*; 72: 61-99.
7. King et al. 2006. A systematic review and economic model of the effectiveness and cost-effectiveness of methylphenidate, dexamfetamine and atomoxetine for the treatment of attention deficit hyperactivity disorder in children and adolescents. *Health Technology Assessment*; 10: iii-iv, xiii-146.
8. Connor et al. 2002. Psychopharmacology and aggression. I: A meta-analysis of stimulant effects on overt/covert aggression-related behaviors in ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry*; 41: 253-261.
9. Majewicz-Hefley & Carlson. 2007. A meta-analysis of combined treatments for children diagnosed with ADHD. *Journal of Attention Disorders*; 10: 239-250.
10. Miranda et al. 2006. Interventions in school settings for students with ADHD. *Exceptionality*; 14: 35-52.

IN REVIEW

Treating ADHD



Although preventing ADHD is not yet possible, researchers *have* evaluated many potential treatments. For some, no rigorous evidence has been found including: dietary modification; allergy treatment; chiropractics; perceptual-motor training; pet therapy; play therapy; electroencephalography feedback and homeopathy.¹⁻³

In contrast, there is evidence supporting behavioural treatments including parent training and some classroom interventions.^{4,5}

Many well-designed studies have also found stimulant medications to be highly beneficial.¹ For example, stimulants consistently demonstrate effectiveness for 70% to 96% of six to 12-year olds with ADHD.⁶

Given the well-established effectiveness of medications in treating ADHD, new research is now being conducted on the effectiveness of combining medication with psychosocial interventions. We highlight this emerging research by presenting findings from two large-scale randomized-controlled trials on combined (medication and psychosocial) ADHD treatments.⁷⁻¹⁸

Stimulants consistently demonstrate effectiveness for 70% to 96% of six to 12-year olds with ADHD

Study designs

Abikoff and colleagues and the Multimodal Treatment of ADHD (MTA) group conducted two long-term studies of combined treatments for ADHD. Both studies included large samples of children rigorously assessed as having ADHD. Many children also met criteria for oppositional defiant disorder (ODD), mood, anxiety, conduct (CD) and tic disorders.

For practitioners interested in learning more about the medication management strategies used in these studies, detailed descriptions are provided in two of the original publications (references 7 & 12).

Study and Child Characteristics

Study	Locations (total # of sites)	Intervention Duration	Sample size (Attrition rate)	Child characteristics		
				Age	Gender	Ethnicity
Abikoff et al. ⁷⁻¹¹	Canada & US (2)	24 mos	103 (21.4%)	7.0 to 9.9 yrs	93% male	84% C 13% AA 2% H
MTA ¹²⁻¹⁵	Canada & US (6)	14 mos	579 (3.5%)	7.0 to 9.9 yrs	80% male	61% C 20% AA 8% H

C = Caucasian

AA = African American

H = Hispanic

Children were randomly assigned to conditions including medication, psychosocial treatment, combined treatment or a control group. The table below shows the treatment conditions for each.

Treatment Conditions

Study	Treatment Conditions
Abikoff et al. ⁷⁻¹¹	<p>Methylphenidate alone (given 3x daily for total average daily dose of 36-41 mg)</p> <p>Methylphenidate + Multimodal Psychosocial Treatment (CT)</p> <p>Methylphenidate + Attention Controlⁱ</p>
MTA ¹²⁻¹⁵	<p>Medication alone (MED: most received algorithm-guided doses of methylphenidate 3x daily for total average daily dose of 30-42 mgⁱⁱ)</p> <p>Behavioural Treatment alone</p> <p>Combined Medication + Behavioural Treatment (CT)</p> <p>Standard Community Care (67% received medication mostly methylphenidate 2x daily for total average daily dose of 23 mg)</p>

ⁱ Included professional time & attention without therapeutic content to control for nonspecific treatment effects

ⁱⁱ Applies to Combined Medication + Behavioural Treatment also

The table below shows the psychosocial treatments including comprehensive interventions designed for parents and children at home and in schools.

Description of Psychosocial Treatments

Study	Intervention Components	Duration
Abikoff et al. ⁷⁻¹¹	<p>Parent training/family therapy</p> <p>Social skills training</p> <p>Individual psychotherapyⁱ</p> <p>Academic skills training</p> <p>Individual academic assistance</p> <p>Academic remediation (when necessary)</p>	<p>For most components:</p> <p>1st yr: weekly sessions</p> <p>2nd yr: monthly sessions</p>
MTA ¹²⁻¹⁵	Parent training	27 group, 8 individual sessions
	Therapeutic summer camp with behavioural point system, social reinforcement, modeling, problem solving & social skills training	8 weeks, 5 days week, 9 hrs/day
	School-based treatment with teacher consultations, classroom-aide & daily report card using home based rewards	10 – 16 teacher consultations 12 weeks of part-time classroom-aide

ⁱ To address negative emotions, improve self-control & problem-solving

Study findings

Main Findings

In the study by Abikoff and colleagues, children in all groups had significant reductions in ADHD symptoms. There were no significant differences in outcomes between the three groups with one exception: children receiving the combined treatment (CT) displayed more positive behaviours in some social interactions. The authors concluded that adding a comprehensive psychosocial treatment to medication did not result in any

clinically significant benefits for children with ADHD, with or without ODD. The possibility of these findings being due to attendance, medication compliance or clinicians' adherence to treatment protocols was ruled out.

In the MTA study, children in all groups showed significant symptom reductions but with large differences between groups at the end of treatment. Medication alone (MED) and combined treatment (CT) both led to significantly better ADHD symptom improvements compared to behavioural treatment alone or to standard community care. Most children receiving standard community care also took medication. However, the MED and CT groups received higher and more frequent doses, well-controlled dose selection and more monitoring. These differences may explain the superior outcomes for the MED and CT groups. Notably, CT did not produce any better outcomes than MED. However, the CT group had significantly lower daily medication doses compared to the MED group (31 vs 38 mg methylphenidate daily).

MTA: Additional findings

The MTA study also examined outcomes for subgroups of children. The main findings applied regardless of gender, prior medication history or presence of CD/ODD. For children experiencing clinically significant anxiety, behavioural treatment and CT showed especially strong benefits. For children from families receiving public assistance, CT resulted in enhanced social skills. Children from this same group who received MED had unexpected decreases in parental closeness and positive interactions.

MTA: Follow-up findings

Following 14 months of randomly assigned treatment, families were free to choose their own treatment making the study observational from post-treatment onwards. Significant changes in medication use occurred. By 22 months post-treatment, high medication use (usage at least 50% of days) was reported for most children. Children who had received MED or CT continued to display better outcomes than children who had received standard community care or behavioural treatment at 10 months post-treatment *but not* at 22 months. Given the observational nature of the study at follow-up, definitive conclusions regarding the lack of ongoing benefit for CT and MED were not possible. However, discontinuing the treatments likely played a vital role.

Recommendations

The studies by Abikoff and colleagues and MTA group build on a body of research evidence establishing stimulant medication as the most effective treatment for children with ADHD. If medication is administered with careful dose selections, frequent monitoring and algorithm-guided dose adjustments, effectiveness can be maximized. For many children, symptoms will likely return if medication use stops. Nonetheless, trial withdrawals from medication can help determine if continued medication use is needed. Despite the effectiveness of stimulant medication, some children and families may be unable or unwilling to use them. For example, some children experience side effects including decreased appetite, weight loss, insomnia and headache.^{1,12}

A body of research evidence establishes stimulant medication as the most effective treatment for children with ADHD.

There are alternatives to medication. Although behavioural treatment does not improve symptoms as well as medication, behavioural treatment can nevertheless help many children. For children with concurrent anxiety problems or those with fewer family resources, behavioural interventions may be particularly beneficial. Behavioural treatment also has potential for using lower doses of stimulant medication. Lower doses in turn can have the important benefit of reducing common side effects.

For practitioners interested in learning more about the behavioural treatments used in the MTA study, detailed descriptions are provided in the original publication (reference 18).

The challenges of ADHD can be best addressed by using effective treatments such as medication. Alternatives to medication, including behavioural treatment, can also meet the needs and preferences of some children and families.

MCFD staff can access original articles cited in *The Quarterly* from the [Health and Human Services Library](#).

References:

1. Pliszka et al. 2007. Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*; 46: 894-921.
2. Pelham et al. 1998. Empirically supported psychosocial treatments for attention deficit hyperactivity disorder. *Journal of Clinical Child Psychology*; 27: 190-205.
3. Altunc et al. 2007. Homeopathy for childhood and adolescence ailments: Systematic review of randomized clinical trials. *Mayo Clinic Proceedings*; 82: 69-75.
4. Chronis et al. 2004. Enhancements to the behavioral parent training paradigm for families of children with ADHD: Review and future directions. *Clinical Child and Family Psychology Review*; 7: 1-27.
5. Miranda et al. 2006. Interventions in school settings for students with ADHD. *Exceptionality*; 14: 35-52.
6. Connor. 2002. Preschool attention deficit hyperactivity disorder: a review of prevalence, diagnosis, neurobiology, and stimulant treatment. *Journal of Developmental and Behavioral Pediatrics*; 23(1 Suppl): S1-9.
7. Klein et al. 2004. Design and rationale of controlled study of long-term methylphenidate and multimodal psychosocial treatment in children with ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry*; 43:792-801.
8. Abikoff et al. 2004. Symptomatic improvement in children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment. *Journal of the American Academy of Child and Adolescent Psychiatry*; 43:802-811.
9. Hechtman et al. 2004. Academic achievement and emotional status of children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment. *Journal of the American Academy of Child and Adolescent Psychiatry*; 43:812-819.
10. Abikoff et al. 2004. Social functioning in children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment. *Journal of the American Academy of Child and Adolescent Psychiatry*; 43:820-829.
11. Hechtman et al. 2004. Children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment: Impact on parental practices. *Journal of the American Academy of Child and Adolescent Psychiatry*; 43:830-838.
12. The MTA Cooperative Group. 1999. A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. The MTA Cooperative Group. Multimodal Treatment Study of Children with ADHD. *Archives of General Psychiatry*; 56: 1073-1086.
13. The MTA Cooperative Group. 1999. Moderators and mediators of treatment response for children with attention-deficit/hyperactivity disorder: the Multimodal Treatment Study of children with Attention-deficit/hyperactivity disorder. *Archives of General Psychiatry*; 56: 1088-1096.
14. The MTA Cooperative Group. 2004. National Institute of Mental Health Multimodal Treatment Study of ADHD follow-up: 24-month outcomes of treatment strategies for attention-deficit/hyperactivity disorder. *Pediatrics*; 113: 754-761.
15. The MTA Cooperative Group. 2004. National Institute of Mental Health Multimodal Treatment Study of ADHD follow-up: changes in effectiveness and growth after the end of treatment. *Pediatrics*; 113: 762-769.
16. Jensen et al. 2006. 3-Year follow-up of the NIMH MTA study. *Journal of the American Academy of Child and Adolescent Psychiatry*; 46: 989-1002.
17. Swanson et al. 2006. Secondary evaluations of the MTA 36-month outcomes: Propensity score and growth mixture model analyses. *Journal of the American Academy of Child and Adolescent Psychiatry*; 46: 1003-1014.
18. Wells et al. 2000. Psychosocial treatment strategies in the MTA study: Rationale, methods, and critical issues in design and implementation. *Journal of Abnormal Child Psychology*; 28: 483-505.

Highlight

Behavioural parent training



Chronis and colleagues recently conducted a review of 28 behavioural parent training (BPT) studies.¹ All BPT interventions focused on training parents using a social learning approach. Many also stressed active collaboration with parents. Some programs increased accessibility by offering conveniently located classes at varying times of day and by providing childcare. Eight to 12 sessions were typical for most programs including both individual and group formats.

Typical BPT session content:

1. Describing ADHD, social learning theory and behaviour management principles
2. Establishing a home/school daily report card/home behaviour checklist
3. Encouraging attending to appropriate behaviours (e.g., compliance) and ignoring minor, inappropriate behaviours (e.g., whining)
4. Teaching use of effective commands and reprimands
5. Encouraging rule establishment and enforcement
6. Developing and using time-out procedures
7. Creating a home point system
8. Planning for behavioural challenges & enforcing contingencies outside the home
9. Teaching problem-solving techniques
10. Maintaining program

Across the studies, BPT was effective in improving observer ratings of negative child and parent behaviours and parent ratings of problem behaviours. In some studies, BPT also improved children's social behaviour and parental stress. In studies comparing BPT to medication, results were mixed. Some studies found medication to be more effective than BPT while others found BPT to be as effective as medication. BPT, although typically less effective than medication, can nevertheless improve children's behaviours and help parents cope.

MCFD staff can access original articles cited in *The Quarterly* from the [Health and Human Services Library](#).

Reference:

1. Chronis et al. 2004. Enhancements to the behavioral parent training paradigm for families of children with ADHD: Review and future directions. *Clinical Child and Family Psychology Review*; 7: 1-27.

IN FOCUS

Choosing ADHD Medications



Given that many different medications are available for treating ADHD, it can be difficult to decide which to choose. A recently published systematic review examined the comparative clinical and cost-effectiveness of three commonly used medications in treating ADHD: methylphenidate (e.g., Ritalin and Concerta), dextroamphetamine (e.g., Dexedrine) and atomoxetine (e.g., Strattera).¹

Review methods

The review included only children under 18 years who were diagnosed with ADHD. The drugs (either used alone or in combination with a psychosocial intervention) had to be compared with a placebo, another drug or with a non-drug intervention. The results had to include outcomes on at least one measure of core ADHD symptoms, quality of life or adverse effects. The authors included 65 randomized clinical trials on clinical effectiveness and one systematic review on adverse events. The authors also used five economic evaluations and two quality of life studies in their cost-effectiveness analysis.

All medications provided benefits

All medications effectively reduced hyperactivity and improved quality of life with no significant differences in effectiveness between the three drugs. For methylphenidate, immediate-release and extended-release versions produced similar outcomes. (Immediate-release is typically taken twice daily and effective for up to four hours while extended-release is typically taken once daily and effective for between six and eight hours). All medications also produced side effects, including decreased appetite, insomnia, headache and stomachache, without significant differences between them. In the cost-effectiveness analysis, the least expensive medications (dextroamphetamine and immediate-release methylphenidate) were *as effective* as the most expensive medications (atomoxetine).

For information on the details of medication management, including a recent Health Canada warning on atomoxetine, please see [Information on Treating ADHD](#), a publication jointly produced by BC Children's Hospital, MCFD and the Public Health Services Authority.

Methodological limitations

The authors identified limitations in their review. The reporting of study methodologies was poor, making it difficult to assess validity and reliability. The trials on atomoxetine were more reliable than the studies of methylphenidate and dextroamphetamine. Very few studies compared different drug treatments directly. Information regarding long-term effectiveness and adverse events associated with the medications was minimal. There was also insufficient information about possible differences in medication responses by ADHD subtype, age, gender or previous treatment. Finally, adolescents were not well-represented as most studies included children between the ages of five and 13.

Medications can offer great benefit to children with ADHD when appropriately used and monitored

Policy and Practice Implications

The evidence suggests that less expensive medications are likely to produce similar outcomes to more expensive ones. Immediate- and extended-release medications are also likely to produce similar outcomes. However, some children and families may prefer the benefits offered by extended-release medications including greater convenience and better medication compliance.² Consistent monitoring is vital for ensuring the medication continues to be effective, the dose optimal and the side effects minimal.² Medications can offer great benefit to children with ADHD when appropriately used and monitored.

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References:

1. King et al. 2006. A systematic review and economic model of the effectiveness and cost-effectiveness of methylphenidate, dexamfetamine and atomoxetine for the treatment of attention deficit hyperactivity disorder in children and adolescents. *Health Technology Assessment*; 10: iii-iv, xiii-146.
2. Pliszka et al. 2007. Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*; 46: 894-921.

IN PRACTICE

From the research journals to the practitioner's office



Don Duncan
Child & Youth Psychiatrist

We spoke with child and adolescent psychiatrist, Don Duncan, about his experiences using research evidence to assess and treat children with ADHD. Don is the Clinical Director for the Interior Health Authority's Adolescent Psychiatry Unit and the Medical Director for Mental Health and Addictions, Okanagan Health Services in Kelowna, BC. Here we describe Don's approach in working with children who have ADHD and their families.

Don emphasizes the fundamental importance of conducting a comprehensive assessment. He uses a "best practices" framework gathering information from multiple sources. This includes a combination of clinical interviews and rating scales completed by children, parents and school personnel. Don purposefully uses measures providing data about numerous areas of a child's functioning. This generates information helpful in determining the absence or presence of ADHD as well as other mental health, health and social concerns.

Don uses a time-line approach in conceptualizing a child's mental health issues. He notes that if a child has ADHD there should be evidence of ongoing symptoms from very early in the child's life. In contrast, other common mental health problems, such as depression and anxiety, tend to have a waxing and waning course. Don also assesses the frequency of experiences with inattention, hyperactivity and impulsivity. ADHD can be diagnosed when a child experiences such symptoms frequently. But children with ADHD do not necessarily *always* have the symptoms. Don notes, "Everyone's attention system works best in interesting, novel and important situations." Many children with ADHD can pay attention and sit still during a clinical interview or while playing a video game. Therefore, Don does not use a child's behaviour in his office to confirm or rule-out a diagnosis of ADHD. Overall, time and care is needed in assessing a child's mental health strengths and needs.

When children with ADHD are provided with appropriate treatments, parenting practices often become increasingly positive

The Texas Algorithm

The Texas Algorithm¹ is a guideline for prescribing medication in the treatment of ADHD alone and with comorbid disorders. A panel of academic and practicing clinicians, administrators, consumers and families developed the formulation using a consensus approach. The goal was to develop medication treatment guidelines that reduced "the immediate and long-term emotional, physical and financial burdens of mental disorders for children, their families, and their health care systems". A previous version of the algorithm resulted in better clinical outcomes and less multiple medication use based on an open trial evaluation.² The 2004 revised version has yet to be studied with randomized-controlled trials, although plans for such an evaluation are underway.²

Don notes that families with children who have ADHD often experience conflict in their parent-child relationships. He highlights the error of viewing relationship problems as causing ADHD rather than as resulting from the disorder. Don is quick to point out that "bad parenting does not create ADHD," but ADHD can lead parents to experience significant challenges. He cautions practitioners not to assume that parents simply need additional skills. When children with ADHD are provided with appropriate treatments, parenting practices often become increasingly positive.

In treating children with ADHD, Don emphasizes the substantial research evidence on stimulant medication's effectiveness in reducing hyperactivity, impulsivity and inattention. Don works with many children and parents who initially resist using medications due to common "myths and media coverage." He provides families with information about the benefits of medication and describes potential side effects ensuring treatment decisions are based on the best available evidence. Don stresses the fundamental need to respect the rights of children and families in making their own decisions about medication. When children and families include medication as part of their treatment plan, Don uses the *Texas Algorithm*¹ in guiding his prescribing practices.

If children and families do not choose medication treatments, Don still stresses the importance of establishing a treatment plan because not intervening means that problems will continue. Don notes that psychosocial treatments are not a substitute for medication but can lead to important improvements. Educating parents and children about treatment options create informed choices that improve the lives of children and their families.

To learn more about the treatment of ADHD, see the Knowledge Network documentary, **Struggle for Control: Child and Youth Behaviour Disorders**. In this documentary, *David's Story* and *Devon's Story* provide examples of the challenges and successes experienced by two children with ADHD and their families.

MCFD staff can access original articles cited in *The Quarterly* from the **Health and Human Services Library**.

References:

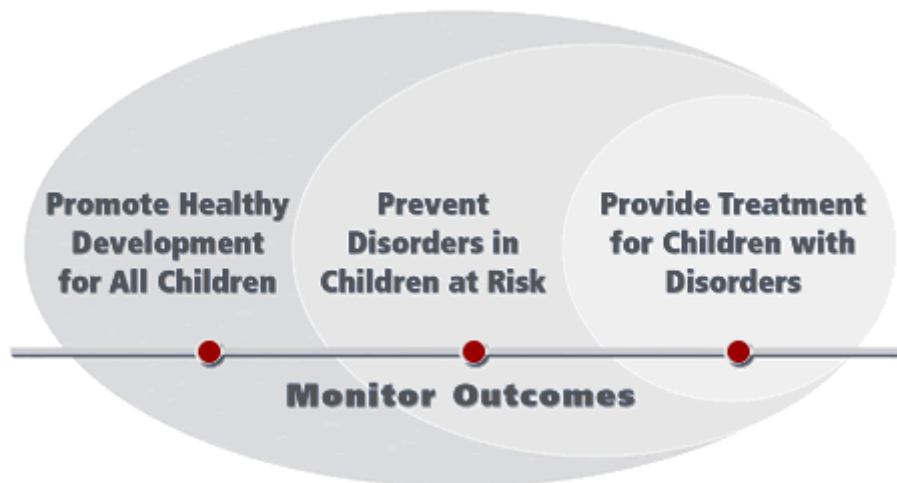
1. Texas Department of State Health Services. 2005. *Children's Medication Algorithm Project overview*. Retrieved July 19, 2007 from <http://www.dshs.state.tx.us/mhprograms/CMAPOver.shtm>
2. Pliszka et al. 2006. The Texas children's medication algorithm project: Revision of the algorithm for pharmacotherapy of attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*; 45: 642-657.

Making Research Work for Children

About the Children's Health Policy Centre

We are an interdisciplinary research group in the Faculty of Health Sciences at Simon Fraser University. Our work focuses on integrating research and policy to improve children's social and emotional wellbeing, or children's mental health. We promote a public health strategy for children's health. Our work complements the mission of the Faculty of Health Sciences at Simon Fraser University to integrate research and policy for population and public health locally, nationally and globally.

Public Health Strategy for Children's Mental Health



About *The Quarterly*

The Quarterly is an electronic publication prepared for Child and Youth Mental Health Services with British Columbia's Ministry of Children and Family Development. It provides updates on the best currently available research evidence in children's mental health for policy-makers, practitioners, families and the public. The methods used in selecting research for review in *The Quarterly* are detailed in [the first issue](#).

Please visit www.childhealthpolicy.sfu.ca to learn more about our ongoing work integrating research and policy to improve children's social and emotional wellbeing.