

# ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD)

*ADHD is not a benign disorder and is probably the most common neurobehavioural disorder a GP will come across.*



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People who suffer from ADHD are far more likely than normal to drop out of school (32 - 40%), to have few or no friends (50 - 70%), to underperform at work (70 - 80%), to engage in antisocial activities (40 - 50%), and to use tobacco and illegal drugs. Children growing up with ADHD are more likely to experience teen pregnancy (40%), to speed excessively and have multiple car accidents, and to experience depression (20 - 30%) and personality disorders (18 - 25%) as adults. This condition needs to be taken seriously, and those who manage it should keep abreast of the relevant science and progress regarding its management.

## AETIOLOGY

About 8% of any population could have an ADHD (range 5 - 10%), with boys reported to be more affected than girls (3:1). However, in a group described as having attention deficit disorder without hyperactivity, girls outnumber boys. Genetic factors probably play a role in this disorder in more than 80% of cases.

The pathophysiology in children with ADHD has been localised to 3 areas in the brain — the frontal lobe, its connection to the basal ganglia, and the relationship to the central aspects of the cerebellum. In ADHD these areas show less activity and may also be relatively smaller. The defect appears to be in the availability of dopamine in these areas.

The home environment, parental management abilities, stressful life events or deviant relationships are important, but do *not* cause ADHD, nor does sensitivity to sugar, colourants and preservatives. ADHD is also not a direct result of allergies, intolerance or deficiencies in the diet, although these factors may adversely affect some patients.

## DIAGNOSIS

In some children signs and symptoms suggestive of ADHD may be normal variants or result from a medical condition or an affective disorder. These may be secondary to learning disabilities, partial sensory deficits or even low cognitive potential. The diagnosis therefore depends on an adequate history and subsequent collaboration from various sources. The more thorough the history and the more members of the team who are brought in to provide collaborative data, the more likely it is that the diagnosis will be correct.

## Attention deficit

The diagnosis is based on the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM IV) criteria, which divide the symptoms of ADHD into 2

groups. The first have to do with inattention. If a child exhibits 6 or more of the criteria below that have persisted for more than 6 months, the diagnosis is probable:

- fails to give close attention to detail and makes careless mistakes (Fig. 1)

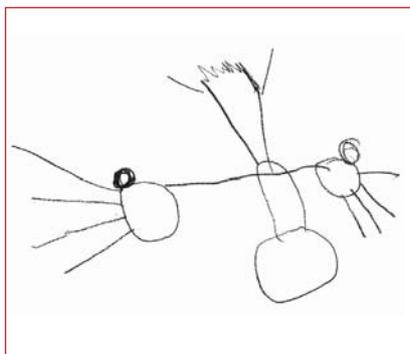


Fig. 1. Draw-a-Person of a 7-year-old boy with ADHD. Notice the lack of attention to detail.

- often has difficulty sustaining attention in tasks or play activities
- often does not seem to listen when spoken to directly
- does not follow through instructions and fails to finish schoolwork
- often has difficulty organising tasks and activities
- often avoids, dislikes or is reluctant to engage in tasks requiring mental effort
- often loses things needed for tasks or activities
- is often distracted by extraneous stimuli
- is often forgetful in daily activities.

The investment, organisation and maintenance of attention and effort are impaired in children with ADHD. Teachers and parents describe these children as seemingly unable to listen or follow instructions in class, finish work independently, sequence auditory and visual stimuli, attend to detail or work alone. Affected children are more inclined to be distracted than their peers, to daydream, to have poor organisational skills and to persevere in tasks (Fig. 2). However, ADHD does not imply that the child cannot pay attention at all. Where the situation is sufficiently novel, or they have a particular interest, attention can be held. It is therefore not uncommon to have a history of being able to

watch television for hours on end! They commonly have good days and bad days (Fig. 3), which can lead to frustration for teachers, parents and the child, as there is always the feeling that the child could have done better.



Fig. 2. Poor-quality work — typical in ADHD.

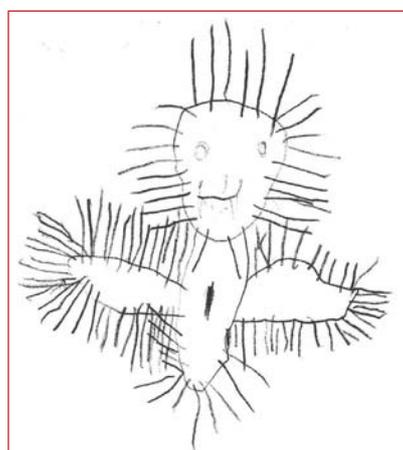


Fig. 3. Perseveration in a Draw-a-Person. Bad hair day!

## Hyperactivity

The second part of the *DSM IV* relates to hyperactivity and impulsivity. For hyperactivity and impulsivity 6 of the following 9 criteria need to be met by the child, again for more than 6 months. There are 6 criteria for hyperactivity:

- often fidgets with his/her hands/feet or squirms
- often leaves his/her seat in the classroom
- often runs about or climbs excessively
- often has difficulty playing or engaging in leisure activities quietly
- often on the go, apparently driven

by a motor

- often talks excessively.

Not all children act as if they are 'driven'. Most present as fidgety, and *talkativeness* is often an indication of hyperactivity, particularly if the child is long-winded, seldom gets to the point and moves from topic to topic.

## Impulsivity

There are 3 criteria for impulsivity:

- the child often blurts out answers before questions have been completed
- the child has difficulty waiting his/her turn
- the child often interrupts or intrudes on others.

These children often react before they have understood a problem clearly. They regularly start an activity before they have understood the instruction and inevitably get it wrong, and may make many careless mistakes in class, leading to poor marks in exams. Impulsivity is also reflected by a low frustration tolerance, antisocial behaviour (destroyers and liars), poor planning and judgement, failure to finish tasks, sloppy work, approximations in reading and writing, reckless behaviour and being accident prone, impaired sphincter control and an inability to delay gratification.

The *DSM IV* criteria state that the hyperactive, impulsive and inattentive symptoms should have caused impairment before the age of 7 and be present in more than 1 setting. An EEG plays no part in the diagnosis or prognosis of ADHD.

## ADHD types

Based on the *DSM IV* criteria there are 4 types of ADHD:

**Combined type.** These children fulfil the majority of criteria of the *DSM IV*. They often present in the pre-school year but may present as late as grade 2 or 3. They have inattention, impulsivity as well as hyperactivity.

**Predominantly inattentive type.** Girls predominate in this group. They

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are low-toned and floppy, but not excessively impulsive or hyperactive and so are not noticed in the classroom. Their inattentiveness causes them to be unaware of their surroundings, and they respond very well to stimulant therapy.

**Predominantly hyperactive impulsive type.** These are usually boys who often present very young (3 - 4 years) with unacceptable behaviour.

**In partial remission.** This is usually ADHD diagnosed in older children who do not present with all the symptoms.

#### CO-MORBIDITIES (ASSOCIATED MENTAL DISORDERS)

- Oppositional defiant disorder.
- Conduct disorders.
- Communication disorders.

- Gilles de la Tourette's syndrome.
- Learning disorders.

#### POOR SELF-ESTEEM

Self-esteem is a problem in most of these children, which they may try to conceal with bravado or clowning in class. Praise for effort will help, even if the end-product is mediocre.

Another strategy is to encourage the child to participate in activities outside the school that will make them unique, for example equestrian sport.

#### ABERRANT SOCIAL BEHAVIOUR

Most of these children are unresponsive to social demands and most disciplinary efforts fail. Their initially charming and talkative type of interaction becomes tiresome once it is clear that they are domineering and require instant gratification.

#### MANAGEMENT

The management of ADHD is multidisciplinary, as a single intervention is rarely affective. The main interventions are:

- medical
- educational
- psychosocial (behaviour modification)
- diet manipulation and supplements.

In this article the medical management is discussed, but this does not imply that other interventions are less important.

#### Medical management

The doctor often is exclusively responsible for pharmacological management. It is important first to exclude other medical causes for these symptoms such as sleep apnoea, obstructive airway disease, use of other medications and poorly managed allergies. The history and examination includes the child's developmental level. Check vision and hearing. Once the diagnosis is made, refer the parents and children to social support groups and also

give some tips on behaviour management if necessary.

#### Stimulants

Stimulants are the mainstay of the medical management of children with ADHD. These have been used for over 40 years and found to be beneficial in about 70% of children. In fact, recent studies have found stimulants to be superior to a combination of stimulants and behaviour modification, although this does not imply that other treatment modalities should not be used as well.

Short-acting methylphenidate (Ritalin) is effective for about 4 hours, and has to be given twice a day. Ritalin SR, a longer-acting methylphenidate, is also available, but is not as effective as 2 short-acting tablets daily because of its distinct activity plateau. It is also only available in 20 mg tablets, making dose manipulation difficult. However, Ritalin LA is available in 20, 30 and 40 mg tablets and mimics the effectiveness profile of short-acting methylphenidate given twice a day.

#### Clinical prescription

Once treatment has been decided on, a 2-week trial of short-acting methylphenidate is the initial therapy. In preschool children and small grade 1 children, 5 mg should be adequate. Most other children will need 1 tablet in the morning. This is prescribed for 2 weeks, generally without the teacher's knowledge for the first week, although I do encourage parents to discuss it with the teachers, at least before the second week.

The reasons for the 2-week trial are the following:

- To ascertain whether the medication has a beneficial effect, usually evident within 1 or 2 days.
- To monitor side-effects, which must be explained to parents. The most important are anorexia and dysphoria, which often settles after the first 3 days, and the rebound effect, where children appear to be worse in the afternoons but are well controlled in the mornings. If parents are not warned about these side-effects, they will stop the medication within the first 3 days.

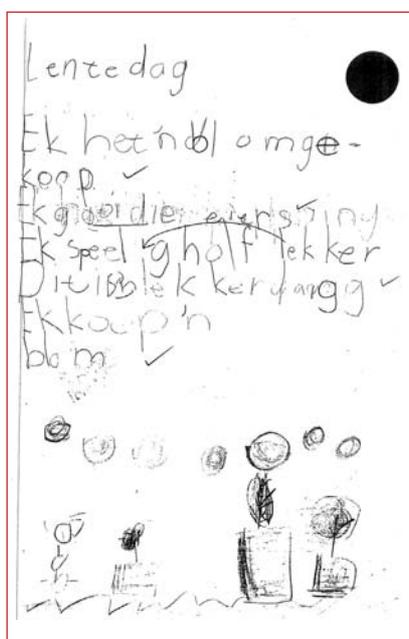


Fig. 4. Example of poor sequencing skills.



Fig. 5. Improvement on stimulant medication (same child as Fig. 4).

The effect of the medication is usually visible within 15 - 30 minutes and lasts for 2 - 4 hours. Stimulants should not be started at the same time as starting a new year at school or an altered classroom setting. If the beneficial effect of the medication is obvious, therapy should be continued and monitored with rating scales (such as a Conners questionnaire). Dosage and time of administration need to be tailored to the child's specific needs. He/she may not be aware of the benefits. If the effect is not noticeable or is uncertain an increased dose can be tried, and if this does not have any

effect the trial should be abandoned and specialist help sought.

The tablet should be taken just before leaving for school in the morning and not chewed, but swallowed whole. The Ritalin LA capsule can be opened and its contents given with a puree (not liquids). To be of use during homework, stimulants could be prescribed 3 times a day. It is also recommended, depending on side-effects, that children do not have weekend or vacation breaks, but use the medication continuously (Figs 4 and 5).

Termination of medication should be based on a clinical trial off stimulants during which behaviour is monitored closely. Frequently there are brief, accidental trials off medication when a dose is forgotten. If ADHD behaviours return immediately, the child is not yet ready for a planned trial off medication. If not, a planned trial off medication for 2 weeks is arranged, usually during less stressful periods. Thereafter the medication can be stopped if there is no deterioration of ADHD symptomatology. The child should still be monitored for at least a year.

#### Contraindications to the use of methylphenidate

There are probably no absolute contraindications to the use of methylphenidate, but relative contraindications include:

- Pure learning disorders
- Developmental disorders
- Emotional disturbance
- Mental retardation
- Uncontrolled epilepsy
- Gilles de la Tourette's syndrome.

#### Side-effects of methylphenidate.

Methylphenidate is very safe. Worldwide clinical experience over more than 40 years has shown few reports of adverse effects or serious toxicity, even when there has been intentional overdose. In children most side-effects disappear as tolerance develops to the medication or resolve when the dose is decreased. Yet resistance to its use in the management of ADHD persists mainly because of reputed side-effects. In a double-blind,

methylphenidate-placebo trial the frequency of side-effects was similar for both the stimulant and the placebo.

Many of the side-effects reported were similar to the symptoms of ADHD themselves.

The most common side-effects are:

- anorexia and weight loss — generally mild and affecting less than half of treated children
- insomnia and nervousness — most children return to their original sleeping pattern after 2 - 3 months
- vague stomach aches/dry mouth/nausea — settles after 2 - 3 weeks
- dysphoria — settles in about 3 days
- transient dyskinetic states, tremors and tics
- cardiac symptoms — usually mild palpitations but can be more severe in intravenous drug abusers
- long-term effects on weight and height — do not appear to be clinically significant and slight reductions in weight and height do not persist into adulthood
- skin rashes and fixed drug reactions are very rare.

**Drug abuse.** Methylphenidate is a very mild stimulant and has a low potential for abuse. Eight outcome studies concluded that stimulant therapy does not promote drug abuse in adolescents. In fact, recent reports seem to indicate that stimulants may protect children against later drug abuse. It should be appreciated that individuals with ADHD have a far higher risk for substance abuse than the normal population. The use of stimulants decreased this risk to levels similar to those in the general population.

#### Antidepressants

Several antidepressants are used for the treatment of ADHD, the tricyclics being the most common and specifically indicated with concurrent depression and anxiety, in a once daily dose. If higher daily doses (over 50 mg) are prescribed, a pre-treatment ECG is usually required. Side-effects include dry mouth and decreased appetite.

**Clonidine**

Clonidine is effective in about 70% of ADHD children. It is used for hyper-aroused, aggressive states and it can be used in Tourette's disorder and in children with tics. It is often most effectively used in sleep disorders. It has many side-effects, including somnolence, sedation, irritability and hypotension.

**Risperidone**

Risperidone is not registered for the treatment of ADHD. It is useful for aggressive, violent behaviour and sleep disorders. It is therefore of great benefit in children with behaviour disorders, such as in Tourette's disorder, developmental delay, autism, pervasive developmental delay and mental retardation.

**Atomoxetine**

Atomoxetine has been found to be effective in the treatment of ADHD in children and adolescents. It appears to be safe and well tolerated, nausea being its main side-effect. It should be available in South Africa by 2005.

**IN A NUTSHELL**

ADHD is not a benign disorder and its management is important, especially as it may lead to so much dysfunction in adults.

Eighty per cent of cases are polygenetically inherited, and in these cases there is dopamine deficiency in the synapses of specific areas of the brain due to overactive elimination.

The diagnosis is based on the *DSM IV* criteria, and 4 distinct clinical vari-

ants are identifiable.

Co-morbidity is common, especially learning disorders.

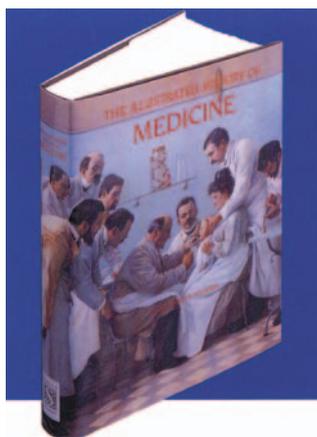
The management of ADHD demands a multi-modal approach, and may include medical, educational, psychosocial and dietary interventions.

Stimulants are the mainstay of the medical management of ADHD; they are effective and safe, with relatively few long- and short-term side-effects.

A 2-week clinical trial with a short-acting methylphenidate is important to ascertain whether the medication is beneficial and to monitor side-effects.

The most important contraindication to the use of methylphenidate is uncontrolled epilepsy.

If taken as prescribed the side-effects of methylphenidate are usually mild and temporary.



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