

ADHD: Review for Primary Care Clinicians

Dr Dennis Ougrin¹

Kraupl Taylor research Fellow

Ms Sandie Chatterton²

Principal Therapeutic Social Worker and Systemic Family Therapist

Mr Ricky Banarsee³

Director, West London Primary Care Research Consortium

¹Child and Adolescent Psychiatry PO 85, Institute of Psychiatry, De Crespigny Park, London, SE5 8AZ (*)

²Lewisham Child and Adolescent Mental Health Service, Kaleidoscope, Lewisham Centre for Children & Young People, 32 Rushey Green, Catford, London, SE6 4JF

³Applied Research Unit, NHS Brent, ARU/Public Health, Wembley Centre for Health and Care, 116 Chaplin Rd, Wembley, Middlesex, HA0 4UZ

Correspondence to:

Dr Dennis Ougrin

dennis.ougrin@kcl.ac.uk

ABSTRACT

Attention Deficit Hyperactivity Disorder (ADHD) is characterised by impulsivity, hyperactivity and inattention. Up to 5% of primary school age children have ADHD. Both genes and environment play a role in the aetiology of ADHD. If left untreated, children with ADHD demonstrate a range of poor long-term psychosocial outcomes. Strengths and Difficulties Questionnaire (SDQ) may be used to screen children for a range of psychiatric disorders, including ADHD.

Principal management options include medication (methylphenidate and atomoxetine are the first line), parent training programmes and school-based interventions.

It is important to provide a dedicated Child Mental Health Specialist Service for children with ADHD. In addition to following the NICE guidelines, the authors recommend the use of wider systemic approaches and early intervention to optimise the effectiveness of recommended treatment options.

WHY THIS MATTERS TO ME

The long-term negative impact of the effects of ADHD is serious and enduring. A third of young people diagnosed face unhappy, problematic futures including poor relationships, significant under-achievements educationally and later unemployment, high levels of involvement with drug and alcohol misuse, anti-social behaviour and criminality. There is a range of effective interventions and primary care clinicians have a particularly important role in the identification of ADHD, service co-ordination and family support.

KEY MESSAGES

- ADHD is a common disorder
- Boys are more commonly affected
- ADHD is associated with a range of poor functional outcomes in adulthood
- SDQ is a screening tool for a range of psychiatric conditions including ADHD
- A combination of pharmacological, parent training and school-based interventions are effective in treating ADHD

INSTEAD OF AN INTRODUCTION: WHY READ THIS ARTICLE?

All health professionals dealing with children are likely to have seen a dramatic increase in the diagnoses of ADHD. Recognition of ADHD will likely continue to increase in the foreseeable future and will probably include more and more adults presenting with ADHD symptoms. There are myriads of sources of information on ADHD both in the “old” and the “new” media, sometimes giving contradictory facts and advice. In this article the authors review the key facts about ADHD in 12 frequently asked and not infrequently misunderstood questions aiming to help any professional, specialist or generalist, community-based or hospital-based, working in health or education to improve their understanding of ADHD.

WHAT IS THE HISTORY OF ADHD?

ADHD is a condition characterised by maladaptively high levels of impulsivity, hyperactivity and inattention. The diagnostic conceptualisation of these symptoms has changed over time significantly. At the beginning of the 20th century hyperactive children were designated as suffering from morbid defect of moral control (if you find explaining ADHD to parents difficult, imagine trying to explain that diagnosis!). In the 1930s concepts of minimal brain damage and minimal brain dysfunction were introduced based on the observation of behavioural disturbances such as were seen in the pandemic of encephalitis in the 1920s or after traumatic birth. Interestingly the effectiveness of amphetamines in the management of these symptoms was established at about the same time. The terminology evolved further with “hyperactive child syndrome” and “hyperactive reaction of childhood” being used before “Attention Deficit Disorder” was introduced in DSM III in the 1980s and finally “Attention Deficit Hyperactivity Disorder” in DSM-IV (1994).

WHAT ARE THE FEATURES OF ADHD?

Attention Deficit Hyperactivity Disorder is a condition that is characterised by all of the following:

1. Presence of symptoms of inattention, hyperactivity and impulsiveness
2. Onset before the age of 7 years and usually from birth
3. At least moderate impairment of functioning in more than one setting (school, home and healthcare, i.e. your consulting room)

4. At least moderate impairment of function in several domains (school achievement, friendships, leisure activity or home life)

DSM IV identifies 3 subgroups of ADHD – combined, predominantly inattentive, and hyperactive-impulsive type. The hyperkinetic disorder in ICD-10 is broadly similar to the combined type of ADHD with severe impairment.

WHAT IS THE PREVALENCE OF ADHD?

Point prevalence for Hyperkinetic disorder in primary school age children is 1% and 5% for ADHD (M:F=3:1)^(1, 2). Girls form 25% of hyperkinetic cases. They demonstrate less impulsivity and aggression, but more fear, mood swings, social withdrawal, and cognitive and language problems.

WHAT IS THE AETIOLOGY OF ADHD?

A commonly held view is that there is nothing wrong with these children apart from bad parenting, chaotic family environment or exposure to child abuse. This is an important point and is subject to much controversy. The evidence so far points to both genetic and environmental factors playing a role in the aetiology of ADHD.

ADHD phenotype is associated with gene mutations in the dopamine transporter gene (DAT1) and the dopamine D4 receptor gene. There is dysfunction of dopamine and noradrenalin metabolism, and neurotransmission located in the prefrontal cortex and associated subcortical structures that persists well into adulthood.

There are various figures for the heritability of ADHD symptoms. Studies have found up to 80% correlation in identical twins; 32% in fraternal twins and 25% in first-degree relatives.

Environmental effects, including maternal stress and smoking during pregnancy; poor quality early care-giving; perinatal complications and prematurity also play a role in the aetiology of ADHD. However, there is not enough evidence to say that the children with symptoms of ADHD, who come from chaotic environments, are fundamentally different from those who come from stable families. The diagnosis of ADHD should certainly not be ruled out purely on the basis that “no wonder this child is hyperactive, everyone would be with this kind of family chaos”.

The role of food additives and preservatives in children’s hyperactivity is controversial. There is probably a subgroup of children whose hyperactivity

could be reduced by carefully applying exclusion diet, however research in this area is in its infancy, and there are real dangers of causing harm if diets are tried without specialist supervision, which is not usually available on the NHS. However, psycho-education which includes good dietary care helps parents to feel more caring, competent and in control.

WHAT ARE THE PROBLEMS ASSOCIATED WITH ADHD?

There is a high incidence of co-morbidity with oppositional defiant disorder (35-50%) and conduct disorders (25%). Similarly co-morbid learning disorders, anxiety, depressive and tic disorders all occur with increased frequency. The majority of children with ADHD do not have any neurological symptoms, although ADHD is more common in children with epilepsy and other brain pathology.

HOW SHOULD ADHD BE DIAGNOSED?

GPs play a crucial role in the initial identification of possible cases. Although only a child health specialist should diagnose ADHD, most referrals to the specialist services are received from GPs. In addition, GPs are in a particularly advantageous position when it comes to identifying possible cases as, they have seen many hundreds of children in their practice, and therefore have a larger reference group for comparison. The same is probably true about the identification of ADHD children by teachers. On the other hand, parents often do not have the benefit of a large reference group to compare their child with.

There are several important considerations that a GP should bear in mind when interviewing the family:

1. What is this child's mental age? Remember that the judgement about a particular child's level of hyperactivity, impulsiveness, inattention and functioning can only be done when comparing the child with others of his or her own mental (not chronological) age. For example a 10 year old with an IQ of 50 (and the approximate mental age of 5) should be compared to other children with the mental age of 5. A specialist psychology referral is required to establish the IQ if it is not known, although a child who has at least average academic achievements at school could probably be assumed to have at least average IQ.
2. Does this child have a specific learning disability (like specific reading or spelling problems)? It would be expected from a child with a specific reading difficulty to appear inattentive when attempting to read; if that child is not inattentive when performing other tasks, the diagnosis of ADHD is less likely.
3. Does this child have any other condition that

mimics ADHD: is inattention part of anxiety? Could the child have autism (although very often ADHD and autism co-exist)? Could this child have Foetal Alcohol Syndrome, PTSD or epilepsy?

Typical primary care presentations vary with age. Preschoolers might present with short play sequences (<3 minutes), leaving activities incomplete, appearing not to be listening, nearly constant movement and appearing not to have a sense of danger. Children of primary school age typically present with inability to sustain attention beyond 10 minutes whilst undertaking moderately challenging activities, premature changes of activity, appearing to be forgetful, disorganised and distracted by environment. In addition they often act out of turn, interrupt other children and blurt out an answer, are restless when calm expected and frequently break the rules in a thoughtless way. Finally, older children and young people often present with persistence less than peers (<30 minutes), lack of focus on details of a task, poor planning ahead, fidgetiness, poor self-control and reckless risk-taking.

WHAT RATING SCALES ARE AVAILABLE TO AID RECOGNITION OF ADHD?

Perhaps the best rating scale to use in primary care to identify cases that warrant a secondary care referral is Strengths and Difficulties Questionnaire (SDQ). The SDQ consists of 25 items that make up five 5-item subscales assessing Conduct Problems, Hyperactivity–Inattention, Emotional Symptoms, Peer Problems, and Prosocial Behaviour. It exists both in a parent- or teacher-rated version and there is a self-report version available. The informant-rated version of the SDQ could be completed for children and teenagers aged between 4 and 16 years. The self-report version is intended for individuals around 11–16 years old. Some of the practical advantages of the SDQ as a tool for the routine measurement of child and adolescent psychopathology, are that it is significantly shorter than other similar questionnaires; is downloadable free of charge from www.sdqinfo.com; and can be scored free of charge online www.sdqscore.net. As a guide any child with a total problem score of 17+ (on parent-rated SDQ) or 16+ (on teacher-rated SDQ) or an impact score of 2+ should be considered for referral. These cut-off scores correspond to the 10% of the most severely affected children in the UK. The score indicating a high likelihood of ADHD is 7+ on the hyperactivity-inattention axis.

Other rating scales, specifically designed to screen for ADHD include SNAP-IV, which is (<http://www.adhdcanada.com/pdfs/SNAP-IVTeacherParentRatingScale.pdf>) available free of charge) or the Conner's Rating Scales where a fee is

required.

HOW SHOULD ADHD BE MANAGED?

The recent NICE guidelines (2008) have not supported the use of medication in pre-school children, given the paucity of robust clinical trials in this age group. Here is the summary of the NICE recommendations.

1. Pre-school children:
Drug treatment not recommended (little evidence base for use)
Offer parent training programme (PTP) as first line
2. School-age children with moderately severe symptoms of ADHD and moderate impairment:
Psychological treatment is first-line. For the parents, PTP should be offered and for the child group CBT or social skills training considered. For adolescents consider individual CBT or social skills training.
Drug treatment can be considered if symptoms persist or where psychological interventions are declined.

Close co-operation between the health professionals and school is required, with the provision of additional support and teaching programme modification for children with ADHD, forming an integral part of treatment

3. School-age children with severe impairment secondary to ADHD symptoms (this in practice is equivalent to the ICD-10 diagnosis of hyperkinetic disorder) should be offered medication. There is evidence that drug treatment is more effective than PTP or other psychological therapies with severe ADHD symptoms and significant impairment(3).

WHAT IS THE PSYCHOSOCIAL MANAGEMENT OF ADHD?

Psychosocial management of ADHD is primarily focused on these four simple, yet difficult to implement principles:

1. Reward positive behaviour
2. Ignore inappropriate behaviour
3. Punish unacceptable behaviour
4. Adjust activities to the child's ability

PSYCHOSOCIAL MANAGEMENT AT HOME

Before any specific PTP is implemented, there are things that any parent could do without professional help. These include doing rewarding and mutually

pleasant activities with the child daily; establishing clear and sensible rules; and creating a predictable structure to the child's day. In order to maximise effectiveness of communication, the child's attention has to be attracted first, followed by clear short sentences whilst maintaining eye contact. Specific behavioural interventions are very often based on token economy, i.e. the child is provided with an opportunity to get rewards for a desirable behaviour. A common example of a token economy intervention is a star chart. Star charts tend to work very well if accompanied by clear rules and expectations, but in children with ADHD their effects tend to wear off fast. The solution to this is to immediately (within 5 seconds or so) provide the child with novel rewards after the desired behaviour has occurred.

Inappropriate behaviour, like fidgetiness, is best ignored. Unacceptable behaviour, like hitting others, should not be ignored and clear consequences should be in place, for example, time out. The rewards collected as a result of token economy (e.g. stars on the star chart), however, should never be removed – this is a common mistake partly propagated by TV parenting programmes.

PSYCHOSOCIAL MANAGEMENT AT SCHOOL

There may be significant benefits to teachers learning the principles of ADHD management. Children with ADHD should be seated close to the teacher with no obstruction between the teacher and the child. This enables clear eye-to-eye contact, better listening and engagement and improves the likelihood of not being distracted. Transitions are especially difficult to manage for these children, so teachers should give warning about transition and allow the child to be the first rather than the last to move to the new location. The work for children with ADHD should be clearly defined and delivered in short chunks of information and punctuated with frequent breaks. The child could usefully be employed as the teacher's classroom aide. Children with ADHD will frequently need more rather than less time to complete tasks. It is important to give immediate positive feedback for the desirable classroom behaviour.

Some children find it much easier to concentrate whilst engaging in repetitive motor activities, like doodling or fiddling with buttons or squeezing a stress-ball. However not all teachers will accept this behaviour in their classrooms. There are reports of additional benefits of doing class-based projects aimed at understanding ADHD better. Many other children will help the child with ADHD if they understand that he/she has these special needs.

WHAT IS THE PHARMACOLOGICAL TREATMENT OF ADHD?

There are more and more examples of joint primary and secondary care management of ADHD. Even though a child health specialist usually initiates prescription of specific medication, GPs often provide long-term pharmacological management.

Principal pharmacological treatment options include methylphenidate, dexamphetamine and atomoxetine.

Methylphenidate is the first line pharmacological treatment for children with ADHD (response rate 60-80%). Its effect is evident within 30 minutes of the dose. Common side effects include headaches and stomach-aches which usually wear off. Appetite suppression and sleep disturbance are more problematic, and may require changes to dose or timing of medication. Stimulants can induce tics in which case medication should be reduced, or stopped and a non-stimulant alternative used (3). Methylphenidate has to be withdrawn if psychotic symptoms emerge, and Atomoxetine may be considered as an alternative. Height, weight and blood pressure should be monitored during treatment.

Atomoxetine is a selective noradrenalin reuptake inhibitor, although its precise mechanism of action in ADHD is unknown. Atomoxetine can be used as a suitable first-line alternative, particularly if a child is unresponsive to stimulants or has a tic disorder which is aggravated by stimulant treatment (3). Atomoxetine does not effect dopamine levels in the striatum, which is associated with motor activity and as a result it does not worsen tics or Tourette's. Atomoxetine can be sedative, and some clinicians choose to split its dosage hoping that its sedative side-effects in the evening dosage will improve sleep. It is also a medication with 24-hour duration of action. Its clinical effect takes up to 4-6 weeks to become fully evident. Some early response but not the full clinical effect may be seen after one week of therapy. There is no specific contra-indication to the co-administration of stimulants with atomoxetine.

Dexamphetamine is the least well studied drug of the three and its use is limited to those cases when methylphenidate and atomoxetine are not tolerated or ineffective or when epilepsy deteriorates.

In general this is the NICE-recommended approach to pharmacological treatment

- methylphenidate for ADHD without significant co-morbidity
- methylphenidate for ADHD with co-morbid conduct disorder

- methylphenidate or atomoxetine when tics, anxiety disorder, stimulant misuse or risk of stimulant diversion are present
- atomoxetine if methylphenidate has been tried and has been ineffective at the maximum tolerated dose, or the child or young person is intolerant to low or moderate doses of methylphenidate
- dexamphetamine when symptoms are unresponsive to a maximum tolerated dose of methylphenidate or atomoxetine or when epilepsy deteriorates
- guanfacine, bupropion, clonidine, modafinil and imipramine are not licensed for ADHD but may be considered if the above treatments are ineffective
- Pre-treatment ECG is recommended if there is a past or family history of cardiac disorders or cardiovascular abnormalities on physical examination.

WHAT IS THE LONGER TERM EFFICACY AND SIDE EFFECTS OF TREATMENT WITH STIMULANTS?

The Multimodal Treatment Study of ADHD (MTA) is the first long term trial looking at the effects of four approaches—medication management, behaviour modification therapy, a combination of medication management and behaviour modification therapy, and routine community care—in the treatment of ADHD. In August 2007 the results of the 3-year follow up were published, and the distinct advantages of the medication algorithm were no longer evident, as they had been over the shorter term. It is important to note that each study arm had only 14 months of treatment as per the study protocol, before reverting back to community treatment (4) so no firm conclusions about the long-term efficacy could be drawn. There were similar results found at 8-year follow up (5) All treatment groups showed significant improvements over their baseline measures.

Other concerns from the 3-year follow up relate to growth rates. The subgroup of children in the study continuously treated with medication had smaller than expected annual gains in height, leading to a loss of up to 2cm in height and 2 kg weight over three years(6). Previous studies have suggested medication would only limit final height by up to 1 cm. Without longer term follow up of the MTA cohort, it is difficult to know what the final impact on height might be.

The authors have also reported elevated substance misuse and delinquency amongst the MTA children in the 3- year follow up vs. a local comparison group drawn from the same schools. Indeed, more days of prescribed medication were associated with more

serious delinquency.

WHAT IS THE PROGNOSIS AND COURSE OF ADHD?

There is evidence that ADHD symptoms show an age-related decline rather than disappearing in adulthood. The number of patients who have persistent hyperkinetic symptoms into adulthood varies between 25% and 50%. Faraone et al (7) found up to 65% continuation if the DSM IV definition of ADHD in partial remission was included. What is not yet clear is whether many of these adults are showing true "adult equivalents" or some residual symptomatology. The diagnosis can be made for the first time in adult life, but only the current conditions should be coded for, rather than the features present in childhood. Children with ADHD vs. their peer group have poorer academic performance, are premature school leavers, with increased rates of delinquency and substance misuse and have lower paid and lower status jobs. They are also more prone to accidental injuries and suicide attempts.

SUMMARY

ADHD is a common condition affecting as many as 5% of children. Both genetic and environmental factors are important in the aetiology of ADHD. There are effective treatments available, including parent training, school support and medication with initial response rate as high as 80%. Untreated ADHD is associated with a range of poor psychosocial outcomes and the symptoms may persist into adulthood.

ADDITIONAL RESOURCES

NICE guidelines

<http://guidance.nice.org.uk/CG72>

Practice Parameters of the American Academy of Child and Adolescent Psychiatry

http://www.aacap.org/galleries/PracticeParameters/JAACAP_ADHD_2007.pdf

The National Attention Deficit Disorder Information and Support Service

<http://www.addiss.co.uk>

Adult Attention Deficit Disorder – UK

<http://www.aadd.org.uk>

National Institute of Mental Health

<http://www.nimh.nih.gov/health/topics/attention-deficit-hyperactivity-disorder-adhd/index.shtml>

ACKNOWLEDGEMENT

This work was supported by Psychiatry Research Trust

REFERENCES

1. Döpfner M, Breuer D, Wille N, Erhart M, Ravens-Sieberer U, group Bs, et al. How often do children meet ICD-10/DSM-IV criteria of attention deficit-/hyperactivity disorder and hyperkinetic disorder? Parent-based prevalence rates in a national sample--results of the BELLA study. *Eur Child Adolesc Psychiatry* 2008 Dec;17 Suppl 1:59-70.
2. Swanson JM, Sergeant JA, Taylor E, Sonuga-Barke EJ, Jensen PS, Cantwell DP. Attention-deficit hyperactivity disorder and hyperkinetic disorder.[see comment]. *Lancet*. [Review]. 1998 Feb 7;351(9100):429-33.
3. NCCMH NCCfMH. Attention deficit hyperactivity disorder: Diagnosis and management of ADHD in children, young people and adults (CG 72). London: National Institute for Health and Clinical Excellence; 2008.
4. Jensen PS, Arnold LE, Swanson JM, Vitiello B, Abikoff HB, Greenhill LL, et al. 3-year follow-up of the NIMH MTA study. *J Am Acad Child Adolesc Psychiatry*. [Clinical Trial Research Support, N.I.H., Extramural Research Support, U.S. Gov't, Non-P.H.S.]. 2007 Aug;46(8):989-1002.
5. Molina BS, Hinshaw SP, Swanson JM, Arnold LE, Vitiello B, Jensen PS, et al. The MTA at 8 years: prospective follow-up of children treated for combined-type ADHD in a multisite study.[see comment]. *J Am Acad Child Adolesc Psychiatry*. [Research Support, N.I.H., Extramural Research Support, U.S. Gov't, Non-P.H.S.]. 2009 May;48(5):484-500.
6. Swanson JM, Elliott GR, Greenhill LL, Wigal T, Arnold LE, Vitiello B, et al. Effects of stimulant medication on growth rates across 3 years in the MTA follow-up. *J Am Acad Child Adolesc Psychiatry*. [Randomized Controlled Trial Research Support, N.I.H., Extramural]. 2007 Aug;46(8):1015-27.
7. Faraone SV, Biederman J, Mick E, Faraone SV, Biederman J, Mick E. The age-dependent decline of attention deficit hyperactivity disorder: a meta-analysis of follow-up studies. *Psychol Med*. [Research Support, N.I.H., Extramural

PATIENT'S STORY

PJ was nearly 4 years old when his mother first brought him to their GP. His symptoms of extreme restlessness, impulsivity and distractibility had been evident from birth and included only short periods of sleep typified by "thrashing around the bed". PJ's mother went to the GP because he was threatened with exclusion from his Nursery School, where he had hurt other children and was described as "hyperactive and impulsive and inattentive".

The Child and Adolescent Mental Health Service (CAMHS) practitioner based at the GP Health Centre became involved and her assessment showed a young mother significantly struggling on her own. PJ scored highly on hyperactivity, peer problems and conduct ratings using the SDQ. (He was just old enough to be scored). He had had the ADHD-type problems since birth and across all settings (at home, Nursery and when out socially).

PJ was too young to be considered for ADHD medication. However, a programme was introduced including psycho-education about the condition and specific parenting skills (as described earlier) to handle it. PJ's mother felt more in control and PJ more contained. Liaison with the Nursery staff implemented the same programme in their setting, building further security and containment there. The Child Mental Health input was closed after 4 sessions (3 months duration).

PJ was referred back to the CAMHS clinician twice more during the next 2 years. His challenging behaviours became more difficult whenever there were family or individual transitions. So, his mother needed more support when he started Primary School and again when she suffered a depressive episode. Each time what worked was working collaboratively with the GP, Health Visitor, school staff and Adult Counsellor to create a standardised understanding and a behavioural management regime which could be implemented across settings. PJ is now helped by medication, although the well established structure and management routines in place continue to contain his emotional and behavioural performance and he is achieving alongside his peers and getting on much better in his everyday relationships.