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Attention-deficit hyperactivity disorder in children and adolescents: assessment and treatment†

ARTICLE

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SUMMARY

Attention-deficit hyperactivity disorder (ADHD) is a heterogeneous neurobehavioural syndrome, complex in aetiology and presentation. It is characterised by symptoms of inattention, hyperactivity and impulsivity of varying combinations and degrees of severity. This article seeks to elucidate the different components of the assessment and diagnosis of ADHD in comparison with various differential diagnoses that must also be considered. Despite its complexities, ADHD can be effectively managed using a comprehensive approach advocated by the National Institute for Health and Care Excellence (NICE). The article discusses the combination of medication, psychoeducation and parental handling that has been shown to be effective in containing the problematic symptoms of ADHD. It also highlights the difficulties that can persist into adulthood and potential strategies to improve prognosis.

LEARNING OBJECTIVES

- To understand the clinical features of ADHD as compared with differential diagnoses
- To understand the steps involved in the assessment of children with ADHD
- To understand the principles of planning and monitoring the progress of the treatment of ADHD

DECLARATION OF INTEREST

P.H. has received honoraria from Flynn, Janssen-Cilag, Lilly, Medice, Novartis and Shire for advising or lecturing on the treatment of ADHD.

Attention-deficit hyperactivity disorder (ADHD) is a heterogeneous neurobehavioural syndrome with a multifactorial aetiology, present since early childhood and commonly having other conditions comorbid with it. The essential components are extreme and impairing inattention, hyperactivity and impulsivity. It is four times more common in boys, so the male pronoun is used in this chapter.

In the UK, the syndrome is recognised as equivalent to the combined presentation type of ADHD in the American DSM-5 (American Psychiatric Association 2013). This comprises both hyperactive/impulsive and inattentive symptoms. In the USA, additional DSM-5 subtypes of predominantly inattentive presentation and predominantly hyperactive/impulsive presentation are recognised, but this practice is less prevalent in the UK, although the unofficial term 'attention-deficit disorder' (equivalent to ADHD – predominantly inattentive presentation) is used in some educational documents. The standards for UK diagnostic practice are often more stringently applied than in the USA, and generally correspond to the ICD-10 criteria for hyperkinetic disorder, which is essentially a severe form of combined ADHD (World Health Organization 1992). The UK prevalence rate for combined ADHD is just under 5%, at 3–4% in boys and just under 1% in girls (Ford 2003). The overall UK rate for hyperkinetic disorder is about 1.5%, with a similar male excess (Meltzer 2000). There is widespread underdiagnosis.

Inattention is a broad concept that refers not just to difficulties in focusing and sustaining attention but includes vulnerability to distraction and poor self-organisation. This results in careless mistakes and a failure to follow through satisfactorily on set tasks, particularly if these contain cognitive demands. Typically, tasks are left unfinished, and the affected individual is likely to be demonstrably distractible.

Hyperactivity refers to a general increase in the tempo and amount of apparently purposeful but ineffectual activity, as well as an increase in the number of purposeless, minor movements (fidgeting) or whole-body movements (restlessness). It includes excessive talkativeness and noisiness.

Impulsiveness is characterised by sudden unconsidered actions: repeatedly interrupting others, blurting out answers prematurely in class, failing to wait for one's turn and butting into other people's activities. It commonly has a quality of impatient social disinhibition. In some individuals it is mainly evident in reckless behaviour; things are done suddenly without heed for danger or consequences.

Current UK practice does not usually recognise hyperactive/impulsive presentation subtypes, thus conforming more to ICD-10 criteria, and takes the threshold for clinical diagnosis of ADHD to

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be at least six items on each of the two axes of inattention and hyperactivity/impulsivity (Box 1). These must be:

- excessive compared with what is normal for a child of that age or developmental ability
- present from an early age
- pervasive, i.e. present in more than one type of social situation; they will be most obvious when self-control is required or when cognitively demanding tasks are set
- associated with impaired personal function.

It is apparent that elements of inattention, hyperactivity and impulsivity exist in the general population, so that the clinical syndrome of ADHD represents an extreme the end of a spectrum of normal variation. It can be conceptualised as a categorical condition by the application of diagnostic rules, but it is not qualitatively distinct from such variation.

It is difficult to diagnose ADHD with confidence in preschool children as preschool hyperactivity does not necessarily persist into the school years. Furthermore, it may not be easy for first-time parents to distinguish normal childhood exuberance and brief but developmentally appropriate attention spans from clinically significant variation. Preschool children may not spend enough time in social situations outside the home for pervasiveness of symptoms and impairment to be established.

Neurobiology

A large number of imaging studies have shown abnormalities in brain structure and functioning in children with ADHD (Rubia 2012). These include reduced volumes of:

- frontal and parietotemporal cortex
- basal ganglia
- splenium of the corpus callosum
- cerebellum.

This is almost certainly due to delayed cortical maturation, estimated as a 2-year delay. Recent longitudinal studies noted by Rubia show that these volume deficits can be corrected over time by stimulant medication. Diffusion tensor imaging work indicates an additional widespread deficit in white matter interconnectivity. In parallel with this, functional magnetic resonance imaging (fMRI) studies have repeatedly shown underfunctioning of frontostriatal pathways and underactivation of several prefrontal cortical areas, consistent with the reduced cognitive executive functioning found in neuropsychological research. In other words, a wider deficit in motivational and inhibitory networks has been identified. The emerging picture is of a generally underconnected and underfunctioning immature brain as far as higher attentional, social and affective functioning are concerned.

None of these findings, although replicated, are yet useful in clinical diagnostic practice and there is no place for routine imaging. Nevertheless, pictorial illustrations from the studies are of great interest to parents and children.

Assessment

The aims of assessment are:

- confirmation of clinical features of ADHD and establishing their level of severity across more than one setting (e.g. home and school)
- evaluating impairment: social, educational and emotional
- exclusion of differential diagnoses (e.g. anxiety, intellectual disability)
- detection of comorbid disorders and problems
- elucidation of aetiological risk factors thought to maintain the clinical picture
- physical appraisal of cardiovascular fitness and growth status
- evaluation of parental attitudes to the child and to treatment.

BOX 1 Attention-deficit hyperactivity disorder items in DSM-5

Inattention

- Careless with detail
- Fails to sustain attention
- Appears not to listen
- Does not finish instructed tasks
- Has poor self-organisation
- Avoids tasks that require sustained mental effort
- Loses things
- Is easily distracted
- Seems forgetful

Hyperactivity/impulsivity

- Fidgets
- Leaves seat when should be seated
- Runs/climbs excessively and inappropriately
- Noisy in play
- Shows persistent motor overactivity unmodified by social context
- Blurts out answers before question completed
- Fails to wait turn or in queue
- Interrupts others' conversation or games
- Talks excessively for social context

For combined-type ADHD, at least six items from each of the previous lists must:

- all occur 'often'
- be pervasive (present in more than one type of situation)
- be present before the age of 12 years)
- impair the child's normal functioning
- not be better explained by another condition.

(After American Psychiatric Association 2013)

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Before clinical contact: children and school-age teenagers

Parent- or teacher-completed rating scales can be used to identify individuals for a specialist clinic and to focus questioning at an initial appointment. It is possible to screen using the parent-scored Strengths and Difficulties Questionnaire (SDQ) (Goodman 1997). Although a score of 7 from the sum of items 2, 10, 15, 21 and 25 has been used to identify probable cases of ADHD in epidemiological studies, there may be advantages in using a lower score (5 or 6), since a false positive will matter less when selecting individuals for clinical assessment.

Questionnaires specifically focused on ADHD, such as the Conners 3 (Conners 2008) or the CADDRA ADHD Checklist (effectively an extension of the SNAP-IV or ADHD-RS scales with items for oppositional defiant disorder; Canadian ADHD Resource Alliance 2011), are best used in clinic (for pretreatment baseline measures), when wording can be clarified at interview. Rating scale scores alone are insufficient for diagnosis.

A school report or questionnaire collected before a first appointment can save time with primary school children, but with secondary school children it is wise to wait until the child is seen to clarify which teacher is best placed to be approached.

Assessment process at a first appointment

Assessment is a clinical procedure. There is no need for routine investigations such as brain scans, electroencephalograms (EEGs) or electrocardiograms (ECGs). A few centres use computerised tools such as the QbTest (Vogt 2011) or a qualitative EEG, but as things stand these cannot substitute for clinical judgement.

Interview with parent(s)

It is inadequate merely to check key items for a diagnosis of ADHD, since comorbidity and differential diagnoses will be missed. A preferable approach is to take a history of presenting problems and check through other behavioural systems and emotions in the standard way. Follow with a developmental history and a family history (especially for ADHD and cardiac morbidity in early adult life). While facts are being elicited, consider family atmosphere and attitudes to the child, ADHD and medication.

Specific questioning on the following may reveal aetiological, intensifying or perpetuating risk factors, each of which will only apply to some children:

- features of ADHD in relatives (including parents)
- mother's alcohol, nicotine or illicit drug intake during pregnancy
- early birth or low birth weight
- failure to regain birth weight in the first 2 weeks of life
- adoption after 6 months of age
- early exposure to environmental lead
- early closed head injury with sustained loss of consciousness
- persistent lack of sleep
- dietary problems
- ongoing family discord.

It makes sense to take an educational history: schools attended, levels of attainment, disciplinary problems and friendships.

Parents should be asked to complete a rating scale such as the Conners 3-P (Conners 2008), the CADDRA ADHD Checklist or SNAP-IV-C (Swanson 2007). Adolescents can complete the self-report Conners 3-SR (Conners 2008).

Observation and physical examination of the child

A child with ADHD may be attentive and self-contained during a very brief individual interview. Observing the child during an interview with the parents as well as seeing the child alone provides a total of at least an hour's worth of sustained observation and much can be learnt from this.

Constructional toys are useful: give an instruction to build something and then look for completion and persistence, as well as coordination. Any clues from the parental account that might indicate dyspraxia should lead to a brief physical examination (Box 2).

Check hearing by speaking a number softly but with just a little resonance at 1 metre distance on each side. Listening to speech and assessing compliance with instructions screens for speech

BOX 2 Movement coordination screen

- Static tremor (outstretched arms and fingers)
- Static balance (standing on one leg for 20 seconds)
- Normal walking and running
- Heel–toe (tight-rope) walk
- Modified Fog's test (walking on the medial sides of the feet with knees apart, then on the lateral sides with knees together): check for dystonic wrist and arm movements
- Finger–nose test
- Thumb to each fingertip in rapid sequence
- Rapid alternating rotation at wrists ('polish a round doorknob') with outstretched arm
- Joint mobility in fingers, thumbs, elbows and knees, and check for flat feet
- Writing their own name and address
- Drawing a man

and language problems. A husky voice can indicate vocal abuse from excessive talkativeness.

It is wise to check for weak auditory short-term and working memory, since this is a common associated impairment and may be the only factor in purely inattentive ADHD. This can be done quickly using a digit span test (a random sequence of numbers spoken at a rate of one per second). Norms are given in Table 1.

Because stimulants can (rarely) slow growth, it is important to record and chart baseline height and weight. Stimulants, and occasionally atomoxetine, can produce an elevation of blood pressure and tachycardia. It is therefore necessary to carry out a clinical examination of the cardiovascular system.

A detailed neurological examination is not likely to yield much of significance, but it can reassure parents, particularly if they raise the topic of brain damage. Watch the child as he leaves the room, since this is the time when tics are likely to be most evident, having been voluntarily suppressed during the assessment.

Interview with an older child or teenager

Even a brief interview with the young person provides an opportunity to learn further about family, peer group and school life. There may be antisocial activities and risky behaviours such as unprotected sex or substance misuse that are unknown to parents.

Further information

It is crucial to obtain a school report and rating scale to confirm pervasiveness of symptoms. The Conners 3-T (Conners 2008) offers broad scope for an initial assessment and includes the 10-item Conners ADHD Index (Conners 3AI), which is convenient for follow-up by teachers or parents. Some clinicians like to use the SKAMP (items 81–90 of the 90-item SNAP-IV-C; Swanson 2007) for teacher follow-up because of its face validity. Some estimation of academic achievement is needed to evaluate impairment, detect possible comorbid dyslexia, and provide a baseline for assessing treatment impact.

Differential diagnosis

Simple misbehaviour

Marked, but age- (or mental age-) appropriate boisterousness, disobedience or cheekiness is the most common differential. The central issue is whether this is excessive for the child's age or developmental level. Teachers are in an excellent position to make this comparison through daily experience of observing the child in a group of children his own age. Explosive temper or excitability are often referred to by parents or peers as 'being a bit hyper'. Rating scales will help clarification.

TABLE 1 Norms for digit span recall

	Number of digits successfully recalled	
Age, years	Forwards	Backwards
6	5	3
10	6	4
14	7	5

Disruptive behaviour disorders

Oppositional-defiant disorder and conduct disorder may be differential diagnoses as well as comorbid conditions, since restlessness and inattention are common among disruptive children generally. The similarity and common coexistence of these disorders has led to a view in the general population of ADHD as essentially an antisocial, angry condition. The diagnosis of conduct disorder requires repetitive, persistent and serious antisocial, aggressive or defiant behaviour. In practice, the distinction between ADHD and disruptive behaviour disorders can be difficult to make because of comorbidity.

Disinhibited attachment disorder

Disinhibited attachment disorder can develop in children who have not had the opportunity to form selected secure emotional attachments because of the lack of sensitive or consistent parental care. Such children may present as distractible or restless, with attentional problems and social disinhibition. In some clinics, heated discussions arise as to whether inattentive restlessness is fundamentally ADHD or represents an attachment disorder. This is usually futile, as the National Institute for Health and Care Excellence (NICE) recommends treating ADHD symptoms when these are present, irrespective of putative aetiology (NICE 2008), and in any case both conditions may well be comorbid.

Generalised anxiety disorder

Generalised anxiety disorder can yield inattentiveness and restlessness, but social disinhibition and impulsiveness are less likely to be present.

Autism spectrum conditions

Mild autism spectrum conditions can present with inattentiveness and it can be difficult to separate inattention arising from a lack of interest in complying with another person's instructions from inattention as a component of ADHD.

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Bipolar disorder

Juvenile bipolar disorder has historically been invoked as a differential diagnosis, but there should be no confusion if the requirement for a sustained period of elevated mood with associated grandiosity in bipolar disorder is maintained.

Comorbidity

All the disorders that need to be differentiated from ADHD can also be comorbid conditions. In addition to the above, the other conditions that are frequently encountered are listed in Box 3 and need to be considered in any clinical assessment.

Impairment

For a diagnosis of ADHD it is necessary to go further than establishing the presence of characteristic symptoms; there must be documentation that impairment exists. This is not a single measure but should involve checking several domains of the individual's life. NICE recommends a helpful list (NICE 2008). The Weiss Impairment Scales, WFIRS-P for parents (Weiss 2004) and the corresponding self-completed WFIRS-S for teenagers (Weiss 2007), are useful instruments.

Tests

It is not necessary to carry out a full psychological assessment on each child unless there are major educational problems that need exploration. Blood tests (e.g. for iron, lead or thyroid function), brain imaging, EEGs and ECGs are similarly not routine, but should be considered on their merits in each case.

BOX 3 Conditions commonly comorbid with attention-deficit hyperactivity disorder

- Autism spectrum conditions
- Depression
- Disinhibited attachment disorder
- Dyscalculia
- Dyslexia
- Dyspraxia (developmental coordination disorder) and dysgraphia
- Generalised anxiety disorder
- Juvenile bipolar disorder
- Oppositional-defiant disorder/conduct disorder
- Sleep disorders
- Specific language impairment
- Substance misuse
- Tic disorders/Tourette syndrome

Formulation

Using parental information, school information, considering impairment and its impact, and one's own observations, it should now be possible to:

- establish a diagnosis of ADHD
- exclude alternative diagnoses
- identify comorbid problems and diagnoses.

Completing an ADHD-RS-IV at interview with the parents enables a measure of severity. The scale lists the diagnostic items shown in Box 1, worded to correspond to the text of DSM-5, and these are each rated 0–3 for frequency (rarely, sometimes, often, very often) by the interviewer so that the maximum possible score is 54. A readily available equivalent, the ADHD items from the CADDRA (Canadian ADHD Resource Alliance 2011) use severity (not at all, somewhat, pretty much, very much) rather than frequency, with comparable scoring. Most children with ADHD seen in clinics will score higher than the mid-30s, although the criterion score for entry to drug trials in the USA is often a score of 28.

In addition, it is particularly useful to ask for a short list of key problems that can be stated in language understandable by all family members and entered onto a simple linear or five-point scale. This may be the best way of identifying operationalised goals of treatment against which progress can be measured.

Treatment: general principles

As things stand in 2015, optimal treatment approaches in the UK follow the principles derived from the NICE (2008) guidelines and include three components: psychoeducation, parental handling and medication. Although dietary treatments, neurofeedback and cognitive therapy may yield worthwhile advances in the future, their evidence base is small and they remain essentially experimental.

School-based measures include those addressing behaviour and those promoting learning. There is a potential role for schools in promoting social competence through social skills groups of peers (which are hard to set up in clinics). Active liaison between clinic and school (with parental permission), usually through the special educational needs coordinator (SENCO) or advisor, is crucial.

Psychoeducation

It is apparent from the VOICES study (Singh 2012) that many children with diagnosed ADHD do not understand what it is. It also seems likely that parents, some teachers and some primary healthcare professionals are less well informed than would be desirable. Newspaper journalism and the

internet are not always helpful. Discussion with both parents and child, and letters to or discussions with schools and primary healthcare, can make the following points.

- ADHD is at the extreme end of a spectrum of difficulties with attention, activity and impulse control in the general population.
- ADHD rarely exists on its own. Most children with ADHD will have other problems, such as difficulties with anger, socialisation, physical coordination, short-term memory or learning. What is seen as ADHD is often actually an associated oppositional-defiant or conduct disorder.
- ADHD is based on known neurological dysfunction that can be demonstrated in research even if this is not yet defined sufficiently to be useful in clinical practice. Pictures from fMRI studies are helpful in making this point.
- The brains of children with ADHD show about 2 years' delay in growth and development of the frontoparietal cortex.
- Research shows that a child with ADHD has particular problems with motivation ('allocating mental effort') and learning from experience.
- Medication can partially compensate for these shortcomings in brain development and motivational learning.
- It is helpful to see the ADHD as something that gets in the way of success ('His ADHD stops you being the sort of parent you want to be', 'The ADHD gets in the way of learning at school and he can't just turn it off').

Parental handling

Clinics may simply refer parents to parenting classes. This is broadly in line with NICE recommendations (NICE 2008) but needs some thought. Parents who have brought up their child's older siblings successfully may feel (and be) patronised. It may be better to discuss two simple points with parents:

- a child with ADHD requires more than standard parenting if he is to learn and prosper
- it is particularly hard to be an effective parent of a child with ADHD, as the ADHD works against the child's ability to learn and the parent's sense of competence.

And recommend that they:

- set a small number of household rules, couched in language that is specific and understandable by all ('Schoolbag always packed before going to bed')
- get beyond simply trying to control disobedience, overexcitement or hyperactivity and set out to have opportunities for a good time with their child, showing him love and appreciation
- keep verbal instructions short and clear
- include positive comments, praise and encouragement, linked with a points incentive system where appropriate
- consider deals ('Get your homework done and OK'd by me, then you can go out'), but ensure that the child's action precedes the reward or the parent's half of the deal
- use a simple disciplinary system such as '1-2-3 Magic' (www.123magic.com)
- avoid harsh punishment, harsh judgements and condemnations
- keep the child's social life alive, but arrange brief play dates with structured activities to avoid over-excited mayhem or fights
- keep as calm as possible
- plan ahead to avoid trouble.

Families containing a child with ADHD need support from a local network if available or from the National Attention Deficit Disorder Information and Support Service (ADDISS). The strain on families is extensive, with parental depression, strained marital relationships and family break-up all common. Bear in mind that a child with ADHD is likely to have siblings and one or both parents who also have ADHD.

Medication

Stimulants (methylphenidate or dexamfetamine) are the mainstay of medication in ADHD, particularly following the initial findings of the Multimodal Treatment of Attention Deficit Hyperactivity Disorder (MTA) study (MTA Cooperative Group, 1999). They are highly effective (effect size 0.8–1.2) against all three symptom areas of ADHD, long-established (>50 years) and relatively safe. Methylphenidate is recommended by NICE as an initial agent (NICE 2008), although some individuals will respond better to dexamfetamine. Both competitively block the dopamine transporter which provides presynaptic reuptake of dopamine from the synapse.

A physical examination must be carried out before prescribing. Potential adverse effects on cardiovascular functioning (very mildly raised blood pressure and pulse rate) mean it is also necessary to check that there are no significant cardiac symptoms and no family history of sudden cardiac death in early adulthood.

Two single-dose trials of 5 and 10 mg of standard (immediate release) methylphenidate on separate days, each given 1 hour before an assigned task that involves simulated or actual schoolwork, with the effect observed by a parent, form a powerful and sensitive predictor of likely effect. Such trials can also identify the few children who become excited

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or irritable after taking the drug. The trial approach can subsequently be extended to school days, comparing morning and afternoon effects following a morning dose. The clinical duration of a single dose of methylphenidate is 3–4 hours.

There is no standard dose of methylphenidate or dexamfetamine, so it is necessary to titrate dose against effect. Simply obtaining a positive result is not good enough; one aims for an optimal result in terms of either general symptom relief or achievement against a specific goal.

An excessive dose produces a vacant expression and diminished social responsiveness. To avoid this it is important to obtain reports from school, since blood levels will be maximal there and have declined by return home.

Most children will move from immediate-release methylphenidate to extended-release preparations such as Equasym XL®, Medikinet XL® or Concerta XL®. These each have differing pharmacokinetic properties with differing release patterns across the day. It is important to track symptoms or deficits across the school day and choose the appropriate preparation accordingly.

Although it has been conventional for drug marketing authorisations ('licences') to cite a 60 mg maximum daily dose of methylphenidate, this has no scientific backing and in practice it is often necessary to exceed this. NICE makes the same point (NICE 2008).

Dexamfetamine can be tried in a similar fashion, using doses approximately half those required for methylphenidate. There are no extended-release preparations of dexamfetamine available in the UK, but the prodrug lisdexamfetamine provides extended effect for 12–13 hours following a single dose. It is inert when taken, but is converted into dexamfetamine by red blood cells.

Stimulant medication commonly suppresses appetite during the day. This is occasionally associated with slowing of weight growth and, less commonly, with slowing of height growth. Existing follow-up studies are weak, but do not show an effect on ultimate adult height. Nevertheless, height and weight should be monitored 6 monthly and the dose adjusted accordingly.

If stimulants are given too late in the day, there is the risk that sleep onset will be delayed. This can be dealt with by simple sleep hygiene advice or, if necessary, melatonin. Other side-effects include abdominal pain, headache and very rarely a skin rash or Raynaud's phenomenon. Some children feel socially constrained or suffer lowering of mood and, occasionally, irritability. Auditory hallucinations are rare and alarming but they do not endure once the medication is discontinued.

Children for whom school behaviour and achievement are the key problems do not necessarily need medication at weekends or holidays. In similar vein, the optimal dose regimen may differ from day to day. One treats for the day in question. There is no need to offer a 'course' of treatment or allow for accumulation, since stimulants are eliminated or metabolised on the day of administration. Occasionally it is necessary to increase the dose after a few months in order to maintain the effect, probably because of reactive upgrading of the dopamine transporter.

Stimulants are controlled drugs and not all general practitioners will prescribe them, in spite of NICE recommendations for shared care protocols between specialist clinics and primary care (NICE 2008). The introduction of specialist ADHD nurses, especially those who can prescribe, has been a major service development.

Children who are anxious, have tics or pre-existing sleep problems, or who need treatment that covers early mornings and evenings will probably need atomoxetine. This is a noradrenaline reuptake inhibitor with similar effects to stimulants, but it does not affect sleep onset, so can be given at night or twice daily. Its side-effect profile includes occasional nausea, irritability and low mood that reverse promptly on discontinuation. Side-effects can be minimised by gradually increasing the dose (starting with 10 mg daily for 7 days and increasing the daily dose according to capsule size (18 mg, 25 mg, 40 mg, 60 mg, 80 mg, …) each week when initiating. Dose is conventionally 1.2–1.8 mg/kg/day. Atomoxetine is not a controlled drug.

Treatment of hyperactive, disorganised or aggressive behaviour in the early morning or evening is hard to achieve with stimulants alone, and either a switch to atomoxetine or supplementation with clonidine or guanfacine should be considered if behavioural management techniques fail.

Treatment: assessing progress

If the symptom count (e.g. score on the ADHD-RS-IV) is very high and it is apparent that ADHD pervades most aspects of the child's life, then the impact of treatment can be titrated against an overall measure (e.g. the ADHD-RS-IV or Conners 3).

Yet there are instances when one or two specific issues caused by ADHD (e.g. getting dressed each morning, fighting with siblings, going to bed on time) are key problems or goals that can be tackled, and in such cases a goal-setting approach makes sense. An individualised simple linear or five- to seven-point scale (see below) can be constructed. For instance, a child may be repeatedly disciplined at school for calling out impulsively in class. A

MCQ answers
1 d 2 b 3 e 4 d 5 b

baseline frequency can be obtained and a simple scale constructed (e.g. called out more than once a lesson, once a lesson, twice a day, once a day, not at all) for an identified day in each week. Progress can be assessed against this in a way that is visible to child, parent and clinician.

Adherence to prescribed treatment is low, especially among teenagers.

Prognosis

A proportion of children will improve with maturation, but it is important to note that although hyperactivity wanes with age, impulsivity and inattention do so at a slower rate. Generally speaking, about 15% of children who show a full ADHD picture in late childhood will have a full diagnosis in early adult life, but 50% will show an attenuated picture characterised by troublesome inattentiveness, impulsiveness and personal disorganisation. Yet generally speaking, the impact of educational and social failure and the persistence of comorbid antisocial behaviours, alcohol and drug misuse, and high rates of mood disorders may be more of a problem in adult life than persisting symptoms or diagnosis of ADHD.

The NICE guideline recommends transition arrangements for teenagers with ADHD who are graduating to adult psychiatric services, specifically the use of the care programme approach and a full assessment following transition to determine comorbidity and impairment (NICE 2008). It is evident that local arrangements vary, from special adult ADHD clinics to absorption into generic mental health teams.

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MCQs

Select the single best option for each question stem

1 Clinical features of 'hyperactivity' include:

a motor tics
b poor self-organisation
c distractibility
d increased purposeless movement
e sudden unconsidered actions.

2 Regarding the neurobiological abnormalities identified in children with ADHD:

a imaging studies demonstrate increased volumes of frontal and parietotemporal cortices
b changes are secondary to an approximately 2-year delay in cortical maturation
c observed brain volume deficits can be rapidly corrected with stimulant medication
d white matter hyperactivity is consistently observed
e imaging is integral to confirming a diagnosis of ADHD.

3 Useful screening tools to identify children for specialist ADHD assessment include:

a the CADDRA ADHD Checklist
b the Conners 3-P
c the SNAP-IV-C
d the Conners 3-SR
e the SDQ.

4 According to NICE guidelines, the three components of ADHD treatment are:

a parental handling, medication and cognitive therapy
b medication, dietary treatments and psychoeducation
c psychoeducation, neurofeedback and medication
d psychoeducation, parental handling and medication
e medication, cognitive therapy and parental handling.

5 When prescribing methylphenidate for the treatment of ADHD:

a height and weight should be monitored monthly for a 6-month period post-prescription
b dosing should be measured against optimal treatment effect
c the maximum recommended daily dose of 60 mg cannot be exceeded
d one 5 mg single-dose trial holds sufficient predictive power regarding treatment effect
e regular measurement of methylphenidate blood levels are essential to monitor drug accumulation in plasma.

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