Scottish Intercollegiate Guidelines Network

Attention Deficit and Hyperkinetic Disorders in Children and Young People
A national clinical guideline

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June 2001
KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS

The definitions of the types of evidence and the grading of recommendations used in this guideline originate from the US Agency for Health Care Policy and Research and are set out in the following tables.

STATMENTS OF EVIDENCE

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>Ia</td>
<td>Evidence obtained from meta-analysis of randomised controlled trials.</td>
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<tr>
<td>Ib</td>
<td>Evidence obtained from at least one randomised controlled trial.</td>
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<tr>
<td>IIa</td>
<td>Evidence obtained from at least one well-designed controlled study without randomisation.</td>
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<tr>
<td>IIb</td>
<td>Evidence obtained from at least one other type of well-designed quasi-experimental study.</td>
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<tr>
<td>III</td>
<td>Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.</td>
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<tr>
<td>IV</td>
<td>Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.</td>
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GRADES OF RECOMMENDATIONS

<table>
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<tr>
<th>Grade</th>
<th>Description</th>
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<tr>
<td>A</td>
<td>Requires at least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation. (Evidence levels Ia, Ib)</td>
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<tr>
<td>B</td>
<td>Requires the availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation. (Evidence levels IIa, IIb, III)</td>
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<tr>
<td>C</td>
<td>Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality. (Evidence level IV)</td>
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GOOD PRACTICE POINTS

☑ Recommended best practice based on the clinical experience of the guideline development group.
1 Introduction

1.1 BACKGROUND

The choice of Attention Deficit and Hyperkinetic Disorders as the subject for the first SIGN guideline on a child and adolescent psychiatric disorder is a reflection of the continuing controversy surrounding these relatively common childhood behavioural disorders. The constellation of symptoms which make up Attention Deficit Hyperactivity Disorder\(^2\) (ADHD) and Hyperkinetic Disorder\(^3\) (HKD) are the most widely researched in child and adolescent psychiatry, but in spite of this there continues to be a lack of consensus regarding the definition of these disorders and their management.

The core symptoms of ADHD and HKD have a significant impact on a child’s development, including social, emotional and cognitive functioning, and they are responsible for considerable morbidity and dysfunction for the child or young person, their peer group and their family. The secondary effects of ADHD and HKD can be extremely damaging. Affected children are often exposed to years of negative feedback about their behaviour and suffer educational and social disadvantage. These disorders are, in many cases, persistent. It is estimated that up to two thirds of children affected by hyperactivity disorders continue to have problems into adulthood.\(^4\) Professionals must therefore be concerned with the identification and treatment of ADHD and HKD and their secondary effects.

ADHD and HKD present a challenge to professionals from a variety of backgrounds, including general practitioners, health visitors, teachers, psychologists, psychiatrists, paediatricians and social workers. To date, management has been made more difficult by the various professionals involved working in isolation. Similarly, research into this complex constellation of symptoms has tended to follow single cause models with a resulting lack of integration of themes.

1.2 THE NEED FOR A GUIDELINE

Hyperactivity is represented in the general population as a continuum. The distinction between normality and abnormality is subjective and arbitrarily defined. The core symptoms of ADHD and HKD can be considered to be an extreme of normal behaviour. In addition, children and young people suffering from several other emotional and behavioural disorders may show symptoms of ADHD and HKD.

Considerable controversy therefore surrounds the extent of these disorders, for which there are, as yet, no robust diagnostic tests; thus their definition continues to be debated. This in turn has led to wide variation in practice, with some affected children going undiagnosed and untreated and, in other cases, unaffected children being treated needlessly. Issues of co-morbidity and potential subtypes further cloud the picture. The available evidence suggests that the constellation of symptoms recognised as ADHD and HKD is valid. Causation remains unclear but the evidence for a biological basis appears to be converging. The evidence for a genetic contribution is strong but other factors are also likely to be important.

Partly as a result of the lack of clarity regarding the cause of ADHD and HKD, there is considerable variation in treatment. There is a lack of consensus about the use of psychostimulants, psychosocial, educational and other interventions or combinations of interventions. However, it is recognised that ADHD and HKD cause considerable morbidity and should be treated.

The use of psychostimulants remains controversial and there are concerns about prescribing such medication to children. Further anxieties surround the potential for inappropriate prescription, abuse and release onto the black market.

In light of these controversies and concerns there is an urgent need for an evidence-based guideline for clinical practice.
1.3 AIM OF THE GUIDELINE

The overall aim of this national guideline is to provide a framework for evidence-based assessment and management of ADHD/HKD, from which locally appropriate multidisciplinary approaches can be developed.

This guideline presents an appraisal of the existing evidence for the management of children and young people presenting with ADHD/HKD. Sections 1 and 2 of the guideline present an introduction to the disorder, including a discussion of the definition of ADHD/HKD and information on prevalence, co-morbidity and diagnostic criteria. Section 3 considers different assessment modes, including initial assessment and various types of specialist assessments. Sections 4 and 5 discuss the management of the disorder using both pharmacological and non-pharmacological interventions. Section 6 identifies a range of resources which may be of help to children and young people with ADHD and their families.

Many aspects of management, including the use of dietary and complementary therapies, have not been subject to systematic evaluation and therefore are not commented on in this guideline. The British Psychological Society has addressed the issue of multidisciplinary practice in the management of ADHD in their recent document Attention Deficit/Hyperactivity Disorder: Guidelines and principles for successful multiagency working. All health care professionals with either direct or indirect involvement in child health care must be aware of ADHD/HKD and the management options available. Continuing professional development is essential to ensure that new developments are implemented.

1.4 STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of medical care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. These parameters of practice should be considered guidelines only. Adherence to them will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made in light of the clinical data presented by the patient and the diagnostic and treatment options available. However, it is advised that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient’s case notes at the time the relevant decision is taken.

1.5 REVIEW AND UPDATING

This guideline was issued in 2001 and will be considered for review in 2003, or sooner if new evidence becomes available. Any updates to the guideline in the interim period will be noted on the SIGN website: www.sign.ac.uk.
2 Definitions and concepts

2.1 DEFINITION

ADHD and HKD are amongst the most commonly diagnosed behavioural disorders in children and young people. Core symptoms include developmentally inappropriate levels of activity and impulsivity and an impaired ability to sustain attention. Affected children and young people have difficulty regulating their activities to conform to expected norms and as a result are frequently unpopular with adults and peers. They often fail to achieve their potential and many have co-morbid difficulties such as developmental delays, specific learning problems and other emotional and behavioural disorders.

The constellation of symptoms which constitutes ADHD/HKD has been recognised for many years and has been given a variety of labels.

2.2 DIAGNOSTIC CRITERIA

The core symptoms of ADHD and HKD comprise developmentally inappropriate levels of:

- inattention (difficulty in concentrating)
- hyperactivity (disorganised, excessive levels of activity)
- impulsive behaviour.

In order to meet diagnostic criteria it is essential that symptoms:

- have their onset before the age of seven years (ADHD) or six years (HKD)
- have persisted for at least six months
- must be pervasive (present in more than one setting, e.g. at home, at school, socially)
- have caused significant functional impairment
- are not better accounted for by other mental disorders (e.g. pervasive developmental disorder, schizophrenia, other psychotic disorders, depression or anxiety).

Associated morbidity includes educational underachievement, antisocial behaviour, delinquency and an increased risk of road traffic accidents in adolescence. In addition, there can be a dramatic effect on family life.

The diagnostic criteria for ADHD and HKD have changed with each revision of the Diagnostic and Statistical Manual (DSM) and International Classification of Diseases (ICD) respectively. It is likely that there will be further revision of the criteria to address outstanding issues such as subtypes of disorder, age of onset and the applicability of the criteria across the life span. Current DSM-IV and ICD-10 diagnostic criteria are similar, with differences relating primarily to symptom severity and pervasiveness.

DSM identifies three subtypes of ADHD: predominantly inattentive type (which features inattention but not hyperactivity/impulsivity); predominantly hyperactive-impulsive type (which features hyperactivity/impulsivity but not inattention) and combined type (which features signs of inattention and hyperactivity/impulsivity).

HKD characterises more severe disturbance with significant hyperactivity included as a criterion for diagnosis. DSM and ICD are categorical models and minimum thresholds of presenting symptoms must be present to achieve diagnosis. Children and young people failing to meet the defined criteria of ADHD/HKD may nevertheless be experiencing significant difficulties in day to day life.

Despite the immense literature describing the investigation of ADHD and HKD, their precise definitions continue to be debated and their validity as disorders questioned. This has been addressed in a number of ways and there is substantial evidence in support of the above definitions of ADHD, its subtypes and HKD. Evidence for the validity of diagnostic criteria for younger children is beginning to emerge, although the applicability of diagnostic criteria across the age range requires further investigation.
2.3 PREVALENCE

Prevalence estimates are highly dependent on three main factors: the population sampled, the method of ascertainment, and the diagnostic criteria applied. Prevalence estimates are rare in the published literature, especially in relation to DSM-IV and ICD-10 criteria. The reported prevalence of ADHD in school-age children varies from 1.7% to 17.8% depending on the criteria used.\textsuperscript{11} Most estimates lie between 5% and 10%.\textsuperscript{12} US estimates have historically been higher than UK estimates, due presumably to the application of narrower diagnostic criteria by UK authors.\textsuperscript{13} Three studies of English populations have shown a prevalence rate of between 2% and 5%, depending on whether DSM-IV or ICD-10 criteria were applied.\textsuperscript{12-14} A large sample of school children ($n = 22,044$) screened using DSM-IV teacher rating scales showed a similar prevalence at school entry.\textsuperscript{15} The male to female ratio in ADHD prevalence (but not necessarily within all dimensions of the disorder) is at least 4 to 1.\textsuperscript{16}

2.4 CO-MORBIDITY

Co-morbidity is common and variable. Academic and school failure has also been shown consistently in ADHD children.\textsuperscript{15,17,18} In children diagnosed with ADHD, oppositional defiant disorder (ODD) or conduct disorder (CD) is present in 25-50% of cases; 25% have co-existent anxiety disorder; 20% have mood disorder; and 20% have specific developmental disorders, including specific learning difficulties, language-based difficulties and motor co-ordination difficulties.\textsuperscript{19,20} Many children with Tourette's syndrome fulfil ADHD criteria.\textsuperscript{6,21}

2.5 OUTCOME

There are as yet no good quality prevalence or outcome data for ADHD/HKD in Scotland. A national baseline audit is required to supply this information. However, the observed rate of ADHD diminishes in adolescence\textsuperscript{9,22} and further reductions have been seen in studies which have followed children into adulthood.\textsuperscript{23-25} Rates of persistence of ADHD vary between 11%\textsuperscript{18} and 68%.\textsuperscript{26} Predictors of persistence of ADHD and co-morbid ODD or CD include: maternal depression, marital discord, negative parent-child interaction,\textsuperscript{12,27} family disadvantage and family history of disorder.\textsuperscript{17,28} There is a relative paucity of evidence available on the management of ADHD in adults; and service provision for such individuals is also limited. Many follow-up studies have shown considerable excess of conduct disorder, antisocial personality disorder, substance abuse, and criminality (often clustered in the same individuals) in adults with ADHD/HKD compared with controls.\textsuperscript{4,18,23,24} Early co-morbidity with CD and ODD has the most adverse outcome.\textsuperscript{17,27-29}
3 Assessment

3.1 INITIAL ASSESSMENT

The initial presentation will usually be to general practitioners, or to other primary care, education and social work professionals. Important information can be obtained at this stage which will suggest the need for specialist investigation. Those involved in carrying out the initial assessment must be aware of the prevalence and core features of ADHD/HKD as well as some of the difficulties encountered in making the diagnosis, including issues of co-morbidity and the impact of situation/environment on presentation.

Key areas to explore at this stage include:

- The nature of the problem: are the presenting problems of the type represented by the diagnostic criteria for ADHD/HKD?
- The severity of the problem (dysfunction in a number of domains, including family, education and social).

If on the basis of preliminary assessment it is suspected that a child or young person is suffering from ADHD/HKD associated with significant impairment, referral for assessment by a child and adolescent psychiatrist or paediatrician with a specialist interest in this field is recommended.

3.2 SPECIALIST ASSESSMENT

The overall aim of assessment is to obtain information to allow diagnosis and the formulation of a management plan detailing further assessments, leading to the development of an appropriate programme of intervention. Such assessment is necessarily extensive and time consuming. The diagnosis of ADHD/HKD cannot be achieved in a brief consultation.

The important components of assessment for ADHD/HKD include: the patient/carer interview, the child/young person interview, questionnaires, psycho-educational assessment, clinical examination, and ancillary (physical, psychiatric and psychological) assessments.

3.3 PARENT/ CARER INTERVIEW

The interview with the parent(s) or carer(s) of the child or young person with ADHD/HKD is the foundation of assessment. The purpose is to obtain information relating to the child’s presentation in order to inform diagnosis and the formulation of a treatment plan.

3.3.1 HISTORY OF PRESENTING COMPLAINT

Parent/carers should be asked details of the history of the child’s current problems, the nature of the symptoms (frequency, duration, situational variation) and any associated behaviours. Emphasis should be on diagnostic criteria for ADHD/HKD and associated disorders.

- Information about performance in the school/nursery setting, including details of academic achievement as well as social functioning in relation to other children and staff, should be reviewed and permission sought to contact the school.
- The clinician should determine what treatment (if any) the child/young person has received in the past.
- Some enquiry as to the impact of dietary factors may be considered, although there are insufficient data to support routine dietary assessment and evaluation for mineral and fatty acid deficiencies (see section 4.2).
- It should be noted that although sleep disorders may be reported in up to 50% of children with ADHD their presence is not a criterion for diagnosis.
Parental reports of current child psychopathology have been shown to provide an accurate means of assessment. Most studies have examined maternal reports and, whilst there is some conflict, in general parents are accurate reporters of children’s behaviour. However, maternal psychopathology, especially maternal depression and marital dysfunction/adjustment, are known to influence parental reporting of child behaviour.

Parental report of their children’s symptoms is an essential component of the diagnostic assessment.

### 3.3.2 OBSTETRIC AND PERINATAL HISTORY

Certain complications including pre-term delivery and maternal cigarette, drug and alcohol abuse are known to be associated with ADHD/HKD.

A history should be obtained of obstetric and perinatal complications.

### 3.3.3 DEVELOPMENTAL HISTORY

Details of the acquisition of developmental milestones and related information about ADHD/HKD and associated problems will allow the development of a chronological picture of a child or young person’s difficulties.

A developmental history should be obtained to show a chronological development of difficulties.

### 3.3.4 FAMILY HISTORY

Details of the child’s immediate and extended family should be obtained, including a history of ADHD/HKD and psychiatric illness of any kind. There is evidence from various lines of research, including twin and adoption studies, pedigree studies and molecular genetic studies, which clearly demonstrates the contribution of genetic factors to ADHD/HKD.

In families with a history of thyroid dysfunction, generalised resistance to thyroid hormone (GRTH) may be present. GRTH is a rare cause of ADHD/HKD and screening need not be routine.

### 3.3.5 FAMILY FUNCTIONING

An assessment of family functioning including relationships within the family, communication patterns, parental management styles and the presence of marital conflict or stress should be explored.

### 3.4 CHILD / YOUNG PERSON INTERVIEW

Whilst children and young people may not always be reliable in reporting externalising behaviour, they are more reliable than their parents at reporting internalising symptoms such as anxiety and depression, which are important in the diagnosis of co-morbid conditions. The focus of the interview should be on the child’s own perception of the problem, their attributional style and their attitude to treatment.

The child or young person should be engaged in the therapeutic process with an understanding of their perception of their difficulties, the possibilities of treatment and their responsibility in the management of the disorder.
3.5 LABORATORY MEASURES AND QUESTIONNAIRES

There is an extensive research literature examining individual and groups of laboratory assessment measures (e.g. Matching Familiar Figures Test, Continuous Performance Test, Actometers). In general these measures do not distinguish children and young people with ADHD/HKD from psychiatric controls or normal peers.52

Observation of behaviour in the clinic, whilst important, may be deceptive and clinicians should avoid basing diagnostic conclusions on evidence of behaviour in the clinic. Standardised observational schedules for use in the home, school and laboratory setting are available; however, some practitioners find these time consuming and difficult to use. In addition, children tend to respond well in novel situations, e.g. a visit to the clinic or the clinician’s visit to the home or school setting, and the results therefore may not provide an accurate picture of the child’s behaviour.51

A detailed analysis of the various rating scales and laboratory assessment measures is beyond the remit of this guideline. Useful reviews of the various assessment instruments have been published.52,54

Self-report questionnaires provide a mechanism for obtaining standardised information about parents’ and teachers’ perceptions of a child’s problems. The instruments providing the most useful information are normatively based and structured to allow analysis of independent factors. Questionnaire results should be interpreted with caution where normative data has been derived from populations other than the UK.55

Laboratory assessments should not be used routinely.

Questionnaires are useful in assessment when used in association with information derived from other sources. They can be used as part of the initial assessment as well as for evaluating treatment response.

3.6 PSYCHO-EDUCATIONAL ASSESSMENT

Children who have ADHD/HKD may experience educational difficulties. ADHD/HKD is not a learning disability per se, in that it does not impact on the brain’s ability to learn, but it can interfere with the individual’s availability for learning.56 This may affect educational attainment and thereby long term prognosis. There are high levels of co-morbidity and many children have learning disabilities in addition to ADHD/HKD.19

An assessment of the child’s presentation in their educational placement is important for confirming diagnosis and identifying educational underachievement.

Psycho-educational assessment involves testing the child’s level of attainment in basic skill areas such as reading, spelling and number work; and evaluating whether the child is achieving appropriately for their age and ability. Qualitative information about the child’s learning style, attention skills, speed of working, impulsivity and self confidence can be obtained from discussions with teachers.

3.7 CLINICAL EXAMINATION

Physical evaluation serves a number of purposes, including:
- assessment of underlying medical problems contributing to presentation
- assessment for potential contraindications to pharmacological intervention.

Neurological signs and minor physical anomalies cannot independently exclude or confirm a diagnosis of ADHD/HKD. Although many studies have shown a slight increase in the number of neurological signs in hyperactive children, the usefulness of this association has yet to be demonstrated.57,58 Similarly, the presence or absence of minor physical anomalies cannot be used as a diagnostic predictor.59 Screening for neurological signs and minor physical anomalies is part of an overall physical evaluation. Standardised assessment schedules are available.
Clinical examination of children and young people presenting with ADHD/HKD should include a systems inquiry, details of previous health problems, current drug treatment, and physical examination. Vision and hearing should be assessed and formally tested if indicated.

3.8 ANCILLARY ASSESSMENTS

Other physical investigations should be carried out when they are thought to be important in the determination of an underlying medical problem. Such investigations might include:
- blood analyses (lead, chromosomes, Fragile X)
- electrophysiological studies (electroencephalography (EEG))
- computed tomography (magnetic resonance imaging (MRI) for neurological disorders / space occupying lesions).

However, neuroradiological, neurophysiological, neurochemical and chromosomal investigations are as yet unproven in the diagnosis of ADHD/HKD.60

The history and examination, bearing in mind the prevalence of co-morbid conditions, may suggest the need for further assessment in order to exclude other diagnoses or elucidate co-morbid disorders. In this context, detailed psychiatric, neurological, psychological, psycho-educational, speech and language, occupational therapy and other assessments should be sought from appropriate specialists.

3.8.1 PSYCHIATRIC ASSESSMENT

Whilst the core assessment for ADHD/HKD can be undertaken by experienced specialists from a variety of backgrounds, assessment by a child and adolescent psychiatrist is essential if there is difficulty in differential diagnosis or concern about the existence of co-morbid psychiatric disorders.

3.8.2 PSYCHOLOGICAL ASSESSMENT

The value of psychological tests lies less in the diagnosis of ADHD/HKD than in the exclusion of co-morbid conditions and the identification of specific areas of difficulty for individual children which might impede educational and social integration. There is no psychological test which decisively characterises ADHD/HKD.

The majority of psychological tests should not be regarded as a routine part of the diagnostic process. Use of these tests should be on the basis of a specific hypothesis in a specific case.

Children with ADHD/HKD do not differ from the normal population on the majority of traditionally administered psychological tasks. Neuropsychological measures of attention and concentration (e.g. continuous performance tasks) do not reliably differentiate ADHD/HKD from other clinical conditions or controls.61,62

Executive functions, that is the management and integration of complex information and behaviour, are impaired in children with ADHD/HKD.61 However, tests of executive function have not yet been demonstrated to differentiate reliably children suffering from ADHD/HKD. There is some support for the notion that a failure in behavioural inhibition, and the resulting impulsivity, represents the underlying deficit in ADHD/HKD.64 An alternative hypothesis, that an intolerance of delay underpins these childrens’ difficulties, has also received some experimental support.65
Non-pharmacological therapy

Children and young people with ADHD/HKD present chronic pervasive problems which in many cases require long term multimodal, multidisciplinary management. It may be necessary to draw upon different treatment methods at different times. Intervention must be individualised, with treatment packages and programmes of intervention developed depending on the specific needs of the child or young person and their family.

The evidence for the effectiveness of various forms of non-pharmacological and pharmacological intervention used in the management of ADHD/HKD is reviewed in sections 4 and 5. The order in which these are discussed below does not represent a treatment pathway.

4.1 PSYCHOSOCIAL INTERVENTIONS

All symptoms presented by a child or young person must be assessed and treated. While the core symptoms of ADHD/HKD can be managed effectively with drugs, there is less evidence that psychosocial interventions have a significant effect on these symptoms. Evaluation of the strength of the evidence relating to psychosocial interventions is complicated by the research designs, which often limit evaluation to short term, protocol-driven programmes without follow-up in the child’s usual environment or over extended periods.

Problems such as ODD, CD and other co-morbid conditions can be treated with combinations of pharmacological and behavioural interventions. Psychotherapy may be used to assess secondary problems of living with ADHD/HKD and its effects on self-esteem and family functioning. Multimodal intervention provides a strategy to manage a chronic condition but does not provide a cure.

4.1.1 CLINIC-BASED PSYCHOSOCIAL INTERVENTIONS

Family psychosocial interventions

Children and young people with ADHD/HKD present management problems in the home and community, therefore equipping parents with effective management skills has intrinsic appeal as a treatment strategy. In addition, the high co-morbidity with conduct problems and ODD make parent behavioural management techniques of considerable importance. Children with ADHD/HKD have also been demonstrated to evoke negative parenting and this has been shown to become part of a coercive cycle in which parents and children maintain each others’ negative patterns of interaction.

Behaviour management training has been shown to reduce conflicts and non-compliance in children with ADHD/HKD. However, even where treatment achieves significant improvement between groups, there is considerable variation between and within individuals. Behavioural management training for children with conduct and behaviour problems has been systematically evaluated and shown to reduce non-compliant or oppositional behaviour. These programmes, although not specifically designed for children with ADHD/HKD, address the most prevalent co-morbid conditions and do include children with these diagnoses in their patient groups. The inclusion of parent training has been shown to increase the acceptability of treatment packages and to improve parental well being.

Family-based psychosocial interventions of a behavioural type are recommended for the treatment of co-morbid behavioural problems.

Individual treatments

Individual psychological treatment for ADHD/HKD aims to instil appropriate self-regulatory and reflective behaviours in children who have had difficulty in developing these skills.
The outcome results for cognitive training are disappointing, even with the adjunct of stimulant treatment. Skills training with children alone has also had some success in improving children’s social skills, whether administered by therapists or parents. However, generalisation to the school setting is limited.

Behavioural paradigms which use immediate rewards and response costs for attention show some temporary improvement while the procedure is in effect, but this is not necessarily maintained or generalised into natural environments.

In the presence of medication, the addition of a parallel parent training module to a social skills programme improves transfer of benefits seen in the study situation to a non-clinical environment. Anger control training is successful in enhancing general self-control and the use of specific coping strategies in a role-play group situation, but again the generalisation of such skills to the natural environment remains doubtful.

Individual psychosocial interventions are not routinely recommended.

### 4.1.2 SCHOOL-BASED PSYCHOSOCIAL INTERVENTIONS

Meta-analysis has shown that contingency management strategies and academic interventions are more effective for behaviour change than cognitive-behavioural strategies.

Children with ADHD/HKD require an individualised school intervention programme including behavioural and academic interventions.

The short term effects of behavioural interventions are typically limited to the periods when the programmes are actually in effect. When treatment is withdrawn, children often lose the gains made during treatment. Although in the short term behavioural interventions can improve targeted behaviours, they are less useful in reducing inattention, hyperactivity or impulsivity. Studies of attending have revealed that smaller class size, use of resource rooms vs. regular classrooms, direct vs. indirect instruction, and entire class engagement have resulted in increased levels of concentration in students with ADHD.

The class teacher will be the main manager of educational intervention in most cases. Most teachers have only limited knowledge of the condition, and will require, at the very least, information and guidance. They also require collaborative support in evaluating the effectiveness of differing combinations of treatment. The involvement of an educational psychologist in the treatment programme and its evaluation is highly desirable.

The non-pharmacological treatments mentioned here should teach problem-solving and coping skills not only to children with ADHD/HKD but also to those who interact with these children on a regular basis.

### 4.2 DIETARY INTERVENTIONS

There is little evidence for beneficial effects in ADHD/HKD from using mineral supplements (iron, magnesium and zinc). There is some evidence to suggest that lower urinary and hair zinc levels are associated with poorer response to methylphenidate (see section 5.1), although there are as yet no studies which have determined whether zinc supplementation leads to a better treatment response to the drug. Essential fatty acids supplementation may be useful, particularly in those individuals with lower levels of polyunsaturated fatty acids. However, there is insufficient evidence at this stage to support the routine use of these interventions in the management of ADHD/HKD.

Despite a widely held belief that the presence of refined sugar and artificial additives in the diet of children can adversely influence behaviour, there is conflicting evidence on the effects of these products. On current evidence, it is not possible to recommend restriction or elimination diets in children with ADHD/HKD.
4.3 COMPLEMENTARY AND ALTERNATIVE INTERVENTIONS

A variety of complementary and alternative interventions have been described, including Chinese herbal medicines, EMG (electromyography) and EEG (electroencephalography) biofeedback, and chiropractic intervention. The guideline development group found no research evidence of an acceptable standard in support of these strategies and it is not possible at present to make a recommendation on their use.

4.4 SOCIAL AND COMMUNITY INTERVENTION

Families of children and young people affected by ADHD/HKD are subject to considerable pressures associated with the disorder on a day to day basis. Clinical experience suggests that families have differing capacity to cope with this and that this fluctuates over time. The provision of support other than what may be available from extended family and friends may be an important part of a multimodal intervention package. The need for social support must be considered for individual families. Various forms of social support are available, including befrienders, respite, self help groups and financial assistance.

4.5 MULTIMODAL INTERVENTION

Multimodal treatment of children and young people with ADHD/HKD is increasingly popular. Stimulant medication alone is not effective other than for the core ADHD/HKD symptoms and does not address the range of problems experienced by affected children and young people.

The suggestion that combinations of interventions produce therapeutic benefit greater than the sum of each individual therapy has been investigated. The recent National Institute for Mental Health collaborative multi-modal treatment study of children with ADHD (MTA) was developed to clarify issues such as the relative merits of medication and psychosocial intervention and to test the benefits of combined interventions. It found that the effects of methylphenidate alone were equal to those of psychosocial intervention and methylphenidate combined. The combined group, however, achieved an equivalent degree of improvement with a significantly lower dosage of medication.\textsuperscript{96} As the likelihood of side effects from medication is related to dosage, where possible, lower dose medication as part of a combined intervention is preferable to higher dose medication alone despite equivalent treatment response.

Combining non-medication interventions produces only a small additive effect,\textsuperscript{97} however this may be of greater benefit where co-morbidity exists.\textsuperscript{98} Another study found no additive effect for combinations of medication, child self-control and parent behaviour management training.\textsuperscript{99} Concern has been raised over methodological problems with the MTA study and further research is needed.\textsuperscript{100}
5 Pharmacological therapy

The initiation of pharmacological treatment for children with ADHD should only be undertaken by a specialist in either child and adolescent psychiatry or paediatrics who has training in the use and monitoring of psychotropic medications in children and adolescents.

5.1 PSYCHOSTIMULANTS

The psychostimulants available in the United Kingdom are methylphenidate (MPH) and dexamphetamine (DEX). (Pemoline was withdrawn from use recently because of concerns about hepatotoxicity and four reports of drug related deaths in North America. DEX is licensed for use in patients aged three years or above. MPH is presently licensed for patients aged six years and over.

5.1.1 EVIDENCE OF EFFICACY

A large number of short term (less than three months) double blind placebo controlled studies demonstrate a 70% response to a single stimulant (methylphenidate, dexamphetamine or pemoline), resulting in improvement in the core symptoms of ADHD with effect sizes of 0.8 to 1 on rating scales. Cognitive and behavioural improvements included increased on-task behaviour; reduced fidgeting, finger tapping and interrupting; reduced impulsive responding and increased accuracy of performance; reduced aggression; improved compliance; improved parent child interactions; and increased peer status.

A review of extended controlled trials with treatment periods ranging from three to seven months indicates that psychostimulant treatment is superior to placebo or non-pharmacological treatment in ameliorating the core symptoms of ADHD/HKD. Longer term studies with treatment periods between 12 and 24 months demonstrate persistence of positive psychostimulant medication effects over time.

A Psychostimulants should be considered as the first line of drug treatment for the core symptoms of ADHD/HKD.

There is evidence for the effectiveness of psychostimulants in pre-school children who demonstrate developmentally inappropriate levels of hyperactivity, inattention and impulsivity.

5.1.2 SIDE EFFECTS

The most frequent psychostimulant side effects in short term studies are insomnia, reduced appetite, abdominal pain, headache and dizziness; less frequently, anxiety, irritability, or proneness to crying. Some side effects may, on further analysis, represent part of the underlying ADHD/HKD condition and be noted in the pre-treatment or placebo states. Some common psychostimulant treatment-related difficulties and suggested responses are listed in Table 1.

Clear lines of contact should be established between the family and the treating physician and his/her team by telephone and via urgent clinic arrangements to deal with new problems as and when they arise. This allows decisions to be made regarding medication treatment changes or other appropriate (behavioural) advice to be given and support arranged.

Most of the short term side effects of psychostimulant treatment are dose-related and subject to inter-patient differences. They frequently diminish within 1-2 weeks of starting treatment and usually disappear if treatment is discontinued, or the dose reduced. Psychostimulant side effects are more commonly seen in pre-school children.

When psychostimulants are first introduced and being titrated, regular contact between the family and the clinician is important to deal with questions and to make any necessary adjustments.
5.1.3 PRESCRIBING AND MONITORING

Since psychostimulant side effects are dose-related, the treatment aim should be to determine the lowest effective dose which produces the maximum therapeutic effect whilst keeping adverse effects to a minimum.\textsuperscript{105,122} Dose recommendations, notably the advised maximum daily dosage, have not been determined by research. Traditionally a cautious approach to drug scheduling has been advocated, with regimens determined empirically in the light of clinical experience. Response to both MPH and DEX is variable and cannot be predicted on a dose/body weight basis. Both are rapidly excreted polar drugs which do not accumulate in fat.

Dose guidelines from various sources from 1992 to 1998 are listed in Table 2 (overleaf). The average quoted dose range for MPH is from 5 mg to a maximum of 60 mg per day, whilst that for DEX, is from 2.5 mg to maximum 40 mg per day. However, given the variable nature of psychostimulant response, some children may benefit from somewhat higher doses.\textsuperscript{105}

Weight-adjusted dose scheduling may restrict appropriate dosage titration for children who require higher doses to control their symptoms. Conversely, fixed pill-type dose titration methods may expose small children to high doses, potentially producing unwanted side effects.\textsuperscript{113,116,127,128}

### Table 1: Psychostimulant side effects and suggested management options

<table>
<thead>
<tr>
<th>Side effect</th>
<th>Management options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anorexia, nausea, weight loss</td>
<td>Monitor carefully, give medication with meals, give calorie supplements</td>
</tr>
<tr>
<td>Growth concerns</td>
<td>If significant (rare in long term) or causing parental anxiety, attempt weekend or vacation medication breaks</td>
</tr>
<tr>
<td>Sleep difficulties</td>
<td>Monitor carefully, reduce or omit late afternoon or evening medication (but note that some patients improve with added evening medication)</td>
</tr>
<tr>
<td>Dizziness and headache</td>
<td>Monitor carefully (check blood pressure), ensure medication is taken with meals and encourage fluid intake</td>
</tr>
<tr>
<td>Involuntary movements, tics and Tourette's syndrome</td>
<td>Reduce, or if persistent, discontinue medication. Consider alternative (e.g. TCA) if symptoms are severe</td>
</tr>
<tr>
<td>Loss of spontaneity, dysphoria, agitation</td>
<td>Reduce or discontinue medication (discontinue if thought disorder or psychosis suspected - this is rare)</td>
</tr>
<tr>
<td>Irritability, behavioural rebound</td>
<td>Monitor carefully, reduce or overlap afternoon dose; evaluate for co-morbidity (ODD/CD)</td>
</tr>
</tbody>
</table>

Once an effective dose has been determined regular review continues to be important. This enables necessary checks of behavioural rating and side effects, along with checks of height, weight and blood pressure. Standard weighing conditions and careful measurements of height and velocity centile calculation using standard charts enable early detection of significant growth problems, although these are uncommon.\textsuperscript{121}

Manufacturer recommendations include ‘periodic’ blood testing for haematological abnormalities. However, the Medicines Control Agency and Committee on Safety of Medicines which monitor suspected drug reactions report that adverse effects of this nature are very rare.

Blood testing should be carried out at the discretion of the supervising clinician and only when clinically indicated.

5.1.3 PRESCRIBING AND MONITORING

Since psychostimulant side effects are dose-related, the treatment aim should be to determine the lowest effective dose which produces the maximum therapeutic effect whilst keeping adverse effects to a minimum.\textsuperscript{105,122} Dose recommendations, notably the advised maximum daily dosage, have not been determined by research. Traditionally a cautious approach to drug scheduling has been advocated, with regimens determined empirically in the light of clinical experience. Response to both MPH and DEX is variable and cannot be predicted on a dose/body weight basis. Both are rapidly excreted polar drugs which do not accumulate in fat.

Dose guidelines from various sources from 1992 to 1998 are listed in Table 2 (overleaf). The average quoted dose range for MPH is from 5 mg to a maximum of 60 mg per day, whilst that for DEX, is from 2.5 mg to maximum 40 mg per day. However, given the variable nature of psychostimulant response, some children may benefit from somewhat higher doses.\textsuperscript{105}

Weight-adjusted dose scheduling may restrict appropriate dosage titration for children who require higher doses to control their symptoms. Conversely, fixed pill-type dose titration methods may expose small children to high doses, potentially producing unwanted side effects.\textsuperscript{113,116,127,128}
Dose frequency should also be determined on an individual basis. Administering psychostimulants three times daily instead of twice daily gives the advantage of achieving treatment effects in the evening, which may be desirable if homework projects or evening activities are planned. There is little objective evidence of major interference with sleep using this regimen. If, however, sleep disturbance does occur, the late afternoon dose may need to be reduced or discontinued. Some teachers report that early morning dose effects have been lost by mid-morning. In such cases a mid-morning dose may be scheduled for 10.30 –11 am, with the first dose of the day given between 7 and 8 am.

There is little research evidence relating to tolerance to the therapeutic effects of MPH over time. Anecdotal reports suggest that therapeutic effects are more likely to reduce with doses of MPH exceeding 40 mg per day. It may be prudent to re-evaluate a child’s maintenance dose of psychostimulant on an annual basis to determine the necessity or otherwise of a dose change.

In most cases, medication should be continued seven days per week to obtain maximum benefit with respect to behavioural control problems which occur at home and in the community as well as in school. Weekend or vacation drug holidays may be required, however, if there are serious concerns about growth.

When prescribing psychostimulants commence with the smallest possible dose and titrate to a 2-3 times daily schedule of increasing dosage at weekly intervals until a satisfactory response is obtained or side effects intrude.

When a specialist considers that a patient’s condition on psychostimulant medication is stable, he/she should seek the agreement of the patient’s GP to share the patient’s care on the basis of a shared care protocol. An example protocol is available on the SIGN website.

### Table 2: Dose Ranges in Literature for Psychostimulant Treatment

<table>
<thead>
<tr>
<th>Source</th>
<th>Methylphenidate</th>
<th>Dexamphetamine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block, 1998</td>
<td>0.3 - 0.6 mg/kg/dose</td>
<td>0.15 - 0.3 mg/kg/dose</td>
</tr>
<tr>
<td>Findling and Dogin, 1998</td>
<td>0.3 - 0.8 mg/kg/dose</td>
<td></td>
</tr>
<tr>
<td>Pliszka, 1998</td>
<td>Up to 1 mg/kg/dose</td>
<td></td>
</tr>
<tr>
<td>AACAP, 1997</td>
<td>0.3 - 0.7 mg/kg/dose</td>
<td>0.15 - 0.35 mg/kg/dose</td>
</tr>
<tr>
<td>NHMRC (Australia), 1996</td>
<td>Max 1.5 mg/kg/day</td>
<td>Max 0.75 mg/kg/day</td>
</tr>
</tbody>
</table>

5.1.4 WHEN TO DISCONTINUE TREATMENT

In view of evidence for persistence of ADHD/HKD into adolescence and, in some cases, adulthood and the rapid return of core symptoms when psychostimulants are discontinued, treatment may require to be long term.

Accepted practice is to undertake regular (annual) short (up to two weeks) trial periods off treatment, obtaining feedback from school as well as parents and child. This is best avoided at the beginning of a new school year. If there is no appreciable difference in the child’s behaviour when he or she is on or off medication, it may be discontinued for a longer period. If there is no appreciable difference with the child on treatment and behavioural difficulties continue, it may be necessary to re-evaluate dosage, switch to another medication, or re-evaluate psychological and behavioural strategies.

Psychostimulants do not need to be discontinued at the onset of puberty, as efficacy in adolescents and adults with ADHD is well-established.
5.2 TRICYCLIC ANTIDEPRESSANTS

Tricyclic antidepressants (TCAs) are the most established and widely studied group of non-stimulant medications used in the treatment of ADHD/HKD. They include the heterocyclic amines: imipramine, desipramine, amitriptyline, nortriptyline and clomipramine.

5.2.1 EVIDENCE FOR EFFICACY

Clinical trials have demonstrated the effectiveness of TCAs in the treatment of ADHD/HKD in children from nursery age to adolescence. Up to 70% of children show significant improvement in behavioural symptoms when treated with TCAs compared to 10% with placebo. TCAs have a larger potential impact on the behavioural than the cognitive effects of ADHD/HKD and they demonstrate a narrower margin of safety than psychostimulants, along with a wider range of potential side effects.

TCAs should be considered in the treatment of behavioural symptoms of ADHD/HKD.

5.2.2 SIDE EFFECTS

Common side effects reported in clinical studies include anorexia, dry mouth (with a sour, metallic taste), dizziness, drowsiness, lethargy and insomnia, along with other anticholinergic symptoms. Irritability, mania, forgetfulness and confusion are signs of potential central nervous system toxicity. Potential cardiotoxicity of TCAs in children, particularly with desipramine therapy, has caused concern.

5.2.3 PRESCRIBING AND MONITORING

No consensus exists regarding dose recommendations for TCA treatment, nor has an optimum dose regimen been determined by research. The average total daily dose of TCA based on the evidence from clinical trials is 2.2 mg/kg/day, with a range of 0.7-6.3 mg/kg/day for imipramine, desipramine, amitriptyline and clomipramine, and 0.4-4.5 mg/kg/day for nortriptyline.

A treatment plan should be carefully organised on the basis of each individual patient’s condition, however the following measures should be undertaken generally:

- Baseline vital signs, cardiovascular examination and ECG (NB a normal ECG does not guarantee against the appearance of cardiotoxic effects).
- Commence with low (sub-therapeutic) divided dose of imipramine or amitriptyline (10-25 mg/day) or nortriptyline (5-10 mg/day) and warn about potential adverse effects.
- Titrate the dose gradually at intervals of several days while monitoring side effects to a target of approximately 1-2 mg/kg/day for imipramine and amitriptyline and 0.5-1 mg/kg/day for nortriptyline.
- Once a dose level has been established, clinically re-appraise and enquire about side effects (these may not necessarily be volunteered spontaneously) and behaviour.
- Checking ECG and serum levels is advisable and mandatory if doses beyond the limits noted above are employed.

Tolerance to TCA drug effects has not been established by research and persisting benefits up to 24 months are reported. When long term treatment is undertaken, periodic re-evaluation of drug response and dosage should take place to allow for growth and development.

5.2.4 WITHDRAWAL EFFECTS

Rapid withdrawal of TCAs should be avoided to prevent influenza-like symptoms due to cholinergic rebound. These include malaise, chills, coryzal symptoms, headache, vomiting and muscle aching. Social withdrawal, hyperactivity, depression, agitation and insomnia may also occur. Patients with poor compliance may undergo periodic self-induced acute withdrawal which may be confused with drug-related side effects, inadequate dosing or worsening psychiatric disorder, making management difficult.
5.3 OTHER DRUGS IN THE MANAGEMENT OF ADHD/HKD

A number of alternative drugs and drug types have been investigated for effectiveness in the management of ADHD/HKD, including clonidine, guanfacine, bupropion, venlafaxine, SSRIs and neuroleptics. Co-morbid disorders such as anxiety, depression, tics and poor response or side effects with psychostimulant or TCA use support consideration of alternative drugs in appropriate patients. However, there is significantly less research evidence to support their use and they are less effective than psychostimulants and tricyclic antidepressants in the management of ADHD/HKD.

- Use of alternative agents should be supervised by clinicians with special knowledge or training in the management of ADHD/HKD.

5.4 COMBINED DRUG TREATMENTS FOR ADHD/HKD

Although increasingly used in clinical practice, drug combinations have been poorly researched to date in the management of ADHD/HKD. Combining drugs increases the risk of potential adverse interactions, e.g. elevation of TCA levels with concurrent administration of psychostimulants, potential toxicity when clonidine and psychostimulants are combined, intraventricular conduction delays with pimozide and TCAs used together, and interference with the metabolism of drugs such as warfarin, and some antiepileptics. Appropriate monitoring is essential and dose reduction may be required.

Combinations of psychostimulants and antidepressant medications have been assessed in limited studies, with positive additive effects on cognitive function and no evidence of excessive side effects. This contrasts with reports of increased levels of confusion and emotional lability in an earlier study of the combined use of imipramine and methylphenidate. The SSRI, fluoxetine, has been reported to be effective, without an excess of side effects, in combination with a psychostimulant in a small number of children with ADHD/HKD and co-morbid depression, ODD, CD or obsessive compulsive disorder.

- Combined drug treatment may be indicated in certain cases, especially where co-morbidity is a feature, but should be supervised by a specialist with expertise in the field.
6 Information for patients

A variety of resources are available which may be of help to children, young people and their families. These include support groups, books and other publications and information available on the Internet.

6.1 SUPPORT GROUPS

The following national organisations can supply current information on local support groups:

**The AD/HD Family Support Groups UK**
Gill Mead
1a High Street
Dilton Marsh
Westbury
Wiltshire BA13 4DL
Helpline: 01373 826045

**Hyperactive Children’s Support Group**
Sally Bunday
71 Whyke Lane
Chichester
West Sussex PO19 2LD
Tel: 01243 551313

6.2 INFORMATION

**ADD Information Services**
Extensive catalogue of books, videos and training aids available for parents and professionals.
Andrea Bilbow
Tel: 020 8906 9068

6.3 WEBSITES

**ADDnet UK:** [www.web-tv.co.uk](http://www.web-tv.co.uk)
*Information, lists of regional support groups and specialists.*

**Children and Adults with Attention Deficit / Hyperactivity Disorder:** [www.chadd.org](http://www.chadd.org)
*Education, advocacy and support*

**IPS:** [www.devdis.com/index.html](http://www.devdis.com/index.html)
*UK training organisation and publisher for Health and Education professionals in the field of childhood developmental disorders, including AD/HD. Information, resources, conferences, online discussion forum.*

**ADD Warehouse:** addwarehouse.com
*Books, videos etc.*

**Information to assist parents and professionals in understanding ADHD and helping children with ADHD to succeed:** [http://www.attention.com](http://www.attention.com)
*Personal site of Dr David Rabiner, clinical psychologist: Research information, monitoring, background.*

**School Psychology Resources Online:**
[www.bcpl.lib.md.us/~sandyste/school_psych.html](http://www.bcpl.lib.md.us/~sandyste/school_psych.html)
6.4 BOOKS

Barnes, Colquhoun.
Hyperactive child - Attention Deficit Hyperactivity Disorder: a practical self-help guide for parents.

Green C, Chee K.
Understanding ADHD: a parents guide to attention deficit hyperactivity disorder in children.

Hallowell EM, Ratey JJ.
Driven to Distraction.
Recognising and coping with Attention Deficit Disorder from Childhood through Adulthood.

Ingersoll BD.
Daredevils and daydreamers: new perspectives on attention deficit hyperactivity disorder.

Ingersoll BD.
Distant drums different drummers: a guide for young people with ADHD.
London: Jonathon Cape; 1995. ISBN 0964854805

Barkley RA.
Taking charge of ADHD: the complete authoritative guide for parents.

Parker RN.
Making the grade: an adolescent’s struggle with ADD.

Cooper P, Ideus K.
Attention deficit hyperactivity disorder: a practical guide for teachers.
7 Development of the guideline

7.1 INTRODUCTION

SIGN is a collaborative network of clinicians, other health care professionals, and patient organisations, funded by the Clinical Resource and Audit Group (CRAG) of the Scottish Executive Health Department. SIGN guidelines are developed by multidisciplinary groups using a standard methodology, based on a systematic review of the evidence. Further details about SIGN guideline development methodology are contained in SIGN 50: A guideline developer’s handbook available at www.sign.ac.uk.

7.2 THE GUIDELINE DEVELOPMENT GROUP

The following multidisciplinary group was formed in consultation with the member organisations of SIGN to develop the guideline. Formal declarations of interest were lodged with the SIGN Executive before commencing work on the guideline development.

Dr Joanne Barton (Chairman)  Senior Lecturer in Child & Adolescent Psychiatry, Royal Hospital for Sick Children, Glasgow
Dr Ken Aitken  Consultant Clinical Psychologist, Edinburgh
Ms Sally Butler  Consultant Clinical Psychologist, Royal Hospital for Sick Children, Glasgow
Mr Robin Harbour  Information Manager, SIGN
Mr Robert Johnstone  Senior Psychologist, Psychological Services, Glasgow
Dr Paul Eunson  Consultant Paediatrician, Royal Hospital for Sick Children, Edinburgh
Dr Moray Nairn  Programme Manager, SIGN
Dr Jamil Nasir  Molecular Medicine Centre, Western General Hospital, Edinburgh
Dr Beverley Norton  Consultant Child Psychiatrist, Department of Child & Family Psychiatry, Edinburgh
Ms Christine Puckering  Consultant Clinical Psychologist, Royal Hospital for Sick Children, Glasgow
Miss Chris Robb  Health Visitor, Ladywell Medical Centre, Edinburgh
Dr Chris Steer  Consultant Paediatrician, Victoria Hospital, Kirkcaldy
Dr David Stone  Paediatric Epidemiologist, Royal Hospital for Sick Children, Glasgow
Dr Alan Woodley  General Practitioner, Dundee

Mrs Janette Lenox, Senior Teacher, Hospital Educational Service, Royal Hospital for Sick Children, Glasgow and Dr David Coghill, Senior Lecturer in Child and Adolescent Psychiatry, University of Dundee, were co-opted onto sub-groups to assist with the evaluation and interpretation of literature. Mrs Barbara Naumann, originally a member of the guideline development group nominated by the Hyperactive Children’s Support Group, resigned in April 2001 due to reservations about the evidence-based methodology used to develop the guideline. (SIGN guidelines are developed according to a standard methodology and recommendations can only be made on the basis of robust evidence).

Guideline development and literature review expertise, support, and facilitation were provided by the SIGN Executive.

7.3 SYSTEMATIC LITERATURE REVIEW

The evidence base for this guideline was collected in accordance with SIGN methodology. Literature searches were performed for all areas covered by the guideline, based on an explicit search strategy. The search covered the Cochrane Library, EMBASE, MEDLINE and PSYCHLIT databases.
In addition, the searches were supplemented by references found by hand searches of recent journals, references cited in other guidelines, references from papers identified through the searches and from personal databases.

There is an extensive literature describing ADHD and HKD, their causation, assessment and management. However, the suitability of much of this literature for inclusion in an evidence-based guideline is affected by a variety of methodological problems, for example:

- The diagnostic criteria for ADHD and HKD have changed over time. This makes direct comparison between studies difficult.
- The diagnostic criteria have been developed for the primary school age group and their applicability to younger and older age groups remains to be established.
- The literature is mainly North American in origin and therefore based on US samples and DSM criteria. Applicability to a UK population is uncertain. In addition much of the research evidence is based on studies of Caucasian males with only limited information available on non-Caucasians and females. Where relevant, these limitations have been highlighted.
- Co-morbidity with other disorders is common and may affect research findings where this has not been addressed.

### 7.4 CONSULTATION AND PEER REVIEW

The draft guideline was discussed at a national open meeting on 8 February 1999, attended by 250 representatives of all the key specialties and organisations with an interest in the guideline. Specialties and organisations represented covered a wide range of interests, including paediatricians, psychologists, GPs, nursing, occupational and language therapists, learning support teachers, social workers and a number of voluntary sector organisations involved in children’s health and learning. The draft guideline was also available on the SIGN web site for a limited period at this stage to allow those unable to attend the meeting to contribute to the development of the guideline.

The guideline was also reviewed in draft form by a panel of independent expert referees, who were asked to comment on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. SIGN is very grateful to all of these experts for their contribution to this guideline:

- Dr James Beattie  |  General Practitioner, Inverurie
- Dr John Gillies   |  General Practitioner, Selkirk
- Dr Peter Griffiths|  Consultant Clinical Psychologist, University of Stirling
- Dr Cyril Hellier  |  Senior Psychologist, Perth
- Ms Sheena Laing   |  Chief Paediatric Dietitian, Lothian University Hospitals NHS Trust
- Dr Angus Mackay   |  Chairman, Health Technology Board for Scotland
- Dr Allan Merry    |  General Practitioner, Ayrshire
- Dr Rachel Oglethorpe|  Consultant Child and Family Psychiatrist, Glasgow
- Professor Lawrence Weaver|  Professor of Child Health, University of Glasgow

As a final quality control check, the guideline is reviewed by an Editorial Group comprising the relevant specialty representatives on SIGN Council to ensure that the peer reviewers’ comments have been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. The Editorial Group for this guideline was as follows:

- Mrs Marion Bennie |  Royal Pharmaceutical Society of Great Britain (Scottish Department)
- Dr Doreen Campbell |  Scottish Executive Department of Health
- Dr Patricia Donald |  Primary Care Adviser to SIGN
- Mrs Pat Dawson    |  Scottish Association of Health Councils
- Dr Chris Kelnar   |  Royal College of Paediatrics and Child Health
- Dr Adrian Lodge   |  Royal College of Psychiatrists
- Ms Juliet Miller  |  Director of SIGN

Each member of the guideline development group then approved the final guideline for publication.
8 Implementation and audit

8.1 LOCAL IMPLEMENTATION
Implementation of national clinical guidelines is the responsibility of each NHS Trust and is an essential part of clinical governance. It is acknowledged that every Trust cannot implement every guideline immediately on publication, but mechanisms should be in place to ensure that the care provided is reviewed against the guideline recommendations and the reasons for any differences assessed and, where appropriate, addressed. These discussions should involve both clinical staff and management. Local arrangements may then be made to implement the national guideline in individual hospitals, units and practices, and to monitor compliance. This may be done by a variety of means including patient-specific reminders, continuing education and training, and clinical audit.

8.2 KEY POINTS FOR AUDIT
Following the development of locally appropriate pathways or guidelines, prospective audit should be undertaken. The management of ADHD/HKD by professionals for different backgrounds means that the development of a National Audit is complicated. Nevertheless, local service providers must ensure that minimum data sets are recorded which address the assessment and management of ADHD/HKD.

Firm outcome measures in the assessment and management of ADHD/HKD are difficult to characterise, although the use of standardised assessment measures in day to day clinical practice would be appropriate. Areas of assessment and management which might be audited include:

- assessment of core symptoms
- assessment of co-morbidity
- assessment of psychosocial functioning
- assessment of family functioning
- number and nature of interventions undertaken
- number of professionals and specialties involved in management
- number of contacts with service
- assessment of patient and family satisfaction with the service.

8.3 RECOMMENDATIONS FOR RESEARCH

- The lack of epidemiological information about prevalence, and therapy in Scotland is an important baseline deficit. A national survey including current regional/post code stimulant prescribing would be valuable.
- Improved management of observed sleep problems has considerable potential for improving the quality of life of those children and families affected. The complex relationships between ADHD/HKD and sleep disorders require further research to be carried out.
- Multimodal treatment studies are difficult to carry out. However they are essential to answering many of the questions posed in this guideline. In particular, girls, pre-schoolers, adolescents and adults are under-represented in the literature and further work must address these groups.
- Long term outcome studies are essential.
- Future studies must combine genetic, neuropsychological and neuroimaging approaches and attempt to integrate or clarify the relationships between the different theoretical models that seek to explain the basis of ADHD/HKD.
- More evidence is required on when treatment should be discontinued.
9 References


ATTENTION DEFICIT AND HYPERKINETIC DISORDERS


## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AACAP</td>
<td>American Academy of Child and Adolescent Psychiatry</td>
</tr>
<tr>
<td>ADHD</td>
<td>Attention deficit hyperactivity disorder</td>
</tr>
<tr>
<td>CD</td>
<td>Conduct disorder</td>
</tr>
<tr>
<td>CRAG</td>
<td>Clinical Resource and Audit Group</td>
</tr>
<tr>
<td>DEX</td>
<td>Dexamphetamine</td>
</tr>
<tr>
<td>DSM</td>
<td>Diagnostic and statistical manual</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>EEG</td>
<td>Electroencephalography</td>
</tr>
<tr>
<td>EMG</td>
<td>Electromyography</td>
</tr>
<tr>
<td>GP</td>
<td>General practitioner</td>
</tr>
<tr>
<td>GRTH</td>
<td>Generalised resistance to thyroid hormone</td>
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<tr>
<td>HKD</td>
<td>Hyperkinetic disorder</td>
</tr>
<tr>
<td>ICD</td>
<td>International classification of diseases</td>
</tr>
<tr>
<td>MPH</td>
<td>Methylphenidate</td>
</tr>
<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
</tr>
<tr>
<td>MTA</td>
<td>National Institute for Mental Health collaborative multi-modal treatment study of children with ADHD</td>
</tr>
<tr>
<td>ODD</td>
<td>Oppositional defiant disorder</td>
</tr>
<tr>
<td>SIGN</td>
<td>Scottish Intercollegiate Guidelines Network</td>
</tr>
<tr>
<td>SSRI</td>
<td>Selective serotonin reuptake inhibitor</td>
</tr>
<tr>
<td>TCA</td>
<td>Tricyclic antidepressant</td>
</tr>
</tbody>
</table>
In order to meet diagnostic criteria it is essential that symptoms:

1. have their onset before the age of seven years (ADHD) or six years (HKD)
2. have persisted for at least six months
3. must be pervasive (present in more than one setting, e.g. at home, at school, socially)
4. have caused significant functional impairment
5. are not better accounted for by other mental disorders (e.g. pervasive developmental disorder, schizophrenia, other psychotic disorders, depression or anxiety).

The core symptoms of ADHD and HKD comprise developmentally inappropriate levels of:

- inattention (difficulty in concentrating)
- hyperactivity (disorganised, excessive levels of activity)
- impulsive behaviour.

Management

ADHD/HKD may be chronic and persistent in many cases. Long-term, multidisciplinary management is required. Further issues to consider include emotional, developmental, educational, and psychosocial factors. It is essential to screen for comorbid conditions, including mood disorders, eating disorders, and substance abuse.

MANAGEMENT

PHARMACOLOGICAL MANAGEMENT

The use of pharmacological agents is important for controlling core symptoms and improving quality of life. The initiation of pharmacological treatment for children with ADHD should only be undertaken by a specialist in either child and adolescent psychiatry or paediatrics who has training in the use and monitoring of psychotropic medications in children and adolescents.

Grade of recommendation

Good practice point

Knowledge of children with special educational needs is important for professionals in their educational and training programmes.

KEY

A

B

C

OTHER DRUG THERAPY

Blood testing should be carried out when clinically indicated. Blood testing should be carried out at the discretion of the supervising clinician and only when clinically indicated.

Alternative Therapies

Family-based psychosocial interventions of a behavioural type are recommended for the treatment of co-morbid behavioural problems. Individualised psychosocial interventions are not family-based psychosocial interventions for the management of ADHD/HKD.

Non-pharmacological Management

Psychostimulants (Methylphenidate and Dexamphetamine) should be considered as the first line of drug treatment for the core symptoms of ADHD/HKD. Tricyclic antidepressants (TCAs) should be considered in the management of emotional and conduct problems in children with ADHD/HKD.

Combined Drug Therapy

Combined drug treatment may be indicated in certain cases, especially where co-morbidity is a feature, but should be supervised by a specialist with expertise in the field.

ASSESSMENT

Psychological and psychosocial assessments associated with significant impairment are essential in the assessment of children with ADHD/HKD.

SOURCES OF FURTHER INFORMATION

ADHD FAMILY SUPPORT GROUPS UK

Helpline 01373 826045

ADD INFORMATION SERVICES

Andrea Bilbow, Tel: 020 8906 9068


diagnostic criteria

education and skills development

for children and young people

Sign

Attention Deficit and Hyperkinetic Disorders in Children and Young People

Quick reference guide

£20 9068

ADHD INFORMATION SERVICES

Helpline 01373 826045

ADHD FAMILY SUPPORT GROUPS UK

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ADD/HKD

SHORT-TERM COMPLICATIONS

Premature birth, low birth weight, parental smoking, alcohol, and drug abuse may be associated with ADHD/HKD.

Long-term complications

ADHD/HKD is associated with significant impairment in many areas of the child and adolescent as they develop. ADHD/HKD is associated with significant impairment in their educational and training programmes.