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MRCPsych Child and Adolescent Psychiatry Module

Attention Deficit Hyperactivity Syndrome (ADHD)

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CAMHS Module: ADHD

Aims and Objectives

- The overall aim is for the trainee to gain an overview of ADHD

- By the end of the session trainees should:
  - Describe signs, symptoms and differential diagnosis of Attention Deficit Hyperactivity Disorder, and treatment options

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CAMHS Module: ADHD

To achieve this

- Case Presentation
- Journal Club
- 555 Presentation
- Expert-Led Session
- MCQs

- Please sign the register and complete the feedback

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CAMHS Module: ADHD

Consider aspects of assessment, formulation, evidence base, NICE guidelines of assessment and intervention, differential diagnosis, co-morbidities, consequences of non-treatment and impact on substance misuse.

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ADHD

- History
- Definition
- ICD10 & DSM V
- Prevalence
- Clinical features
- Differential diagnosis
- Co-morbidities
- Aetiology
- Treatment
- Prognosis: consequence of non treatment & impact on substance misuse

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History of ADHD

- **Not a new concept**
  - **1865** Heinrich Hoffman, German Physician
    - described ‘Fidgety Philip’ – ‘won’t sit still, wriggles, giggles, swings backwards, tilts his chair …growing rude and wild’
  - **1902**: George Still
    - 3 lectures to the Royal College of Physicians, described 43 impulsive children with significant behaviour problems – often aggressive, defiant, resistant to discipline ……
  - **1908:** Tredgold
    - also described similar children who would now have a diagnosis of ADHD with Oppositional Defiant Disorder or Conduct Disorder

History of ADHD

- **1917-18** Encephalitis epidemic in North America
  - Sequelae similar to concept of ADHD
- **1937** Charles Bradley
  - Amphetamine in children with EBD improvement in over-activity & classroom behaviour
- **1940** Methylphenidate (Ritalin) synthesised
  - 1991-1995 USA 500% increased in production. Has continued to increase
  - 1996-2006 UK - 50,000 -500,000 prescriptions.
  - 1990s Adult ADHD

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ADHD

- Clearly defined clinical condition
- Common
- Tends to run in Families
  - probably results from a combination of factors
- Children with ADHD have other problems

Diagnostic classification

- **ICD 10: Hyperkinetic Disorder**
  - ‘a persistent and severe impairment of psychological development, characterised by ‘a combination of overactive, poorly modulated behaviour with marked inattention and lack of persistent task involvement; and pervasiveness, over situations and persistence over time of these behavioural characteristics’

Dignostic Classification

- **DSM V: ADHD**
  - ADHD is described as “a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with development, has symptoms presenting in two or more settings (e.g. at home, school, or work), and negatively impacts directly on social, academic or occupational functioning” - symptoms present before age 12

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ICD 10: F90 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence

- **F90 Hyperkinetic disorder**
  - F90.0 Disturbance of activity and attention
  - F90.1 Hyperkinetic conduct disorder
  - F90.8 Other hyperkinetic disorders
  - F90.9 Hyperkinetic disorder,
  - Age specific

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ICD 10 medical classification system for HKD

- Simultaneous hyperactivity, impulsivity and inattentiveness
- Symptoms prior to 6 years of age
- Impairment present in ≥2 settings
- Exclude diagnosis of mania, depression, anxiety disorders and/or pervasive developmental disorder

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ICD 10 medical classification system for HKD

- Describes that the characteristic behaviour problems associated with HKD should be of early onset (age <6 years) and of long duration
- Caution is recommended in children of pre-school age and *only extreme levels of hyperactivity* should lead to a diagnosis in these individuals
- Diagnosis of HKD may also be made in adult life using the same criteria, however, attention and activity must be judged with reference to developmentally appropriate norms

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DSM V medical classification system for ADHD

- **Children**
  - ≥6 symptoms of inattention and/or ≥6 symptoms of hyperactivity-impulsivity, for 6 months prior to assessment
- **Adults**
  - ≥5 symptoms of inattention and/or ≥5 symptoms of hyperactivity-impulsivity, for 6 months prior to assessment
- Hyperactive-impulsive or inattentive symptoms prior to 12 years of age
  Impairment present in ≥2 settings
- Clinically significant impairment in social, academic or occupational environments
- Symptoms do not occur exclusively during the course of schizophrenia or another psychotic disorder, or are not better accounted for by another mental disorder

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Attention Deficit Hyperactivity Disorder

- Inattention
- Impulsivity
- Hyperactivity
- Executive Functions

Inattention

- **But there are at least 6 types of attention**
  - Arousal, alertness, selective, divided, span of attention, & persistence
- **Not all are impaired - What is?**
  - Poor persistence toward goals or tasks
  - Impaired resistance to responding to distractions
  - Deficient task re-engagement following disruptions
  - Impaired working memory (remembering so as to do) in 80% of children with ADHD

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Hyperactivity and Impulsivity

- Often fidgets with or taps hands or feet, or squirms in seat.
- Often leaves seat in situations when remaining seated is expected.
- Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).
- Often unable to play or take part in leisure activities quietly.
- Is often "on the go" acting as if "driven by a motor".
- Often talks excessively.
- Often blurts out an answer before a question has been completed.
- Often has trouble waiting his/her turn.
- Often interrupts or intrudes on others (e.g., butts into conversations or games)

Executive Functioning

- ADHD disrupts the 5 levels EF but especially the tactical and strategic levels thereby creating a disorder of self-regulation across time
- ADHD can be considered as “Time Blindness” or a “Temporal Neglect Syndrome” (Myopia to the Future)
- It adversely affects the capacity to hierarchically organize behavior across time to anticipate the future and to pursue one’s long-term goals and self-interests (welfare and happiness)
- It’s not an Attention Deficit but an Intention Deficit (Inattention to mental events & the future)

(From Professor Russell Barkley)

PLUS the following conditions must be met …

- Several inattentive or hyperactive-impulsive symptoms were present before age 12 years
- Several symptoms are present in two or more settings:
  - home, school or work; with friends or relatives; in other activities
- There is clear evidence that the symptoms interfere with, or reduce the quality of, social, school, or work functioning
- The symptoms do not happen only during the course of schizophrenia or another psychotic disorder.
- The symptoms are not better explained by another mental disorder
  - e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder

ADHD

- **Prevalence**
  - 3-5% of UK children have ADHD
  - Gender ratio: M: F 4:1
    - Mental Health clinics 6:1 – 9:1
  - Many girls do not get diagnosed
    - Predominantly inattentive and diagnostic construct based in male behaviour
  - Hyperkinetic Disorder
    - UK: 1% of school aged children, UK
    - ~69,000 6-16 yrs olds in England (NICE)
    - 4,200 in Wales (NICE)
    - LAC: 9% (BMJ 2007)

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Co-morbidity

- **Over 50% will have one or more of the following conditions**.
  - Learning disabilities
    - 20-30% have ADHD but can also mimic ADHD in situations
  - Tic & Tourette's Syndrome
    - 7% have Tic disorder
    - 60% TS have ADHD
  - Oppositional Defiant Disorder (ODD)
    - 1/3 of ADHD children mainly boys have ODD
  - Conduct Disorder (CD)
    - 20-40% of ADHD children have CD
  - ASD
    - 1/3 have ADHD
  - Anxiety 34%
  - Depression, Substance abuse, Developmental language delay

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ADHD in girls

- Easily distracted
- Disorganized and “messy”
- Friendship troubles
- Forgetful/day dreamy
- Difficulty completing tasks
- Slow to process information and directions (It may even appear that they aren’t hearing you)
- Careless
- Often late (poor time management)
- Hyper-talkative
- Verbally impulsive (blurts out, interrupts others)
- Easily upset, over-reactive

Differential diagnosis

- Disinhibited attachment disorder;
- Over-activity associated with autistic spectrum disorders
  - including Asperger's syndrome
- Conduct disorder
- Anxious in-attentiveness secondary to stress and trauma
- Agitated depression;
- past closed head injury
- Attention deficit without over-activity
- Gilles de la Tourette syndrome
- Chromosomal disorders e.g. Fragile X syndrome
- Lack of consistent parenting
- Specific learning difficulties
- Physical or sexual abuse or neglect

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What causes ADHD?

Exact causes unknown

- Substantial evidence:
  - Neurobiology and Genetics
- Very little evidence for purely social factors or child-rearing methods
- Environment can play a part to influence severity of ADHD but it is not the cause

What causes ADHD?

Neurobiology

- Reduced Dopamine and Noradrenaline in the synaptic cleft
  - this is thought to be due to: faster reuptake of NA/DA, not enough is produced
- Medication for ADHD reduces the re-uptake of DA and NA back in to the neurones

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What causes ADHD?

Environmental agents

- Some studies have shown association between:
  - use of Cocaine, Benzodiazepine abuse, Alcohol and Cigarettes in pregnancy and risk of ADHD in the child
  - Low birth weight
  - Higher levels of lead in children with ADHD
  - Prenatal stress
  - Pesticides

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What causes ADHD?

Brain Injury

- Only a small percentage of children with ADHD have suffered a traumatic brain injury

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What causes ADHD

Food additives and Sugar

- **1982 scientific consensus**
  - about 5% of children with ADHD had food allergies, mostly young children
- **1985 & 1994 studies**
  - no evidence
  - 1985: alternate days of sugar /sugar substitute. Parents/staff/children did not know
  - 1994: Given sugar substitute (Aspartame). 50 % told they were given sugar and other half told given Aspartame. Parents who thought children had sugar rated more hyperactivity and more critical

What causes ADHD?

Genetics

- Often run in families
- Studies have shown
  - 25% close relatives in the families of ADHD children have ADHD compared to 5% in the general population
  - 1/3 of ADHD children have at least one parent who has ADHD
  - Twin studies:75% concordance in identical twins
- ADHD molecular Genetics Network established in 1999 to help researchers to share the findings

Possible causes…

- Epilepsy and other brain disorders (minority) & Low birth weight/prematurity
- Major disruptions of attachments
- Excessive drinking and smoking in pregnancy
- Prenatal exposure to benzodiazepines and anticonvulsants also predict later hyperactive behaviour
- Exposure to lead in utero and childhood.

What causes ADHD?

Recent Evidence

- These are imaging studies of the brain
  - 2002: studied 152 (boys and girls) with ADHD vs. 139 age and gender matched controls:
    - ADHD children showed 3-4 % smaller brain volumes in all regions
    - The ones on medication: white matter was similar to normal
    - The ones who never had medication: had smaller white matter

Summary

- **No evidence exists to suggest that ADHD is caused by anything other than neurobiological malfunctioning including deficits in**
  - dopamine-decarboxylase in the anterior frontal cortex, leading to reduced dopamine availability and diminished focusing and attention; more symmetrical brains; smaller-sized brains in the area of the prefrontal cortex (caudate, globus pallidus); duplication polymorphism in the DRD4 and DAT genes
- **ADHD sufferers have difficulty in suppressing impulse**
  - respond to all impulses, being unable to exclude those that are unnecessary for the situation
  - rather than failing to pay attention, they pay more attention to more cues than the average person, and are unable to stop the relentless flow of information
  - fail to pause, to consider the situation, options and consequences - act without thinking

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ADHD across life span

- Children do not grow out of it
  - 70-80% carry the condition into their adult life
- Early identification and multi-modal treatment reduces the risk of developing future difficulties including
  - Antisocial behaviour
  - Abuse of alcohol & Tobacco & illicit substance
  - Poor academic & social functioning
  - Poor self esteem
  - Other psychiatric difficulties
  - Pressure on families

Assessment and Diagnosis

- **Assessment and diagnosis by CAMHS/Community Paediatrics**
- Assessment
  - Information from parents/carers and other professionals who know the child (school teachers etc.)
  - Observations in clinic and at school
  - QbTest
  - Rule out other causes for the behaviour
- Diagnosis
  - Inattention, impulsivity, hyperactivity, present before the age 7 and pervasive
- Regular monitoring as per NICE guidelines
- Regular audit of practice against NICE Guidelines

ADHD

Treatment and Intervention

- Multi-modal:
  - social, psychological and behavioural intervention – child, parents, teachers
- Behaviour Management
- Parenting strategies (WS groups, Parent Child Game)
- Individual work with Children and Families
- Medication
- Address co-morbidities Liaison with school and other agencies

Medication

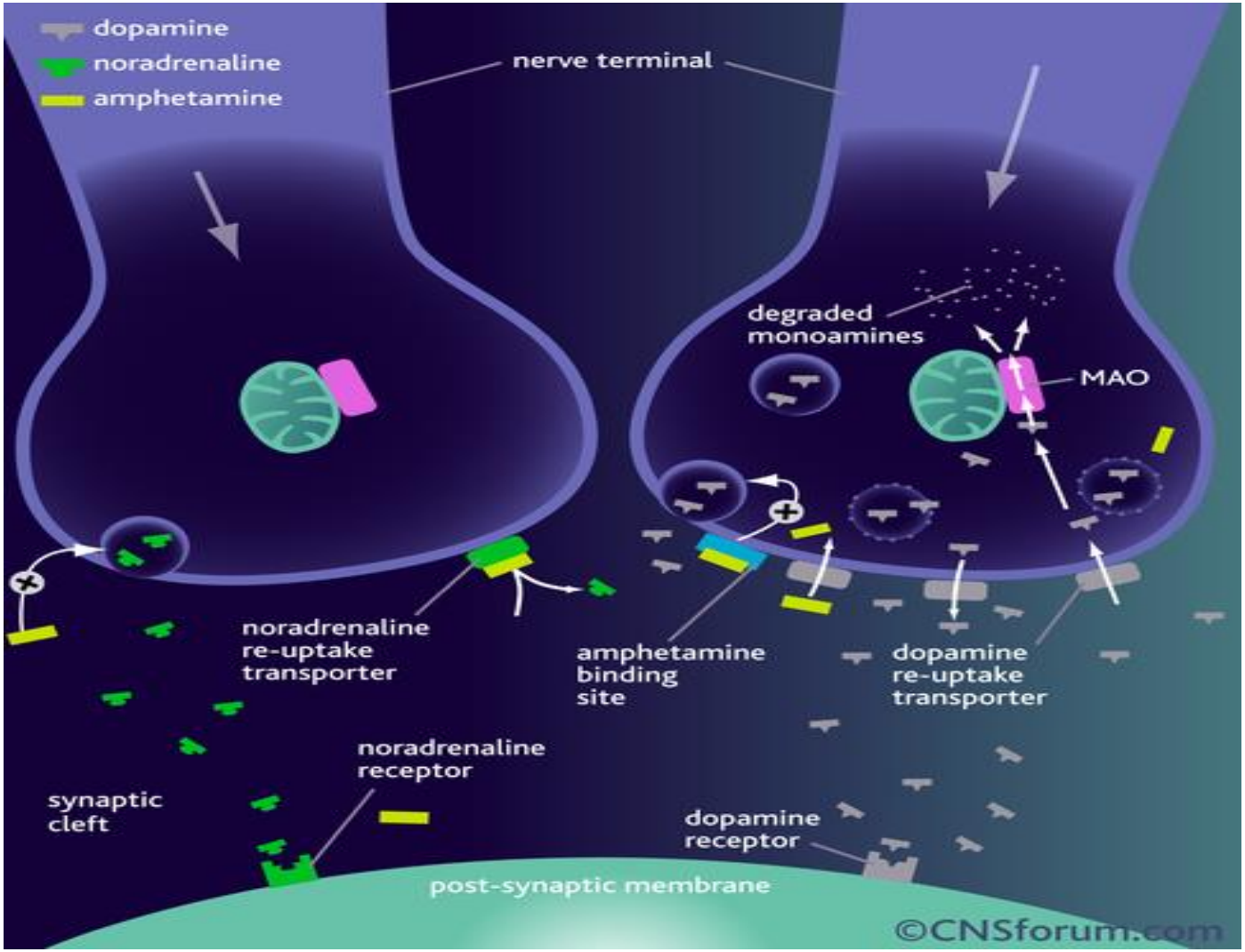
Stimulants

- **Short acting**
  - Methylphenidate (Ritalin, Equasym), Dexamfetamine.
- **Long acting**
  - Matoride/Concerta XL (20/80 – 12 hrs)
  - Equasym XL 30/70 – 8 hrs)
  - Medikinet XL (50/50 – 8 hrs)
  - Elvanse (pro-drug of Dexamfetamine) lasts for 12 hrs

Medication

Non-stimulants

- Atomoxetine
  - noerepinephrine reuptake inhibitor-long acting up to 24 hrs
- Guanfacine
  - central alpha 2A-adrenergic receptor agonist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dopamine receptor
post-synaptic membrane
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Medication

Side-effects

- Reduced appetite
- Sleep disturbance
- Tics
- Headache
- Nausea & Vomiting
- Abdominal Pain
- Emotional
- Listlessness
- Increase in suicidal thoughts (Atomoxetine)

Maintaining factors

- Response of parents
- Response of teachers
- Peer influences

NICE guidelines for ADHD

- Methylphenidate (MTP) is recommended as part of a comprehensive treatment programme
  - not licensed for children <6
- Assessment and treatment by Child Psychiatrists or Paediatricians with special expertise in ADHD
- Should involve children, parents, carers, school,
- Consider cultural factors and environmental factors
- Comprehensive treatment programme desirable
- Regular monitoring and drug holidays

Challenges for Health Services

- Raising Awareness and training of front line professionals who can refer or direct referrals to CAMHS
  - resource implications
- Desire to treat Children with ADHD and impairment *vs.* how can we manage if all these children are referred?
  - Need for multiagency integrated pathways)
- Multi-modal therapies are the treatment of choice
  - This needs skilled practitioners and closer working relationship with other children services colleagues
- Implications for ADHD graduates from CAMHS to adulthood
- Addressing myths about ADHD/Treatments

Prognosis

- **Children with ADHD do not grow out of it**
  - Between 70-80% carry the condition into their adult life to a varying degree (Klein and Mannuzza, 1991)

- **Early identification and multimodal treatment reduces the risk of developing further complications**
  - Antisocial behaviour
  - Abuse of alcohol, tobacco and illicit substances
  - Poor academic and social functioning,
  - Further psychiatric morbidity

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How important is it to treat?

- Barkley et al 2002 (Milwaukee) identified that adults with ADHD compared to a control group have:
  - 2.4 times the rate of heart disease
  - 11.4% higher BMI
  - 2.2 times the rate of non-medical drug use
  - 32% more medical/dental problems
  - 2.5 times the rate of sleep problems

How important is it to treat?

- Barkley et al 2002 (Milwaukee) note that adults with ADHD have:
  - increased use of the healthcare system
  - increased use of sick days from employment
  - higher rates of depression, anxiety and antisocial personality disorder
  - higher risk sexual activity
  - higher rates of divorce and separation

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How important is it to treat?

- Barkley et al 2002 (Milwaukee) notes that adults with ADHD have:
  - more job terminations, disciplinary actions, job changes, lower incomes and more problems following instructions and carrying a workload
  - they have significant problems budgeting
  - they have greater rates of driving accidents

MCQ:1

- **A four year old boy is brought to clinic with his parents. They report that he is inattentive at school, will not sit and play with his siblings at home and on one occasion let go of his mother's hand whilst shopping and ran out into the road. Following assessment and diagnosis, what would your initial management step be?**

- a) Refer patient for individualised CBT
- b) Refer family for Family Therapy
- c) Refer family to parent training and education sessions
- d) Commence 5mg methylphenidate daily, titrating up weekly until improvement is seen
- e) None of the above

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Answer

- **Answer: c**: refer to parent training and education sessions. NICE guidelines advise that first steps in management of pre-school aged children with a diagnosis of ADHD should be a referral for parent training and education. Medication is not first line for pre-school children or those with mild-moderate illness.

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MCQ:2

- **Whilst taking a history from a father of a 6 year old boy with suspected ADHD, he tells you that his son drinks a lot of orange squash when he visits his grandparents and his impulsive and inattentive behaviour seems to be worse afterwards. What would be your initial advice?**
- a) Instruct the grandparents not to give him orange squash
- b) Refer to a dietician
- c) Commence fatty acid supplements
- d) Advise father to commence a food/behaviour diary
- e) All of the above

Answer

- **Answer: d**: advise father to commence a food/behaviour diary. Clinical assessment of ADHD should include asking about food and drinks that appear to influence hyperactive behaviour. If there is a clear link, health professionals should advise parents or carers to keep a diary of food and drinks taken and ADHD behaviour. If the diary supports a relationship between specific food or drinks and behaviour, then a referral to the dietician should be offered. Dietary fatty acid supplementation is not recommended for the treatment of ADHD in children and young people. (NICE guidelines 2008 1.4.2.3-4)

MCQ:3

- **The parents of a 5 year old girl recently diagnosed with ADHD have cancelled their second group parent training and education session. They tell you this is because their 11 year old son has learning disabilities and is wheelchair bound. They have no extended family or close friends to help with child care arrangements on the days required. What would you advise?**

- a) Offer to commence medication for the patient as they will not be able to attend the parent training and education sessions
- b) Offer to hold individualised parent training and education sessions on a day that would better suit them
- c) Discharge the family from your case load as they have missed two consecutive appointments
- d) None of the above
- e) Ask them to contact children and family services to arrange child care whilst they attend the training sessions

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Answer

- **Answer: b**: offer to hold individualised parent training and education on a day that would better suit them. Individual-based parent training and education programmes are recommended when
- A group programme is not possible due to low participant numbers
- There are particular difficulties in attending group sessions such as disability, needs related to diversity such as language
- Family needs are too complex to be met by group based training
- (NICE guidelines 2008 1.5.1.5)

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MCQ:4

- **You have assessed a 7 year old boy with suspected ADHD in clinic. You would like to get further information about his behaviour in school from his teachers. Which of the following regarding consent to discuss the case with school is correct?**
- a) You will need to document that you have obtained consent from the patient's parents or carers before you contact the school for information
- b) You will need to document that you have obtained consent from the patient before you contact school for information
- c) You don't need consent to request information with school
- d) You don't need consent to request information from school as long as you don't discuss treatment with them
- e) You will need verbal consent from the patient's parents or carers before you contact the school for information

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Answer

- **Answer: a**: you will need to document that you have obtained consent from the patient's parents or carers before you contact the school for information. You must always obtain consent from parents or carers before contacting outside agencies about a patient, including school, paediatricians etc. This should be documented in the notes(historically, legal case law suggests that if something isn't written down, it never happened!). Occasionally, in cases where there are child protection concerns and consent is refused; this refusal can be overridden if you feel the risk to the child is high enough to warrant it.

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MCQ:5

- **Following assessment of an 8 year old boy, you diagnose severe ADHD with severe impairment of functioning in both social and academic domains. What would be your initial step in management?**
- a)Refer family to Family Therapy
- b) Refer patient for CBT
- c) Refer family to parent training and education
- d) Commence the patient on medication
- e) None of the above

Answer

- **Answer: d**: commence the patient on medication. The first line treatment for school aged children with severe ADHD and severe impairment is drug treatment. If the child wishes to refuse medication and/or the parents reject it, a psychological intervention may be tried but drug treatment has more benefits and is superior to other forms of treatment for this group. Parents can be offered the parent training and education as an adjunct. (NICE guidelines 2008 1.5.3)

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MCQ:6

- **You wish to complete a pre-drug treatment assessment on a 7 year old girl with diagnosed severe ADHD. Which of the following is NOT routinely required?**
- a) Record of height and weight plotted on centile chart
- b) ECG
- c) Heat rate and blood pressure plotted on a centile chart
- d)Mental health and social assessment
- e) Assessment of cardiovascular symptoms

Answer

- **Answer: b:** ECG. An ECG is not part of the routine assessment and is only required if there is a past medical or family history of serious cardiac disease, a history of sudden death in young family members or abnormal findings on cardiac examination. (NICE guidleines 2008 1.5.4.1)

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MCQ: 7

- **You have been seeing a 12 year old boy with ADHD. Parent training/education sessions proved ineffective. With the parents' consent you commenced the patient on low dose methylphenidate, 5mg daily. At the following review the methylphenidate is not working and the patient's behaviour continues to be impairing his social and academic functioning. You are happy that your diagnosis remains correct. He does not describe any side effects on questioning. What would your next step in treatment be?**
- a) Consider commencing low dose bupropion as an adjunct to methylphenidate
- b) Consider stopping methylphenidate and commencing Atomoxetine
- c) Stop medication and review diagnosis again
- d)Consider stopping methylphenidate and commencing low dose dexamfetamine
- e) Consider increasing the dose of methylphenidate

Answer

- **Answer: e**: Consider increasing the dose of methylphenidate. Methylphenidate is first line drug choice in those with ADHD without significant comorbidity. This patient has been commenced on a low dose and this should be increased before thinking about other medication providing there are no contraindications to doing so. BNF max: 2mg/kg/day. Atomoxetine can be considered if methylphenidate has been tried and is ineffective at maximum tolerated doses or the patient is intolerant to low doses. (NICE guidelines 2008 1.5.5.3)

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MCQ:8

- **NICE guidance suggests that modified release preparations of methylphenidate should be considered for all the following reasons, except:**
- a)Convenience
- b) To increase adherence
- c) To help in facilitating schools who cannot safely store medication
- d) Patients with co-morbid tic disorder
- e) Reducing stigma

Answer

- **Answer: d**: Patients with co-morbid tic disorder. Nice guidelines suggest MR preparations to aid convenience, improve adherence, reduce stigma, reduce problems at school in storing and administering, for their pharmacokinetic effect. It does not mention its use specifically for those with tic disorder

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MCQ:9

- **ICD 10 diagnosis of hyperkinetic disorder includes all the following criteria, except:**
- a) Inattention, hyperactivity and/or impulsivity persistent for at least 3 months
- b) Symptoms are pervasive across situations
- c) Symptoms are not caused by other disorders such as autism or affective disorders
- d) Symptoms cause impairment in social, academic or occupational functioning.
- e) All of the above

Answer

- **Answer: a**: inattention, hyperactivity and/or impulsivity persistent for at least 3 months. ICD 10 suggests symptoms of ADHD should have persistent for at least **6** months before a diagnosis is made.

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MCQ:10

- **Adverse effects of Methylphenidate can include all, except:**
- a) Raised blood pressure
- b) Anorexia
- c) Insomnia
- d) Growth acceleration
- e) Exaggeration of tic disorders

Answer

- **Answer: d**: growth acceleration. Side effects of methylphenidate can include growth

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CAMHS - ADHD

Any Questions?

Thank you