Children and Adults with ADHD: Bridging the Gap – The Need for Creative Collaboration

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An extensive review of the literature reveals that Attention Deficit Hyperactivity Disorder (ADHD) is the most widely researched of all childhood conditions and the most common neuropsychiatric disorder that presents to Child and Adolescent Mental Health Services (CAMHS)[1][2]. International epidemiological studies using standardized diagnostic criteria suggest that 3% to 6% of the school-aged population is affected.[3][4] Studies in the UK report the lowest prevalence in the world, most likely due to stricter criteria rather than a lesser incidence. The percentage of youth in the UK being treated for ADHD is at the extreme end of the international prevalence range. Epidemiological studies do not yet exist for determining the prevalence of ADHD in adults; however there are a growing number of outcome studies indicating that the condition in childhood persists into adulthood in approximately 30-60% of individuals. [5][6][7]

There is concern among professionals and parents who are familiar with the condition that the significant underdiagnosis in the UK may leave many children untreated and vulnerable to long-term negative consequences and many families negatively affected. The greatest movement for understanding ADHD in the UK has been initiated by the parents of children with this condition. Hundreds of support groups for parents are emerging throughout the UK, reflecting a grass roots movement to disseminate information and to help others about this complex and debilitating condition. Over four hundred UK parents of children and young adults with ADHD attended the first ever parent only convention supported by ADDISS in September 2003 in Southport. (See www.ADDISS.co.uk for details). They shared their experiences, views and concerns, which will be collated and presented to the Government.

Historical Background

In the UK and amongst European nations, professionals using the ICD 10 refer to this condition as Hyperkinetic Disorder. Historically, the hyperkinetic diagnostic label was prevalent in British clinical practice influenced by the early work of Professor Rutter and his colleagues who viewed hyperkinetic disorder as: 1) an extreme state of excessive activity, 2) a relatively uncommon disorder, 3) and usually occurring in conjunction with epilepsy, hemiplegia, intellectual disabilities or a clear history of brain injury such as trauma or infection.[8]

Dr Constantine von Economo first observed post-encephalitic behaviour in children during the early 1900s and this was used as a model for the term *hyperkinetic syndrome* in which normal children were described as having behaviour similar to minimal brain dysfunction.[9] In the early 1970's, Paul Wender advanced the hypothesis that the aetiology of minimal

brain dysfunction (MBD) might be genetic in origin and produced by decreased catecholaminergic functioning.[10]

In 1980, the Diagnostic and Statistical Manual of Mental Disorders (DSM III) introduced the classification of an attention–deficit disorder, with or without hyperactivity. For the first time, it was viewed as a disorder that often persisted into adulthood, but no clear criteria of adult symptomatology was described. Evidence based practice has persuaded clinicians to currently view the DSM IV description of ADHD which takes into consideration other elements of the disorder that the hyperkinetic label with it's stringent criteria omits, such as the distinction between inattention and other symptom clusters. The evolution of this condition is thus defined by chronic difficulties with inattention, impulsivity and hyperactivity, which Russell Barkley labeled as the 'holy trinity' of ADHD.

A more recent and unifying model of brain pathology has evolved from neuropsychological research on ADHD which hypothesises self-regulation deficits involving *executive functions* of the pre-frontal lobe cortex. Using a range of neuropsychological measures, impairments are evident during effortful tasks in children, adolescents, and adults with ADHD (controlled for psychiatric co-morbidity and specific learning disabilities). The impairments found involve component neuropsychological executive functions associated with: response inhibition, emotion regulation, working memory, regulation of motivation and motor control (planning, inhibition).[11] Social functioning is impaired as a result of these deficits and can have a devastating impact interpersonally and intrapersonally.

Aetiology

Research[12] indicates that this condition has a high likelihood of genetic transmission, which supports the validity of ADHD in adulthood. Monozygotic twins have a heritability index ranging from 0.88-1.0, which on average is the same concordance rate for schizophrenia. The rate in dizygotic twins is about 30%.[13] Biological parents of children with ADHD have a much greater rate of having the condition than a comparison group of adoptive parents.[14] There is also more alcohol abuse, mood and personality disorders in the biological relatives of children with ADHD. [15]

> Thus, ADHD is most likely multifactorial in its aetiology. Environmental factors play a role in the *expression* of ADHD (e.g. harsh and punitive parenting), but genetic factors are much more significant. The research is prolific in genetic studies, and findings suggest that polymorphic variation in the gene encoding implicates the postsynaptic D4 receptor and the dopamine transporter as candidate genes contributing in the expression of ADHD symptomatolgy.[17] Biederman et al[12] reports multiple groups have independently reported on associations between ADHD and the postsynaptic D4 receptor in both children and adults with ADHD. The occurrence of the postsynaptic D4 polymorphism in ADHD youth is higher than would be expected by chance. In addition, ADHD youth with the polymorphism have more severe symptomatology and impairment than those without it.

Cerebral catacholamines deficits are also aetiologically recognised: specifically dopaminergic, nonadrenergic, and serontonergic systems dysfunction. This is clinically manifested in a

person's poor performance on specific task oriented requirements, defective information processing, executive functioning deficits, short-term memory and poor attention to detail.[18] Noradrenaline plays a role in individuals who are disinhibited, impulsive, or aggressive. Positron and single-photon emission tomography scans have also indicated hypo function and low metabolic activity in the brain at prefrontal and caudate nucleus areas.[19] These abnormalities may be associated with difficulties in planning, judgment, and time perception. The research of Zametkin *et al* [18] using positive emission topography (PET) with {fluorine 18}fluoro-2-deoxy-D-glucose confirmed earlier brain imaging studies regarding abnormal regional and global glucose metabolism in the brains of adults with ADHD since childhood.

ADHD is a condition that rarely exists alone. If a child has been diagnosed with 'pure' ADHD, it more likely that a co-morbid condition has been undetected or the diagnosis is inaccurate. In 2002, the US Centers for Disease Control and Prevention (CDC) indicated that 60% of the 1.6 million school-aged children diagnosed with ADHD have been identified with an accompanying specific learning difficulty such as dyslexia, dysgraphia, or dyscalculia.[20] In The US Coalition for Juvenile Justice's 16th Annual Report to the President, the Attorney General's report to the Congress was that "Between 50 to 75 percent of incarcerated youth have a diagnosable mental health disorder; up to 50 percent have Attention Deficit-Hyperactivity Disorder". [21]

Research[22] indicates that approximately 80 percent of children simultaneously present with other conditions (e.g. specific learning disabilities, mood disorders, disruptive behaviour disorders, conduct disorders, autistic spectrum disorders, childhood bi-polar disorder, developmental co-ordination disorder, anxiety and tics).[23] Co-morbidity in adolescents and adults with ADHD include: specific learning disorders, anxiety disorders, intermittent explosive disorders, Cluster B personality disorders, bi-polar disorder, mood disorders, and substance abuse.[24] This is an extraordinarily high co-morbidity rate and calls for early diagnosis and intervention with fierce clinical precision of the symptom trajectory and multi-modal treatment with a view towards long-term management planning.

Co-morbidity
Risks & Impairment in Adolescents with ADHD

Children and young people with ADHD frequently suffer educational and social disadvantage, and can also be at higher risk for life-threatening problems. Children with ADHD are more likely to be at increased risk for accidents (such as bicycle and pedestrian), accidental poisoning, serious injuries, and deaths.[25] Adolescents with ADHD when compared to their peers, are more likely to experience teen pregnancy (40%) and sexually transmitted diseases (16%). Young adults with ADHD are more likely than controls to have significantly more automobile crashes (and to be at fault for them), have more bodily injuries associated with auto accidents, have more speeding tickets and other citations, and to have driving license suspensions.[26]

Adolescents and young adults with untreated ADHD are more at risk than their peers for using illegal drugs and abusing alcohol.[26][27][28] A recent study by Harvard researchers has provided evidence that treating children with ADHD pharmacologically reduced the risk of

drug and alcohol disorders by half.[29] These studies comprised data from 674 subjects with ADHD and 360 unmedicated youths. Pre-pubescent boys and girls and adolescents with ADHD are more likely than their peers to be addicted to nicotine.[26] Data from laboratory neurochemical studies[30] show that nicotine stimulates dopaminergic neurotransmission, improves cognition and heightens awareness and reduces hyperarousal, which may explain the high rate of addiction in those that suffer form ADHD.

Assessment of Childhood VS Adulthood Symptomatology

ADHD was previously thought to be largely a childhood condition, however there is increasing evidence that this neurobehavioural condition and its associated impairments will often persist through the lifespan.[31] Considerable controversy exists in the UK about the persistence of ADHD in spite of longitudinal studies and clinical trials that present evidence for post adolescent ADHD. Toone and Vander Linden[32] estimate that approximately 0.5% to 1% of the young adult population in the United Kingdom has symptoms associated with ADHD, however this figure currently is most likely an underestimation.

According to Barkley et al,[33] and Wender,[34] roughly 60% of children with ADHD have symptoms that persist into adulthood. Wender regards ADHD as the most common undiagnosed neuropsychiatric disorder of adult life. There is a vast body of international opinion regarding the appropriate way forward for adults with a childhood onset that challenges the notion that symptoms remit during or after adolescence.[35]

Adolescents Transitioning into Adult Services

The need for collaboration between Child and Adolescent Mental Health Services and Adult Mental Health Services is crucial as the evidence indicates that ADHD symptomatology often persists into adulthood and causes severe impairment. Clinicians are confronted with the problem of transitioning young people with ADHD from CAMHS into adult services. There exists only one NHS service for adults in the whole of the UK and it is not without a long waiting time. Paediatricians often carry a large load of adolescents and young people with ADHD. They need to hand over care of their patients at 16 or 17 years of age, which often leaves patients languishing on waiting lists or lost in the NHS shuffle.

The issue of provisions for college students with ADHD in the UK has not been well addressed. Preparation for the transition to college/university, environmental restructuring, study skills preparation, and exam accommodations are a few of the salient needs during this developmental stage. Medication for young adults is another concern. A recent questionnaire pack(36) was sent to 50 UK undergraduate student health centres attached to higher education colleges/universities regarding pupils who were diagnosed with ADHD and were taking Methylphenidate. It was determined that those caring for undergraduate students with ADHD, the majority of whom were GP's, were still largely unfamiliar with the condition due to inadequate clinical training. Guidelines need to be drawn up to establish handover from paediatric to adult care. A recent US study[37] concurred with these obstacles and empahsised the need for a well-validated screening tool that could help primary care physicians refer individuals on to the appropriate specialist or specialist clinic. The study

described a new assessment tool, the Adult ADHD Self-Report Scale (ASRS), which was developed in conjunction with the World Health Organization.

Clinicians are faced with the challenge of treating adolescents with ADHD and co-morbid conditions such as oppositional defiant disorder (ODD) and conduct disorder (CD). There is a high percentage of youth with ADHD who will turn to criminal activity because they are not receiving any treatment at all, let alone treatment that is evidence based. As mentioned earlier, there is high occurrence probability of ADHD among the prison population; most of whom remain undiagnosed. Of all the common co-morbidities, CD poses the most serious risk for the young person and threat to our society.

Impairment in Adults with ADHD

Several longitudinal and cross-sectional studies have shown that adults with ADHD are more likely to be impaired academically, psychosocially, and occupationally than their non-ADHD peers.[38] [39] They complete fewer years of higher education, change jobs more frequently, are more likely to be unemployed/underemployed and have a lower adult standard of living. In addition, they are more likely to experience interpersonal conflicts, including marital break up and multiple marriages. The rate of antisocial personality disorder in adults diagnosed as having ADHD in childhood is ten times that of controls, occurring in at least 23% of subjects.[40]

Barkley's research[41] found that 170 adults with ADHD compared to matched controls had more recurrent changes in employment, poorer job performance, more serious driving risks, had been sacked more and quit jobs more frequently, had a history of poorer educational performance and more frequent school disciplinary actions against them. In summary, the empirical evidence shows severe impairment for individuals with ADHD who are undiagnosed and untreated, especially when confronted with the developmental challenges of higher education attainment, employment and marital/family relationships.

ADHD in Parents

As members of a CAMHS multidisciplinary team who co-run a weekly ADHD Assessment Clinic, we are sensitive to both the environmental and genetic aspects when evaluating the child and family. In the initial feedback session with parents whose child has been positively diagnosed with ADHD, we emphasise that the nature of this neurodevelopmental condition often causes children to be highly demanding and difficult to manage. The child's behaviour puts enormous stress on the family unit, exhausts the parents' resources and makes them feel deskilled. Sometimes parents experience a wave of sadness after their child's diagnosis and break down in tears with a myriad of feelings, including relief. For years they knew there was something "wrong" with their child. They felt enormous guilt and blamed themselves. They felt judged by professionals who indicated that their child's problems were caused by poor parenting despite the puzzling aspect that their other children were faring relatively well (in many cases).

It is important that parents understand that their child's disruptive behaviour can often generate reactions of intense feelings within themselves such as disappointment, fury, impatience and despondency. This 'expressed emotion' within the relationship may create a

vicious cycle reinforcing the amount of negative attention that the child receives. [42] Parent training for younger children and family therapy for adolescents offered by experienced therapists knowledgeable about ADHD are classified as evidence based treatments for childhood ADHD.[43]

We not only take a detailed history of the child, but the background and family history of the parents is explored and marital and parental functioning is assessed. It is a relatively common experience to hear parents say "I know I have got it too" or a spouse may state, "I think he/she also has this condition." One parent described her problems as:

> I have anger management problems. But it is the adrenalin rushes that I can't control more than anything. The need to always be busy to the point of exhaustion affects my time spent with the kids. I often get angry when I am trying to concentrate on something (i.e. driving). I often daydream in the car to the point of asking myself, "How did I get to here"? So I must concentrate harder when I drive. Sometimes I will snap out of it if something happens in the road (i.e. break lights etc.). The daydreams are often about planning the day, running over conversations, trying to remember everything that needs to be done. I can't slow my brain down.

When parents make the connection about how their own adult ADHD symptoms may have unintentionally contributed to their parenting difficulties, they may feel like they can now start with a new approach. They are often willing to engage in parent training or family therapy, especially if they know the therapist has knowledge and understanding of ADHD in adults. Helping parents to reduce their friction with their ADHD child, use a neutral language, and adopt new techniques of management produces more successful family interventions. Parents often respond extremely well to the support and sometimes ask for a referral to adult psychiatry/psychology for therapy or for an assessment of adult ADHD.

Clinicians working with families may make use of Michael White's[44] narrative therapy techniques. Dr Dinah Jason, Consultant Child and Adolescent Psychiatrist from Manchester highlights the importance of using *externalising language* (separating the ADHD from the person) when working with families:

> 'It's not you I'm angry at, but the behaviour'. 'Please go out of the room and leave the trouble outside'- These phrases can be said as much by the child as the parent if they learn to 'catch' trouble out before it escalates, and develop a family rule about not letting the intense expression of emotions into the room. Parents can learn to separate their impulsive 'temper' reaction triggered by a minor stimulus in their child after a bad day and excuse themselves from the room while they sort it out and leave it outside, hence not rejecting or blaming the child. This improves attachments. A parent who once believed 'I am a bad parent' can shift their thinking to 'ADHD has hindered me from being the good parent I want to be and am capable of being'. They can be empowered to change with motivational work and support.

Grief is often triggered in parents who identify the losses and harm incurred from their own untreated ADHD in childhood and the wreckage of their adult history. Suddenly they have found some of the pieces to their childhood jigsaw puzzle and events begin to make sense. They remembered being negatively evaluated by parents, teachers and peers in certain areas of functioning that were near impossible to achieve, resulting in years of feeling shamed and blamed. The combination of their ADHD characteristics and low frustration tolerance of their parents (first generation) was a recipe for abuse. In a long-term study by Wender, 45% of patients with ADHD had been physically abused.[45] These adults often need educating

about their child's condition as well as their own. They need to find a framework for making sense of their past experiences and will benefit from a combination of treatment interventions.

Parents with ADHD report that normal day-to-day activities are particularly taxing. For example, just getting themselves and their children organised in the morning to arrive at school and work on time alone is described as a Herculean effort. Marital relationships and raising children can be extremely challenging when two or more family members have ADHD as well as accompanying co-morbid conditions. This has far reaching effects on the family and society in general.

Assessment of Childhood VS Adulthood Symptomatology

Attention Deficits

Parents and teachers often describe attentional problems in children as: "doesn't seem to listen, fails to finish assigned tasks, day dreams, often loses things, can't concentrate, easily distracted, can't work independently of supervision, requires more redirection, shifts from incomplete activity to another, confused and seems to be in a fog".[46][47] Inattention is seen most dramatically in situations requiring the child to sustain attention to dull, boring, repetitive tasks such as independence, school work, home work, and chore performance.[48]

There is no data currently using direct behavioural observation of inattention in adults with ADHD that are similar to the data that exists for children. Adults with ADHD are highly likely to self-report attentional problems. Murphy and Barkley[49] found that 83% of adults diagnosed with ADHD reported having difficulties with sustained attention and organisational problems. The self-reports are corroborated by others who know the subjects well (i.e. spouses, and parents). In a study by Millstein et al.,[50] 90% of adults presenting for treatment with ADHD endorsed functionally impairing inattentive symptomatology.

Impulsivity

Children with ADHD make careless mistakes and impulsive errors. They frequently call out in class, have difficulty waiting their turn in groups, and have deficits in response inhibition and arousal modulation. Studies on ADHD in adulthood indicate problems with interrupting or intruding into others boundaries, difficulty with delaying gratification, and loquaciousness. Adults with ADHD are prone to make impulsive comments to others, are impulsive spenders (and are often in debt). Other symptoms include hyperarousal, explosive expression of anger, difficulty in managing frustration, hypersensitivity to criticism and to external stimuli, and problems related to driving because of poor impulse control and judgement (e.g. excessive speeding).[51] [52]

Hyperactivity

Although hyperactivity diminishes in a majority of children as they grow older, it can often be replaced with an inner feeling of restlessness in adults and difficulties with relaxing. Barkley's research[53] on persisting hyperactivity in adults indicated that 40 per cent of the

subjects with ADHD at age 15 years had conduct disorder and higher rates of oppositional defiant disorder. Other research shows that persisting hyperactivity is associated with defiance or aggression as well as increases the risk of conduct disorder, antisocial personality, substance abuse and criminality in adulthood [54] The majority of outcome studies however, indicate that inattention is probably the most enduring of all persisting symptoms (e.g. Biederman's on-going longitudinal study[55] in which symptoms were measured in 128 boys).

Operational Criteria and Protocol for Assessing ADHD in Adulthood

Both the ICD 10 symptom criteria for Hyperkinetic Disorder and DSM IV criteria for ADHD are specifically in reference to children, with only one reference indicating the persistence of the DSM-IV childhood criteria in adults. Many of the childhood symptoms are grossly inapplicable to adults, such as "can't play quietly", and "climbs on furniture inappropriately".

Paul Wender and his colleagues developed an operational criteria for the diagnosis of ADHD in adults via the "Utah Criteria" in which symptoms were determined empirically by open ended interviews with patients who had an established history of ADHD in childhood.[56] The *Wender Utah Rating Scale* (WURS) asks the adult to rate his/her own memory of descriptors characteristic of ADHD in childhood. This scale is extremely useful when making a retrospective diagnosis as it includes persistence, pervasiveness and dysfunction in the rating. The adult reports on his/her memories of 25 descriptors characteristic of ADHD in childhood. The parents of the adult with ADHD symptomatology can be helpful in the assessment of childhood symptoms. The *Conners' Parent Rating Scale* (CPRS) used retrospectively and in conjunction with the WURS is highly recommended. The parent can also give important information on early developmental history such as gestation, delivery, temperament, developmental milestones, and medical history. If the parent(s) were unavailable or deceased, the clinician would still need to obtain additional objective data such as school records going as far back as possible and conduct interviews with siblings or significant others who knew the person as a child or adolescent.

The purpose of the WURS is not to diagnose the presence or absence of ADHD currently, but to determine if the adult had a childhood history compatible with the diagnosis of ADHD. For example, someone with childhood onset Bipolar Disorder might obtain a high score on the WURS, but if so, he/she would have a diagnosis of Bipolar Disorder, and any current ADHD symptoms would need additional investigation using a different measure. Even if an individual had ADHD as a child, this does not mean he/she has it at present, even though it does persist in a significant number of people post-adolescence.

When assessing current adult symptoms, it is imperative to use other sources than self-report because research indicates that critical symptoms are often underestimated or not disclosed by the adult who is being assessed.[33] A 15-year longitudinal study of hyperactive children into young adulthood found that parental reports of their offspring's ADHD in adulthood have greater validity and were more useful in predicting impairment in major life activities than were self-reports. [57]

There are several rating scales for adult ADHD, however, we recommend the *Wender-Reimerr Adult Attention Deficit Disorder Scale* (WRAADDS),[52] [74] because it is the only measurement based on the inquiry of adults who had a diagnosis of ADHD in childhood. The ratings are assessed during a joint interview with a significant other(s) and it evaluates the severity of the highly relevant symptoms from the Utah diagnostic criteria. Wender's research shows that along with hyperactivity, inattention, and impulsivity, four additional symptoms create the 7 categories in total which comprise the cornerstone of adult ADHD core symptomatology:

1. mood lability
2. hot temper
3. disorganization
4. over-reactivity to stress

The scale rates individual items in the 7 categories. An example is: "Do you have angry outbursts or lose your temper frequently?" Or "Does your mood change frequently, going up and down like a roller coaster in the sense of getting sad or feeling 'up'?" The WRADDS is also not intended to diagnose ADHD, but is used as one part of a comprehensive assessment which begins with a structured interview. The initial interview may start off with a question regarding impairment: "What is going on in your life that leads you to believe you may have ADHD?" The clinician will need to take a thorough educational, occupational, social/interpersonal, health and psychiatric history. Objective data can be gathered, such as job evaluations, college or university records, police reports, medial records, behavioural observations, and a meeting with informants such as a spouse, adult children, parents and other significant people in the individual's life. Neuropsychological testing is especially useful when there are co-morbid disorders that make the clinical presentation complex (such as specific learning difficulties), or when evaluating symptom severity.

Differential Diagnosis

The assessment can be troublesome when sorting out co-morbidity and differential diagnoses. The clinician will have to determine whether ADHD is the primary problem and what co-morbidity exists. That is why the longitudinal history is so critical in establishing the appropriate diagnosis. ADHD symptoms are more chronic in terms of onset, such as concentration deficits and disorganisation which will have been noted from an early age. At the same time, the symptoms presenting in adulthood can be of a more episodic in nature. Wender cautions that adult mood lability should be distinguished from depressed mood. Adults with ADHD may exhibit depression, affective lability and irritability which can be confused with cyclothymic disorder, bi-polar disorder and borderline personality disorder (BPD). The shifts of mood seen in cyclothymic disorder however are of weeks or months' duration and not from hour-to-hour or day-to-day as seen in ADHD. Although an adult can have both BPD and ADHD, it is important to distinguish the two:

> The ADHD and BPD patients seemingly share symptoms of impulsivity, affective instability, angry outbursts and feelings of boredom. These symptoms, however, differ both quantitatively and qualitatively between the two diagnostic groups. The ADHD patient's impulsivity is short-lived and is thoughtless rather than "driven." The ADHD patient's anger is episodic and also short-lived compared to the brooding anger of the BPD patient who has suicidal preoccupations, self-mutilation, identity disturbances, primitive defenses such as "splitting" or feelings of abandonment. [52]

Psychopharmacology

Stimulant medications has been used for almost half a century to treat children with ADHD and are known as first-line agents. The results of a systematic review of treatment studies conducted by Greenehill et al.,[58] (which included hundreds of outcome studies and thousands of subjects); found that stimulants showed robust short-term effectiveness and good safety data in the vast majority of individuals who were properly diagnosed. Although fewer in number, there is no evidence via longer-term studies that the appropriate therapeutic use of psychostimulants is harmful. In the world's largest randomised clinical study on ADHD, the Multimodal Treatment Study (MTA), the efficacy of stimulants was documented with 600 children over the course of 14 months of treatment.[59]

Methylphenidate hydrochloride has been the most widely used and researched psychotropic medication in the history of child psychiatry.[60] The mechanism of action for the stimulants results from a release of norepinephrine from granules in sympathetic nerve endings and chromaffin cells.[61] Stimulants interact with the presynaptic transporter, blocking the reuptake of both norepinephrine and dopamine into the presynaptic neuron. They stimulate both alpha- and beta-adrenergic receptor sites in the cerebral cortex.

In the UK, immediate release methylphenidate and dexamphetamine have been the most commonly used psychostimulants for children with a fairly rapid increase of the sustained release MPH (Concerta XL) used especially for children and adolescents who have problems taking their medication at second and third doses. The positive effects of Concerta have been reported in the majority of children and adolescents who have been treated with the optimal dosages in our ADHD follow-up clinic. The long-acting mechanism via the osmotic pump means that individual can take it once in the morning, thus avoiding stigma at school when needing to go to the office for a second dose, oppositional resistance to take it again in the day, and forgetfulness. Interestingly, a recent US study [62] indicated that 39% of the pre-adolescents, adolescents and adult patients treated with sustained released methylphenidate (Concerta XL) needed the immediate release MPH as jump start in the morning and as a top up in the evening to enhance therapeutic effects.

Stimulants are endorsed as the treatment of first choice for adults because they are effective not only for the core behavioural symptoms, but also for associated impairments such as cognition, interpersonal relating and family functioning.[63] There have been a number of published studies on the use of stimulants with adults, all of them demonstrating moderate to significant reductions in ADHD symptoms with associated overall improvement in daily functioning, particularly when given optimal doses. An unpublished study by Wender[52] included 116 patients in a double blind trial of methylphenidate and placebo and showed that 72 patients had moderate to marked improvement on MPH and another 14 non-responders responded during a four-week open trial. The responders were treated for 12 months and 75% continued through that period. The duration of MPH was 2-2 ½ hours when given 5-6 times per day equaling a total daily dosage of 50-90 mgm per day. This dosage afforded 12-15 hours of symptom suppression sufficient to produce an 80% decrease in the target symptoms of inattention, hyperactivity, mood lability, hot temper, stress intolerance, disorganisation and impulsivity (as measured by a structured interview). The effect size was 2.0.

The most common side effects of psychostimulants include initial sleep and appetite disturbance, headaches, and gastrointenstinal problems. The majority of individuals (80%) are able to tolerate the transient short-term side effects and on the whole respond well to them. The prescribing clinician may have to consider other medication and more intensive treatment in cases where the adolescent/adult is a substance abuser. It is indicated that in the first instance, avoidance of stimulant medication and a referral to a drug rehabilitation programme may be necessary. Fortunately, Concerta XL is a pellet that cannot be abused for snorting or injecting due to the chemical make up of its thick coating and therefore, has no street value.

Many parents, educators, and professionals worry that psychostimulants are oversubscribed and addictive. A study by Volkow[64] in 1995 comparing methylphenidate to cocaine was widely misinterpreted in the popular media despite the fact that the study highlighted that a **major element in the addiction process is the speed at which dopamine levels are increased. The differences in rate of uptake and clearance from the brain between cocaine and MPH is profoundly different in the physiological and psychological effects**. When discussing medication with parents and children at our clinic we try to assuage worries about addiction based on the evidence and point out that street drugs are chemicals that make a person escape from reality and cause life-threatening and/or grave long-term consequences. On the other hand, the judicious use of medication for ADHD helps the person's brain to function better. It enhances the person's ability to take more responsibility in developing their daily living skills, which will help to increase positive short-term and long-term outcomes.

Specific antidepressants are generally considered second-line medication of choice for ADHD. The literature documents the efficacy of tricyclic antidepressants on ADHD in more than 1,000 subjects.[65] The new non-stimulant medication Strattera (atomoxetine HCI) is a noradreniline reuptake blocker and is currently being used in the US to treat individuals with ADHD. It appears to help individuals with co-morbid depression. A recent study indicated that the WRAADS effectively measured improvement in symptoms in mood dysregulation in a large controlled trial of atomoxetine[66] and another study showing its effectiveness in treating ODD in adolescents.[67] There has been a mixed review by families where an individual is using Strattera. The jury is out on the long-term safety effects. Bupropion has been utilised in children (primarily when stimulants have been ineffective or cause impairing side effects) and it has been documented to be effective for adults.[68] It has also been used for reducing nicotine addiction and as a first agent for complex ADHD patients with co-morbid substance abuse or a mood disorder.[69] Venlafaxine has also been shown to be effective in adolescents and adults with ADHD and co-morbid alcohol abuse.[70]

The antihypertensives, clonidine and guanfacine (Tenex) are used to treat the hyperactive-impulsive symptoms of ADHD. There are no studies showing the effectiveness of Tenex with adults. Cognitive improvements are not as pronounced with Tenex (an alpha-2-adrenergic agonist) as they are with stimulants. It is longer lasting and does not have the severity of rebound that clonidine can have. Tenex is not yet available in the UK but can be accessed on a named-patient basis. Chlonidine helps with sleep problems and associated motor and vocal tics (by pre-medicating before adding the stimulant both at low dosages). Research confirms that this combination is quite safe and effective as a treatment for

ADHD.[71] Side effects are usually minimised or eliminated by starting the dose quite low and working up slowly, and usually become non-troublesome in 4-6 weeks. Melatonin is used for stimulant sleep related disturbance, but there is a currently a paucity of outcomes studies.

Individuals with an autistic disorder may benefit form stimulants, although they sometimes are more sensitive to them, and thus a very low dose titrated slowly is in order. Equisym is an alternative stimulant for children with ASD.

Multi-modal Approach

There is no cure for ADHD, but a proper diagnosis can help with planning the appropriate interventions. Evidence based treatment for children and adolescents includes: parent training, school interventions, operant behavioural therapy, psychosocial training, and psychopharmacology.(71) Effective forms of treatment for adults include a combination of medication, psychoeducational, grief work (if post adolescent diagnosis), psychosocial training, marital therapy for couples, stress management, and cognitive behavioural therapy. CBT can help the individual with ADHD to understand their dysfunctional thinking and begin to challenge it as well as develop strategies for self-regulation. Finally, coaching is beneficial especially for daily living skills, organisational problems and management of finances. Coaching can also help the adult learn self-care strategies such as slowing down the fast pace and concentrating on healthy dietary choices, exercise and encouragement to practice relaxation strategies. Naturally the most effective forms of treatment are also recommended for any co-morbid conditions in both children and adults.

Summary and Conclusion

Attention Deficit Hyperactivity Disorder is a common childhood disorder, yet controversy about the validity of the condition and psychopharmacological treatment continues to exist in the UK. Pressure from support groups, parents and widely available literature is now leading towards a wider recognition of its prevalence. On the other hand, the continuity of this condition through adolescence and into adulthood is yet to be recognised in the UK.

A review of the literature has brought to light that adult ADHD is most certainly an under recognised and under treated condition in today's society. Treatment with stimulant medications enhances academic performance, work performance, and psychosocial functioning.[72] Stimulants are not addictive and are not overprescribed which has been and continues to be notoriously misrepresented via the tabloids and popular press. With the newer stimulant medications and improved pharmaceutical delivery systems, hope is offered for a better quality life for these individuals.

There is evidence from international research and the experts agree that ADHD continues throughout the life span (its presentation changes as the child develops into an adolescent and into adulthood), however, the currently available diagnostic criteria (DSM IV & ICD 10) is inadequate for adolescents and adults. There is little evidence of widespread overdiagnosis when taking into consideration the prevalence rates according to epidemiological studies.

Longitudinal studies indicate that ADHD if untreated, causes significant educational and psychosocial disadvantage, psychiatric morbidity, personality dysfunction and parenting problems. There now exists appropriate screening tests, structured interviews, and standardised rating scales that can be used retrospectively and currently to measure symptoms that can help establish a diagnosis in adulthood. Evidence based treatments can help to modify symptomatology, improve cognitive and social functioning and reduce the incidence of co-morbid psychiatric conditions.

In conclusion, the authors emphasise the urgent need for widespread education that is based on scientific evidence to help facilitate the earlier recognition, diagnosis and treatment of ADHD in the UK. There is also a need for further research in studying the prevalence and spectrum of co-morbidities associated with this condition, especially in adulthood. We do know that social impairments are profound and are the best predictor of devastating long term outcomes. Barkley [73] states, "…*that is why ADHD is not simply some trivial impairment in the capacity to pay attention. Ultimately, what may make us uniquely human is our capacity to attend to the social future and so to act with social purposes and intentions. It is my considered opinion that this is what is ultimately impaired, albeit secondarily and relatively, in those with ADHD".*

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