

## **ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) IN CHILDREN AND ADULTS**

### **1. Introduction**

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurobehavioral disorders. ADHD is a chronic disease which begins in childhood with an estimated worldwide prevalence rate for children and adolescents of 5% and 3% in adults.<sup>1-4</sup> The symptoms of ADHD often persist through adolescence into adulthood and until old age.<sup>5-7, 30</sup> This has been confirmed in long-term follow-up studies which have demonstrated the persistence of symptoms in many adults diagnosed with ADHD in childhood.<sup>8-10,31</sup> A meta-analysis of follow-up ADHD studies reported that 15% of all cases show persistence of full diagnosis into adulthood, whilst almost 75% continue to have significant ADHD related impairments in their adult life.<sup>11-12</sup>

ADHD is characterized by symptoms of inattention and/or hyperactivity-impulsivity that interfere with functioning or development and are present in more than one setting. ADHD may cause difficulties at school, in the work place, and in the social environment. Children with ADHD may experience significant adaptation problems because their functional level and behavior may not correspond to their chronological age or expected development level.<sup>13</sup>

ADHD sufferers have a high incidence of co-morbidities. A recent study showed the most frequent co-morbidities in children to be learning disorders (47.3%), conduct disorders (28.6%), and oppositional defiant disorder (22.1%).<sup>13,14</sup> Other relevant studies have reported co-morbid depressive disorder rates of 5%–47% in children and adolescents with ADHD.<sup>15-17</sup> Evidence from a meta-analysis of prospective studies in children with ADHD suggests that those with ADHD also have a higher risk of developing substance use disorders and cigarette smoking than those without ADHD.<sup>18</sup> Untreated ADHD has also been associated with (morbid) obesity in children and adults.<sup>32,33</sup> These and other co-morbidities are also present in the adult population with ADHD.<sup>19, 20</sup> Studies of a large Danish clinical register find increased mortality rate ratios in children, adolescents and adults with ADHD, even after adjustment for comorbid psychiatric disorders such as oppositional defiant disorder, conduct disorder, and substance use disorder.

This increase in mortality is largely driven by deaths from unnatural causes such as accidents.<sup>38</sup> Similar studies find that injury prevalence and emergency ward visits in children with ADHD were reduced significantly with appropriate pharmacological treatment.<sup>39</sup>

## **2. Diagnosis**

### **A. Medical History**

The diagnosis of ADHD is a clinical one and requires a complete medical evaluation to detect specific symptoms. The presence of symptoms is directly obtained from the patient (child or adult), parents and other family members or spouses, teachers and work colleagues. The Diagnostic and Statistical Manual of Mental Disorders, 2013 (DSM 5) criteria for ADHD as defined by the American Psychiatric Association are the most widely used criteria and describe three subtypes of ADHD based on the predominant symptom pattern: inattentive type, hyperactive-impulsive type and the combined type.<sup>21</sup> The International Classification of Diseases (ICD-10) criteria for hyperkinetic disorder (HKD), as defined by the World Health Organisation (WHO), are more conservative and define a severe subgroup of people fulfilling the ADHD combined type diagnosis.

The essential feature of attention deficit/hyperactivity disorder is a persistent pattern of inattention and or hyperactivity-impulsivity that interferes with functioning and development. The requirement that several symptoms be present before age 12 years conveys the importance of a substantial clinical presentation during childhood. Manifestations of the disorder must be present in more than one setting (e.g. home, school, work). There is an exclusion that the symptoms should not occur exclusively during the course of schizophrenia or another psychotic disorder and are not better explained by another mental disorder (e.g. mood disorder, anxiety disorder, dissociative disorder, personality disorder, substance intoxication or withdrawal)

In most parts of the world, the clinicians involved in the diagnosis and treatment of ADHD are pediatricians, psychiatrists and clinical psychologists.

### **B. Diagnosis**

- 1) Evaluation should be performed by a pediatrician, psychiatrist or other physician who specialises in the treatment of ADHD/ADD;
- 2) The specialist physician should have assessed the patient/athlete's clinical history and examination and may have also interviewed parents or partners and assessed supporting documents in the form of school reports and/or previous medical/paramedical assessments. The findings of this comprehensive assessment **must** meet the **DSM-5 criteria** (or ICD 10). Simply stating that the patient meets the DSM 5 criteria is not adequate. There should

be some description or summary on how the criteria were assessed and which criteria were met.

Additional Information in the assessment of ADHD (These are not mandatory):

i. In the diagnostic assessment there should ideally be reference to the use of validated diagnostic instruments and scales assessing symptoms and impairment. These could include but are not limited to:

- a) Adults: ACDS, CAADID, CAARS, Barkley, DIVA 2.0<sup>33,34</sup>
- b) Children: Vanderbilt, K-SADs, DISC, Conners<sup>24</sup>, SNAP

ii. Assessment by a psychologist can assist in confirming the diagnosis but is not mandatory

iii. Description of previous therapies trialed, both pharmacological and non pharmacological as well as evidence of symptom return after a break from medication can assist in supporting the DSM 5 diagnosis. However, it is not mandatory to demonstrate that a patient has tried and failed other medication.

- 3) Primary Diagnosis of ADHD as an Adult (i.e. after 18 years).  
To fulfill the DSM 5 criteria, there should be evidence of symptoms during childhood, regardless of the age of the primary diagnosis i.e. the DSM 5 criteria cannot be met unless there were symptoms in childhood\*. However, if there was difficulty in establishing this history, which is not unusual, a second opinion from an independent specialist medical practitioner (usually psychiatrist) confirming the diagnosis, may be required,  
(\*ideally from other reliable independent sources i.e. psychologist's reports, school reports etc.).

### **3. Medical best practice treatment**

#### **A. Name of prohibited substance**

Sympathomimetic psychostimulants (methylphenidate and amphetamine [amphetamine] derivatives, including the amphetamine prodrug lisdexamfetamine) form the basis of the treatment of ADHD in most countries around the world. Pharmacologic treatment with stimulants usually has the direct effect of reducing over activity, increasing attention and reducing impulsiveness, with the effects being evident within a short period of time.<sup>22</sup> It should be noted that the choice of first line pharmacological treatment in ADHD varies across countries and atomoxetine (Strattera), guanfacine and clonidine are

non-prohibited substances that are also used in the treatment of ADHD and may be considered first line in some countries, but not in others.<sup>24,25,27,29</sup>

B. Route

Oral

C. Dosage and Frequency

Both methylphenidate and amphetamine compounds come in immediate release (active for 2-5 hours) and extended release (6-14 hours) preparations. There are also combinations of immediate and extended release formulations in single tablets. Combinations of these preparations may be used to achieve the best symptom control. Optimal doses vary greatly and dosages based on body weight are too variable across the world to use as guidelines in this document. Long-lasting, extended release formulations in general are preferred in the treatment of adults for reasons of adherence to treatment, for the protection against abuse, to avoid rebound symptoms, and to provide coverage throughout the day without the need for multiple dosing.<sup>29</sup> Optimal doses, however, are best decided on an individual basis whilst adequately monitoring for symptom control and side effects.

It should be noted that there is no necessity to cease treatment during competition periods. It is now generally considered that cessation of treatment can have a number of negative effects including an adverse effect on symptom control, which can take time to re-establish. This destabilizing of symptom control can also lead athletes to have an increase in risk taking behaviors and can potentially increase their involvement in conflict situations (e.g. altercations with referees).

Patients usually find that their symptoms are best controlled on a regular, stable dose of stimulant medication once their optimal dosing regimen has been achieved. For this reason, intermittent use including PRN dosing is not generally recommended.

In newly diagnosed ADHD patients, particularly in young teenage patients who will continue growing, there will be dosage changes until optimal management is achieved. Given this, a range of doses may be appropriate on the approval certificate with a maximal 12-month approval allowing for the next approval to be granted for a stable dose. This prevents the need for repeat TUE applications in the first year for changes of doses whilst stabilizing the symptoms.

### **Side effects of stimulants for consideration by treating doctors**

Some of the more common side effects reported with the use of psychostimulants include insomnia, reduced appetite, headaches and jitteriness, but these are usually tolerable.<sup>24</sup> There is evidence that stimulants can increase the blood pressure and heart rate with relative contra-indications to use in those with hypertension, arrhythmias and cardiomyopathies.

There are some studies linking increased cardiac events with the use of stimulants. The studies in the younger population indicate that there is no significant risk in an otherwise healthy population. The studies in adults are more varied but there remains insufficient evidence to advise against the use of stimulants for the treatment of ADHD in an otherwise well young adult. Despite this it would be advisable to complete a thorough cardiovascular history and examination in all patients who are being prescribed stimulants.

Literature reviews have confirmed that the risk of developing long-term substance abuse whilst taking psychostimulants for the treatment of attention deficit hyperactivity disorder (without co-morbidities) is small and may even decrease with proper treatment.<sup>26</sup>

There is no evidence that the therapeutic use of stimulants in the treatment of ADHD increases aggressive behavior. There are however reviews suggesting that untreated ADHD patients are more likely to become involved in risk taking behavior and conflict situations, including car accidents and that treatment with stimulants reduces this risk<sup>28,37</sup>.

#### **D. Recommended duration of treatment**

The pharmacological treatment of ADHD is usually over many years.

It is highly recommended for any athlete on continued therapy with psychostimulants to undergo at least an annual review by a specialist in the management of ADHD.

### **4. Other non-prohibited alternative treatments**

Atomoxetine (Strattera) has been identified as a non-prohibited alternate treatment for some patients with ADHD. This medication is considered by many to be less effective than stimulant medication and it has a different more expansive side effect profile. In addition, this medication is not available in all countries. Other medications (e.g. clonidine, guanfacine, bupropion)<sup>35</sup> have also been shown to have some efficacy in the treatment of ADHD.

In general, the medications listed above are considered second line treatment in many (but not all) countries, and therefore it is **not** necessary to demonstrate a failed trial of these medications prior to the acceptance of methylphenidate or amphetamine for a TUE<sup>29</sup>

## **5. Consequences to health if treatment is withheld**

Untreated, ADHD is widely recognized as having detrimental effects on the quality of life and psycho-social development of the patient. Co-morbid psychiatric conditions may manifest if ADHD is left untreated.

## **6. Treatment monitoring**

Following the initiation of treatment, monitoring should be undertaken to assess the effectiveness of treatment until stabilization has been achieved. This may require 2-3 monthly reviews. Symptom scales can be helpful in these reviews. Once stabilized on a dosage regimen, regular review appointments are recommended.

## **7. TUE validity and recommended review process**

Due to the chronic nature of ADHD, a TUE, in the case of a well-documented, long standing diagnosis of ADHD, can be granted for up to four (4) years at a time.

An initial application for a newly diagnosed ADHD patient may be more appropriately approved for 12 months until a stable dose is achieved. A TUE reapplication should include current and appropriate notes from the treating physician.

Any change of medication or significant adjustment of the dosage should result in a re-submission or advisement to the ADO granting the TUE.

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