

Neuropsychiatric Attention Deficit and Hyperactivity Disorder that Responds to ADHD Medication (NADHDM) in the International Classification of Diseases ICD- 11: An Opportunity to Increase Sensitivity and Specificity of Diagnosis

Klaus Martin Beckmann

Senior Lecturer, School of Medicine
Griffith University, Logan Campus
Logan, Queensland QLD 4131
Australia
martinbekmannnn@hotmail.com

Abstract: *Attention Deficit and Hyperactivity Disorder (ADHD) is a common life span disorder associated with marked impairment at all ages. Efficacious treatment for ADHD has been in place for many decades. Past and present publications of 'international classification of diseases' (ICD) [1], past and present issues and 'diagnostic statistical manual' (DSM) [2] does not make use of the fact that a certain proportion of patients with ADHD have an excellent response to ADHD medication. The next edition of ICD is going to be published shortly [3]. The new ICD- 11 is an opportunity to increase sensitivity and specificity of diagnosis. There is a marked difference between ADHD syndrome and neuropsychiatric ADHD [4] that responds to ADHD medication (NADHDM). ADHD syndrome has a multitude of underlying pathologies [5], but neuropsychiatric ADHD has unlikely such a multitude of underlying pathologies [6]. ICD -11 has the opportunity to do well limiting diagnosis of ADHD to 'ADHD neuropsychiatric disorder that responds to ADHD medication' (NADHDM).*

Keywords: *Attention Deficit and Hyperactivity Disorder, ADHD, International Classification of Diseases, ICD- 11, specificity of diagnosis, sensitivity of diagnosis, medication, ADHD test, ADHD syndrome, neuropsychiatric ADHD (NADHDM).*

1. INTRODUCTION

ADHD is a common disorder. Prevalence is quoted for children and adolescents to be between less than 1%, to over 18%, with a pooled prevalence of 5.29 % [7]. ADHD typically starts in the earliest years of life. ADHD affects individuals throughout the life span [4]. It is a developmental disorder. The diagnosis rests on 3 main axes: attention, activity levels and impulsivity. There is marked impairment in functioning. However criteria for diagnosis of ADHD are controversial [8]. ADHD diagnosis per se is not pathognomonic [9]. Also the debate on adult ADHD is controversial [10]. A contributing factor is the doubtful role of medication in some patients, as sometimes there is limited or no response to medication in some clients; this is notwithstanding that some patients clearly benefit from medication [11]. Intensity of side effects from medication varies for individual patients and varies throughout the life span [12]. Also the symptom cluster varies over the decades [9]. Around 2 thirds of patients with ADHD continue with ADHD symptoms into adulthood. There is a modified form ADHD in adulthood with reduction of intensity on the axis of hyperactivity, which often reduces after early teenage years. Commonly used are diagnostic criteria from ICD 10 [1] and DSM 4 [2], of late this is DSM 5 [13]. These 2 classifications ICD and DSM are the most important and the most frequently used around the world. Historically diagnostic classifications were requested by government, DSM by the USA government, ICD by the world health organisation (WHO). One of the reasons to have a classification was to gain an understanding of the morbidity and prevalence of mental disorders, to best adjust funding and expenditure for mental illnesses [14]. The medical psychiatry establishment assisted ever since. Of course the more specific, sensitive, valid and reliable diagnostic criteria are, the better a government can plan for mental health service provision [15].

In the present day up to date diagnostic criteria for ADHD do not differentiate whether there is a response to medication or not, moreover a formal test to see whether or not a patient has ADHD responding to ADHD medication [16], has so far not been included into either DSM or ICD. DSM and ICD so far describe an ADHD syndrome. This very likely is unsatisfactory. NIMH for example criticised DSM 5. One of the reasons for NIMHS criticism may well be that DSM5 still does not built on formal tests like brain scans or EEG to confirm diagnosis of ADHD [17]. DSM 5 may not have built their diagnostic criteria on such hard evidence as any tests have not been standardised as yet. An “EEG test” exists but so far there does not appear to be evidence that this is a test of sufficiently high specificity [18]. At present ADHD diagnosis as it stands is not a concept that is maximised for sensitivity and specificity. Ideally sensitivity and specificity are both as high as possible. This is so to increase the accuracy of a diagnosis. ICD 11 expected for 2017 can do better than previous ICD. Moreover ICD11 likely can do better than the recent and newest 2014 DSM5. This paper outlines the possible differential diagnosis with the aim to show some of the pathology that may lead to an individual presenting with ADHD syndrome. This paper then shows how dramatic the benefits of medication can be for the patients who have the neuropsychiatric ADHD which responds to ADHD medication (NADHDM). The paper then goes on recommending a diagnostic trial with ADHD medication to confirm or refute a diagnosis of neuropsychiatric ADHD which responds to ADHD medication (NADHDM). The conclusions give a final summary of the paper.

1.1 Glossary

Sensitivity is important for correctly diagnosing NADHDM as this is the measure for including all those individuals who correctly have the diagnosis. Specificity in this context is important as it is a measure for how many of those who are diagnosed with ADHD truly have the neuropsychiatric ADHD which responds to ADHD medication (NADHDM). Validity is a concept that purports to a construct being an accurate representation of what is happening in the real world. Reliability in this context is a measure of the ADHD diagnosis being replicable across several domains, e.g. diagnosing professionals, time, domains of a patient’s life (school, home, at leisure activities, with friends and family).

1.2 Information on Criteria for A Diagnosis Of ADHD from the Latest Classification, the DSM 5

DSM-V [13] diagnosis of ADHD is based on descriptions of behaviours. The symptoms are listed on the axis of inattention, hyperactivity, and impulsivity. The predecessor classification is the DSM-IV and criteria for ADHD were similar [2]. For a diagnosis with ADHD the patient’s needs to show either a first set or a second set of diagnostic criteria.

The first set is about inattentiveness which does not match up with developmental level, lasting longer than 6 months. ADHD can be diagnosed in a patient who has 6 or more of the following symptoms:

- difficulties with close attention or often making careless mistakes in e.g. schoolwork, work, or other activities
- having difficulty with sustaining attention in tasks or at play activities
- seeming not to listen when spoken to
- not following through with instructions and difficulties with finish schoolwork, tasks or duties in the workplace
- finding it difficult to organize tasks and activities
- avoid doing, or dislike of, or being hesitant with engage in tasks that require maintained mental effort
- losing things that are important for tasks or activities of daily living
- easily distracted by less important stimuli
- forgetful of routine activities

Neuropsychiatric Attention Deficit and Hyperactivity Disorder that Responds to ADHD Medication (NADHDM) in the International Classification of Diseases ICD- 11: An Opportunity to Increase Sensitivity and Specificity of Diagnosis

The second set is about overactivity and impulsivity which does not match up with developmental level, lasting for longer than 6 months. ADHD can be diagnosed in a patient who has 6 or more of the following symptoms:

- Fidgeting with hands or feet or squirming in seat
- Leaving seat in classroom or in other places
- To excess running about or climbing when it is inappropriate, in the older patients this may be limited to subjective feelings of restlessness
- Difficulty with quietly playing or being involved in leisure activities
- "on the go" or acting as if "driven by a motor"
- Talking excessively

Symptoms of impulsivity include:

- Blurting out answers
- Difficulty awaiting turns
- Interrupting or intruding on others, like butting in

DSM V lists more criteria. These need to be met after the aforementioned symptoms criteria are met. These criteria include:

- Several of the hyperactive-impulsive or inattentive symptoms causing impairment are present from before the patient reached 12 years old.
- Impairment from symptoms is present in more than 2 settings.
- There is significant impairment in social, academic, or occupational functioning.

1.3 The Scientific Method

20th century research moved on from the classical inductivist view. Karl Popper [19] took a lead in rejecting classical inductivist views on scientific methods and promoted empirical falsification. ADHD stimulant medication has a rapid onset if it has an effect. The null hypothesis is that the medication has no beneficial effect. Indeed when an individual grows out of ADHD the medication will no longer have its beneficial effect. When an individual does not have ADHD from the start the medication will not have the beneficial effect on the triad of symptoms overactivity, distractibility and poor concentration. Hence at non response, the null hypothesis that an individual has no ADHD has been confirmed. The diagnosis of ADHD does not apply. However, if an individual has a beneficial response than the null hypothesis has been falsified and the individual has a diagnosis of ADHD.

2. ADHD SYNDROME – ADHD PER SE

2.1 Neuropsychiatric Disorder as the Neuropsychiatric ADHD which Responds to ADHD Medication (NADHDM)

(NADHDM) is the typical ADHD which both professionals and lay person know and think about when they hear about ADHD. This type of ADHD is also the ADHD that the lay press talk about in the headlines [20]. Patients with this type of ADHD benefit from stimulant or non stimulant medication. Impairment is reduced with the use of ADHD medication. Research studies show that benefits are maintained well for the first 2 years [11]. Prognosis can be good. Medication treatment is best combined with psychosocial treatments [11]. There are diverse modalities amongst the psychosocial treatment and no doubts have an important role [21].

2.2 ADHD Syndrome – ADHD Symptoms where there are Physiological Parameters that can be Tested for to Substantiate Another Disorder that May Present as if it were ADHD

2.2.1 Hyperthyroidism

An overactive thyroid gland produces excess thyroid hormones [22]. These hormones have a stimulating effect. Patients present with mood disturbance, psychomotor activation, can appear too well perfused because of fast pulse and heartbeat. The patient may be perspiring and may even have diarrhoea. This can be associated with weight loss. The diagnostic test is to check the thyroid function with a blood sample.

2.2.2 Pheochromocytoma

This disorder has as cause intermittent significant extra release of adrenaline [23]. Also clinical symptoms of ADHD syndrome are intermittent. Patients do not present with typical ADHD as symptoms do not last. A hard investigative test exists. Urine can be collected and tested for the metabolites of adrenaline that are excreted through the kidneys.

2.2.3 Cushing Syndrome

Also overproduction of cortisol and other steroids can present as an ADHD [24]. Longer exposure to cortisol can lead to change in bodily appearance with stigmata like “bull’s neck” and the typical adipose tissue distribution. A test is available to check for raised cortisol levels in bloods or urine.

2.2.4 Cerebral Frontal Lobe Lesions

The different parts of the anterior part of the brain are increasingly defined [25]. Depending where the lesion occurs this may present with ADHD syndrome too. The diagnostic test would be doing a scan of the brain.

2.2.5 Infectious Diseases Affecting the Brain

Extremely rarely in developed countries and also very rarely in developing countries lesions in the frontal lobe can occur by reason of an infectious disease process. A historically well-known disorder is syphilis [26]; the treponema can affect frontal lobe and lead to sequelae that may present as ADHD. Another cerebral process that leads to not severe sickness though, but possible frontal lobe impairment with maintained consciousness may be tuberculosis [27]. Viral diseases like cytomegaly virus (CMV) [28] or herpes virus [29] in predisposed individuals can lead to encephalitis; also if those viruses affect nerve cells in the frontal lobe, however the impairment lies not in a presentation like ADHD but in symptoms of encephalitis. There are also extremely rare other causes for frontal lobe impairment for example cysticercosis [30].

2.2.6 Autoimmune disorders like systemic lupus erythematoses (SLE) or Kawasaki syndrome

Autoimmune disorders like systemic lupus erythematoses (SLE) [31] or Kawasaki syndrome very rarely as a first presentation may affect the brain. Depending where the autoimmune reaction takes place, for example if it were the frontal lobe, the initial presentation could be overactivity, impulsivity and distractibility. Of course there is significant malaise too and blood parameters when measures will be abnormal.

2.2.7 Other rare disorders that may theoretically present with ADHD syndrome

Excess of growth hormone [32], excess of testosterone [33], paraneoplastic syndrome [34] and other autoimmune disorders may initially lead to symptoms of ADHD. However it is usually clear that this is not ADHD as such. There are the typical stigmata for the specific illness, moreover there are tests like growth hormone levels, testosterone levels and c-reactive protein (CRP) as a screening test for autoimmune disorders and malignancies. Physical examination is particularly useful if looking for any cancers to exclude neoplastic lesions and/or paraneoplastic syndrome.

2.3 Substances, Legal and Illegal, Leading to ADHD Syndrome - An Overview

2.3.1. Numerous prescribed medications can have a stimulating effect [35]. In some individuals medication and drugs have paradoxical effects [36] and/or placebo effects. Some of the prescription substances can be tested for by exhaling breath, with blood or urine samples. However the clinical history, where needed seeking advice from a pharmacist, pharmacologist or drug information database, can assist with understanding why an individual presents with overactivity, impulsivity and distractibility.

Neuropsychiatric Attention Deficit and Hyperactivity Disorder that Responds to ADHD Medication (NADHDM) in the International Classification of Diseases ICD- 11: An Opportunity to Increase Sensitivity and Specificity of Diagnosis

2.3.2. Herbal, complimentary over the counter medications [37] may have effects that ameliorate ADHD [38] but also present as ADHD [39]. These likely are short lasting and are related in time to drugs ingestions and then elimination.

2.3.3. There are numerous activating substances that are available on the illicit drugs market: prescribed substances from deviation of prescribed medication, counterfeit medications and illicit substances [40]. Again such substances when taken ad hoc or intermittently, with good wash out periods in between, likely will have short lasting effects on the mental state. ADHD symptoms will be brief as related in time to drug's ingestion and then elimination. In some cases drug screen can yield results as to what the exact substance it is. Sadly a not insignificant number will develop a formal psychiatric illness and may have to be admitted to hospital. It is tragic that some individuals who consume illicit substances never recover from a mental illness that was triggered off by "street drugs".

2.3.4. Legal substances like caffeine etc have a stimulating effect [41]. Caffeine intake is not an illness or disorder as such, but an overdose, accidental or intended will leave the individual restless and irritable [42]. In the short term this may present as ADHD syndrome.

2.3.5. All medications whether legal or illegal have placebo effects [43]. The placebo effect is likely to depend on the expectations the client who takes the placebo. The body – mind interaction vice versa is relevant here.

2.3.6. In drugs dependence or harmful use of drugs, ADHD symptoms can occur during drugs and alcohol intoxication but importantly also during withdrawal [44]. The diagnosis is a clinical diagnosis. Medication treatment exists and alleviates suffering but this is not stimulant or non stimulant ADHD medication.

2.3.7. There have been numerous reports in the lay person's press that prescribed stimulant medication allegedly may produce illicit substance dependence in patients with ADHD [45]. However evidence shows that this is not the case [46].

2.3.8. Patients with neuropsychiatric ADHD (NADHDM) who consume illicit drugs, or consume deviated prescribed medication, in the short term will feel calmer and will find relief from ADHD symptoms subjectively. However in the longer term with repeated abuse of 'street drugs' sequelae of drugs dependence likely leave an individual more impaired than if the individual suffered from ADHD alone [46]. Indeed research shows that individuals with ADHD are less likely to follow on an ADHD illicit drugs forensic outcome trajectory if medicated with stimulant or non stimulant medication.

2.3.9. Most intoxication with poisons or metals like mercury or lead [47] will eventually lead to severe illness. However in the early stages such poisoning can lead to ADHD syndrome with overactivity, impulsivity and distractibility.

3. ADHD SYNDROMES NOT DUE TO NEUROPSYCHIATRIC ADHD (NADHDM), NOT DUE TO PHYSICAL ILL HEALTH, PSYCHOLOGICAL TRAUMA AND NOT DUE TO DRUGS, MEDICATION OR SUBSTANCES

3.1. Worldwide a substantial number of individuals are diagnosed with ADHD, but do not respond to ADHD medication. These individuals may not have neuropsychiatric ADHD (NADHDM). Mental health workers need to take heed. Several disorders can have sequelae of ADHD without neuropsychiatric ADHD (NADHDM) and many of those differential diagnoses are listed here. The umbrella term here is ADHD syndrome, syndrome as a collection of symptoms. The symptoms are overactivity, impulsivity and distractibility.

3.1.1. Anxiety disorder in the wider sense may present as ADHD syndrome [48]. A common underlying physiology to anxiety is excess of the adrenaline system with psychological and physiological effects.

3.1.2. Generalized anxiety disorder [13] may present with agitation, poor concentration and distractibility. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

3.1.3. Panic disorder may present with agoraphobia or without [13]. Symptoms may include agitation, poor concentration and distractibility. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available

3.1.4. Personality traits may present with ADHD symptoms too [49]. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

3.1.5. All individuals have their own defences, in face of stressors, or when an exit for psychological conflict is needed. There are helpful defences and not so helpful defences. One of the helpful defences can be the manic defence [50]. This can present as ADHD syndrome. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

3.1.6. A hypomania episode may present as ADHD [13]. However hypomania episodes are time limited. Clinical history will confirm this. Psychology tests but no bloods or x ray diagnostic test is available.

3.1.7. A manic episode [13] can present as ADHD but psychotic symptoms are mandatory and the time limited nature of a manic episode assist with excluding a diagnosis of ADHD. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

3.1.8. Speech and language difficulties may leave the individual impaired and revert to alarming behaviors including impulsivity, overactivity and inattention to communicate [51]. This can present as ADHD syndrome until the issue that needs communicated and associated emotions have abated. Of course speech and language assessment can confirm a diagnosis, however it may be that the clinical interview clarifies that ADHD is not present. The diagnosis of Speech and language disorder is made clinically. Speech and language tests but no bloods or x ray diagnostic test is available.

3.1.9. Impaired intelligence (II) is associated with reduced coping skills and conflict resolution as well as reduction of many other skills [52]. Children with global learning difficulties can present with overactivity, impulsivity and distractibility. Children with II may respond to antecedent, behavior and consequences (ABC) model- and once the ABC model has been applied a diagnosis of ADHD may be refuted. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

3.1.10. Sleep deprivation can present with ADHD syndrome [53].

3.1.11. There are also other diagnoses that may present with ADHD symptoms like agitated depression or agitation associated with the delusional or hallucinatory system for example schizophrenia [13]. This is notwithstanding that good clinical assessment can usually clarify the conundrum. The diagnosis is made clinically. Psychology and psychiatry tests, but no bloods or x ray diagnostic test is available.

4. ADHD SYNDROMES NOT DUE TO NEUROPSYCHIATRIC ADHD (NADHDM), NOT DUE TO PHYSICAL ILL HEALTH, NOT DUE TO DRUGS, MEDICATION OR SUBSTANCES BUT ASSOCIATED WITH PSYCHOLOGICAL TRAUMA

4.1. Learned behaviours can present as ADHD. The flight response stemming from the fight flight freeze response is such a learned behaviour [54]. This is not associated with ADHD but is a mammalian response that goes back to the phylogenetic history of human kind. Chronic flight response especially can present as ADHD syndrome. This can be seen in individuals who have been exposed to chronic trauma. This is not ADHD. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available. Important for treatment is the psychosocial aspect [55].

4.2. If one of the identities of a dissociative identity disorder (DID) [56] is an identity with ADHD syndrome, then this will be a clinically intermittent presentation, depending on the timing of the episodes of dissociation to ADHD syndrome. Moreover a presentation of ADHD syndrome will depend on which part of the dissociated individual presents. An individual who suffers from DID may not be aware when attending interview with the health professional that he/she has a part to his/her identity which presents with ADHD. In such a situation the collateral is likely provide the necessary clinical information. The diagnosis of DID itself is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

4.3. Acute stress disorder [13] may present as ADHD syndrome but a formal diagnosis can be excluded in light of the history of clearly identifiable stressor and that no ADHD symptoms were present prior to the stressful life event. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

4.4. Post Traumatic Stress Disorder may present with agitation, poor concentration and distractibility [57]. The diagnosis is made clinically. Psychology tests but no bloods or x ray diagnostic test is available.

4.5 Difficulties in development of attachment types may lead to disturbed attachment, bonding including disinhibited attachment and may present as ADHD syndrome. [58]

5. EFFICACIOUS MEDICATION FOR ADHD AND THE STIMULANT MEDICATION TEST FOR NADHDM

5.1. There are 2 important, but different groups of medications available to treat ADHD. This paragraph comes with caveat: the author does not take responsibility for this paragraph if it about the actual supplying medication to any patient. The doctor or other health professional who supplies a script will be responsible for all aspects that involve medication (and/or additional treatments [21]) – or not medication for that matter, independent from this article.

5.2. The first group is the stimulant medication [59]. The onset of any beneficial effect (if there is a beneficial response) or adverse, side effects occurs within 30 to 60 minutes. Depending the wrapping of the efficacious pharmacological substance the response may last between 4 – 12 hours. If there is the desired response then this gets noticed by improved attention, less distractibility and less impulsivity. Side effects typically include reduced appetite. If given later in the day sleep disturbance likely becomes a problem. If too much medication has been given the patient with ADHD, the patient may appear sedated. A smaller dose can then be trialled. Very rarely a patient may develop a severe adverse reaction, a behavioural escalation or an allergic reaction to one of the ingredients of the wrapping, or to the efficacious substance. Hence the first dose should be the smallest dose and the shortest acting preparation. At medical reviews and follow up the dose needs adjusted for maximum benefits and minimum side effects. This is called titration and can last several days and maybe even weeks. The idea is to slowly and safely achieve the best balance between beneficial and side effects. If there are beneficial effects then a diagnosis of NADHDM can be made. Such a diagnosis may then lead to continued supply of ADHD medication with regular reviews. Also in the longer term medical reviews are necessary at regular intervals to confirm that there continues to be good response, good sleep, satisfactory weight gain and satisfactory growth. There are other side effects too [59] but this is not expanded on here in this article. A dispensing pharmacy will have consumer information leaflets with the details.

5.3. The second group is non stimulant ADHD medication [5]. Since this article is mostly about differential diagnosis and diagnostic tests non stimulant medication is not expanded on, the reason being that non stimulant medication is not suitable for testing. Non stimulant medication typically has an onset of beneficial effects on ADHD after several days, if not weeks, taking tablets every day [60].

5.4. There are also third line etc medications, but these are not suitable for diagnostic testing either [61].

5.5. This paper suggests that a short acting preparation of a stimulant medication can be used to safely investigate whether there is a NADHDM underlying in the ADHD syndrome [62]. Once a beneficial response has been confirmed the diagnosis can be confirmed

5.6. Ongoing review for ongoing presence of ADHD symptoms is important. Once the trial has been done other tests have to be used during follow up to appraise response. An important question can be whether there has been an ‘accidental’ break in compliance with medication and if so if there was a reoccurrence of ADHD symptoms. Such assessments need to look at whether there is impairment or no impairment from NADHDM in the diverse areas of the patient’s life.

5.7. There are several individual tests and test batteries that help with diagnosis at any point in the timeline of ADHD symptoms, diagnosis, and treatment. Some of the best known psychometric

tests are the Child Behaviour Check List [63] and Connor's [64]. There are many others tests. Many of these are copyrighted.

6. LIMITATIONS

6.1. Short acting stimulants have a reputation that they may cause addiction. Evidence shows that those individuals who have ADHD are less likely to develop addiction to stimulants than those individuals who do not have ADHD [65]. Hence ADHD medication likely is protective against drugs dependence in those individuals who have NADHDM.

6.2. Historically there have been reports that stimulants may cause cardiac dysrhythmia [6] and even death in ADHD patients. However epidemiological studies have found that the rates of sudden death in ADHD patients are not increased compared to the general population baseline rate of cardiac mortality. However prescribing health professionals should always consider ECG and/or a cardiology opinion in those individuals where stimulant medication is taken into consideration, where there are indications of an individual and/or family history of cardiac pathology [59]. This is to rule out any cardiac vulnerability that prohibits prescription of stimulant medication.

6.3. Any diagnostic trial in the individual patient will have the possibility of a type 1 error and a type 2 error. Type 1 error occurs if an individual is deemed to have a beneficial response to the trial but in reality does not have an underlying diagnosis of NADHDM (false positive). Hence the role of medication in practice must regularly be reviewed with for example trials off medication. Type 2 error occurs if an individual is deemed to not have a beneficial response to the trial but in reality does have an underlying diagnosis of NADHDM (false negative). In this case the medication trial could be repeated at a later point in time, i.e. if independent from the first trial the patient clinically shows ADHD syndrome and a diagnosis of NADHDM is still suspected.

6.4. A trial with stimulants has no role where it is clear that no NADHDM is co morbid. There is especially no role for stimulant medication in those illnesses listed in this article from 2.2. to 4.5. onwards, because of the time frame of duration of ADHD syndrome and the specific criteria of the underlying medical condition when diagnosed and then treated.

6.5 This article gives an overview of possible differential diagnosis to NADHDM, however the author makes no claim that this list is comprehensive.

7. CONCLUSIONS

This paper emphasises that ADHD syndrome as per the commonly used diagnostic guidelines is an ill-defined unspecific, poorly valid and not pathognomonic diagnosis. There is however, amongst all the differential diagnosis, a neuropsychiatric ADHD that responds to medication. No better alternatives to the existing guidelines exist so far. ICD 10 and DSM 5 and good clinical assessment, psychological tests, experience and judgment can help with diagnostic clarification of neuropsychiatric ADHD. Exclusions of other additional diagnoses from amongst the differential diagnosis are of utmost importance. In some cases where physical presentation suggests underlying physical illness diagnostic medical tests can guide diagnostic work up. In case of psychological sequelae and psychiatric disorders the gold standard remains the clinical interview, psychological tests and psychiatric standardized assessments that lead to diagnostic formulation. The diagnosis of ADHD can be endorsed with a psychological test – battery. This paper adds that medication response to short acting stimulant can be used to confirm a diagnosis of NADHDM. It is unlikely in clinical practice that an ADHD or NADHDM diagnosis appears in isolation. To the contrary: it is more likely that from amongst the ADHD syndrome, several diagnoses appear in combination with other diagnosis in addition to neuropsychiatric ADHD (NADHDM). However if the diagnosis includes neuropsychiatric ADHD then ADHD medication is likely to be of help to alleviate ADHD symptoms. ADHD medication helps where it has the greatest clinical efficacy: enhance concentration, enhance ability to sit still and reduce distractibility. Once this is achieved the medication helps the suffering individual with the demands of today's society by reducing impairment and enhancing productivity , alleviating costs to individual and society and improving quality of life for the individual and family and friends. Further research is needed to confirm that medication response to short acting stimulant has greater specificity for a diagnosis, compared to the diagnostic criteria as currently in place. The diagnostic test with medication also has to be

Neuropsychiatric Attention Deficit and Hyperactivity Disorder that Responds to ADHD Medication (NADHDM) in the International Classification of Diseases ICD- 11: An Opportunity to Increase Sensitivity and Specificity of Diagnosis

evaluated against any other tests that may be in development at the time of writing and publishing this article. The differential diagnoses mentioned in this article give an overview and the author does not claim to provide comprehensive lists. Yet a focus for future research should be diagnostic tests in isolation or combination with the highest sensitivity and specificity for neuropsychiatric ADHD with or without co-morbidity. Once reliable indicators for ADHD have been found maybe a single and simple diagnostic test for neuropsychiatric ADHD can be identified. Easiest for young and old of course will be tests that are easily done, pain free. A test that involves mouth swap, urine sample or maybe peripheral blood is preferable. So far there are no such established tests, nor are there radiological examinations that can be used on a broader scale. Radiological tests that identify gross and/or subtle brain changes that are specific to neuropsychiatric ADHD so far do not exist. EEG may be promising but this still has to be validated. The future may well yield inexpensive high sensitivity and specificity test to identify those individuals with neuropsychiatric ADHD who respond to medication. So far the best test for NADHDM is a trial with a short acting stimulant. ICD 11 may do well considering this short trial stimulant medication test, where safe, for inclusion into diagnostic criteria for the subtype of ADHD syndrome, namely NADHDM.

8. DECLARATION OF INTEREST

K M Beckmann is a senior lecturer at the School of Medicine, Griffith University. He has an interest in minors who present with ADHD syndrome. He also has an interest in children who clearly do not have NADHDM, children where a trial of medication from the start is clearly not indicated, children where a trial has been done but there was no beneficial response. His interest is that children are not unduly exposed to stimulant medication where clearly not necessary. K M Beckmann also has an interest in timely publication and easy access to this article (ICD11 is in development and will be published shortly), hence submission to this journal.

9. ETHICS APPROVAL

This article does not require ethic approval as this is not a research project involving patients, but this is an interpretation and review of the evidence that exists already.

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