NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Diagnostics Assessment Programme

Technologies for the assessment of attention deficit hyperactivity disorder (ADHD)

Final scope

November 2023

1 Introduction

The topic selection oversight panel identified QbTest as suitable for evaluation by the Diagnostics Assessment Programme based on a NICE Medtech innovation briefing on the QbTest for the assessment of attention deficit hyperactivity disorder published in March 2023.

The final scope was informed by discussions at the scoping workshop held on 30 October 2023. A glossary of terms is provided in appendix A.

2 Description of the technologies

This section describes the properties of the technologies based on information provided to NICE by manufacturers and experts and information available in the public domain. NICE has not carried out an independent evaluation of this description.

2.1 Purpose of the medical technologies

The assessment of attention deficit hyperactivity disorder (ADHD) is based on a healthcare professional's judgment using information from questionnaires, symptom rating scales, interviews, and observational data. In some instances, a continuous performance test (CPT) may also be used. However, the information from these sources may often be incomplete or contradictory, requiring multiple clinic visits or observations to obtain a diagnosis. Diagnosis of ADHD is further complicated by similarities in presentation and overlap with other neurodevelopmental disorders and

mental health conditions, which may lead to a difficulties and delays in decision-making.

Technologies that combine measures of cognition and motor (physical) activity, may help healthcare professionals when considering a diagnosis of ADHD. This could:

- Reduce the number or length of clinical appointments required to reach a diagnosis, reducing patient waiting lists and freeing up NHS resources.
- Reduce under- or over-diagnosis of ADHD and provide people with quicker access to appropriate further care or assessment.

Clinical experts also noted that the additional information provided by the technologies supports communication with people about their diagnosis, especially when providing a negative or differential diagnosis.

After a diagnosis with ADHD, people may be offered medication to help manage their symptoms, which may need titrating (adjusting) over time. In the longer term, medication is also reviewed and monitored. Technologies that provide additional objective data may also be used as an aid in determining treatment effectiveness, which may help in decisions about medication use to:

- Make sure people are getting the best possible medication and dosage for their condition (to manage symptoms and reduce side effects),
- Reduce overprescribing.

Clinical experts noted that objective measures of treatment response were particularly useful in managing people who had additional conditions to ADHD, and those who regularly take other medication.

Some technologies allow assessment to be done remotely. That is, without the need for a person to travel to a healthcare professional for an assessment. This could have benefits for services through savings associated with healthcare professional and facility time and resources. This could also benefit those people being assessed, by allowing them to take the test in a familiar environment and reduce the need to travel for appointments.

2.2 Product properties

The innovative aspect of the QbTest described in the Medtech innovation briefing was that it combines a CPT with an objective and standardised measure of motor (physical) activity. Experts commented that the combination of assessing cognition and movement by tools was an innovative feature.

The following technologies have been identified as relevant for this assessment because, in addition to providing an objective measure of cognition, they use sensors to measure motor (physical) activity.

Technologies will only be included in final guidance if they are available to the NHS and have appropriate regulatory approval.

2.2.1 EFSim Test (Peili Vision Company)

The EFSim Test (also known as ARVO) is a CE-marked, class I medical device. It is a game-like virtual reality (VR) suitable for children and young people aged 8 to 13 years, which measures neurological performance measures, including head and hand movement. It requires the completion of common everyday tasks performed in a simulated home environment using a virtual reality headset. The EFSim Test is intended to identify whether a patient belongs to the neurotypical population, by assessing deficits in executive function associated with ADHD. It is intended to be used alongside current ADHD clinical assessment.

The test involves a 25 minute in-game session completed using an Oculus Go head mounted display and its hand controller. During game play, motion tracking sensors in the goggles as well as in the controller capture the participants' movements, whilst tasks assess cognitive performance. The test measures several performance indicators associated with ADHD including attention, hyperactivity (motor activity), impulsivity, prospective and external memory, time management and timeliness, planning and behaviour regulation, task efficiency, and efficiency of information processing.

An updated version of the EFSim Test that includes eye movement (saccades) tracking is due to be available in early 2024.

A web-based, remote version of the EFSim Test is also in development. This is due to be available in early 2024.

2.2.2 Nesplora Attention Adults Aquarium (Giunti psychometrics)

The Nesplora Attention Adults Aquarium is a CE-marked, virtual reality continuous performance test (VR-CPT) suitable for people 16 to 90 years. It measures auditory and visual attention, impulsivity, motor activity and reaction time. It is intended to be used alongside current ADHD clinical assessment.

The test involves an 18 to 22 minute computerised task that is conducted whilst wearing a VR headset and headphones. The person must respond to both visual and auditory stimuli, by pressing a handheld button. Results are available immediately, and are visually reported, detailing a score for the following categories: attention, inhibitory control (impulsivity), motor activity, processing speed, distractibility, and vigilance. This score is calculated by comparing to a normative data set of people without ADHD of the same sex and age. All measures for sustained attention and inhibition are obtained separately for auditory and visual modalities and for the two modalities combined.

The Nesplora Attention Adults requires a virtual reality device, computer, stable internet connection, and headband headphones.

2.2.3 Nesplora Attention Kids Aula (Giunti psychometrics)

The Nesplora Attention Kids Aula is a CE-marked, virtual reality continuous performance test (VR-CPT) suitable for children and young people aged 6 to 16 years. It measures auditory and visual attention, impulsivity, motor activity and reaction time. It is intended to be used alongside current ADHD clinical assessment.

The test involves an 18 to 22 minute computerised task that is done whilst wearing a VR headset, handheld remote, and headphones. Motor activity is detected through motion sensors in both the remote and headset. The person responds to both visual and auditory stimuli, by pressing a handheld button. Results are available immediately, and are visually reported, detailing a score for the following categories: attention, inhibitory control (impulsivity), motor activity, processing speed, distractibility, and vigilance. This score is calculated by comparing to a normative

data set of people without ADHD of the same sex and age. All measures for sustained attention and inhibition are obtained separately for auditory and visual modalities and for the 2 modalities combined.

The Nesplora Attention Kids requires a virtual reality device, computer, stable internet connection, and headband headphones.

2.2.4 QbCheck (QbTech Ltd.)

QbCheck is a CE-marked, class I medical device, indicated for use to aid in the assessment of ADHD and in the evaluation of treatment interventions in patients with ADHD. QbCheck results should be interpreted by qualified professionals. It is suitable for people aged 6 to 60 years. It combines a web-based CPT with a webcam motion tracking system to measure 3 core symptoms of ADHD: attention, impulsivity, and hyperactivity. It is designed for remote testing that can be done without a healthcare professional present. The QbCheck should always be interpreted in combination with other clinically relevant information, such as a clinical interview and standard symptom scales.

QbCheck requires use of the user's own computer with web camera.

The test involves a 15 to 20 minute computer task, pressing a button in response to certain stimuli, whilst a webcam tracks motor activity. Results from the test are compared to a normative group set of the same sex and age who do not have ADHD. Outputs of the test are visually reported, detailing the performance in each of the three symptom domains of ADHD (activity, attention, and impulsivity) and the level of deviation from non-ADHD score. Test takers do not gain access to their test results upon test completion. These are provided by the issuing healthcare professional together with other clinical information.

Instructions are provided for people to self-administer a QbCheck by an instruction video, narrative, and check list for optimal environment. A computer check must be completed before each home test to ensure compatibility and quality checks are run during the test. People using the QbCheck do not gain access to their test results upon test completion. These are provided by the issuing clinician, in conjunction with other clinical information. The company recommend that any follow-up data is

collected using the same technology version as baseline (i.e., QbCheck and QbTest are not interchangeable).

The QbCheck requires a laptop or computer, webcam, and stable internet connection in an appropriate location.

2.2.5 QbTest (QbTech Ltd.)

QbTest is a CE-marked, class I medical device, indicated for use as an aid in the clinical assessment of ADHD and in the evaluation of treatment interventions in people with ADHD. It is suitable for people aged 6 to 60 years referred for ADHD assessment. It combines a CPT with a high-resolution motion tracking system to measure 3 core symptoms of ADHD: attention, impulsivity, and hyperactivity. The QbTest should always be interpreted in combination with other clinically relevant information, such as a clinical interview and standard symptom scales.

The test involves a 15 to 20 minute computer task, pressing a button in response to certain stimuli (Quantified Behavioural Task), whilst wearing a headband with a reflective marker that allows an infrared camera to track motor activity.

For children and young people aged 6 to 12 years QbTest is designed as a simple target detection ('go/no-go') task in which participants must press a hand-held responder button each time a circle appears on-screen, but withhold the response when a cross appears in front of the circle.

In the QbTest+ for those over 12 years, participants monitor a stream of blue and red squares and circles and must respond each time two consecutive stimuli match on both colour and shape. This version requires participants to hold each stimulus in working memory to determine whether the next stimulus is a match.

Several output report options are available (which can depend on whether this is a first QbTest or not) and include a version to share with people who have been tested. Results from the test are compared to a normative group set of the same sex and age who do not have ADHD. Outputs of the test are visually reported, detailing the performance in each of the 3 symptom domains of ADHD (activity, attention, and impulsivity) and the level of deviation from non-ADHD scores. The company

recommend that any follow-up data is collected using the same technology version as baseline (i.e., QbCheck and QbTest are not interchangeable).

The QbTest requires a private, quiet room with a computer, desk and chair, and access to a colour printer. The test can be administered, observed, and interpreted by healthcare professionals alongside questionnaire responses and observational data from routine clinical assessment.

3 Target condition

ADHD is a behavioural syndrome characterised by a persistent pattern of hyperactivity, impulsivity, and inattention that interfere with daily and occupational functioning.

ADHD is viewed as a heterogeneous disorder with different subtypes:

- Inattentive subtype
- Hyperactive-impulsive subtype
- Combined subtype (both inattentive and hyperactive-impulsive)

The exact cause of ADHD is unknown but involves the interplay of multiple genetic and environmental factors that are thought to lead to altered brain neurochemistry and structure.

The global prevalence of ADHD in children is estimated to be around 5% and is more commonly diagnosed in boys than girls (Posner et al., 2020). Prevalence ratios for males to females diagnosed with ADHD are estimated at between 2 and 5 to 1 (BMJ Best Practice, 2022). This sex difference may be because boys present more often with disruptive behaviour that prompts referral, whereas girls more commonly have the inattentive subtype and have lower comorbidity with oppositional defiant disorder (ODD) and conduct disorder. In the UK, prevalence of ADHD in adults is estimated at 3% to 4%, with a male to female ratio of about 3 to 1 (BMJ Best Practice, 2023). It is estimated that 25% of people within the UK criminal justice system meet the diagnostic criteria for ADHD (Young and Cocallis, 2019).

ADHD is associated with psychiatric disorders including ODD, conduct disorder, substance abuse and mood disorders such as depression and mania. Autism

spectrum disorder, dyslexia, dyscalculia, and dyspraxia have higher occurrence in people with ADHD. Overall prognosis may depend on the severity and management of any co-morbid disorders.

3.1 Diagnostic and care pathway

3.1.1 Referral

Children with suspected ADHD may be referred from the community by health, education or social care professionals (for example GPs, paediatricians, educational psychologists or school special educational needs coordinators; NICE guideline (NG87)). Children and young people presenting to primary care with behavioural or attention problems suggestive of ADHD are referred to secondary care for assessment.

NICE guideline NG87 recommend that adults presenting with symptoms of ADHD in primary care or general adult psychiatric services, who do not have a childhood diagnosis of ADHD, should be referred for assessment by a mental health specialist trained in the diagnosis and treatment of ADHD where there is evidence of typical manifestations of ADHD (hyperactivity, impulsivity, or inattention) that meet certain criteria (see the guideline for further details). Adults who have previously been treated for ADHD as children or young people and present with symptoms suggestive of continuing ADHD should be referred to general adult psychiatric services for assessment. The symptoms should be associated with at least moderate or severe psychological or social or educational or occupational impairment.

3.1.2 Diagnosis

NICE guideline NG87 recommend that a diagnosis of ADHD should only be made by a specialist psychiatrist, paediatrician or other appropriately qualified healthcare professional with training and expertise in the diagnosis of ADHD, on the basis of:

- A full clinical and psychosocial assessment of the person, including a discussion about behaviour and symptoms in different settings, and
- A full development and psychiatric history, and
- Observer reports and assessment of a person's mental state.

The diagnosis process should also involve assessing a person's needs, coexisting conditions, social, familial, educational, or occupational circumstances and physical health.

The guidance states that a diagnosis of ADHD should not be made solely on the basis of rating scale or observational data. However, rating scales such as the Conners' rating scales and the Strengths and Difficulties Questionnaire are valuable adjuncts, and observations (for example, at school) are useful when there is doubt about symptoms.

A person is diagnosed with ADHD if, after the completion of all assessments, they show symptoms that:

- Meet the DSM-5 or ICD-11 criteria for ADHD and
- Cause at least moderate psychological, social, or educational or occupational impairment based on interview or direct observation in multiple settings and
- Are pervasive, occurring in 2 or more important settings including social, familial, educational and/or occupational settings.

The Royal College of Psychiatrists in Scotland good practice guidelines suggest that in most cases the assessment and diagnosis of ADHD in adults will require 2 to 3 one hour sessions.

Due to the overlap in symptoms between ADHD and other psychiatric disorders, as well as the prevalence of comorbid neurodevelopmental disorders, differential diagnoses may be considered. Sometimes diagnosis may only be confirmed if a person’s symptoms reduce after treatment with ADHD medication.

Clinical experts commented that CPTs which measure attention and impulsivity (but not movement associated with hyperactivity) have been available for many years, but their use in ADHD diagnosis is not routine or widespread in practice.

3.1.3 Managing ADHD and medication

Treatment for ADHD includes pharmacological and non-pharmacological interventions and depends on the person's age, symptoms, and preferences. See

NICE guideline NG87 for recommendations on managing ADHD and medications. This includes a recommendation that before starting medication for ADHD, people with ADHD should have a full assessment (baseline assessment).

3.1.3.1 Dose titration

For people starting or switching medication for ADHD symptoms, dose titration is required. NICE guideline NG87 outlines that ADHD symptoms, impairment and adverse effects should be recorded at baseline, and at each dose change, on standard observer rating scales by parents and teachers, and progress reviewed regularly (for example, by weekly telephone contact) with a specialist. Doses should be titrated against symptom and adverse effects until dose optimisation is achieved. Treatment is considered optimal when people demonstrate reduced symptoms, positive behaviour change, improvement in education, employment, and relationships, with tolerable adverse effects.

NICE guideline NG87 recommends that the same medication choices are offered to people with ADHD and anxiety disorder, tic disorder or autism spectrum disorder as other people with ADHD. It also recommends ensuring that dose titration is slower and monitoring more frequent if any of the following are present in people with ADHD:

- neurodevelopmental disorders (for example, autism spectrum disorder, tic disorders, learning disability [intellectual disability])
- mental health conditions (for example, anxiety disorders [including obsessive–compulsive disorder], schizophrenia or bipolar disorder, depression, personality disorder, eating disorder, post-traumatic stress disorder, substance misuse)
- physical health conditions (for example, cardiac disease, epilepsy or acquired brain injury).

The NICE guideline NG87 includes a research recommendation on medication choices in people with coexisting conditions (people with ADHD and tic disorders, a history of psychosis or mania, or personality disorder). It states that no evidence was identified to justify different medication choices in people with ADHD and tic disorders, a history of psychosis or mania, or emotional dysregulation. It noted that

there are reasons (for example, mechanism of action of medication options, previous reports of adverse effects) to suspect that these groups may respond differently to different drugs, but a lack of trials to confirm this (and that these groups are often excluded from trials).

Common side effects of ADHD medications include a small increase in blood pressure and heart rate, decreased appetite leading to weight loss, aggression and irritability, headaches, stomach aches, nausea, vomiting, diarrhoea and trouble sleeping (Treatment: Attention deficit hyperactivity disorder, NHS).

3.1.3.2 Medication review and monitoring

Monitoring the effectiveness of non-pharmacological and pharmacological interventions for ADHD can help to inform decisions about starting, switching, or discontinuing treatment. For example, NICE guideline NG87 suggests to consider a course of cognitive behavioural therapy (CBT) for people with ADHD who have benefited from medication but whose symptoms are still causing a significant impairment in at least one domain.

For people taking medication to treat ADHD symptoms, NICE guideline NG87 recommends to monitor effectiveness of medication for ADHD and adverse effects, and document in the person's notes. It also recommends considering using standard symptom and adverse effect rating scales for clinical assessment and throughout the course of treatment for people with ADHD. The guidance includes further recommendations on maintenance and monitoring.

The NICE guideline also recommends that a healthcare professional with training and expertise in managing ADHD should review ADHD medication at least once a year and discuss with the person with ADHD (and their families and carers as appropriate) whether medication should be continued. This review should include a comprehensive assessment, including adverse effects and benefits (including how well the current treatment is working throughout the day). Full details can be found in NICE guideline NG87. Experts commented that monitoring can be very variable across the NHS, and may be less frequent than this in practice.

3.2 Patient issues and preferences

NHS ADHD services are under considerable strain, with long waiting lists for those referred for ADHD assessment. Waiting for a diagnosis can induce anxiety for people, as well as their parents or carers. For children, a delayed ADHD diagnosis may impact considerably on their education and long-term development, by delaying access to appropriate support or treatment to help manage their symptoms. In adults, delayed diagnoses may impact considerably on their employability and personal relationships.

A reduction in wait times for those referred for ADHD assessment may reduce the number of people seeking private assessment and the costs associated with this.

Clinical experts commented that the technologies may help improve communication between people under assessment for ADHD, and their carers, with healthcare professionals by offering further objective evidence of the state of their symptoms. This can be of particular benefit when there are discrepancies between observer reports, for example between a parent and teacher, or between 2 carers.

For children diagnosed with ADHD at a younger age, the ability to make informed, shared clinical decisions about managing their ADHD is important as they become older. Some experts noted that using technologies with objective measures of ADHD symptoms may be a particularly useful way for teenagers and young adults to understand and manage their ADHD. In particular, their choice to titrate or come off medication.

4 Comparator

The diagnosis of ADHD as outlined in NICE guideline NG87 (see section 3.1.2), and without the use of interventions included in this assessment (see table 1).

Assessment of treatment effectiveness as described in NICE guideline NG87 (see section 3.1.3) and without the use of interventions included in this assessment (see table 1).

5 Scope of the assessment

Table 1: Scope of the assessment

Decision question	Do technologies that combine measures of cognition and motor (physical) activity to: • help aid diagnostic decision-making for people with suspected ADHD, • help evaluate intervention effectiveness for people with ADHD represent a clinically and cost-effective use of NHS resources?
Populations	For use in assisting diagnostic decision-making (see section 6.1) for: (1) People* referred with suspected ADHD, (2) People* referred with suspected ADHD for whom current assessment methods cannot reach a diagnostic decision For use in evaluating intervention effectiveness: (3) during dose titration for people* with a diagnosis of ADHD (4) for longer term treatment monitoring for people* with a diagnosis of ADHD Where evidence is available, subgroups may be based on: • Age* (for example children, young people, and adults) • Sex • People of different ethnicities • People with mental health, behavioural and neurodevelopmental conditions People with developmental trauma • People in the Youth Justice System or Adult Criminal Justice System • Looked-after children * Technologies included for assessment differ in terms of which ages they are indicated for use in (see section 2.1 for further details of technologies).

Interventions	The following technologies, used as part of an ADHD assessment by a healthcare professional: • EFSim Test • Nesplora Attention Aquarium • Nesplora Attention Kids • QbCheck • QbTest
Comparator	Assessment by a healthcare professional without use of the interventions.
Healthcare setting	Secondary care or remote assessment
Outcomes: intermediate measures	Intermediate measures for consideration may include: • Test performance • Test failure • Time to assessment or to reach a diagnostic decision • Use of NHS and PSS services (such as the number and length of clinical appointments prior to diagnosis) • Impact on clinical decision-making • Confidence of healthcare professionals in assessment • Ease of use/acceptability for clinicians • Use of interventions (such as ADHD medication) • Adherence to treatment
Outcomes: clinical	Clinical outcomes for consideration may include: • Morbidity (including related to ADHD symptoms and adverse effects of medication) • Mortality
Outcomes: patient-reported	Patient-reported outcomes for consideration may include: • Health-related quality of life • Ease of use/acceptability for patients or carers • Patient and carer experience, including confidence in diagnosis
Outcomes: costs	Costs will be considered from an NHS and Personal Social Services perspective. Costs for consideration may include: • Costs related to using the technologies (including device, hardware and software, and time required to conduct the test and analyse results) • Cost of training staff to operate technology and interpret results • Costs of resources associated with diagnosing and reviewing ADHD • Cost of interventions to help manage ADHD

Measuring cost-effectiveness	The cost-effectiveness of interventions should be expressed in terms of incremental cost per quality-adjusted life year.
Time horizon	The time horizon for estimating clinical and cost effectiveness should be sufficiently long to reflect any differences in costs or outcomes between the technologies being compared.

6 Other issues for consideration

6.1 Use of the technology for people with suspected ADHD

Clinical experts commented that for diagnostic decision-making the technologies should be used alongside assessment by a healthcare professional but noted that they could be used in different ways:

- as part of the assessment for all people referred, or
- only for people where a diagnostic decision cannot be reached using current questionnaire and rating scale-based assessment methods.

6.2 Remote testing

Some technologies allow for remote assessments, that is the assessment is done in a different place to the healthcare professional administering the assessment, such as at home. NICE guideline NG87 does not provide any recommendations on remote assessment in ADHD, however clinical experts noted that this was becoming more common since the COVID-19 pandemic. Clinical experts emphasized the value of observing people whilst they undertake assessment for ADHD, as this information may be just as informative as the test performance scores. For example, a person's inability to complete the test due to severe inattention and distraction may help a clinician to reach a diagnostic decision. Experts also commented that assessment may be partially in-person, and partially done remotely. They commented that remote assessment may be more common for monitoring response to treatment, particularly during dose titration where assessment might need to be relatively frequent.

6.3 Concern for technologies use as a standalone assessment

Clinical experts highlighted the importance of using technologies as an additional decision aid to routine clinical assessment of ADHD and not as a standalone

assessment to make decisions about diagnosis or treatment. The over-reliance on technologies for making a diagnosis was also flagged as a concern. Experts raised concern that the technologies, where already used in the NHS, may not be used as intended.

6.4 Younger children

Clinical experts noted that these technologies may have considerable benefits for diagnostic decision-making in younger children (5 years or under), who are particularly difficult to diagnose. The final guidance recommendations for this evaluation will be restricted to the indicated use age ranges of the included technologies, which differ across technologies (see section 2).

6.5 Feigning of symptoms

Some clinical experts highlighted that people feigning symptoms and “gaming” the system for a predetermined diagnosis was a risk in a small proportion of people under assessment for ADHD. This may lead to an overdiagnosis of ADHD.

7 Potential equality issues

NICE is committed to promoting equality of opportunity, eliminating unlawful discrimination, and fostering good relations between people with particular protected characteristics and others.

ADHD is most commonly diagnosed in children and young people and is thought to be under-diagnosed in girls and women. Two experts who commented on the NICE Medtech innovation briefing (MIB318) for QbTest stated that they found use of the technology particularly helpful with young girls where the presentation may be less clear and in those who may 'mask' their symptoms. Age and sex are protected characteristics under the 2010 Equality Act.

The tests being consider for this assessment have different age ranges for which they are indicated for use in.

Clinical experts also noted that children with ADHD from different ethnic backgrounds may show different symptoms of ADHD. Race is a protected characteristic under the 2010 Equality Act.

NICE guideline NG87 highlighted that compared to the general population, the following groups may have increased prevalence of ADHD:

- People born preterm
- Looked-after children and young people
- Children and young people diagnosed with oppositional defiant disorder or conduct disorder
- Children and young people with mood disorders (for example, anxiety and depression)
- People with a close family member diagnosed with ADHD
- People with epilepsy
- People with other neurodevelopmental disorders (for example, autism spectrum disorder, tic disorders, learning disability [intellectual disability] and specific learning difficulties)
- Adults with a mental health condition
- People with a history of substance misuse
- People known to the Youth Justice System or Adult Criminal Justice System
- People with acquired brain injury.

Clinical experts also noted that diagnosis may be more difficult where observer reports are missing, for example, from those not attending school.

The tests may not be suitable for use in people with existing learning disabilities, visual impairment, or physical disability, who may be covered by the disability provision of the Equality Act 2010.

Technologies with wearable components such as a headband or headset may not be suitable for all people, such as those with anxiety and sensory difficulties associated with autism spectrum disorders.

The technologies may offer additional value to people or their carers who experience problems communicating their symptoms. This could include people with cognitive disorders and people who do not speak English as a first language.

If technologies allow greater use of remote appointments, this could have greater benefits for people in more rural or remote settings. Increased use of remote appointments may also allow greater access to care for people who are less able to afford travel to in-person appointments.

8 Potential implementation issues

Potential barriers and enablers to implementation include:

Capacity and waiting times

There are large variations in wait times among NHS Trusts for ADHD assessment. Implementation of technologies that could reduce the time taken to reach a diagnosis or be assessed, reducing waiting times and staff workload would likely be welcomed by services.

Additional space needed

The technologies need an assessment room that is suitably quiet and free from distractions for people to complete the tests. Availability of a suitable additional room space may not be available everywhere.

Remote assessment

Technologies used for remote assessment require people to have access to all necessary equipment, including a laptop with internet access. Companies highlighted that some technologies were not compatible with all operating systems.

Training

Some experts noted that implementation of these technologies may provide the opportunity to upskill healthcare staff to carry out tests but noted that this would take significant training time. Learning how to interpret tests would also require training. Clinical experts noted the importance of having enough trained staff in order to avoid bottlenecks in the administration of tests, or issues if staff trained in using and interpreting the technologies leave or are unexpectedly unavailable.

Data governance

Variations in data governance and IT infrastructure across NHS trusts may be a barrier for implementing technologies in both secondary care and remoted settings.

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Appendix A Glossary of terms

Continuous performance test (CPT)

A neuropsychological test of sustained attention. Usually a task-orientated computerised assessment, which requires the participant to perform a constant-difficulty task without interruptions.

Dose titration

The process of adjusting a medication dose until an optimum dose is found. This optimal dose will control ADHD symptoms with the fewest side effects.

Hyperactivity

The state of being unusually or abnormally active.

Impulsivity

The inability to inhibit behavioural impulses and thoughts.

Neurodevelopmental disorders (NDDs)

A group of conditions which begin in childhood, caused by disrupted brain development, which cause developmental impairments.

Oppositional defiant disorder (ODD)

A behaviour disorder in which a child or young person often loses their temper, argues with adults, and are easily annoyed.

Psychosocial assessment

An investigation of a person’s mental health, social wellbeing, and functional capacity.

Appendix B References

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