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Review

ADHD Assessment Recommendations for Children in Practice Guidelines: A Systematic Review

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Abstract: Objective: The current review sought to synthesise and evaluate ADHD guidelines to identify recommended procedures for co-occurring and differential diagnosis for ADHD assessments of school aged children. Method: A systematic literature review was conducted by searching PsycInfo, Medline, CINAHL and Web of Science. A grey literature search was also performed. ADHD guidelines that described a diagnostic process for school aged children, published between 2013 and 2021, by Government organisations or a national professional association, and written in English were included. Results: Each of the six included guidelines were produced by panels consisting primarily of paediatricians and psychiatrists. All guidelines recommended assessing for co-occurring conditions. Five of the guidelines recommended consideration of a differential diagnosis. Five guidelines also recommended referral to a specialist, mental health clinician or psychologist when diagnostic uncertainty exists. Conclusions: Guidelines to assist in the assessment of referred cases were not discovered. There is a need for recommendations to be developed to supplement existing guidelines to aid psychologists and mental health clinicians in a systematic ADHD assessment process, particularly in complex cases.

Keywords: ADHD; children; assessment; co-occurring diagnoses; differential diagnosis

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1. Introduction

Attention deficit hyperactivity disorder (ADHD) is one of the most frequently occurring neurodevelopmental disorders worldwide [1]. Clinical practice guidelines can aid the assessment process; however, concerns regarding inadequate assessment of potential co-occurring and differential conditions are common [2]. Misdiagnosis may result in associated risks and side effects if pharmaceuticals are administered incorrectly [3], while underdiagnosis results in children not receiving needed support [4] and in potentially lost social and educational opportunities [5]. Given concerns regarding adequacy of assessments, as well as the consequences of both misdiagnosis and underdiagnosis, the current review sought to synthesise and evaluate ADHD guidelines to identify recommended procedures for co-occurring and differential diagnosis for ADHD assessments of school aged children.

ADHD is a neurodevelopmental disorder described as "a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development" [6] (Attention-Deficit Hyperactivity Disorder section, paragraph 1). The aetiology of ADHD is primarily grounded in genetic and neurological factors which may be influenced by interactions in the environment such as infections or exposure to toxins [7]. Children with ADHD may experience challenges inhibiting inappropriate behaviour, refocusing attention, implementing goal directed behaviour, and regulating emotions such as anger, impatience and frustration [7]. Consequently, they may experience an increased incidence of adverse outcomes such as relationship problems [8], sleep disturbances [9], anxiety [10] and academic failure [11]. Increased levels of parental stress and disruptions in parent–child relationships may also occur when a child has ADHD [12].

Classification systems for clinical diagnoses are contained within the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD) [13]. This review focused on the DSM-5 (5th ed.) [14] as it is considered the gold standard for the classification and diagnosis of mental disorders [15]. Although a later version of the DSM, the DSM-5 TR [6] has subsequently been released, no changes have been made to the ADHD diagnostic criteria between the two versions. According to the DSM-5, the diagnosis of ADHD is based on five criteria, the first of which is a behavioural checklist of 18 symptoms according to three presentations: inattentive, hyperactive/impulsive, and combined presentation. Symptoms must be present in two or more settings [14]. Identifying behavioural symptoms of ADHD sufficient to meet the first criteria is seemingly straightforward as all symptoms can be observed in behaviour [5]. However, the DSM-5 also states that a diagnostic checklist is not sufficient to diagnose a neurodevelopmental disorder in isolation. Rather, a diagnosis should also incorporate a clinical history that considers biological, social and psychological factors that may contribute to symptoms. Moreover, consideration of co-occurring disorders is also suggested, and 16 disorders are also listed for consideration as a differential diagnosis [14].

Considerable research has been conducted into ADHD and co-occurring conditions. Indeed, approximately 67–87% of school-age children with ADHD have at least one other neurodevelopmental or mood disorder [7]. For children, the most common co-occurring condition is oppositional defiant disorder (ODD), occurring in approximately 60% of cases [16]; as well as anxiety disorders in 50% of cases [17]; and specific learning disorders in 45% of cases [18]. In addition, for children with ADHD, the risk of co-occurring language problems increases threefold [10]. Moreover, symptoms of many conditions, including sensory deficits such as visual or hearing impairments [14] or traumatic experiences [19] may result in symptoms similar to those listed in the diagnostic criteria for ADHD [14]. Further, medical conditions such as sleep disorders, metabolic abnormalities and epilepsy; or psychological or neurodevelopmental disorders can also present with symptoms that mimic ADHD [20]. For example, a child with a specific learning disorder may display symptoms of inattention because they are frustrated, have limited ability, or lack interest in learning, or a child with anxiety may appear inattentive or restless [14]. Alternatively, a child with ADHD may have difficulty with emotion regulation becoming easily frustrated and angry or have difficulty internalising rules of social conduct and consequently experience conflict with parents and teachers [8]; such symptoms, however, are also characteristic of ODD [14]. Given the overlap between symptoms of ADHD and such disorders, as well as the potential for co-occurring physical, neurodevelopmental, and emotional and behavioural disorders, reliable diagnosis of differential and co-occurring conditions is vital [20,21].

There is general agreement between paediatricians and psychologists regarding "best practice" for assessing a child with symptoms of ADHD [2]. Diagnosis is typically based on a clinical interview [5] and behaviour rating scales [22] both of which may be completed by the child's parent and teacher [23]. The assessment process, however, is often complicated due to the heterogeneous nature of ADHD and the variance in clinical profiles [24]. Determining which assessment approach to use, when faced with complex mental and behavioural symptoms is challenging [25]. According to the DSM-5 Handbook of Differential Diagnosis, clinicians determine a client's diagnosis within the first 5 min of an evaluation, eliciting a diagnostic bias through which the remainder of the assessment is interpreted [26]. To counter such challenges and biases and to ensure accurate diagnosis or diagnoses, methodological consideration of potential differential conditions [26] and standardised assessment procedures are recommended [4].

Numerous guidelines have been created for a broad range of professionals to inform the assessment and treatment of ADHD. Two recent reviews have been conducted examining ADHD clinical practice guidelines [27,28]; however, to our knowledge, no systematic review has explicitly focused on the ADHD differential assessment process recommended within clinical practice guidelines. Therefore, the current study sought to synthesise and evaluate recommendations provided in current ADHD guidelines to determine if they

include standardised procedures for differential and co-occurring diagnosis during the ADHD assessment process. Studying guideline recommendations is important because practice guidelines can direct evidence-based assessment (and treatment) in a systematic manner [28]. Our study will therefore lead to a summary of recommendations, or lack thereof, for the assessment of co-occurring and differential conditions during an ADHD assessment of school aged children.

2. Materials and Methods

The reporting of this systematic literature review was based on PRISMA guidelines [29]. This systematic review was registered at PROSPERO (CRD42021252081).

2.1. Database Search

Search terms were developed in consultation with SC, NF, and a university subject librarian (see Table 1 for search terms). A database search was then conducted in PsycInfo, Medline, CINAHL and Web of Science. Where required, search terms were altered based on the requirements of the database. Following the search, all articles were imported into Covidence, and duplicate articles were removed.

Table 1. Terms used for database searches.

Concept 1: ADHD	Concept 2: Guideline	Concept 3: School Aged Children
ADHD		child *
Attention deficit disorder	guideline *	youth *
Hyperactivity disorder	Guidance	adolescen *
hperactiv *	clinical practice	young people
overactiv *	recommendation *	teen *
hyperkinetic disorder		school age

* Boolean wildcard search operator.

2.2. Grey Literature

A grey literature search strategy was also formulated based on simplified terms (ADHD AND guidelines AND child) as the database search terms yielded only ten results in Google. The following grey sources were searched: Google (results screened from pages 1–30), Clinical practice guidelines (Australia), Cochrane Library, Clinical Practice Guidelines Infobase, Guidelines International Network (GIN), Library, MedNar, National Guideline Clearinghouse, Scottish Intercollegiate Guidelines Network, SUMSearch 2, and the TRIP Database. Search terms were amended as required for each of the websites. For example, only the term ADHD was used to search the GIN website.

2.3. Inclusion Criteria

Guidelines were included if they meet the following criteria: (1) published in English; (2) included information regarding the diagnostic process; (3) diagnostic criteria were based on DSM-5; (4) published, revised or updated between 2013 and 2021 (given the DSM-5 was published in 2013, guidelines published prior to 2013 would be based on previous versions of the DSM); (5) relevant for any school-aged children; and (6) published by a government organisation, NGO commissioned by State/Federal Government (or equivalent overseas) or a National Professional Association (Criterion 6 was based on inclusion criteria from a recently published scoping review of practice guidelines for autism assessments [30]).

2.4. Exclusion Criteria

Guidelines were excluded if any of the following criteria were met: (1) diagnostic criteria were based on an earlier version of the DSM; (2) created by a single author or were written as part of a dissertation (based on recommendations that a guideline development group includes a mix of policymakers, clinicians, consumers and researchers [31]); (3) referenced an adult population only; (4) published in a language other than English; (5) a guideline that has since been revised; (6) commentary or summary of a guideline; (7) guidelines for funding (Criteria 3–6 were also based on recently published scoping review of practice guidelines for autism assessments [30]).

2.5. Screening

Articles obtained through database searches were screened according to Cochrane Searching and Selecting Studies Guidelines [32]. Title and abstracts were reviewed by CP. If there was any uncertainty about whether an article met inclusion/exclusion criteria during screening they were included in the full-text review (n = 89). Full text review was then conducted independently by CP and HK. Where disagreement arose (n = 6), CP and HK discussed each article. Consensus was reached following this discussion. To capture grey literature, CP completed a Google search from pages 1 to 30. 15% of the search was also blind screened by an independent reviewer (pages 1 to 5). Full-text review was conducted for 16 guidelines. Following perfect inter-rater agreement on the 15% screened, it was deemed unnecessary for 100% screening to be conducted. The search through guideline databases such as Clinical Practice Guidelines (Australia) and Cochrane Library was conducted by CP.

2.6. Guideline Quality Assessment Tool: AGREE II

The Appraisal of Guidelines for Research and Evaluation (AGREE II) instrument [33] was used to assess the methodological rigour of each guideline. The tool comprises 23 items that were rated on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The items are organised into six domains: scope and purpose, stakeholder involvement, the rigour of development, clarity of presentation, applicability and editorial independence [33]. CP reviewed and rated all guidelines using the My AGREE PLUS tool (https://www.agreetrust.org/my-agree/, accessed on 14 August 2021). Guidelines were then reviewed by a second independent reviewer. Interrater agreement was conducted once all guidelines were viewed by a second rater. Any items with a score difference greater than two points were discussed between raters and scores were reconsidered, resulting in all scores having no more than a two-point difference [30]. To calculate domain scores, results of both raters were aggregated for each domain. A percentage was then calculated by dividing the summed domain score by the total score possible [31]. Using these percentages, recommendations regarding guideline use were then made [27].

3. Results

A total of 3703 documents were retrieved through a comprehensive database and grey literature search. 2991 documents remained after duplicates were removed. 105 guidelines were eligible for full-text screening. In total, six guidelines that met the inclusion criteria were identified (See PRISMA flowchart in Figure 1). These guidelines were published in the United Kingdom, Canada, Singapore, Malaysia and two were published in the United States of America. Two guidelines were produced by government bodies and four by professional associations, with all guidelines being developed by panels consisting primarily of paediatricians and psychiatrists. See Table 2 for details of included guidelines.

3.1. Quality Assessment

There was near positive agreement between raters with all but six articles being agreed upon. These articles were later excluded as closer inspection revealed that they did not meet inclusion criteria. The result was 100% agreement between raters. There was also near

positive agreement in AGREE II ratings between appraisers for all guidelines following discussion and reconsideration of any scores that had more than a two-point difference. Table 3 provides an overview of AGREE II scaled domain ratings and demonstrates that all the six guidelines met the minimum of four domain scores being over 60% to be classified as 'strongly recommended', however as can be seen in Table 3, there is much variance in the overall assessment ratings with ratings ranging from 62% through to 93%.

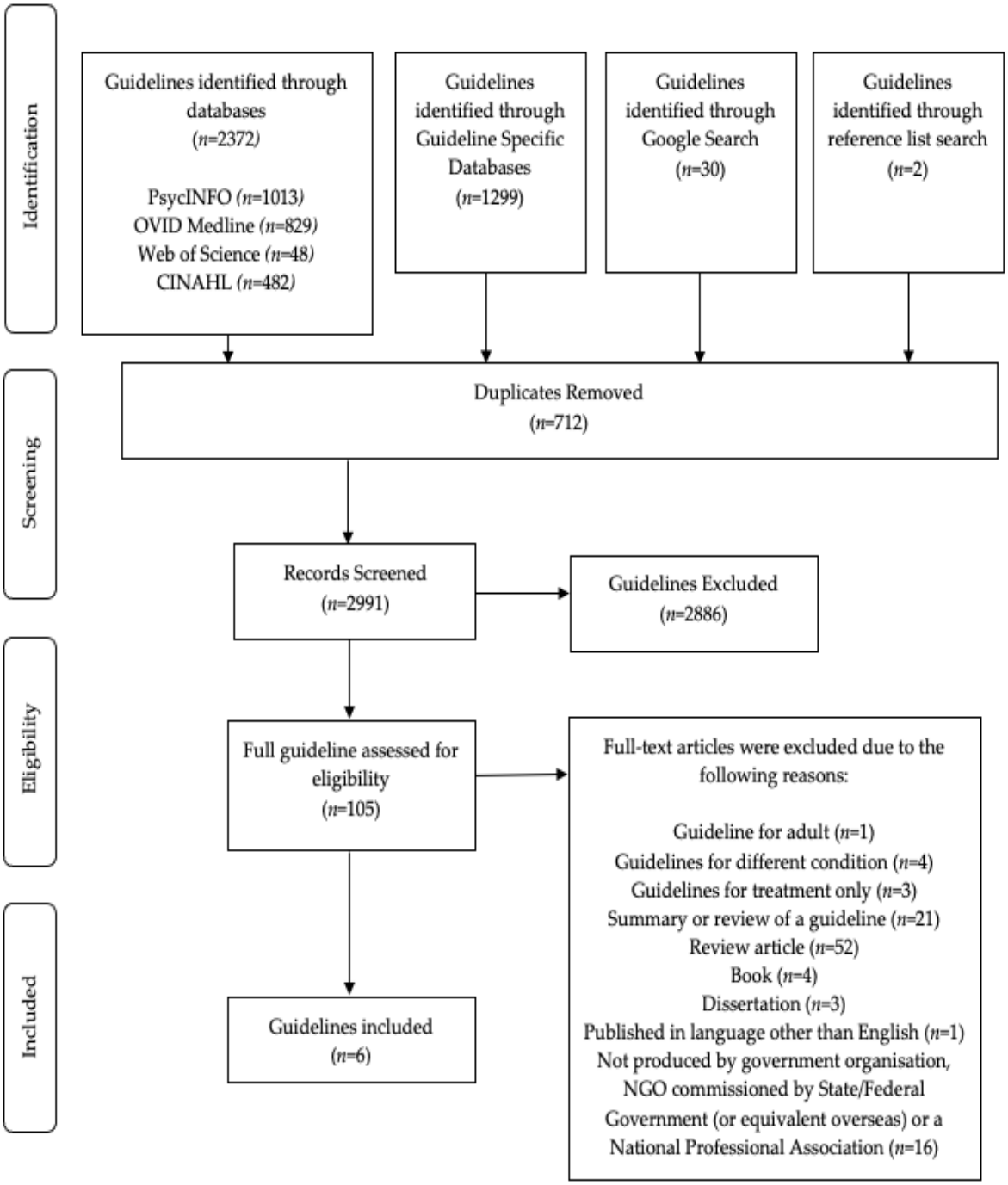

Figure 1. PRISMA flowchart for the study selection process.

Table 2. General characteristics of ADHD clinical practice guidelines.

Organisation (Short Name)	Title	Year of Publication	Country of Origin	Guideline Development Group/Profession
AAP	Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents	2019	United States of America	Professional association
AMS-MOH	AMS-MOH Clinical Practice Guidelines 1/2014	2014	Singapore	Government
CADDRA	Canadian ADHD Resource Alliance: Canadian ADHD Practice Guidelines	2020	Canada	Professional association
MOH/PAK	Management of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents (Second Edition)	2020	Malaysia	Government
NICE	Attention deficit hyperactivity disorder: diagnosis and management (NG87)	2018 (Last updated 2019)	United Kingdom	Professional association
SDBP	Society for Developmental and Behavioral Pediatrics Clinical Practice Guideline for the Assessment and Treatment of Children and Adolescents with Complex Attention-Deficit/Hyperactivity Disorder	2020	United States of America	Professional association

Table 3. Quality Analysis: AGREE II domain ratings and overall recommendations for clinical practice guidelines.

Guideline	Domain 1: Scope and Purpose	Domain 2: Stake Holder Involvement	Domain 3: Rigour of Development	Domain 4: Clarity and Presentation	Domain 5: Applicability	Domain 6: Editorial	Overall Assessment	Recommendation
AAP (2019)	95	83	86	100	63	93	93	Strongly Recommend *
AMS-MOH (2014)	98	74	57	98	63	14	71	Strongly Recommend
CADDRA (2020)	83	71	33	62	38	71	62	Strongly Recommend
MOH/PAK (2020)	100	76	74	88	63	57	86	Strongly Recommend
NICE (2018)	95	100	87	80	64	57	86	Strongly Recommend
SDBP (2020)	100	64	57	98	64	46	86	Strongly Recommend

* Minimum of four domain scores greater than 60% = strongly recommend.

3.2. Recommended Assessment Process

Table 4 provides a summary of the most comprehensive assessment process found within the six guidelines. The recommendations that come from the CADDRA guidelines [22] detail a number of steps to take during an assessment. A flow chart for both child and adolescent assessment is also provided in the guidelines.

Table 4. Summary of ADHD assessment recommendations in CADDRA guidelines.

Guideline	Page Number/s	Recommendations for ADHD Assessment (Level of Evidence)
CADDRA (2020)	1–32	"The clinical interview and evaluation continues to be the mainstay of ADHD diagnosis". (Literature Review) "Although rating scales are not sufficient to diagnose ADHD . . . their use to enrich the process of evaluation is widely recommended". (Single reference) "Psychoeducational evaluations are frequently recommended, these are most useful in situations of diagnostic uncertainty". (Single reference)

Table 4. *Cont.*

Guideline	Page Number/s	Recommendations for ADHD Assessment (Level of Evidence)
CADDRA (2020)	1–32	Step 1: Information gathering Step 2: Medical review "Exclude any medical causes that can mimic or aggravate ADHD signs or symptoms". "Review nutrition and lifestyle habits". "Evaluate potential contraindications to ADHD medications". Step 3: ADHD specific interview "Discuss patient's strengths and observe patient during interview". "Review developmental history and obtain collateral information from parents/caregivers". "Review the questionnaires used in assessment". "Consider contributions of other psychiatric, psychosocial factors or learning disorder to the presenting symptoms [see pages 14–32 for further information about differential and co-occurring diagnosis]. Consider specialist referral if necessary". A flow chart with more detailed information regarding steps 1–3 can be found on pages 7–12 of the guideline.

3.3. Recommended Co-occurring Process

Table 5 summarises the recommendations made by each guideline for co-occurring diagnosis. All six guidelines recommended assessing for co-occurring conditions with varying degrees of information on how to do so. MOH/PAK guidelines [34] stated that co-occurring conditions should be assessed and recommended referral from the primary care provider to a paediatrician or psychiatrist where there is diagnostic uncertainty. AMS-MOH guidelines [35] recommended that co-occurring disorders are assessed when a child is diagnosed with ADHD. An appropriate specialist assessment was also recommended if a learning disorder or speech or language disorder is suspected. NICE guidelines [36] recommended that a full psychiatric and developmental history is taken and that coexisting conditions, social, familial and educational circumstances as well as physical health is considered in the assessment process.

Table 5. Recommendations for differential and co-occurring diagnosis in each guideline.

Guideline	Page Number/s	Differential Diagnosis Recommendations (Level of Evidence)	Co-occurring Diagnosis Recommendations (Level of Evidence)
AAP (2019)	5	"Rule out any alternative cause" (Grade B, strong recommendation) [a] Refer to a clinical child psychologist or mental health professional if a distinction cannot be made between ADHD and other mental health disorders	"Screen for comorbid conditions, including emotional or behavioral conditions (e.g., anxiety, depression, oppositional defiant disorder, conduct disorders, substance use), developmental conditions (e.g., learning and language disorders, autism spectrum disorders), and physical conditions (e.g., tics, sleep apnea)" (Grade B, strong recommendation) [a]
AMS-MOH (2014)	10–15	"Before diagnosing attention deficit hyperactivity disorder (ADHD), a careful evaluation to exclude psychiatric or medical conditions which can account for ADHD-like symptoms should be performed" (Grade B, Level 2++) [a]	"Assess a child diagnosed with attention deficit hyperactivity disorder for co-morbid conditions" (Grade C, Level 2+) [a]

Table 5. *Cont.*

Guideline	Page Number/s	Differential Diagnosis Recommendations (Level of Evidence)	Co-occurring Diagnosis Recommendations (Level of Evidence)
CADDRA (2020)	Multiple	"A careful assessment of other possible diagnoses should be undertaken at the time of evaluation" [b] "A thorough history and full functional review accompanied by a physical examination may highlight underlying physical conditions" [b] "Psychological testing may be required to address a suspected learning disability or other cognitive challenges" [b] Details of potential differential conditions, each with a list of overlapping and distinguishing features can be found on page 14–32 of the guideline. [c]	"An evaluation for ADHD requires screening for possible comorbid disorders and consideration of biological, social, and psychological factors. Consideration of a second opinion or referral to an ADHD specialist should be made if the patient has a clinical history that is complex" [b] Details of potential co-occurring conditions, each with a list of overlapping and distinguishing features can be found on page 14–32 of the guideline. [c]
MOH/P/PAK (2020)	3–5	"A comprehensive physical examination (including vital signs, height and weight) should be performed to exclude physical conditions which mimic ADHD" (Level of evidence based on expert committees, consensus, and case reports) [a]	"Children with ADHD should be evaluated for co-morbidities" [b]
NICE (2019)	11–12	No recommendation provided	"Include an assessment of . . . coexisting conditions, social, familial and educational or occupational circumstances and physical health. For children and young people, there should also be an assessment of their parents' or carers' mental health" [b]
SDBP (2020)	41–43	"If ADHD is not confirmed, consideration should be given to other conditions that may present with symptoms similar to ADHD. Identification of these other conditions may require psychological testing, mental health assessment . . . [or] neuropsychological testing" [b1]	"The clinician should . . . assess for coexisting conditions". (Grade B) [a] "ADHD symptoms cannot be evaluated in these children [with an ID, LDs, or ASD] without data from formal cognitive/developmental testing and, in the school-age child, academic achievement testing and assessment of classroom functioning" [c] "When diagnostic uncertainty remains . . . children with ADHD should be referred by their primary care clinician for comprehensive assessment" [c]

[a] Level of evidence was defined by the guideline authors. [b] Level of evidence not provided. [c] Additional information provided to supplement recommendation; level of evidence not provided. [1] Information provided in the supplemental algorithm rather than the guideline

The remaining three guidelines AAP [37], CADDRA [22] and SDBP [38], also suggested assessing for co-occurring conditions through a comprehensive assessment which includes a medical history and screening for psychological, social and neurodevelopmental disorders. A referral is recommended in each of these guidelines where diagnostic uncertainty remains or when learning or neurodevelopmental disorders are suspected. AAP guidelines [37] suggested referral to a mental health professional or a clinical child psychologist, SDBP [38] recommended a referral to a mental health clinician, CADDRA [22] suggested a referral to a specialist such as a psychologist, psychiatrist, medical specialist, speech-language pathologist, or occupational therapist. SDBP guidelines [38] also provided more explicit

information about psychoeducational assessments, stating that "ADHD symptoms cannot be evaluated without data from formal cognitive/developmental testing" (p. 42). AAP [37] and CADDRA [22] were the only guidelines that explicitly recommended a hearing and visual assessment and only CADDRA [22] provided a list of co-occurring conditions and information regarding overlapping and distinguishing symptoms of each disorder.

3.4. Recommended Differential Diagnosis Process

Table 5 also summarises the recommendations made by each guideline for differential diagnosis. NICE guidelines [36] did not provide explicit information regarding differential diagnosis. The remaining guidelines all provided information on this process, however, there was little consistency across recommendations. For example, the SDBP [38] process of care algorithm (SPCA), which can be used to aid the implementation of the SDBP guideline [38], recommended that if ADHD is not confirmed, that other conditions are considered. In contrast, AAP [37], AMS-MOH [35], CADDRA [22] and MOH/PAK [34] guidelines recommend that it is essential to exclude medical or psychiatric conditions before diagnosing ADHD. AAP guidelines [37] recommended a referral to a child psychologist or mental health professional if a determination between ADHD and these difficulties cannot be made. CADDRA guidelines [22] also recommended psychological testing when learning disabilities or other cognitive challenges are the suspected cause of attention difficulties. SDBP guidelines [38] suggested that mental health, psychological or neuropsychological testing may be required if symptoms are present, yet ADHD is not confirmed.

3.5. Content Analysis and Level of Evidence

In Table 5, the level of evidence for each recommendation is also provided, however, it is important to note that each guideline graded evidence in their own way. AAP [37] reported that their recommendation was based on strong evidence. Evidence for AMS-MOH [35] recommendations ranged from a well-conducted study to a high-quality systematic review. Although SDBP guidelines [38] included an evidence rating, the only recommendation which included a level of evidence was the recommendation regarding the assessment of coexisting conditions. The level of evidence was not provided for recommendations regarding formal testing, referral and the recommendation to consider alternative causes if ADHD is not diagnosed. Although MOH/PAK [34], NICE [36], and CADDRA [22] referred to evidence from previous guidelines, information regarding the level of evidence was not provided in the current editions. Finally, MOH/PAK [34] and CADDRA [22] stated that where evidence was insufficient, expert consensus had been implemented. Given the inconsistencies in how each guideline graded the level of evidence, the current review was unable to conduct a comparison between the types of evidence provided for recommendations.

4. Discussion

Diagnosing ADHD in children can be complex [24]. Misdiagnosis presents a risk of lost social and educational opportunities [5] and underdiagnosis may result in children not receiving needed support [4]. While practice guidelines are designed to offer practical support for clinicians, the absence of consensus regarding the process of co-occurring and differential diagnosis is a significant gap in the literature and highlights the need for further research to guide recommendations for clinicians having to reach diagnostic decisions in complex cases. Six guidelines, from five countries, were included and analysed in this review.

4.1. Ratings of Guidelines and Evidence for Recommendations

All included guidelines met the minimum of four domain scores being over 60% to be classified as 'strongly recommend', however, there was a large variance in the overall assessment percentages obtained for each guideline with the lowest being CADDRA [22] at 62% through to the highest rating of 93% for the AAP guideline [37]. Given that the

focus of the current review was on the assessment process, specific analysis of the evidence level for the assessment process of the guidelines was also included. It is important to note that unique methods to assess the level of evidence were used and reported by each guideline; consequently, critique and comparison across guidelines was not possible. Recommendations provided by CADDRA [22] for an ADHD assessment (Table 4) ranged from single studies to a literature review spanning ten years. Regarding co-occurring and differential diagnosis, AAP [37] recommendations were based on strong evidence. The AMS-MOH guideline [35] recommendation to rule out conditions that may account for ADHD symptoms was based on a high-quality systematic review, and the recommendation for co-occurring diagnosis was based on well-conducted case or cohort studies, both of which are a lower level of evidence than a high-quality systematic review. Interestingly, the requisite level of evidence was not provided in the SDBP guidelines [38] for considering differential diagnosis if ADHD is not confirmed. However, assessing for co-occurring conditions was based on high to moderately high-quality evidence. The level of evidence for co-occurring diagnosis recommendations was not provided by NICE [36]. The level of evidence was also not provided in CADDRA [22] and MOH/PAK guidelines [34]; however, both guidelines included a comment that where evidence was lacking, recommendations were based on expert consensus. To reach consensus between all members of a group, a process such as the Delphi method is recommended [39]. Given that neither CADDRA [22] nor MOH/PAK [34] reported the use of the Delphi method or similar, and that the level of evidence was not provided for the recommendations in the NICE guidelines [36], caution is best used when interpreting recommendations pertaining to the assessment process in each of these guidelines.

4.2. Recommended Assessment Process

To enhance the practical utility of the current review, an overview of recommendations for an ADHD assessment was provided based on the CADDRA [22] guidelines. The recommendations in these guidelines were chosen as they were one of the guidelines that provided the most comprehensive information. As can be seen in Table 4, a number of steps are listed which include history taking, a medical review and an ADHD specific interview. Reference to the guidelines for further information when conducting an assessment is recommended. Moreover, further consideration of the recommendations in all guidelines regarding the co-occurring and differential diagnosis process, as detailed below and within guidelines, is essential.

4.3. Differential Diagnosis Assessment Process

Differential diagnosis was recommended in five guidelines (AAP [37], AMS-MOH [35], CADDRA [22], MOH/PAK [34], SDBP [38]). However, although SDBP guidelines [38] referred to differential diagnosis in the SPCA, the recommendation suggests that this should be considered only if ADHD is not diagnosed. Consequently, any child who displayed symptoms of ADHD would be diagnosed even if the symptoms were the result of another condition. The only guideline that did not recommend considering differential diagnosis was the NICE guidelines [36]. Interestingly, superseded NICE guidelines [40] included a subsection titled 'Differential Diagnosis'. The reason for omission of this section in the most recent guidelines is unknown. It is therefore possible that the DSM-5 recommendation regarding differential diagnosis [14] may be overlooked if clinicians adhere to NICE [36] or SDBP guidelines [38] without reference to the DSM.

4.4. Co-occurring Assessment Process

Assessment of co-occurring conditions was recommended in all included guidelines. Recommendations ranged from a brief statement suggesting that co-occurring conditions be assessed in the MOH/PAK guidelines [34] through to details of potential co-occurring conditions, each with a list of overlapping and distinguishing features in CADDRA guidelines [22]. Of the six guidelines, five recommended a referral where there is diagnostic

uncertainty (AAP, [37], AMS-MOH, [35], CADDRA, [22], MOH/PAK, [34], SDBP, [38]). However, this review highlights a significant gap in current guidelines as further guidelines to aid the clinician to whom a child is referred were not discovered. Perhaps not surprisingly, in an executive summary of the SDBP guidelines, it was concluded that uncertainty still exists regarding the essential components of an assessment and that further research is required to understand how children with different co-occurring conditions can be accurately diagnosed [41]. The recommendation to refer also highlights an assumption that paediatricians are the first clinicians to assess children who present with attention difficulties. In clinical practice however, the hierarchy, or flow of referrals does not always occur in this manner as ADHD is also commonly assessed by psychologists [42]. It is also important to note that current methods of psychological and neuropsychological testing can be time consuming [43] and costly [44].

4.5. Gaps

Inspection of the authors and contributors section of each guideline revealed that all guidelines included in the current review were produced by panels consisting primarily of paediatricians and psychiatrists [22,34–38]. Given that referral to a specialist mental health professional or psychologist is recommended in five of the guidelines when there is diagnostic uncertainty, it appears that current guidelines assume that a referral is sufficient, and that psychologists and mental health professionals are equipped with specialist knowledge to make a differential or co-occurring diagnosis. Given that a guideline to assist in such cases was not discovered, the current study has revealed the need for evidence-based recommendations to guide diagnostic decisions in complex cases for the clinician whom such cases are referred. To minimise diagnostic bias and enhance diagnostic accuracy, a systematic assessment process which accounts for symptoms of co-occurring or differential conditions to guide standardised assessments is recommended [4,26]. Furthermore, the use of the DSM-5 release year (2013) as the benchmark for inclusion also highlighted the need for an update of the Australian guidelines which referred to the DSM-IV [45] as the change to allow co-occurring diagnoses of ADHD and autism in the DSM-5 may enhance diagnostic sensitivity for individuals with milder ADHD symptoms who were missed when assessed based on the DSM-IV [46]. Updated Australian guidelines were being developed at the time the current review was conducted and were released in October 2022. Recommendations in the newly released guidelines include a comprehensive assessment, awareness and assessment of commonly co-occurring and differential conditions and a neuropsychological, psychometric or language assessment if learning disorders, language or speech disorders are suspected. However, in line with conclusions of the current review, guidance regarding a consistent diagnosis process to ensure accurate diagnosis of ADHD was noted as being an area of uncertainty and a clinical practice gap [47].

4.6. Limitations

The current review is not without limitations. Firstly, a gold standard for grey literature searches is yet to be established and therefore relevant guidelines may have been overlooked [48]. Secondly, only guidelines published in English were included in the review. It is possible that the excluded guidelines provide insight into the gaps which this review has highlighted. Furthermore, the cut-off score used to distinguish the quality of guidelines was based on AGREE II interrater assessments conducted in two recently published guideline reviews [27,30]. Other guideline reviews may have determined a different cut-off score and therefore reached different conclusions regarding overall appraisals.

It is important to note that in different countries, variance in the diagnostic process exists. For example, the National Health System in the United Kingdom suggests that an assessment may be conducted by a specialist child psychiatrist, a paediatrician or an appropriately qualified health care professional, and although psychologists fall under the category of qualified health care professional, they are not specifically mentioned [49]. The International Classification of Diseases is also typically used as the classification system in

the United Kingdom [50]. In Australia, ADHD may also be diagnosed by an experienced and trained mental health professional such as a child psychologist or paediatrician [40] or by a multidisciplinary team [23], however, diagnosis is generally made in accordance with the DSM-5 [51] or recently released DSM-5-TR [6]. As previously discussed, no changes were made to the ADHD diagnostic criteria between the DSM-5 and DSM-5 TR, therefore current guidelines are not likely to be impacted by the updated DSM. Moreover, the updated classification manual is not likely to impact the conclusions made in the current review. Nonetheless, it is important to consider our findings and any future research within the reader's context.

4.7. Future Research

It is suggested that future research is conducted to determine what elements of an assessment are important for ensuring accurate differential and co-occurring diagnosis when assessing a child for ADHD [41]. This could be achieved by determining how mental health professionals, including psychologists, currently conduct ADHD assessments alongside a study to review the most current tools, measures and processes to aid differential and co-occurring diagnosis recommended in the literature. Reference to the list of overlapping and distinguishing features of potential co-occurring and differential conditions in the CADDRA [22] guidelines may also be helpful. Synthesising the processes currently used by professionals with distinguishing and differentiating characteristics of ADHD and other disorders and recommendations within the literature is then recommended to develop a systematic assessment process which includes potential co-occurring and differential conditions, and assessment methods to utilise dependent on presenting symptoms. Following the development of a systematic assessment process, a study to pilot the utility of the process by mental health clinicians and psychologists is recommended.

5. Conclusions

Accurately diagnosing a child who presents with suspected ADHD can be challenging. Moreover, the consequences of both underdiagnosis and misdiagnosis can be harmful to the individual and their family. The current study found that all guidelines recommend assessing co-occurring conditions and all, but one guideline recommends considering differential diagnosis and referring where this is diagnostic uncertainty; however, specific recommendations to assist in situations of diagnostic uncertainty are scant. Given that clinical practice guidelines are fundamental in delivering evidence-based healthcare [52] and that reliable diagnoses are essential in guiding effective treatment [14], the development of recommendations to guide systematic assessment and decision-making regarding differential and/or co-occurring diagnosis when complex cases are referred appears essential.

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