

Consensus Statement of the Indian Academy of Pediatrics on Evaluation and Management of Attention Deficit Hyperactivity Disorder

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for the **National Consultation Meeting for Developing IAP Guidelines on Neuro Developmental Disorders
under the aegis of IAP Childhood Disability Group and the Committee on Child Development and
Neurodevelopmental Disorders

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Justification: Attention-Deficit/Hyperactivity Disorder (ADHD) is highly prevalent in children worldwide. Management of ADHD requires a systematic, multidisciplinary approach and therefore evidence-based, standardized national guidelines are essential.

Process: A meeting for formulation of national consensus guidelines on neurodevelopmental disorders was organized by Indian Academy of Pediatrics in Mumbai, on 18th and 19th December, 2015. The invited experts included Pediatricians, Developmental Pediatricians, Pediatric Neurologists, Psychiatrists, Remedial Educators and Clinical Psychologists. The participants framed guidelines after extensive discussions.

Objective: To provide consensus guidelines on evaluation and management of ADHD in children in India.

Recommendations: ADHD is a chronic condition and thus education of patients, families, and teachers regarding the diagnosis is an integral part of management. Involvement of patient and the family in the management program is extremely vital. Management of ADHD centers on the achievement of target outcomes, which are chosen in collaboration with the child, parents, and school personnel. Coexisting conditions must be treated concurrently with ADHD. Modalities of management of ADHD include behavioral interventions, medications, and educational interventions. These modalities can be implemented individually or in combination.

Keywords: *Diagnosis, Guidelines, Hyperactivity, Inattention, Multidisciplinary.*

Published online: March 29, 2017. PII:S097475591600055

Attention-Deficit/Hyperactivity Disorder (ADHD) is highly prevalent in children worldwide, and could be the most common neuro-behavioral disorder in children [1,2]. In India, the reported prevalence rates vary. A 2013 study from southern India reported prevalence of 11.3% in primary school children (sample size of 770 children, 6-11 years of age) [3]. In terms of centre-based data, a retrospective study in Mumbai reviewed archival data (2009-2012) from case records of 1301 children presenting with developmental concerns (mean age: 6 years) and identified 422 children with ADHD (32.4%) [4]. ADHD often co-exists with other developmental conditions such as Oppositional defiant disorder, Conduct disorder, Learning disability and Anxiety. Given the public health burden and complexity of the condition, management of ADHD requires a systematic, multidisciplinary approach and therefore, evidence-based, standardized national guidelines are essential.

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organized by Indian Academy of Pediatrics in Mumbai, on 18th and 19th December, 2015. The invited experts included Pediatricians, Developmental Pediatricians, Pediatric Neurologists, Psychiatrists, Remedial Educators and Clinical Psychologists. The participants framed guidelines after extensive discussions and review of literature. Thereafter, a committee was established to review the points discussed in the meeting, and the points of consensus on evaluation and management of ADHD are presented herein.

RECOMMENDATIONS

ADHD is a disorder that manifests in early childhood. The symptoms affect cognitive, academic, behavioral, emotional and social functioning. ADHD is a chronic condition and children and adolescents with ADHD are to be considered as children and youth with special health care needs [5].

ADHD has a genetic and biochemical basis. Role of environmental factors is uncertain; they may influence symptoms of ADHD (sub-syndromic) rather than the

syndrome of ADHD [5].

Developmental Screening

Parent and teacher-rated scales are recommended for screening, which have been used globally as well as in studies conducted in India to screen ADHD, followed by a formal diagnosis using the Diagnostic and Statistical Manual of Mental Disorders (DSM). These scales include the Conners Index Questionnaire, and the Vanderbilt ADHD Diagnostic Teacher Rating Scale [6,7].

Core clinical features: Clinical sub-types include: predominantly hyperactive-impulsive, predominantly inattentive and combined ADHD.

Hyperactivity-Impulsivity (HI): Although typically observed by 4 years of age, HI is increasingly being reported in children with younger age of presentation of symptoms. HI increases during the subsequent three to four years, peaks at seven to eight years of age and declines thereafter. By adolescence, it is difficult to identify HI, although the adolescent may feel restless or have difficulties in settling down.

In contrast, impulsivity usually persists throughout life and it is influenced by the child's environment. Adolescents with untreated ADHD and easy access to alcohol and substances of abuse are at greater risk of substance abuse, than adolescents without ADHD [8].

Inattention: Children with predominantly inattentive ADHD have limited ability to focus and they are slow in cognitive processing and responding. Note that these symptoms are not due to defiance or lack of comprehension [9]. Inattention is usually identified late and not apparent until the child is 8-9 years of age.

Core symptoms must impair function in academic, social, or occupational activities for a child to be diagnosed with ADHD. Early diagnosis is essential to avoid further compromise of functional achievement [5].

ADHD AND LIFE-STAGE

Pre-school children: High activity level, poor inhibitory control and short attention span are common even in typically developing pre-school children. ADHD should be suspected in case of increased precarious behaviors and physical injuries or unmanageable behaviors across different settings. Combined type of ADHD is most common in this group and persists in 60-80% of children in school-age.

Schoolchildren: School children have relatively stable attention levels and experience decrease in hyperactivity. However, 70% of these children have co-morbidities such as Oppositional defiant disorder and Specific learning

disorder. ADHD has a major impact on peer and family interactions and academics, thereby influencing parent's reporting of presenting concerns.

Adults: At age 25 years; 15% individuals meet the full criteria for ADHD and ~65% are in partial remission. Symptoms of inattention persist more and show slower decline [14].

Co-morbidities: Following co-morbidities have been identified with ADHD [5]: Oppositional Defiant Disorder (ODD); Conduct disorders; Learning Disability; Anxiety disorders; Intermittent explosive disorder; substance abuse disorder; Antisocial disorder; obsessive compulsive disorder; tic disorder; Autism spectrum disorder and major depressive disorder.

Diagnosis

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders [5] is used to diagnose ADHD. It is to be noted that diagnostic criteria (without subtyping) can be applied to children as young as 4 years of age [11]. On the other hand, adolescents may under-report core symptoms or functional impairment and may spend too little time at home for parents to be accurate informants. Hence, the pediatrician must obtain information from at least two teachers and/or other adults with whom the adolescent interacts (e.g., counselor, coaches, etc) [11]. The diagnostic tools mentioned (*i.e.* Child Behavior Check-List, Connors abbreviated rating scale and Vanderbilt ADHD diagnostic parent rating scale) have not been validated in the Indian population. The only freely available tool (based on fourth edition of DSM) that can be used for diagnosis of ADHD in the Indian context is the INCLEN Diagnostic Tool for ADHD (INDT-ADHD) [12]. The sensitivity, specificity, positive and negative predictive values for the same are 87.7%, 97.2%, 98% and 83.3%, respectively. INDT-ADHD has an internal consistency of 0.91 and a moderate convergent validity with Conner's Parents Rating Scale ($r = 0.73$) [12]. The INCLEN tool is available in English, Hindi, Odia, Konkani, Urdu, Khasi, Gujrati, Telgu and Malayalam [12]. The time taken for its administration (excluding scoring time), as observed in clinic-settings, is 15-30 minutes (approx.).

Differential diagnosis: The symptoms of ADHD overlap with a number of other conditions, including developmental variations; neurologic or developmental conditions; emotional and behavioral disorders; psychosocial or environmental factors, and medical conditions [11,13-14]. Detailed history of the child and family, examination, psychometric testing, laboratory investigations, and genetic testing would help to establish the diagnosis. Few salient conditions to be differentiated

include hyperactive/inattentive behaviors but within normal range for the child's developmental level and not impairing function, intellectual disability, learning disability, autism, language or communication disorder, anxiety disorder and motor incoordination disorder. Children with ADHD and with clinical features of autism should also receive genetic testing to rule out Fragile X syndrome. In areas that are known to be endemic for lead toxicity, a blood lead examination is indicated. Children in cities are at higher risk of lead toxicity due to vehicular traffic pollution and in case of use of leaded petrol. An audiological examination should also be conducted to rule out a hearing impairment.

Evaluation and Assessments

Any child 4 through 18 years of age, who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity, should be evaluated [11]. Information should be obtained from parents or guardians, teachers, and other school and mental health clinicians involved in the child's care. Comprehensive evaluation for ADHD includes: a) Confirmation of core symptoms for presence, persistence, pervasiveness and functional complications; b) Exclusion of differential diagnoses; and, c) Identification of co-existing emotional, behavioral and/or medical disorders. Such a comprehensive evaluation requires review of medical, social, and family histories, clinical interviews with the parent and patient, and information on functioning in school or day-care [11,15,16].

Medical evaluation: Important aspects of medical history include prenatal exposures (tobacco, drugs, alcohol), perinatal complications or infections, head trauma, central nervous system infection, recurrent otitis media, history of sleep disturbances, medications, family history of similar behaviors, and detailed child and family cardiac history before initiating medications [11,16,17].

Physical examination: Physical examination is normal in most children with ADHD. Vision and hearing assessments are mandatory. It is essential to rule out differential diagnoses. Equally important is to document the following at each visit: height, weight, head circumference, and vital signs, assessment of dysmorphic features and neuro-cutaneous abnormalities, a complete neurologic examination, and observation of the child's behavior in the clinic [18].

Developmental and behavioral evaluation: This includes age of onset of core symptoms, their duration, settings in which the symptoms occur, and degree of functional impairment or functional impact of ADHD symptoms. Further information needed is developmental milestones, especially language milestones, school absences,

psychosocial stressors, emotional, medical, and developmental events that may provide an alternative explanation for the symptoms (*i.e.*, different diagnostic conditions). Observation of parent-child interactions in the office is an important component of assessment.

Information about core symptoms can be obtained through open-ended questions or from ADHD-specific rating scales. The pediatrician must document the presence of relevant behaviors from DSM-5 [16].

Educational evaluation: This includes completion of an ADHD-specific rating scale; a detailed summary of classroom behavior and interventions, learning patterns, and functional impairment at school; evaluation of copies of report cards and samples of schoolwork; and a review of school-based multidisciplinary evaluations (if performed).

The teachers who provide the information should have regular contact with the child for a minimum of four to six months, if they are to comment reliably on the persistence of symptoms. If there are discrepancies between parent and teacher reports, then information should be obtained from professionals working in after-school programs or other structured settings. Environmental factors (e.g., different expectations, levels of structure, or behavior management strategies) may be contributing to these symptoms [11].

Management

Children with ADHD, 4 to 18 years of age, without comorbid conditions can usually be managed by the primary pediatrician. Completion of ADHD rating scales by parents and teachers during the diagnostic evaluation helps to establish the presence of core symptoms in multiple settings [19]. Modalities of management of ADHD include behavioral interventions, medication and educational interventions (alone or in combination). Since children with ADHD or its symptoms are at an increased risk of intentional and unintentional injury, safety and injury prevention should be discussed during each visit [5,11]. **Table I** summarizes behavioral and educational interventions.

The teacher may submit a report card at regular intervals, which helps to monitor symptoms and the need for changes in the treatment plan [24].

Age and choice of intervention

For children 4-6 years of age:

- Behavioral Intervention (BI), rather than medication, is the initial therapy.
- Addition of medication is indicated if target behaviors

TABLE I BEHAVIORAL AND EDUCATIONAL INTERVENTIONS

Type of intervention	Components	Age group
Behavioral intervention	a) Positive reinforcement; b) Time-out; c) Response cost (withdrawing rewards/privileges when problem behavior occurs) and d) Token economy (combination of positive reinforcement and response cost)	For children 4-6 years of age as primary therapy and Children >6 years of age and adolescents, as therapy in addition to medication
Educational intervention	The classroom modifications and accommodations include 1. Having assignments written on the board 2. Sitting near the teacher 3. Having extended time to complete tasks 4. Being allowed to take tests in a less distracting environment 5. Receiving a private signal from the teacher when the child is 'off-task' 6. Being assigned a 'Study Buddy' 7. Being assigned a 'Shadow Teacher'	Children 5 years and above; depends on the child's capacity

do not improve with BI and the child's functioning continues to be impaired.

- Methylphenidate is preferred rather than amphetamines or Atomoxetine.

For children >6 years of age and adolescents [11,25]:

- Treatment with medication rather than BI alone or no intervention.
- Stimulant drugs are the first line agents. Non-stimulants are second line agents.
- BI should be added to medication therapy.

Adding behavioral/ psychological therapy to stimulant therapy in school-aged children and adolescents does not provide additional benefit for core symptoms of ADHD, but has an impact on:

- Symptoms of coexisting conditions (e.g., oppositional/ aggressive behavior)
- Educational performance
- Dose of stimulant therapy necessary to achieve the desired effects.

Behavioral Interventions

Parent-child behavioral therapy is aimed at improving parent-child relationships through enhanced parenting techniques. Behavioral interventions are most effective if parents understand the principles of behavior therapy (*i.e.*, identification of antecedents and altering the consequences of behavior) and the techniques are consistently implemented [11,20-22]. Indications of behavioral intervention include: (a) Initial intervention for preschool children with ADHD (preferred to medication); (b) Adjunct to medication for school-aged children and adolescents with ADHD; (c) For children who have problems with inattention, hyperactivity, or impulsivity

but do not meet criteria for ADHD (sub-syndromic). Specific interventions include: (a) Positive reinforcement; (b) Time-out; (c) Response cost (withdrawing rewards/privileges when problem behavior occurs) and d) Token economy (combination of positive reinforcement and response cost) [22]. **Box 1** provides useful strategies for parents and teachers to help children with ADHD regulate their own behavior [11,23].

Educational interventions

Children with ADHD may require changes in their educational program, including (a) Provision of tutoring or resource room support (either in a one-on-one setting or within the classroom), (b) Classroom modifications, (c)

Box 1 STRATEGIES FOR PARENTS AND TEACHERS TO REGULATE BEHAVIORS IN CHILDREN WITH ADHD

1. Maintaining a daily schedule (e.g., time table, post- its, reminders)
2. Using charts and checklists to help the child stay 'on task'
3. Keeping distractions to a minimum
4. Limiting choices
5. Providing specific and logical places for the child to keep his school books, toys, and clothes
6. Setting small, reachable goals
7. Rewarding positive behavior (e.g., with a 'token economy')
8. Identifying unintentional reinforcement of negative behaviors
9. Finding activities in which the child can be successful (e.g., hobbies, sports)
10. Using calm discipline (e.g., time out, distraction, removing the child from the situation)

Accommodations, and (d) Behavioral interventions [11,23].

Pharmacologic Intervention

The drugs used for management of ADHD and their side-effects are detailed in **Tables II, III** and **IV**. The choice of medication depends on whether the child is in preschool in which case a stimulant (Methylphenidate) may be given, if indicated. For a school-aged child or adolescent, a stimulant is the first-line agent, followed by amphetamines or a monoamine reuptake inhibitor *i.e.*, Atomoxetine. Other medications (*e.g.*, Alpha-2-adrenergic agonists) usually are used when children respond poorly to a trial of stimulants or Atomoxetine, or when children have unacceptable side effects or significant coexisting conditions. The duration of action of the recommended drug and the child’s ability to swallow pills also influence the choice of medication.

Stimulants are preferred to other medications because stimulants have rapid onset of action, and a long record of safety and efficacy. Individual differences in metabolism are more significant than weight-based dosing of stimulant medications. The optimal regimen is determined by changes in core symptoms and occurrence of side effects [18,26].

Stimulant medications usually are started at the lowest dose that produces an effect and increased gradually (*e.g.*, every 3-7 days) until core symptoms improve by 40% - 50% compared with baseline, or adverse effects become unacceptable. The frequency of stimulant medication (*i.e.*, both, times per day and days per week) is based upon the type of ADHD and the functional domains in which improvement is desired. Onset of action is very important in a school-going child. At a therapeutic dose, the effects of stimulant medications on core symptoms usually are apparent in 30-40 minutes after administration and continue for the expected duration of action. Appetite suppression may indicate treatment response. Inadequate

dose may be indicated by shorter than expected duration of action [18].

A child with the predominantly inattentive type of ADHD may need medication only on school days. A child who has difficulty with peer relationships may need medication every day. A child who participates in after-school sports or activities on certain days of the week may require longer-acting preparations or more frequent dosing on those days. Optimal dose is the dose at which target outcomes are achieved with minimal side effects.

Parents should be advised that 2-6 weeks of medication maybe needed for any therapeutic effect to show and before dose-reduction is considered. If side-effects are severe, the clinician may decrease the dose of medication or change to another ADHD medication (stimulant or non-stimulant) [27].

After several years of medication, children and adolescents who have had stable improvement in ADHD symptoms and target behaviors are offered a trial off, of medication to determine whether medication is still necessary. If symptoms re-appear, after a period of remission, consider the risk factors/stressors that have led to the same and counsel parents on mitigating those; and resume medication. Children with ADHD may require changes in their educational programming. Combination therapy with medications and behavior/ psychological therapy is superior to behavior/ psychological therapy alone and necessary for restoration of function and inclusion.

Combination Therapy

Combination therapy uses both behavioral interventions and medications. Combination therapy may be warranted in preschool children who do not respond to behavioral interventions.

In a systematic review and a meta-analysis, combination therapy with medications and behavior/ psychological therapy, was superior to behavior/

TABLE II MEDICATIONS FOR ADHD

Type of drug	Name of the drug	Dosage forms	Duration of action	Dosage	Maximum dose
Stimulant	Methylphenidate	5 mg, 10 mg and 20 mg tablets	3-5 hours	Start with 5 mg/day for 1 st day; then 5 mg twice a day	≤25 kg: 35 mg; >25 kg:60 mg.
Stimulant	Delayed onset methylphenidate	5 mg, 10 mg and 20 mg tablets	3-8 hours	5 mg/day twice daily dosing; increments of 20 mg per day, every 3-7 days	≤50 kg: 60 mg >50 kg: 100 mg.
Non-stimulant	Atomoxetine	10, 18 and 25 mg	10-12 hours	Start with 0.5 mg/kg per day for minimum 3 days and increase to 1.2 mg/kg per day after at least 3 days	100 mg per day or 1.4 mg/kg, whichever is lesser

TABLE III SIDE-EFFECTS OF STIMULANT MEDICATIONS AND MANAGEMENT

<i>Side-effects</i>	<i>Management</i>
Decreased appetite	Counsel on high-protein, high-calorie diet and frequent snacks; advise on medication after meals
Tics	If distressing, taper or discontinue stimulant medication and consider guanfacine ER or clonidine ER monotherapy or augmentation
Poor growth	No action as ultimate adult height is not compromised
Dizziness	Self-resolving; symptomatic treatment
Insomnia/nightmares	Sleep hygiene; encourage natural sleep; melatonin as needed
Mood lability	Look for direct effect of medication (emotional symptoms correlate with expected time of medication effect) – if present, discontinue medication; if rebound effect (emotional symptoms occur later in day as medication expected to wearing off), then add short-acting stimulant in afternoon
Rebound symptoms	Add short-acting stimulant in afternoon; add slow-release tablets

TABLE IV SIDE-EFFECTS OF NON-STIMULANT MEDICATIONS AND MANAGEMENT

<i>Side-effects</i>	<i>Management</i>
Gastrointestinal distress	Typically self-resolves; symptomatic care
Headache	Typically self-resolves; symptomatic care
Sedation (drowsiness)	Administer medication at bed-time
Transient growth effects	No action; adult height not affected
Elevated blood pressure or heart rate	No action if within age appropriate norms and asymptomatic
Suicidal ideation, hepatotoxicity, priapism (rare)	Counsel families on warning signs and symptoms of hepatotoxicity; discontinue medication; re-evaluation of the child

psychological therapy alone. Children receiving combination therapy may require lower doses of medication and achieve greater improvement in non-ADHD symptoms (e.g., oppositional/aggressive, internalizing, teacher-rated social skills, parent-child relations and reading achievement) than children receiving medication alone. Cognitive behavioral therapy may be a helpful adjunct to medications for adolescents with ADHD. Dietary interventions are not recommended.

Referral to a developmental pediatrician, child neurologist or child psychiatrist is needed in case of Co-morbid conditions (e.g., oppositional defiant disorder, conduct disorder, substance abuse, emotional problems); b) Coexisting neurologic or medical conditions (e.g., seizures, tics, autism spectrum disorder, sleep disorder); c) Lack of response to a controlled trial of stimulant or Atomoxetine therapy [25, 28-30].

Fig.1 provides a flowchart for the management of ADHD.

Disability Certification

Government organizations, the Persons with Disability Act (Equal Opportunities, Protection of Rights and Full Participation), 1995, and the National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental

Retardation and Multiple Disabilities act, 1999, do not recognize ADHD as a neurodevelopmental disorder. Currently, there are no provisions for certifying children with ADHD. However, the Rashtriya Bal Swasthya Karyakram (RBSK) focuses on early detection and intervention of disease, disabilities, deficiencies and developmental problems including ADHD. Owing to the fact that it is the most common childhood neuro-behavioural disorder; high prevalence rates in India, and the dire need for affected children to receive sustained multidisciplinary interventions over a long period, the expert group strongly recommends disability certification for ADHD.

CONCLUSION

ADHD is characterized by behavioral, emotional and academic concerns, and requires a range of interventions such as medications, behavioural intervention, occupational therapy/sensory integration, remedial education, parent and child counselling and classroom modifications. A comprehensive inter-disciplinary approach leads to sustained alleviation of symptoms and greater capacity-building of caregivers and children to adjust with the disease over the long term.

Contributors: All authors have contributed, designed and approved the manuscript .

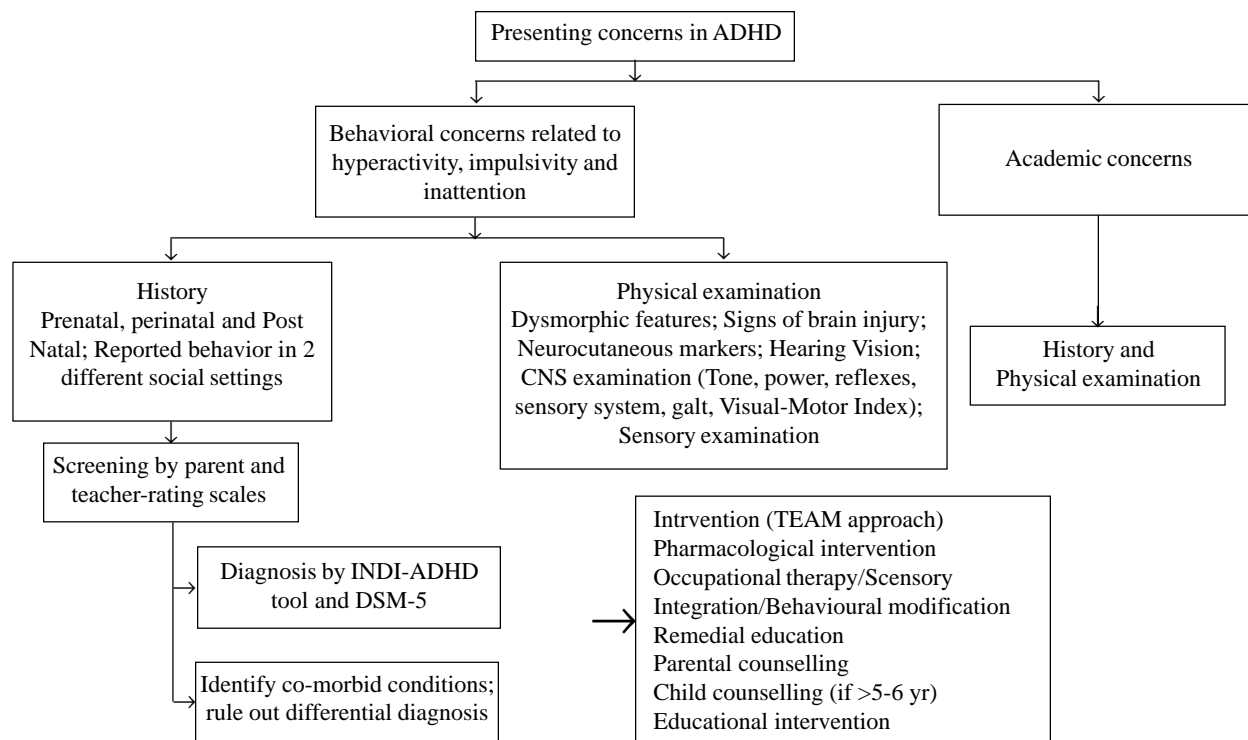


Fig. 1 Flowchart for management of ADHD.

Funding: None; Competing interests: None stated.

ANNEXURE I

Participants of the National Consultative Meet for Development of IAP National Consensus Guidelines on Neuro Developmental Disorders

Convener: Dr Samir Dalwai, New Horizons Child Development Center, Mumbai

Experts: (In alphabetical order) Abraham Paul, Kochi; Anjan Bhattacharya, Mumbai; Anuradha Sovani, Mumbai; Bakul Parekh, Mumbai; Chhaya Prasad, Chandigarh; Deepti Kanade, Mumbai; Kate Currawalla, Mumbai; Kersi Chavda, Mumbai; Madhuri Kulkarni, Mumbai; Monica Juneja, New Delhi; Monidipa Banerjee, Kolkata; Mamta Muranjan, Mumbai; Nandini Mundkar, Bangalore; Neeta Naik, Mumbai; P Hanumantha Rao, Telangana; Pravin J Mehta, Mumbai; SS Kamath, Kochi; Samir Dalwai, Mumbai; Sandhya Kulkarni, Mumbai; Shabina Ahmed, Assam; S Sitaraman, Jaipur; Sohini Chatterjee, Mumbai; Uday Bodhankar, Nagpur; V Sivaprakasan, Tamil Nadu; Veena Kalra, New Delhi; Vrajesh Udani, Mumbai; and Zafar Meenai, Bhopal.

Rapporteurs: Leena Deshpande, Mumbai; Leena Shrivastava, Pune; Ameya Bondre, Mumbai.

Invited but could not attend the meeting: MKC Nair, Thrissur; Pratibha Singhi, Chandigarh; Jeason Unni, Kochi; and Manoj Bhatvadekar, Mumbai.

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KEY MESSAGES

- Behavioral interventions within an inter-disciplinary model, are preferred over medication for pre-school children; and are an adjunct to medication for older children.
- For a school-aged child or adolescent, a stimulant is the first-line medication, followed by atomoxetine or amphetamines.
- Combination therapy with medications and behavior/ psychological therapy is superior to behavior/ psychological therapy alone.
- Children may additionally require classroom modification and educational support.

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