A DECISION TREE AND CLINICAL PATHS FOR THE ASSESSMENT AND MANAGEMENT OF CHILDREN WITH ADHD

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Attention Deficit/Hyperactivity Disorder (ADHD) is a common neurobehavioral disorder. Children with ADHD are disproportionately represented in pediatric populations characterized by school failure, criminal behavior, and substance abuse. Many children who present with ADHD symptomatology do not receive systematic assessments nor comprehensive treatment that is well coordinated across home and school environments. And yet, evidence suggests that early detection and appropriate treatment can alter the probability of a negative developmental trajectory. The Decision Tree and Clinical Paths for Assessment and Management of ADHD identify the critical components of care through a stepwise decision-making process involving the assessment, diagnosis, treatment, and outcome evaluation of children who present with ADHD symptomatology. Preliminary field testing supports the clinical utility and validity of the ADHD Decision Tree/Paths. In addition, cross-validation comparisons

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The ADHD Manual with Decision Tree and Clinical Paths may be purchased from: NCAST, Box 357920, University of Washington, Seattle, WA 98195-7920. Phone: (206) 543-8528, E-mail: ncast@u.washington.edu

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indicate consistency between the ADHD Decision Tree/Paths and recently released ADHD clinical guidelines issued by several national professional organizations.

The Report of the Surgeon General’s Conference on Children’s Mental Health: Developing a National Action Agenda (Department of Health and Human Services [DHHS], 2000) characterizes the nation as facing a public health crisis in pediatric mental health care services. In particular, children diagnosed with neuropsychiatric disorders are estimated by the year 2020 to “rise proportionately by over 50 percent, internationally, to become one of the five most common causes of morbidity, mortality, and disability among children” (p. 13). Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common childhood neurobehavioral disorders with estimates ranging from 3% to 6% of the school-age population in the United States (Barkley, 1998; Cantwell, 1996; Goldman, Genel, Bezman, & Slanetz, 1998), and even recently as high as 10% to 12% based on school-age community samples (American Academy of Child and Adolescent Psychiatry [AACAP] 1997; American Academy of Pediatrics [AAP], 2000). Primary care providers are frequently challenged to evaluate children who present with ADHD-type symptoms (AAP, 2000). Nearly 50% of pediatric psychiatric populations are characterized to have ADHD (Cantwell, 1996).

Children diagnosed with ADHD may also concurrently experience other mental health disorders such as oppositional defiant disorder, anxiety, depression, and learning disorders (Cantwell, 1996; Richters et al., 1995). Populations of children with ADHD are at risk for social and educational functional difficulties such as academic failure, school suspension, disruptive behaviors, delinquency, peer rejection, substance abuse patterns, and higher rates of accidents (Barkley, 1998). Family, school, and environmental factors as well as certain child health conditions may exacerbate the intensity, severity, and frequency of the presenting symptoms (Cantwell, 1996). However, early assessment and treatment of ADHD can often redirect the developmental trajectory toward positive outcomes (Cantwell, 1996; Multimodal Treatment Study of Children with AD/HD [MTA] Cooperative Group, 1999a).

NEED FOR CLINICAL GUIDELINES

There is a growing professional acknowledgment that ADHD is a neurophysiologically based self-control disorder (Barkley, 1998). However, the diagnostic and treatment approaches are controversial and vary considerably across professionals. In addition, ADHD is often misunderstood
and held with suspicion by segments of the general public. Controversy centers on the degree of cultural sensitivity exhibited when considering the diagnosis and treatment of ADHD, the increase in the production and use of stimulants to treat ADHD, and the emphasis on short-term treatment benefits without a careful consideration of long-term benefits.

ADHD may be diagnosed inappropriately or missed at times because a comprehensive evaluation was not used. A thorough, systematic evaluation is needed to validate the established ADHD diagnostic criteria or to differentiate ADHD from the diagnostic criteria of other conditions with similar presenting symptom patterns (Goldman et al., 1998). Children who present with inattentive-like symptoms without hyperactivity and impulsivity may be overlooked and not diagnosed until academic failure or learning problems occur (Barkley, 1998).

As a population, children who present with ADHD-type symptoms often receive an inconsistent level of health and educational services that are fragmented, ineffective, and costly. The American Medical Association Council on Scientific Affairs (Goldman et al., 1998) and the National Institutes of Health (NIH, 2000) Consensus Developmental Conference Statement on the Diagnosis and Treatment of Attention Deficit/Hyperactivity Disorders concluded that inconsistencies in the diagnosis, treatment, and follow-up of children with ADHD present a major public health problem.

The formulation of an ADHD diagnosis is challenging and complex. Experts in the field note that “the diagnostic criteria for ADHD are based on extensive empirical research and, if applied appropriately, lead to the diagnosis of a syndrome with high inter-rater reliability, good face validity, and high predictability of course and medication responsiveness” (Goldman et al., 1998, p. 1100). The diagnostic features of ADHD as specified by the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV: American Psychiatric Association [APA], 1994) form the framework for the diagnostic differential. DSM-IV diagnostic ADHD Criteria A–E specify the symptomatology by type, number, severity, pattern of occurrence, developmental trajectory, and role function interference.

For Criterion A, the essential diagnostic feature of Attention Deficit Hyperactivity Disorder is a persistent pattern (at least 6 months) of inattention and/or hyperactivity-impulsivity that is maladaptive and inconsistent with developmental level. Criterion B notes that some symptoms were present before age 7 and thus there is a developmental trajectory. The threshold for clinical significance requires that the pattern of persistent symptoms is more severe than is typically observed in individuals at a comparable level of development. For Criterion C, the child’s functional difficulties are present in two or more settings (e.g., school or work, and at
home). Criterion D indicates that clear evidence of clinically significant impairment must exist in social, academic, or occupational functioning. The last Criterion, E, requires that the symptoms do not occur exclusively during the course of Pervasive Development Disorder, Schizophrenia, or other Psychotic disorders, and are no better accounted for by another mental disorder. Various subtypes of ADHD are specified (APA, 1994, pp. 78–85).

The extent that the DSM-IV criteria are used to diagnosis ADHD varies considerably across practitioners, clinical settings, primary care and mental health services, and geographic area (Cantwell, 1996; Goldman et al., 1998; NIH, 2000). The American Medical Association Council on Scientific Affairs (Goldman et al., 1998) and the NIH Consensus Developmental Conference Statement on the Diagnosis and Treatment of Attention Deficit/Hyperactivity Disorders (2000) encouraged the creation and dissemination of practice guidelines to assist clinicians in the diagnosis and treatment of children with ADHD.

CLINICAL GUIDELINES FOR ASSESSMENT AND MANAGEMENT OF CHILDREN WITH ADHD

In response to the growing need for standards of care relevant to ADHD, faculty, students, and community-based clinicians affiliated with a graduate nursing training grant entitled Nursing Graduate Program for Leadership Development: Children & Adolescents with Special Health Care Needs, Families and Communities (Magyary & Brandt, 1993–1998) initiated an ADHD Clinical Project to develop and field test clinical guidelines for use across disciplines to assess and treat children aged 6–14 with ADHD. The clinical guidelines Children with ADHD: A Manual with Decision Tree and Clinical Paths for Health Care Professionals (Magary, Brandt, & Kovalesky, 1996, 1999) were developed with four goals in mind. These goals guided the development and evaluation process and are as follows:

1. To enhance the comprehensive and systematic nature of the assessment process, thereby increasing the probability of an accurate diagnosis.
2. To enhance the comprehensive and multimodal nature of the intervention plan and the matching of the plan with the individual child and family, thereby increasing the probability of adherence and efficacy.
3. To enhance collaboration among the various providers of care, the child and parents, thereby enhancing coordination, relevance, and successful outcomes.
4. To enhance cultural sensitivity of care, thereby incorporating health beliefs and practices into the assessment and intervention plan.

With the onset of health care reform and the increasing emphasis on clinical accountability, decision trees and clinical paths serve to systematically improve care by organizing and documenting the delivery of care according to client-oriented outcomes (Center for Case Management, 1993; Crummer & Carter, 1993; Marek, 1989; Woodyard & Sheetz, 1993).

CREATION AND EVALUATION OF THE DECISION TREE AND CLINICAL PATHS

The creation and evaluation of the ADHD Decision Tree and Clinical Paths involved a five-year process from 1995 to 1999 that entailed four phases. Phase One focused on identifying the conceptual format and the empirical basis for the Decision Tree and the Clinical Paths, designed to complement each other. The process of determining the conceptual and empirical basis for the guidelines involved (1) reviewing and synthesizing interdisciplinary literature, standards of care, clinical guidelines, and policy statements on ADHD; (2) reviewing and synthesizing the latest assessment, monitoring, and outcome instruments; and (3) contacting researchers and clinicians affiliated with ADHD assessment and treatment centers across the nation. As a result of Phase One, the first draft of the Decision Tree and Clinical Paths for ADHD evolved. The Decision Tree and the Clinical Paths organize clinical information into four categories: Child-Physical, Child-Psychosocial, Family/Community, and School/Educational.

- The Decision Tree entitled Decision Tree for the Assessment and Management of ADHD, is a flow diagram with decision steps for clinicians to take into consideration when assessing and intervening with a child who presents with ADHD symptoms. The flow diagram is organized according to seven sections: Presenting Concerns; Assessment Domains; DSM-IV Diagnostic Criteria for ADHD; Concurrent/Differential Diagnoses; Diagnostic Considerations; Multimodal Intervention; Management and Ongoing Evaluation; and Summative Outcomes.
- The Clinical Paths identify the essential components of care stated as clinical outcomes and organized by two timelines. The first timeline, Clinical Path for Assessment and Diagnosis, focuses on the clinical content and process of assessment outcomes that need to be achieved during the differential diagnosis decision-making phase. The second
timeline, Clinical Path for Management and Follow-Up, focuses on the intervention process and content outcomes that may be individualized within a comprehensive treatment plan. The process of building collaborative partnerships with child, family, and the school system is also addressed as a clinical outcome.

During Phase Two, the Project’s Advisory Board reviewed Draft #1 for its content and face validity and its clinical feasibility. The Advisory Board consisted of 25 multidisciplinary faculty and clinicians who represent disciplines of nursing, medicine, education, and psychology. The professionals offered a variety of perspectives reflective of health care reform practices at mental health clinics, primary care clinics, developmental disability clinics, and schools. The Decision Tree and Clinical Paths content and format were revised to clarify the essential components and continuity of care, outline the chronological phases of care, provide a means for documenting care, and include outcomes oriented to the child and family. The outcome section of the clinical path emphasized a collaborative goal setting process that includes realistic, meaningful, and measurable outcomes. In addition to the Advisory Board feedback, parents of children with ADHD provided suggestions about ways to build cultural sensitivity and collaborative partnerships with children and family members.

Phase Three entailed the actual field-testing of the Decision Tree and Clinical Paths by ten advanced practice nurses representing both pediatric nurse practitioners in primary care settings and psychiatric nurse practitioners in mental health settings. The clinical application of the Decision Tree and Clinical Paths generated changes primarily in clarity of instructions and the format for documentation.

Phase Four involved continual testing by nurse practitioners, pediatricians, and a psychiatrist affiliated with an integrated mental health and primary care pediatric clinic that primarily serves an urban-based African American population. This field-testing generated a systematic and comprehensive ADHD History Taking Interview format. Behavioral questionnaires and observational instruments were identified to supplement the interview and assist in obtaining a comprehensive database that reflects the perspective of the child, parents, and teachers.

CROSS-VALIDATION OF THE ADHD DECISION TREE AND CLINICAL PATH

After the development and field-testing of the ADHD Decision Tree and Clinical Paths, two major professional organizations published
practice guidelines for ADHD. The AACAP (1997) and the AAP (2000) guidelines are oriented toward the assessment and treatment of children challenged with ADHD. The AACAP (1997) and AAP (2000) publications provide an opportunity to cross-validate the ADHD Decision Tree and Clinical Path with two externally developed clinical parameters that evolved from scientific review of the literature and clinical expert consensus. The ADHD Decision Tree and Clinical Paths are consistent with the recommendations proposed by the two professional organizations. For example, the ADHD Decision Tree and Clinical Paths exemplify the guidelines in a variety of ways: (1) the DSM-IV criteria are used as the framework for establishing the ADHD diagnosis; (2) the process of assessment is outlined to rule out differential and/or concurrent comorbid conditions; (3) the comprehensive child, family, and educational data base is specified using multiple methods, sources, and settings, plus standardized measures of assessment; and (4) a range of multimodal treatment and management components are specified for the development of an individualized intervention plan. A particular strength of the ADHD Decision Tree and Clinical Paths is that the assessment and treatment recommendations plus summative outcomes are illustrated by a decision tree step-wise flow diagram coupled with corresponding clinical paths that outline the essential components of care and expected clinical outcomes. For practice-based work with families, the ADHD Decision Tree and Clinical Paths offer the methodology of transferring written guidelines to the clinic setting to assure that there is a systematic and comprehensive consideration of child physical, child psychosocial, family, and school/educational data.

THE PROCESS OF DIAGNOSTIC DECISION MAKING

The pediatric nurse practitioners, psychiatric clinical nurse specialists, psychiatric nurse practitioners, and pediatric clinical nurse specialists who field tested the ADHD Decision Tree and Clinical Paths reported improvement in documenting whether or not the diagnostic criteria for ADHD had been met. The process of diagnostic decision making was enhanced by constantly searching for patterns in the data set to confirm or disconfirm an early and persistent pattern of ADHD symptoms as defined by the DSM-IV. The nurse practitioners also reported that they were more likely to systematically consider other differential diagnoses or concurrent diagnoses when using the ADHD Decision Tree and Clinical Paths.

The nurse practitioners and clinical nurse specialists engaged in a diagnostic decision-making process based on the following ADHD
Decision Tree and Clinical Paths’ assessment principles, formulated to increase the probability of making an accurate diagnosis:

1. The child’s *developmental* trajectory and manifestations of the behavioral symptoms are understood *across time* in a *variety of situations* such as the home environment, school, and extramural activities.

2. The way significant persons in the life of the child *perceive and respond* to the child’s behavioral symptoms are critical influences in the plan of care. Significant persons would include, for example, parents or primary caregivers, teachers and other school personnel, peers, and siblings.

3. The child’s behavioral symptoms are understood in the context of the child’s *medical, perinatal, and developmental history, current physical status* including vision and hearing capabilities, *and overall behavioral profile* including strengths. Major historical and current indicators relevant to a child’s learning and behavior responses may play an important role.

4. The child’s behavioral symptoms are understood in the context of the child’s *home environment*, including the existing or potential environmental stresses such as significant losses, major changes, domestic violence, or substance abuse by the child or parent.

5. The child’s behavioral symptoms are understood in the context of the child’s *school environment and activities*, including classroom structure, teaching styles, recess, and transition periods.

6. Other *concurrent or differential* physical and psychiatric *diagnoses* are systematically considered.

7. A *variety of data collection methods* are used to obtain information such as behavioral rating scales, direct observation, and interviews.

8. The *response style* to self-report measures is considered by clarifying with the respondent the degree of understanding of the directions, thoughts about the tool in general, and the specific items scored extremely low or high.

9. Observations of the child’s behavior are more valid and reliable if obtained in *natural settings*.

10. *Corroborated patterns* are identified in the data set looking for both consistencies and inconsistencies across time, situations, sources of data, methods of data collection, and types of data.

11. A diagnosis or a “working hypothesis” is constantly reevaluated in the context of new information obtained during all phases of care.
TREATMENT OF ADHD

Once an ADHD diagnosis is well substantiated, the clinician and family with the child are faced with decisions about the breadth and depth of the treatment plan. Choices about medications and the type and intensity of behavioral treatments need to be considered. Preliminary results of the 14-month multisite, multimodal treatment study of children with Attention Deficit Hyperactivity Disorder (MTA Cooperative Group, 1999a) suggest that children in the medication management group showed significantly greater improvement in core ADHD symptoms than either the intensive behavioral treatment or routine community care groups. Subgroup analyses suggest that combined medication management coupled with intensive behavioral management provide better benefits for the non-ADHD comorbid symptoms that commonly coexist with ADHD, and thus resulted in better positive functional outcomes (MTA Cooperative Group, 1999b, p. 1073). These non-ADHD comorbid symptoms included, for example, externalizing aggressive symptom patterns and internalizing anxiety-depressive symptom patterns. Thus, the additional benefits of using intensive behavioral treatment with medication may be justified when treatment goals encompass more than just reducing core ADHD symptoms, but include helping children and families cope with this disorder or any cooccurring disorders. In conclusion, the MTA Cooperative Group investigators (1999b) note that subgroup analyses of variations within the population of children with ADHD highlight the need for caution in interpreting and generalizing the results to a “one size fits all” approach to treatment (p. 1083). Thus, careful monitoring of the treatment match to the child within his or her context will continue to be critical.

Cultural perspectives and clinical guidelines in various countries corroborate the complexity in delineating the best treatment approaches for children with ADHD due to the variations in severity of symptoms, behavioral response patterns, and contexts of the children. The European Professional Consensus Group on ADHD (Taylor et al., 1998) recommends medication for severe cases; whereas, in mild to moderate cases medication should be introduced if home and school-based behavioral approaches are not sufficient (Taylor, 1999, p. 1097). If an individualized plan of care yields little improvement in the child’s symptom patterns, then additional components of care should be considered in a timely manner. For example, validated behavioral approaches could supplement medication or medication could supplement behavioral approaches
if a combination of medication and behavioral approaches had not been initially implemented.

Regardless of the type or sequence of interventions chosen for the management plan, the efficacy of the plan requires the coordination of intervention strategies across the various settings in which the child functions and consideration of the multiple factors that interact with the child over time. Many children with ADHD are not receiving multimodal treatment for a variety of reasons ranging from the lack of accessible and comprehensive services to cost constraints imposed by health care systems.

The ADHD Decision Tree and Clinical Paths include a listing of different home- and school-based intervention modalities empirically demonstrated to be useful in achieving broad-based therapeutic outcomes for children with ADHD and their families. The intervention approaches and defined clinical outcomes are categorized according to four dimensions of the child: physical, psychosocial, family, and educational/school.

The ADHD Clinical Path component that is oriented to treatment was based on four key assumptions about interventions. First the child, family, and provider collaboratively select, prioritize, and develop a plan that is feasible to implement within the family and community context in a progression of steps over time. The intervention plan is matched to the child’s symptom pattern, any concurrent mental and physical health condition, as well as family, school, and other environmental factors.

Second, a therapeutic relationship and working partnership among the providers, family, and child need to be established that allows for collaborative problem solving and negotiation. Intervention plans require an open and collaborative dialogue process throughout each stage of the plan—development, implementation, and evaluation. Working relationships also are needed among the family, school personnel, and provider to maximize the coordination and successful implementation of the plan across home and school.

Third, culturally sensitive approaches that acknowledge the family’s and child’s perspectives and beliefs are central to consumer satisfaction and successful treatment implementation. For example, the use of medication may not be consistent with personal or cultural belief systems and thus behavioral approaches without medication may need to be implemented and evaluated during the early intervention phases. In particular, parents who have recovered from substance abuse addictions may find using stimulants to treat ADHD in their children disconcerting and thus try to rely solely on behavioral approaches.
Fourth, the identification and amplification of the child’s and family’s strengths enhance treatment efficacy. Because of the intensity of the child’s symptoms, sometimes patterns of negativity dominate interactions and thus, positive interpersonal experiences between the parents and child are minimal (Gallagher, 1997). Often the intervention plan is organized predominately around concerns to the extent that developmental assets and family resources may be overlooked. The acknowledgment and enhancement of positive behaviors, events, and experiences in the child’s and family’s life contribute toward the obtainment and stabilization of long-term positive outcomes.

Fifth, interventions are needed that explicitly address the child’s sense of self-efficacy through developmentally appropriate self-management strategies in the real life context. A self-efficacy approach will enhance the child’s ability to view his or her efforts as necessary and important for the management of ADHD. Children will understand the connection between medication and self-effort toward behavioral management when they are helped in a supportive way to watch for and monitor the impact of these approaches on their behavioral symptoms, interpersonal patterns, and school performance. Parents often rightfully raise questions about how to minimize the possibility that their child will develop a cognitive dependency on medication as the sole attribution for change. Thus, building strategies into the intervention plan for parents and teachers to promote the child’s developing efficacy in graduated steps will help families and children recognize and take credit for their efforts toward strength building, behavioral management, and skill acquisition.

Consistent acknowledgment and reinforcement of the child’s efforts toward behavioral self-regulation enhance self-efficacy and a sense of self-mastery over time. Since the diagnosis of ADHD is typically treated over many years, having self-mastery at each developmental period will be crucial for a positive trajectory into adulthood.

FUTURE PRACTICE-BASED RESEARCH QUESTIONS

The pilot testing of the ADHD Decision Tree and Clinical Paths for the Assessment and Management of Children with ADHD provided preliminary evidence of its value to clinical practice. Further study of the ADHD Decision Tree and Clinical Paths is needed in regard to reliability, validity, specificity, sensitivity, and clinical utility. Does the use of the ADHD Decision Tree and Clinical Paths

- yield a well-substantiated ADHD or ADD diagnosis with consideration given to other coexisting conditions?
identify variations in response patterns by child, family, and school variables;

- generate the creation of an individualized, effective, and culturally sensitive intervention plan that results in favorable short and long-term clinical outcomes including the impact on the family and educational systems;

- assist primary care providers in making differential referrals by determining which type of child would benefit from further mental health assessment and treatment;

- generate positive evaluations for being clinically useful and feasible to implement and thus result in widespread practice changes, particularly by clinicians that practice in managed care environments?

Other investigative areas that are essential for developing effective care include studies of cross-cultural, race, and gender differences in the manifestation and treatment of ADHD in children and adolescents (Mann et al., 1994; NIH, 2000). Some beginning efforts in this regard have involved normative studies of behavioral observation scales that focus on ADHD symptomatology using minority populations (Connors, 1997) and subgroup analyses of ADHD during childhood (MTA Cooperative Study, 1999b).

SUMMARY

The knowledge base of ADHD during childhood has had remarkable gains in the last five years. The challenge in the next five years will be to carefully interpret and generalize these advancements into clinical services. Long-term outcomes of individually developed treatment plans are needed to explicitly address the cost-benefits of multimodal interventions, family preferences, and cost constraints. With the development and evaluation of ADHD clinical practice guidelines, recommendations addressing the complexity of clinical decisions will be welcomed by clinicians who must balance time and financial constraints while trying to provide quality care for the children with ADHD, their families, and schools.

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