

Early Autism Detection

Implications for Pediatric Practice and Public Policy

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Autistic spectrum disorders (ASD) present numerous challenges for early diagnosis and intervention. Recent research has concentrated on identifying symptoms of ASD in infants and toddlers. This article examines the feasibility of detecting ASD in infants and toddlers using early behaviors related to ASD and the impact that recent government policy changes and professional guidelines for family practitioners and pediatricians have had on early screening for young children with ASD. Empirical evidence from retrospective video analysis implies that ASD may be detected in infants and toddlers. Recent policy changes and guidelines for pediatricians and other practitioners recommend more intense efforts be made for developmental surveillance and referrals, but the impact of these policies on practice and on the lives of children with ASD and their families has been limited. Policy recommendations are made.

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Early intervention and detection of autism spectrum disorders (ASD) is currently a topic of much discussion. Everyone from academics to daytime talk show hosts is willing to take on this subject, give advice to parents, and advocate for children with ASD and their families. A search of the research literature for the terms *autism* and *diagnosis* for the year 2005 alone yields 167 hits using the PsycINFO database. Although there is clearly a great deal of discussion, two important questions remain: Can ASD be effectively detected in toddlers or infants? If it can, who is going to do the detection, evaluation, and intervention? This article integrates information from empirical research about detection of ASD, information about pediatric practices, and legislative policy in order to examine the issue in an interdisciplinary way and seek practical answers to the above questions. (For an exhaustive examination of research about symptoms of ASD in infants or toddlers, see Volkmar, Chawarska, and Klin, 2005, and for an excellent review of federal legislation related to ASD, see Turnbull, Wilcox, and Stowe, 2002.)

We begin discussion of these issues with a brief primer on U.S. law as it relates to ASD, the education of children with disabilities, and early evaluation and intervention services. Then we discuss the prevalence and distribution of ASD in the United States. From there, we turn to a more detailed discussion of early detection of ASD, a brief discussion of the efficacy of early intervention for

ASD, pediatrician practices relating to early detection, and the practical implications of developmental surveillance related to ASD. We conclude with practical and policy recommendations.

Legislation Relating to ASD

Congress began legislating educational services for children with mental retardation and physical disabilities as early as the late 1950s (U.S. Department of Education, n.d.). Early examples of this legislation include the Training of Professional Personnel Act of 1959, which legislated appropriate training to educate special education teachers, and the Captioned Films Acts of 1958, which worked to help children with hearing impairments succeed in the classroom. Throughout the 1960s, public laws were designed to help children with disabilities of all kinds be included in the school systems and receive appropriate education. During this time, however, it continued to be common practice for children with disabilities and behavioral problems to be legally excluded from school systems. In 1975, the Education for All Handicapped

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Children Act (EHA) was passed by Congress. The EHA authorized support both for expanded Head Start programs and for educational services for all children with disabilities. For the first time, every child age 3 to 21 in the United States, regardless of cognitive abilities, behavioral problems, or physical impairments, was guaranteed a free, appropriate public education (Katsiyannis, Yell, & Bradley, 2001).

Since the 1970s, laws have defined and expanded the rights granted by the EHA. The 1986 amendments to the EHA extended all services to 3- and 4-year-olds and mandated the development of programs and services for infants and toddlers by 1991 (Education of the Handicapped Act Amendments, 1986). More recently, in 1997, the EHA was renamed the Individuals With Disabilities Education Act (IDEA), and federal funding was made available for early intervention services for infants, toddlers, and their families. IDEA also specifically identified ASDs as developmental disabilities and emphasized the importance of intervention for children with ASD (Katsiyannis et al., 2001). IDEA mandates the creation of an individualized family service plan (IFSP) for each infant or toddler diagnosed with a developmental problem of any kind, including ASD. The IFSP is a comprehensive plan of education, therapy, and intervention for the child and family (Katsiyannis et al., 2001). This has meant greater access to assessment and intervention services (U.S. Department of Education, n.d.). These interventions cannot take place, however, if children are not referred early to the appropriate agencies in their communities. These early referrals are commonly made in the primary care system in the context of well-baby visits. Difficulties involved in detecting and diagnosing ASD make these referrals complicated, and many children miss out on important services (American Academy of Pediatrics [AAP], 2001a). Recent policy changes have mandated appropriate intervention and education for children with disabilities from the age of 3 and have recommended that states extend those services to infants and toddlers (Final Regulations, Individuals With Disabilities Education Act Amendments, 1999).

Diagnosis of ASD

Autism has been described as the most devastating developmental disorder of childhood (AAP, 2001b). ASD can cause disabilities in all areas of psychological development, from cognitive, language, and behavioral deficits to impairments in social interaction. Correctly diagnosing ASD is often difficult because of large variation in the behaviors related to the diagnosis (Volkmar

et al., 2005). Some children with ASD are very talkative and affectionate with family but exhibit bizarre repetitive behavior and social impairments with peers, whereas other children with autism never develop verbal skills and are severely mentally retarded. This variability led to the creation of a category to encompass several diagnoses, including the classic diagnosis of Autistic Disorder as well as others (Asperger's Syndrome, Rett's Disorder, Pervasive Developmental Disorder–Not Otherwise Specified [PDD-NOS], and Childhood Disintegrative Disorder). This category in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV*; American Psychiatric Association, 1994) is called Pervasive Developmental Disorders. In this article, these disorders are referred to as *autism spectrum disorders (ASD)*.

Speech difficulties are the most often first-cited concern for referral of children later diagnosed with ASD (Watson, Baranek, & DiLavore, 2003). There is much variance in the symptoms and age of onset for ASD. Children who never develop speech have a more obvious and distinct deficit earlier in life than do children who very slowly develop some speech or who develop speech and then regress (Volkmar et al., 2005). Pediatricians often want to wait to evaluate children who show some speech development (American Academy of Neurology [AAN], 2000). Children with higher functioning autistic disorder or Asperger's have more subtle symptoms, so diagnosis is even more difficult in young children because the range of normal development includes children who may not speak sentences until they are nearly 3 years of age. Concentrating on social deficits rather than on speech delays may be the key to identifying toddlers with higher functioning ASD (Volkmar et al., 2005). Standardization of diagnoses and clear definitions are necessary for efficient treatment and the development of quality resource materials for parents, pediatricians, teachers, and other community service providers.

Prevalence and Distribution of ASD

Information about the prevalence of ASD is complicated by increasing rates of diagnosis of autism in children who are higher functioning (Fombonne, 2003). Reported prevalence rates from studies done in the 1980s are 4 to 5 cases per 10,000 children for all the ASDs (Fombonne, 2003). Other recent studies have found highly variable rates ranging from 7 to 10 cases per 10,000 children to 62.6 cases per 10,000 children (Yeargin-Allsopp et al., 2003). A conservative estimate

of the current prevalence of ASD in the United States cited by Fombonne is 3.4 per 1,000 children. The problem with estimating the prevalence of all ASDs is that many studies do not include information about the distribution of diagnoses such as Asperger's Syndrome and PDD-NOS. Children with higher functioning ASDs are less likely to receive special school services and may not come to the attention of school psychologists or teachers until they are older, and so prevalence rates, which are usually based on young children (ages 3–10) often do include these youngsters (Yeargin-Allsopp et al., 2003). These complications are due also in part to the difficulty of obtaining the in-depth information required to differentiate between various ASDs and because there is no specific medical or genetic test for ASD (Yeargin-Allsopp et al., 2003). Future research on prevalence rates should include the full age range of children; should break down estimates separately by age; and should differentiate between individuals who are diagnosed with all the different ASDs including autism, Asperger's Syndrome, high-functioning autism, and PDD-NOS.

Can ASD Be Diagnosed in Infants and Toddlers?

Baranek (1999) states that diagnosis of ASD in children younger than 2 to 3 years of age seems to be limited by two major factors. First, researchers have had limited information about normal infant social development versus the development of infants with ASD and how that development relates to later behavior. Second, clinicians rely on diagnostic systems that are based on the behavior of much older children (e.g., *DSM-IV*). Clinicians are appropriately hesitant to diagnose an infant or toddler using those criteria (Baranek, 1999). It is important that developmentally appropriate diagnostic criteria for ASD in infants and toddlers be developed and disseminated to pediatricians, paraprofessionals, and organizations that provide resources to parents.

A typically developing infant begins to vocalize in a social manner as early as 2 months of age (Werner, Dawson, Osterling, & Dinno, 2000). During the second 6 months of life, typically developing infants begin to exhibit a greater amount of social babbling, such as verbal turn taking, and nonverbal behaviors, such as pointing at objects. Infants seek attention from others in social situations through imitative vocalizations, directing the attention of others through nonverbal behavior (pointing), greeting others, and requesting objects. Infants and toddlers later diagnosed with ASD have been shown to lack many of these typical behaviors through both

retrospective video analysis and parental report (Baranek, 1999; Watson et al., 2003). The AAP (2001b) states that parents report noticing differences in their child's social behavior around 7 months of age, on average. Parental concern about early cognitive or language development often predicts a later diagnosis of an ASD (AAP, 2001b). The problem with retrospective parental report is that memories are affected by the stress of raising a child with ASD and what they remember may be incorrect or exaggerated, so these reports are limited for use in empirical research (Watson et al., 2003).

In the past decade, a great deal of work has been done to better understand early traits associated with ASD and how they can be detected. Capitalizing on the fact that so many families make home movies of their infants and toddlers, researchers began analyzing these videos as a way to observe children early on in their naturalistic social environments. Retrospective video analysis studies have begun to identify early differences in behavior associated with later diagnosis of ASD (Adrien et al., 1991; Adrien et al., 1993; Baranek, 1999; Losche, 1990; Maestro et al., 2002; Osterling & Dawson, 1994; Werner et al., 2000). Research on early diagnosis of ASD has concentrated on infant sociocommunicative functions and their relationship to later behaviors typical in children with ASD (Baranek, 1999).

This research highlights a constellation of infant behaviors that are indicative of later ASD diagnosis (Volkmar, 1999; Werner et al., 2000). Table 1 outlines a number of studies using retrospective video analysis and specific behaviors found to be significantly different for infants later diagnosed with ASD. This constellation of behaviors includes impairments in social attention (eye contact, responding when called by name), affective responsiveness (social smiling), and prelinguistic vocalizations. The constellation of behaviors associated with later diagnosis of ASD can be outlined as follows: Infants later diagnosed with ASD often fail to respond to their names, fail to orient toward people, and show less verbal and nonverbal communicative behaviors. The *DSM-IV* states that children with autistic disorder must have qualitative impairments in social interaction; qualitative impairments in communication; and restricted repetitive and stereotyped patterns of behavior, interests, and activities (American Psychiatric Association, 1994). Although it may be difficult to observe an infant or toddler having restricted interests and stereotyped behavior, the first two of these criteria have been identified through specific behavioral deficits in infants younger than 12 months of age. An infant who ignores parental attention, who does not watch the parent for social cues, and who does not respond to his or her name likely has measurable

Table 1
Infant Behaviors Related to Autistic Spectrum Disorders Identified by Retrospective Video Analysis

Study	Age of Children	Behaviors
Rosenthal, Massie, and Wulff (1980)	13–24 months	Lack of shared interaction with mother
Losche (1990)	13–24 months	Low frequency of social interactions, no symbolic play or goal-directed actions
Adrien et al. (1991, 1993)	Younger than 12 months	Paradoxical reactions to sounds, poor social attention, lack of social smiling, hypotonia (extremely quiet)
Osterling and Dawson (1994)	First birthday party	Failing to orient to name, not looking at the face of another person, no pointing at objects
Baranek (1999)	9–12 months	Poor visual orientation, delayed response to name, excessive mouthing of objects
Maestro et al. (2002)	6 months or younger	Poor social attention, failing to seek contact, excessive exploratory activity with objects
Osterling, Dawson, and Munson (2002)	First birthday party	Failing to orient to name, no looking at the face of another person

difficulties in communication and socialization characterized by ASD and outlined in the *DSM-IV*. The *DSM-IV* criteria for diagnosis of ASD can be relevant for use in infants and toddlers if clear and concise definitions of infant and toddler behaviors related to *DSM-IV* criteria are developed for use by practitioners.

Morphological differences between children showing typical development and children with ASD may also be observed in infancy. Evidence suggests that ASD is a neurological disorder that begins with differences in prenatal brain growth and atypical brain morphology that have been shown to be associated with behavioral deficits during the first year of life (Courchesne, Carper, & Akshoomoff, 2003; Volkmar, 1999). There are widely acknowledged morphological differences between children with ASD and typically developing children, such as head circumference above the 95th percentile and high brain weight (Volkmar, 1999). Further, ASD commonly occurs with certain genetic abnormalities (fragile X syndrome) and physical disabilities (tuberous sclerosis) and may be related to brain abnormalities found with these diseases (AAP, 2001b; Volkmar, 1999). Studies of families also show a 50- to 100-fold increase in incidence of ASD and elevated rates of social awkwardness, withdrawal, and anxiety in first-degree relatives of people with ASD (Volkmar, 1999). Schultz (2000, as cited in Maestro et al., 2002) used functional magnetic resonance imaging to study brain activity related to face discrimination and object perception tasks. He found that children with ASD have patterns of brain activation different from the normal control group during facial discrimination tasks.

Finally, recent research has found that observed behavioral changes in children later diagnosed with ASD are preceded by abnormal cranial growth. First, many

ASD infants are born with relatively small heads followed by a sudden, excessive increase in head size between the ages of 2 months and 14 months (Courchesne et al., 2003). Courchesne et al. state that this type of sudden acceleration in rate of head growth can also serve as an early sign of ASD. The compelling evidence discussed here indicating biological markers for ASD suggests that brain morphological variables could be used effectively as part of an overall screening program for ASD.

Efficacy of Early Intervention for ASD

The first few years of life are undeniably sensitive to environmental influences and intervention (Ramey & Ramey, 1998). For children deemed to be at risk for developmental delay due to impoverished environments, early intervention seeks to prevent those delays from occurring, but for a child diagnosed with a developmental disability such as ASD, early intervention is designed to provide treatment for that developmental disability and prevention against the development of secondary deficits while the brain is still rapidly developing and changing (Blackman, 2002; Ramey & Ramey, 1998). Therefore, early interventions for children with specific problems such as ASD must be different than early interventions for children living with environmental risk factors (Kasari, 2002).

Overall, positive benefits have been found in several reviews and meta-analyses of early intervention in general (Blackman, 2002; Ramey & Ramey, 1998). Data on the effectiveness of early interventions specifically for children with ASD are promising but limited due to wide variability in the type of intervention programs implemented and in how much information on control variables

is typically collected about the children and families before intervention begins (Blackman, 2002; Kasari, 2002). There is a great need for longitudinal studies examining later outcomes for individuals with ASD, comparing different paths of diagnosis, intervention, education, and transition services (Kasari, 2002).

Kasari (2002) examined 10 different early ASD intervention studies and found that all of the interventions reported significant child improvements in behavior, cognition, or social interactions, and 1 reported complete recovery in 47% of participants through early adulthood. McConnell (2002), in another extensive review of early intervention for children with ASD, also found generally positive outcomes for children involved in intensive, comprehensive interventions. Researchers have found that intensive educational curriculums that capitalize on the strengths of the child, combined with compelling social situations including both peer and family involvement, produce pronounced changes in the behavioral capabilities and social functioning of children with ASD (Blackman, 2002; McConnell, 2002); however, the long-term longitudinal data available for these studies are limited. Clearly, early intervention is effective with young children diagnosed with ASD, and there are a variety of different early intervention options available to families; however, such services will only be effective if young children with ASD are identified early on and if families have access to such services.

Developmental Surveillance and ASD

The AAP recommends developmental surveillance of all children. Developmental surveillance should include screening for common psychological problems, such as ASD (AAP, 2001a). For early detection and diagnosis to take place, practitioners must be able to easily screen children for ASD while avoiding problems such as false positives. Efforts to create efficacious screening instruments have been somewhat successful. Baron-Cohen, Allen, and Gillberg (1992) identified key behaviors related to ASD in older children and developed the *Checklist for Autism in Toddlers* (CHAT). The CHAT is a screening instrument to be used by general practitioners at 18-month well-child visits. Section A consists of questions to ask parents during the visit, and Section B consists of observational questions for the general practitioner about the child's behavior. The infant behaviors that Baron-Cohen et al. identified as related to typical ASD behaviors in older children were protodeclarative pointing (requesting an object nonverbally, pointing after someone says "look"), gaze monitoring (social referencing), and pretend play. These three behaviors are social

in nature and are consistent with the deficits in behavior found in the retrospective video analysis studies discussed earlier. Five items on the CHAT are related to these behaviors; consistent failure of these items on the CHAT indicates a more than 80% chance of the child developing ASD (Baron-Cohen et al., 1992; Baron-Cohen et al., 1996; Scambler, Rogers, & Wehner, 2001). Although research with the CHAT has been limited due to small sample sizes and only the use of children without any developmental delays as a control group, the findings are still impressive. Scambler et al. specifically compared children with ASD and children with mental retardation and found that the CHAT did differentiate between these groups, but this is the only study that has done this comparison with a clinical control group, and it has not yet been replicated. Further research on the use of such tools is clearly needed.

The CHAT is one example of an accessible screening tool for early detection of children who are at risk for developing ASD. Interestingly, on the basis of an earlier lack of research on the instrument, technical reports for general practitioners state that the CHAT does not differentiate well between children with ASD and children with other developmental disorders, such as mental retardation (AAP, 2001b). These guidelines need to be revised to take into account more recent findings of the utility of the CHAT. The AAP (2001b) maintains that no currently published screening instrument has proven to be both sufficiently sensitive and selective because not one has proven to consistently differentiate between ASD and fragile X or mental retardation. The AAN (2000) recommends using the CHAT to screen children in whom developmental concerns are raised by parents. The association emphasizes listening to parental concerns and then using the CHAT to gain more information before referring a child for evaluation. More recent research, using the CHAT on a population of children whose parents expressed concern about their social development, showed much higher sensitivity than originally found (Scambler et al., 2001). As such, current research indicates that the CHAT may be a useful first screening tool for toddlers whose parents show concern. There are also other potentially useful screening tools, such as the *Screening Tool for Autism in Two-Year-Olds* (Stone, Coonrod, & Ousley, 2000) and the *Australian Scale for Asperger's Syndrome* (Attwood, 1998), currently being developed, but less research has been done regarding their validity for screening children whose parents show concern (AAP, 2001b; Volkmar, 1999). Using the CHAT as a first level of screening for children whose parents are concerned may be a relatively easy way for pediatricians or practitioners to identify which

children are more clearly at risk. More research and further development of the CHAT and other potential screening instruments need to be completed so that clinicians are confident using them in practice.

Is Developmental Screening Taking Place?

In their 2000 Practice Parameter, the AAN reported that when screening takes place 25% of children seen in a primary care practice show developmental problems such as speech delays, motor delays, or cognitive deficiencies; however, only 30% of general practitioners follow the AAP's guidelines and actually screen for developmental delays (Howlin & Moore, 1997, as cited in AAN, 2000). The AAP, AAN, and American Psychological Association have officially recommended, since 2000, that all infants and toddlers be screened for developmental delays, specifically for ASD (AAN, 2000). Further investigation will reveal whether primary care practitioners are following these guidelines. Without the full participation of general practitioners, the process of detection, diagnosis, intervention, and treatment cannot take place. The AAN (2000) also reported that parents feel that they receive more help and intervention from the school system than they do from the medical community and their own family physicians. Many parents feel that their nonmedical developmental concerns are ignored or dismissed by their pediatricians (Young, Davis, Schoen, & Parker, 1998), but much of this research was based on interviews with parents, and none of it specifically addressed issues relating to ASD or other developmental delays. There is a great need for research specifically addressing pediatric developmental surveillance and its implementation, especially for children with ASD.

Glascoe and Dworkin (1993) reported that only half of children with developmental delays are identified by physicians when they rely on intuition and clinical impressions of the children rather than on screening instruments or by eliciting parental concerns. These findings are further evidence that reliable screening instruments could be very helpful tools for pediatricians. Several articles have been published in recent years in journals for pediatricians in an attempt to educate them about developmental surveillance and screening (Glascoe & Kundell, 2002; King & Glascoe, 2003; Young et al., 1998), but it remains to be seen whether the guidelines are followed. There is a serious lack of empirical evidence regarding pediatric developmental surveillance. Regalado and Halfon (2001) conducted a review of studies examining the clinical efficacy of childhood

developmental surveillance. They found that eliciting parental concerns about developmental problems identified as many possible problems as did using a valid assessment instrument but that neither is done often enough to identify most children. Another group of researchers (Sices, Feudtner, McLaughlin, Drotar, & Williams, 2004) surveyed 800 pediatricians and family physicians around the United States and found that parental concern often did not influence referral of children for further evaluation and that many physicians continue to use a watch-and-wait approach. They found much variance in decision-making practices among physicians regarding developmental surveillance and referrals to developmental specialists. Most recently, another group of researchers surveyed 646 members of the AAP to gain information about their developmental surveillance practices (Sand et al., 2005). Consistent with the research mentioned earlier, they found that fewer than 30% of these physicians used a standardized assessment instrument for developmental surveillance. They also found that there was a statistical difference in referral rates between the pediatricians who used a standardized instrument and those who did not (Sand et al., 2005). The above research indicates that current efforts to identify young children with developmental disabilities, such as ASD, are not particularly effective and that physicians lack a standardized approach to pediatric developmental surveillance. It would appear that physicians need better training and communication about the assessment of children for developmental problems, including ASD, and they need to pay more attention to parental concerns. There is still a startling lack of research about developmental surveillance practices that directly relate to ASD, as all of the above surveys were generalized to include surveillance for motor delays, speech and language problems, pervasive developmental disorders, and other problems of early childhood.

The implementation of recent federal mandates (such as the Individuals With Disabilities Education Act of 1997) has forced the education system to fully include children with disabilities. Early intervention, education, and mental health care for children with developmental disabilities, such as ASD, are all equally important. Physicians must follow their own guidelines in order for early intervention and special education services to be implemented in a timely manner in the lives of children with autism. Pediatricians and family physicians should be educated about IDEA and other relevant legislation, and information about local community agencies that provide services for families should be available in the physician's office. Regalado and Halfon (2001) state that the boundary between pediatric care and community-based

intervention services is not well defined and that this leads to confusion regarding funding. Practicing physicians, educators, and community-based service providers must communicate better with each other and work to streamline the process of detection, referral, evaluation, and intervention for children with ASD.

Practical Implications in Screening for ASD

There are many complexities involved in implementing a screening program for any childhood disorder. When screening for ASD, these complexities are magnified by the difficulties involved in recognizing the disorder in a very young child. The children identified then enter an already strained early intervention and evaluation system that is not always well funded or organized (Baker & Feinfeld, 2003). The lack of clear research about screening programs and instruments creates reasonable concern about false positives and the long-term impact of an incorrect diagnosis on a child's life. The need to improve physician training is clear in physician journals (AAP, 2001a; AAN, 2000), but the public is likely unaware of this problem because people generally assume that pediatricians are already well trained to recognize developmental problems. There are regular articles in AAP, AAN, and American Medical Association journals about ASD and the importance of early screening that explain the importance of listening to parents and helping them access community resources (Baird et al., 2001; Curry & DUBY, 1994; Dworkin, 1993; Gilbride, 1995; Glascoe, 2005; King & Glascoe, 2003; Sand et al., 2005). Physicians need to reevaluate and abandon the watch-and-wait stance they have historically taken with regard to developmental disabilities like ASD and to screening and referring children when parents have concerns.

Funding for physician training is available from different agencies—governmental and private. Physicians are required to continue their education and earn continuing medical education credits. The requirements vary in each state, but all require yearly education for continued licensure (American Medical Association, 2006). A short search online shows that classes for these credits are offered through many universities, as correspondence courses, and at conferences. Providing training about ASD and other developmental problems through these types of mechanisms would encourage more physicians to be better informed about early screening for these disorders. Because a venue for physician education already exists, educating about a subject like developmental surveillance for ASD ought not to be difficult. As for the issue of funding for evaluation and early intervention, IDEA legislation provides for early

evaluation and intervention services for all children who are delayed or at risk. If a state has chosen to participate in the IDEA mandates for early intervention, that state will receive funding to evaluate and intervene in the lives of those children identified (Turnbull et al., 2002). Turnbull et al. published an exhaustive discussion, with a special emphasis on ASD, of legislation regarding special education. They note that the IDEA mandates only apply to educational facilities that receive state funding, but that many states use Medicaid money to make up for gaps in this funding. These states create interagency agreements between school systems and Medicaid providers to better serve children already diagnosed with ASD.

Conclusion and Recommendations

For children diagnosed with ASD and their families, early intervention has been shown to improve long-term outcomes (Blackman, 2002), but early intervention is not possible without early screening and detection. Retrospective video analysis, assessment from screening instruments like the CHAT, and evidence of neurological markers for ASD taken together have shown that infants and toddlers begin to show signs and symptoms of socio-communicative dysfunction very early in life. The implication here is that early detection is feasible and screening instruments need to be carefully developed for infants younger than 12 months of age and widely tested for efficacy. It is in our best interests as a society to fully fund training programs for pediatricians, parent and consumer education about early child development, and early evaluation programs for children.

To this end, we make following recommendations:

- Policy makers at every level of government must continue to refine and fund important legislation like IDEA. A great deal of progress has been made in this area in the past several decades, but although the legislation is in place, many children still slip through the system and do not get the help that they need to reach their full potential. Full implementation of IDEA has yet to be reached.
- Clear and concise definitions of ASD, related to infant behavior and *DSM-IV* criteria, need to be developed and disseminated to parents, paraprofessionals, and general practitioners. Using the traits found through retrospective video analysis, research with the CHAT, and parental reports, we know that an infant who does not engage socially by smiling at people and responding to his or her name and who refuses or avoids contact with

others may have a qualitative impairment in social interaction that is characteristic of the behavior of older children and adults with ASD. It is important for pediatricians to recognize these behaviors quickly and to not hesitate to refer a child for evaluation.

- The AAP and AAN need to monitor and publish information about implementation of developmental surveillance by general practitioners who are on the front lines of ASD detection and diagnosis. Organizations for physicians must be held responsible for maintaining high professional standards among their members.
- Family physicians and pediatricians should be offered multiple opportunities to learn about ASD, screening for ASD, and the efficacy of early intervention programs. Education of physicians should occur while they are in medical school and later through continued education. Parents often turn to the family physician when they have concerns about their child, and therefore that family physician must have available educational materials about early child development (typical and atypical) and about effective early intervention strategies.
- Pediatricians and family physicians must abandon the watch-and-wait approach to detecting developmental problems, including ASD, and begin to use assessment instruments and elicit parental concerns regarding social development, speech development, and the other markers of early ASD that have been identified in recent research. Waiting to refer a child for evaluation when ASD is suspected is never a good idea—it only deprives that child of the opportunity to participate in state-mandated early intervention and education programs that might change that child's outcome and allow the child to live up to his or her potential as an adult. Better research about this practice is sorely needed.
- The information gained from recent research should be used to develop more sensitive screening tools for children as young as 12 months. Instruments such as the CHAT have been shown to be useful in toddlers, but the research reviewed in this article shows that detection may be feasible in even younger children. The time has come for the development of such screening instruments for younger children.

Implementation of these recommendations in the current systems for referral, evaluation, and early intervention is possible. There are dedicated professionals in every

related field working to promote best practices to improve the lives of children with ASD. This is evidenced by the large variety of sources referenced in this article—medical journals, government documents, and a host of academic sources. Government agencies, doctors, developmental psychologists, and other clinicians must work together to continue the research and development of strategies for diagnosis and intervention in ASD.

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