Gillette Children's Specialty Healthcare

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Developmental Surveillance: Early identification of motor delays improves outcomes

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In childhood, a motor disability is an important issue for the child and family. It can interfere with a child's ability to become independent socially, functionally and later, financially. Early recognition and intervention can help prevent secondary problems related to developmental delays and change the overall outcome of the disability.

Primary care practitioners play an important role in the early recognition of delays. Recognizing this, the federal government has made developmental screening a component of the Medicaid EPSDT program for all Medicaid-eligible children, ages birth to 21. (In Minnesota, this program is known as the Child and Teen Checkup program*)

The benefits of early identification

Educational and habilitative intervention at an early age can potentially improve outcomes for children with, or at risk for, developmental disabilities. The best time to begin services is while the child's nervous system is still malleable and potentially responsive. For this reason, developmental surveillance ought to be a part of every child's routine health maintenance visits.

Early identification helps both the child and their parents — even when there is no etiologic explanation for the delay. It allows the family to obtain help and intervention services for their child and can prevent secondary emotional disabilities in the child. In some cases, it is possible to treat a genetic, metabolic or infectious disease to prevent disability. Early intervention is not only important to a child's health, but has educational, social and economic benefits as well. Studies show that children with delays have 1.5 times the number doctor visits, 3.5 times the number of hospital days and miss twice the number of school days as children who have no delays. They also experience a 2.5 fold increase in the likelihood of repeating a grade in school.[1]

However, when these children participate in early intervention programs, they are less likely to repeat a grade, to need special education services or drop out of school. Comparative studies have also shown that reducing spasticity and decreasing disability in children with cerebral palsy is more successful when children receive treatment early in life.[2] Not only does early intervention benefit the child, but the cost to health and public school systems decreases since fewer children will need special health and school services as they get older.

When and how to do developmental surveillance

The early identification of delayed development can be troublesome, despite the fact that 10 to 17 percent of children have some form of delay. Yet, it is a crucial prerequisite for early intervention. While severe disorders are often recognized in infancy, it is unusual to diagnose speech impairments, hyperactivity and/or emotional disturbance before the age of 3-to-4 years. Learning

disabilities often go unnoticed until children start school. Ideally, all children should have a developmental screening at an early age for the major areas of development including: social, self-help, fine motor, gross motor, language and cognitive skills. An estimation of development compares a child's skill with developmental norms and helps identify the child whose development is borderline or delayed.

To monitor development effectively, it is helpful for primary care practitioners to have a reliable screening tool. The Ages and Stages Questionnaire (developed for the state Follow-Along Program) is a useful tool for community screening programs. The Denver Developmental Screening Test (DDST or Denver II), the Infant Development Inventory (IDI) and the Child Development Review (CDR) permit rapid office screening.

Each of these tools has its advantages and limitations (see Fig. 1). However, the IDI and CDR are particularly helpful parent-report screening tools (the Child Development Chart compliments these tools). They allow the physician to systematically elicit and address parent observations and concerns regarding their child's development, health, behavior, and social interactions, as well as the family's well-being.

Assessing Motor Development

Parents are often the first to identify delays in their child's development. Their concerns are usually legitimate, especially when it comes to delayed motor development during the first year of life.

Children with motor disabilities present in different ways at different ages. For example, at an early age, they may have floppiness (hypotonia) or spasticity, suggested by posturing such as frog-legging or scissoring. Fisting may also be an early sign of motor impairment. Likewise, delays in the disappearance of primitive reflexes or delays in the appearance of postural reactions, may indicate delays in motor development. Abnormal movement patterns may indicate pathology. Later, children may be unable to walk.

Initially, the physician needs to identify the reason for a delay in a child's motor development. In addition to developmental screening, assessment should include a careful history and four distinct clinical examinations, usually performed simultaneously. These include a general physical exam, a neurological exam, a functional assessment and an examination of the special reflexes of infancy (the presence of any of these special reflexes after 6 months of age is abnormal).

Differential diagnosis for motor delay

There are many reasons for delayed motor development including: 1) maturational motor delay (which can be a normal, often familial, variation); 2) a cognitive disability that results in motor delay accompanied by other delays; 3) a structural disorder; 4) a non-progressive neuromuscular disorder; and 5) a progressive neuromuscular disorder. If the child's primary physician has questions about the significance or extent of certain delays, a developmental pediatrician can provide further assessment, diagnosis and treatment recommendations.

Fig. 1 **How do the available surveillance tools measure up?**

	Ages and Stages Questionnaire	Denver II	Infant Development Inventory and Child Development Review
Age Range	4–48 months	1 week to 6 yrs., 6 months old	Birth–18 mos.; 18 mos.–kindergarten
Areas Reviewed	communication; gross motor; fine motor; problem solving; personal-social	personal-social; fine motor-adaptive; problem solving; language (hearing, speaking, understanding); gross motor	social; self-help; gross motor; fine motor; language
Accuracy	sensitivity: 75% overall specificity: 86% overall ability to identify established delay: 96%	sensitivity: 83% specificity: 43% (Glascoe 1992)	IDI CDR sensitivity: 85% 68% specificity: 77% 88%
Administration	parent completes questionnaire and program staff scores it	individually administered by professional	parent completes questionnaire (or it may be used as an interview if literacy is an issue); staff interprets the results
Time Required	15–30 minutes to administer 5 minutes to score	15 minutes	5–10 minutes for parent to complete
Advantages	o cost effective o encourages family collaboration o considers typical performance of the child as well as professional assessment o decreases need for	o training videotape available o training sessions held twice annually o manual includes information on initiating and	o obtains parents questions and concerns about the child o comprehensive — not only screens development but elicits concerns about health and

	o frequent clinic visits o companion videotape describing use of ASQ on home visits o Spanish version available	conducting community screening program o companion Denver Developmental Activities o companion Prescreening Developmental Questionnaire (PDQ) for parent completion is available	o behavior identifies child's strengths as well as weaknesses o Child Development Chart can be used by professional to make direct observations of the child
Limitations	o subjectivity of parent and examiner o cut-off scores cannot be used for children falling outside the two-month age range band for each questionnaire o screening tool only	o sample based on children living in Colorado only (may not be representative of overall child population) o reliability is strong but no other psychometric characteristics reported o tendency to over-refer	o subjectivity of parent/examiner (although most parent observations are found to be reliable)

** If you have questions about the components of the Child and Teen Checkup program or would like to receive C&TC training, call the Minnesota Department of Health at (651) 281-9957 or call the C&TC state coordinator at (651) 296-1723.*

1. Boyle CA, Decoufle P, Yeargin-Allsopp M. Prevalence and health impact of developmental disabilities in US children. Pediatrics 1994;93:399-403.
2. Dormans JP, Pellegrino LP. Caring for Children with Cerebral Palsy: A Team Approach. Baltimore, MD: Paul Brookes Publishing Company; 1998.