Resources on Developmental Surveillance, Screening, & Referrals

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Evaluating Model Programs to Support Dissemination
An Evaluation of Strengthening the Developmental Surveillance and Referral Practices of Child Health Providers

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KEY POINTS

- Evaluation of developmental programs should consider process, outcome, and impact measures.
- Brief, in-office training for community-based child health providers was successful in influencing provider and practice behavior.
- Training increased the identification of children with developmental and behavioral concerns and referrals to the *Child Development Infoline (CDI)*.

The project *Strengthening the Developmental Surveillance and Referral Practices of Child Health Providers* was designed to educate Connecticut's community-based child health providers in early detection and identification of childhood developmental and behavioral concerns and in the use of the *Help Me Grow* referral system. The training program provided in-office education and discussion on developmental surveillance and on the use of a statewide triage and referral system for community-based primary care practices. Project staff traveled to each practice and offered a brief training intervention to providers and office staff.

EVALUATION DESIGN

The evaluation, supported by The Commonwealth Fund, included process measures, which tracked program activities; impact measures, which examined whether the training changed developmental surveillance and referral patterns within participating practices; and outcome measures, which assessed provider and staff satisfaction with the training and changes in attitudes toward developmental surveillance and referral. The impact evaluation was designed to determine whether the intervention was effective, using 3 questions:

1. Is the rate of developmental surveillance for intervention practices higher after training?
2. Is developmental surveillance more comprehensive in intervention practices after training (i.e., detecting children with a wider range of concerns, detecting more at-risk children, and detecting children at earlier ages)?
3. Are intervention practices more likely to refer to *Help Me Grow* following training?

The impact evaluation consisted of a chart review study and an analysis of provider referrals. The chart review compared provider behavior before and after the intervention and compared trained and untrained practices. Charts were examined for evidence that developmental surveillance had occurred at the last well-child visit, defined as the presence in the chart of any of the following: notes on development; a completed surveillance instrument; or evidence of solicitation of parental concerns. ''Completed instrument,'' as defined in the chart review, included any of: a validated instrument (e.g., PEDS,[1] Denver II,[2] Ages and Stages[3]), a milestone checklist, a hearing tracking tool, a growth chart, and various practice-specific forms designed to track development. The charts were also reviewed to determine if a developmental concern had been identified at the last well-child visit.

The second impact evaluation study examined providers' referral behavior using data from *Child Development Infoline (CDI)*. *CDI* operates a statewide telephone number that receives all calls related to *Help Me Grow*, *Birth-to-Three (Early Intervention)*, *Children with Special HealthCare Needs,* and *Preschool Special Education* and provides referral to the appropriate programs and services. Details of the impact evaluation designs are shown in the Appendix.

The outcome evaluation assessed provider and staff knowledge and attitudes using the results of questionnaires distributed at the end of each training intervention. The questionnaires were designed to assess providers' confidence in their ability to conduct developmental surveillance, the practice staff's confidence in its ability to use *Help Me Grow*, and the practice staff's intent to use *Help Me Grow*. The questionnaires also assessed barriers to surveillance and referral and the perceived importance of those barriers.

RESULTS

Process Evaluation

During the study period, 141 of 300 Connecticut community-based pediatric and family medicine practices received the training intervention (47% of all practices),

compared to the project goal of 50%. Practices receiving training included a combined staff of 1301 (330 physicians, 454 other primary care providers, and 517 other staff). Of these, 59% attended the training, including 53% of primary care providers and 67% of office staff.

Impact Evaluation

Chart reviews: Chart reviews were conducted, on average, 7 weeks after the practice intervention. Reviewers examined 629 charts from the practices that received the intervention (309 before and 320 after intervention) and 289 charts from the control practices. Over 90% of charts contained some evidence of developmental surveillance, both in the control group and in the intervention group pre- and post-training (Table 1). There were no statistically significant differences between the intervention and control groups.

The factors defined as ''evidence of developmental surveillance'' did not appear at different rates in intervention group charts, before vs. after training (Table 2).

Trained practices identified significantly more developmental or behavioral concerns, with 18% of reviewed charts noting a concern, compared to 9% in those same practices before training (odds ratio: 2.34; 95% confidence interval: 1.42, 3.85; $p = .001$) (Table 3). The increase in children identified occurred across most practices trained.

In those charts containing some evidence of developmental surveillance, there were no differences in the child's age, sex, insurance status, or type of delay in trained vs. untrained practices. Of those children where a developmental concern had been identified, there were also no differences in these factors by practice training status.

Provider calls to Child Development Infoline (CDI). There were 1217 calls from community-based practices to *CDI* over the study period. Of these, 33% were from practices trained by the date of the call, while 67% of calls were from practices that were not or had not yet been trained. Calls to *CDI* from intervention practices increased over the training period. By the end of the training period, 44% of practices had been trained, but 57% of calls came from trained practices.

The average age of children referred to *CDI* from practices that had received the intervention was 23.0 months, compared to an average age referred from non-trained practices of 20.9 months ($p = .006$). Fourteen percent of calls from trained practices were for children over 3, compared to 6.4% for untrained practices ($p < .0001$). Among the 1106 calls for children ages 0 to 36 months, the average age of children referred from trained practices was 18.1 months, compared to 19.0 months ($p = .11$) from untrained practices.

There were significant differences in the conditions for which young children were referred in trained vs. untrained practices. Behavioral conditions were involved in 4.2% of referrals from trained practices, compared to 1.4% for untrained practices ($p = .005$). Four percent of referrals from trained practices were for parent support, compared to 0.8% from untrained practices ($p = .0002$). Trained practices referred relatively less frequently for health and communication issues. There were no differences by practice training status in the sex, language spoken at home, and Medicaid status of referred children.

Table 1. Evidence of Developmental Surveillance in Chart Reviews

		Intervention Practices	
	Control Practices	Before Intervention	After Intervention
Percent of charts with evidence of surveillance	95%	96%	93%

Table 2. Types of Surveillance Present. (% of reviewed charts)

	Intervention Practices	
Type of Evidence of Surveillance	Before Intervention	After Intervention
Note on development	40%	38%
Completed surveillance instrument	77%	80%
Note on parental concerns	29%	30%

Outcome Evaluation

Questionnaires were collected from 517 staff members from 105 practices, representing 85% of the recorded attendance at those trainings. Seventy percent of providers reported that they expected a very significant or significant change in their practice of developmental surveillance attributable to the training. Providers reported various barriers to conducting developmental surveillance, including lack of time, with 26.9% describing lack of time as a significant or very significant barrier. Other reported barriers to conducting developmental surveillance were lack of medical office staff support (15.5%), inadequate reimbursement (11.3%), lack of confidence in ability to conduct developmental surveillance (5.5%), and unspecified barriers (23.6%). Ninety-three percent of providers and staff reported that they definitely or probably intended to use the *Help Me Grow* program in their practices. Fifteen percent of providers and staff reported that the overall effect of all barriers to using *Help Me Grow* would be significant or very significant.

Table 3. Percent of Charts Where a Developmental or Behavioral Concern was Identified at the Last Well-child Visit

Practice	Before Intervention	After Intervention
1	24%	22%
2	4%	21%
3	9%	24%
4	3%	13%
5	11%	21%
6	6%	26%
7	9%	11%
8	11%	9%
9	3%	15%
Total	9%	18%

DISCUSSION

This brief, in-office training program for community-based pediatric and family medical practices was successful in influencing provider and practice behavior. Among practices receiving the intervention, the identification of children with developmental or behavioral concerns doubled. Practices that received the intervention referred children to *CDI* in greater numbers than control practices. The training increased referrals to *CDI* for older children, and for children with behavioral issues or a family need for parent support, although the chart review study did not find any differences in age or types of need in children identified with concerns. Trained practices may be differentially referring to *CDI*, using the *CDI* more often for certain groups of children, perhaps where there are fewer available alternatives.

The model used in developing the evaluation design assumed that the training program would lead to more consistent use by the medical practices of certain techniques of developmental surveillance (i.e., chart instruments, solicitation of parental concerns, and consistent monitoring of the child's development) and that this would be expressed in a greater frequency of chart notations and completed instruments. The model further assumed that as a result of this consistent use, more children with developmental and behavioral concerns would be identified. Although more children with developmental and behavioral delays were identified in the trained practices, it is unclear what changes in provider and staff practices, knowledge, or attitudes resulted in this change. There were no changes in charted evidence of developmental surveillance after training.

The rates of developmental surveillance noted in the charts were very high, over 90% in both intervention and control practices. This is much higher than recent surveys conducted by American Academy of Pediatrics[4] and is contrary to current understanding of the state of developmental surveillance in pediatric and family practice. The high rates of surveillance may have been driven by a liberal definition of a ''completed instrument'' as one type of evidence of surveillance. Other types of evidence of surveillance were present in the charts with less frequency, including a note on development (45% of charts prior to intervention) and a note on parental concerns (30% of charts).

Further research on training pediatric and family providers in the use of developmental surveillance and referral may wish to investigate:

1. Medium- and long-term effects of this program–How long does the increased rate of identification of children last? What is the longer-term effect of the training on calls to *CDI*?
2. Mechanism–What changes in provider behavior or attitudes have been effected by the intervention? What is the mechanism leading to greater identification of children with developmental delays? How can these techniques or changes in attitude be more effectively transmitted to providers?
3. Attendance–In practices that were trained, only half of the providers attended the training program. Since the primary effect of the program is on provider behavior, how can this attendance rate be improved in future training, and what effect will it have?

All of these questions are potential future issues for study that can build on the strong base of the program *Strengthening the Developmental Surveillance and Referral Practices of Child Health Providers*, which successfully influenced provider surveillance and referral behaviors for children in primary care practices across Connecticut.

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APPENDIX: IMPACT EVALUATION DESIGN

CHART REVIEWS

The chart review study was conducted among a group of practices enrolled in the *ProHealth* physicians' network. Ten intervention practices of varying sizes and patient populations provided access to their charts for review of well-child visits both before and after the intervention. Ten practices that did not receive training were matched on practice characteristics with the first ten, and served as a comparison group. For each outcome of interest, results from each practice that received training were compared to results in two comparison groups—the same practice prior to training, and a matched practice not receiving training.

REFER CENTER DATA

This study examined records of calls from primary care providers to *Child Development Infoline (CDI)* during the one-year training period. In the *CDI* data, the practice of the referring primary care provider was matched to the program database to determine whether the call came from a practice receiving or not receiving training, and whether the call occurred prior to or following the training session. Monthly trends in calls during the training period were examined to determine if there were increases in the number of calls to *Help Me Grow* and whether trained practices were disproportionately represented among practices calling or referring to *Help Me Grow*.

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POLICY STATEMENT

Identifying Infants and Young Children With Developmental Disorders in the Medical Home: An Algorithm for Developmental Surveillance and Screening

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Council on Children With Disabilities
Section on Developmental Behavioral Pediatrics
Bright Futures Steering Committee
Medical Home Initiatives for Children With Special Needs Project Advisory Committee

ABSTRACT

Early identification of developmental disorders is critical to the well-being of children and their families. It is an integral function of the primary care medical home and an appropriate responsibility of all pediatric health care professionals. This statement provides an algorithm as a strategy to support health care professionals in developing a pattern and practice for addressing developmental concerns in children from birth through 3 years of age. The authors recommend that developmental surveillance be incorporated at every well-child preventive care visit. Any concerns raised during surveillance should be promptly addressed with standardized developmental screening tests. In addition, screening tests should be administered regularly at the 9-, 18-, and 30-month visits. (Because the 30-month visit is not yet a part of the preventive care system and is often not reimbursable by third-party payers at this time, developmental screening can be performed at 24 months of age. In addition, because the frequency of regular pediatric visits decreases after 24 months of age, a pediatrician who expects that his or her patients will have difficulty attending a 30-month visit should conduct screening during the 24-month visit.) The early identification of developmental problems should lead to further developmental and medical evaluation, diagnosis, and treatment, including early developmental intervention. Children diagnosed with developmental disorders should be identified as children with special health care needs, and chronic-condition management should be initiated. Identification of a developmental disorder and its underlying etiology may also drive a range of treatment planning, from medical treatment of the child to family planning for his or her parents.

INTRODUCTION

Early identification of developmental disorders is critical to the well-being of children and their families. It is an integral function of the primary care medical home[1] and an appropriate responsibility of all pediatric health care professionals. Delayed or disordered development can be caused by specific medical conditions

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development, developmental disorders, developmental screening, disabilities, children with special health care needs, early intervention, medical home

Abbreviations
AAP—American Academy of Pediatrics
CPT—*Current Procedural Terminology*

and may indicate an increased risk of other medical complications. Delayed or disordered development may also indicate an increased risk of behavior disorders or associated developmental disorders. Early identification should lead to further evaluation, diagnosis, and treatment. Early intervention is available for a wide range of developmental disorders; their prompt identification can spur specific and appropriate therapeutic interventions. Identification of a developmental disorder and its underlying etiology may also affect a range of treatment planning, from medical treatment of the child to family planning for his or her parents.

Current detection rates of developmental disorders are lower than their actual prevalence, which suggests that the challenges to early identification of children with developmental disorders have not been overcome.[2–4] A recent survey of American Academy of Pediatrics (AAP) members revealed that despite publication of the 2001 policy statement "Developmental Surveillance and Screening of Infants and Young Children"[5] and national efforts to improve developmental screening in the primary care setting, few pediatricians use effective means to screen their patients for developmental problems.[2] This 2006 statement replaces the 2001 policy statement and provides an algorithm as a strategy to support health care professionals in developing a pattern and practice of attention to development that can and should continue well beyond 3 years of age.

We recommend that developmental surveillance, as described later, be incorporated at every well-child visit. Any concerns raised during surveillance should be promptly addressed. In addition, standardized developmental screening tests should be administered regularly at the 9-, 18-, and 30-month* visits. Pediatric health care professionals may also find it useful to conduct school-readiness screening before the child's attendance at preschool or kindergarten. These recommendations represent our consensus; further research to evaluate the effectiveness of the proposed approach and available screening tools is encouraged. Separate recommendations aimed at the screening of children for behavioral and emotional disorders are also under consideration by the AAP and are not included in this document.

The detection of developmental disorders is an integral component of well-child care. Title V of the Social Security Act (42 USC Chapter 7, Subchapter V §§701-710 [1989]) and the Individuals With Disabilities Education Improvement Act (IDEA) of 2004 (Pub L No. 108-446) reaffirm the mandate for child health professionals to provide early identification of, and intervention for, children with developmental disabilities through community-based collaborative systems. The medical home is the ideal setting for developmental surveillance and screening of children and adolescents. Parents expect their medical home, as the site of their child's continuous and comprehensive care, to be interested in children's development throughout childhood and adolescence, to competently identify developmental strengths and weaknesses, and to be knowledgeable of available community resources to facilitate referrals when needed.

Developmental screening is included in the AAP "Recommendations for Preventive Pediatric Health Care"[6] or "periodicity schedule" and is further recommended by the 2 current AAP compilations of well-child care guidelines: *Bright Futures*[7] and *Guidelines for Health Supervision III*.[8] In collaboration with other experts in child health care, the AAP is currently revising *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*. It is hoped that the third edition of *Bright Futures* being developed by the AAP and the revised periodicity schedule will be consistent with the recommendations of this document.

Note Regarding Language

Within the context of this document, clear distinctions have been drawn among (1) surveillance, the process of recognizing children who may be at risk of developmental delays, (2) screening, the use of standardized tools to identify and refine that recognized risk, and (3) evaluation, a complex process aimed at identifying specific developmental disorders that are affecting a child. These definitions build on existing definitions.[9] In a further effort to ensure clarity throughout the document, we have purposefully avoided the term "assessment." Although the Individuals With Disabilities Education Improvement Act of 2004—and others—use "assessment" as a synonym for "evaluation," this usage is not universally shared.

"Developmental delay" is used in this statement for the condition in which a child is not developing and/or achieving skills according to the expected time frame. The terms "delayed development," "disordered development," and "developmental abnormality" are used synonymously. "Developmental disorder" and "developmental disability" refer to a childhood mental or physical impairment or combination of mental and physical impairments that result in substantial functional limitations in major life activities.[10]

THE ALGORITHM†

1. Pediatric Patient at Preventive Care Visit

Developmental concerns should be included as one of several health topics addressed at each pediatric pre-

*Because the 30-month visit is not yet a part of the preventive care system and is often not reimbursable by third-party payers at this time, developmental screening can be performed at 24 months of age. In addition, because the frequency of regular pediatric visits decreases after 24 months of age, a pediatrician who expects that his or her patients will have difficulty attending a 30-month visit should conduct screening during the 24-month visit.

†Numbers and headings refer to steps in the algorithm (Fig 1).

ventive care visit throughout the first 5 years of life (see Fig 1).[6] Many children are born with risk factors that predispose them to delayed development and developmental disorders; other children will show delayed or disordered development in early childhood, which if undetected and untreated, can contribute to early school failure and attendant social and emotional problems. Some children will have delayed development attributable to a specific medical condition for which medical treatments may be indicated. Early therapeutic intervention may be available for a wide range of developmental disorders.

2. Perform Surveillance

Developmental surveillance is a flexible, longitudinal, continuous, and cumulative process whereby knowledgeable health care professionals identify children who may have developmental problems. Surveillance can be useful for determining appropriate referrals, providing patient education and family-centered care in support of healthy development, and monitoring the effects of developmental health promotion through early intervention and therapy.

A great breadth and depth of information is considered in comprehensive developmental surveillance; it is important to note, however, that much of this information (eg, static risk factors such as low birth weight, results of previous screenings) will accumulate within the child's health record, where it can be reviewed and flagged as necessary before the visit.

There are 5 components of developmental surveil-

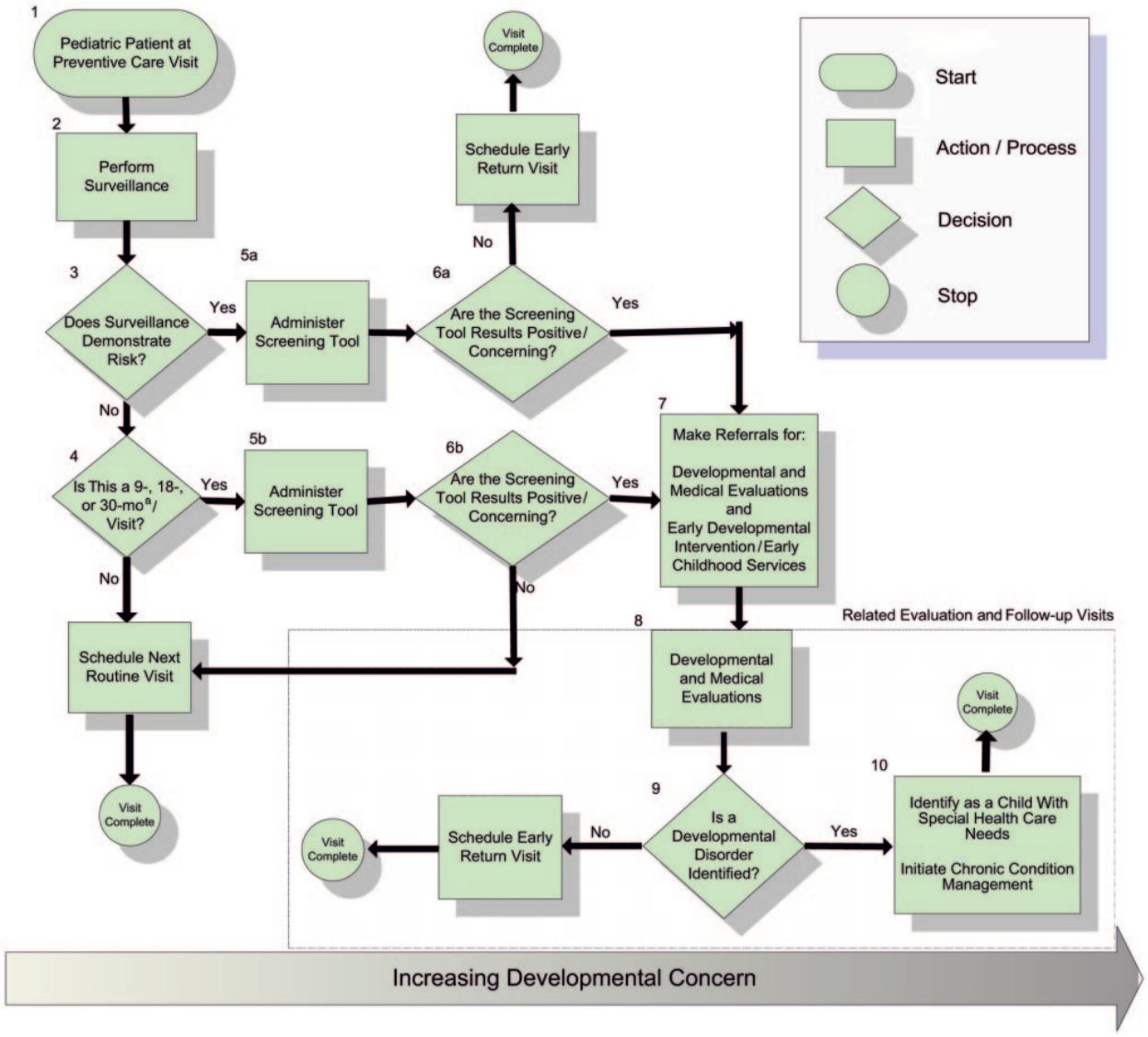
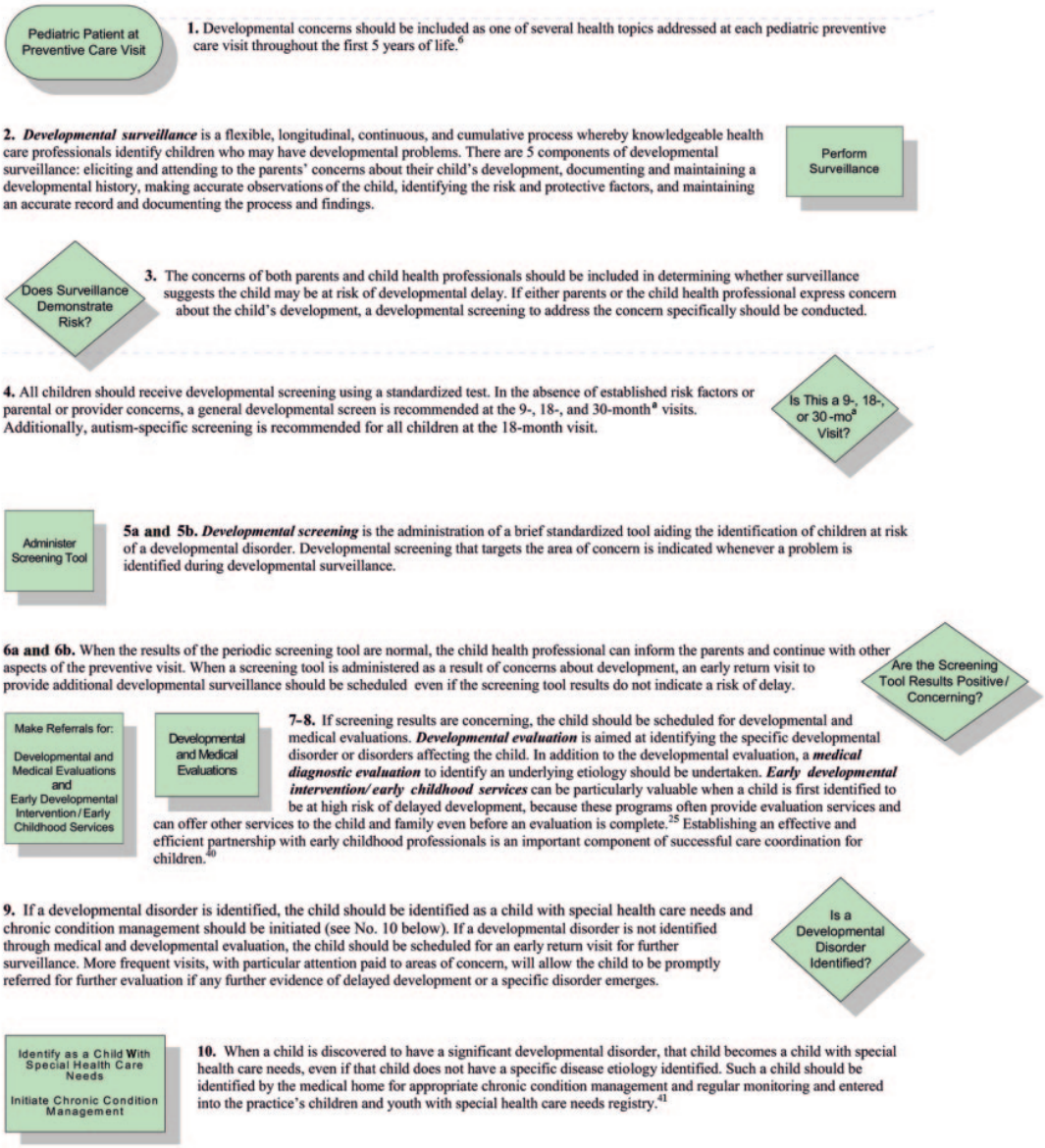


FIGURE 1
Developmental surveillance and screening algorithm within a pediatric preventive care visit. [a] Because the 30-month visit is not yet a part of the preventive care system and is often not reimbursable by third-party payers at this time, developmental screening can be performed at 24 months of age.



lance: eliciting and attending to the parents' concerns about their child's development; documenting and maintaining a developmental history; making accurate observations of the child; identifying risk and protective factors; and maintaining an accurate record of documenting the process and findings.

Eliciting and Attending to the Parents' Concerns

Parents and child health professionals have valuable observation skills, and they share the goal of ensuring optimal health and developmental outcome for the child. In the optimal situation, the child health professional elicits parental observations, experiences, and concerns and recognizes that parental concerns mandate serious attention. The literature suggests that posing simple questions to parents related to concerns about the child's development, learning, or behavior can elicit quality information.[11–13] Health care professionals might ask, for example, "Do you have any concerns about your child's development? Behavior? Learning?" Asking parents specifically about their child's behavior can yield valuable information regarding development, because parents do not necessarily differentiate between behavior and development, and developmental delays often manifest through behavior. The absence of parental concern does not preclude the possibility of serious developmental delays.[14] The health care professional must attend to all aspects of developmental surveillance.

Maintaining a Developmental History

"What changes have you seen in your child's development since our last visit?" A developmental history, updated through this or similar questions, should be a component of any history taken during a well-child visit and can assist a child health professional in identifying developmental abnormalities that warrant further investigation. Age-specific queries, such as asking whether the child is walking or pointing, are also valuable.

In addition to attending to delayed development—whereby children acquire skills more slowly than their peers—child health professionals should give equal consideration to other developmental abnormalities.[15] Deviations in development, whereby children develop skills out of the usual sequence, are recognized in disorders such as cerebral palsy and autism. Dissociation—differing rates of development in different developmental spheres—commonly occurs with developmental disorders. Children with mental retardation or autistic spectrum disorders, for example, commonly display normal motor skills and delayed language development. Conversely, children with cerebral palsy of the spastic diplegic type often display delayed motor skills with normal language function. Regression, the loss of developmental skills, is a very serious developmental problem suggestive of an active, ongoing neurologic problem.

Making Accurate and Informed Observations of the Child

As trained and experienced professionals, pediatricians and other child health professionals have the expertise and comparative knowledge to identify developmental concerns. A careful physical and developmental examination within the context of the preventive care visit is integral to developmental surveillance.[16] Limited evidence suggests that observation of the parent-child interaction may aid in identifying children with delayed development.[17]

Identifying the Presence of Risk and Protective Factors

A risk assessment is an important part of developmental surveillance. Environmental, genetic, biological,[16,18] social, and demographic factors[19] can increase a child's risk for delays in development. Multiple risk factors can amplify each other.[20,21] Children with established risk factors may be referred directly for developmental evaluation or may require developmental surveillance at more frequent intervals than children without risk factors.

Child health professionals should identify protective factors as well as risk factors in children's lives. Strong connections within a loving, supportive family, along with opportunities to interact with other children and grow in independence in an environment with appropriate structure, are important assets in a child's life. These factors, associated with resiliency in older children, are important components in each family's story.[22]

Documenting the Process and Findings

Medical charts, in paper or electronic form, should document all surveillance and screening activities during preventive care visits. In addition, specific actions taken or planned, such as scheduling an earlier follow-up visit, scheduling a visit to discuss developmental concerns more fully, or referrals to medical specialists or early childhood programs and specialists, should also be noted. A paper medical chart might contain a "developmental growth chart" on which the results of developmental surveillance and formal screens are recorded in relationship to the child's age and the dates at the time the findings were obtained. An electronic chart, on the other hand, may allow for the development of a form on which developmental findings and plans are recorded and from which prompts for further action may occur automatically. Recent technologies that automate developmental risk assessments within the waiting room through computer-interpreted paper forms or information kiosks are also increasingly commonplace. We encourage continued development and scientific evaluation of these technologies given their potential to facilitate the process of developmental surveillance and screening.

3. Does Surveillance Demonstrate Risk?

The concerns of both parents and child health professionals should be included in determining whether surveillance suggests that the child may be at risk of developmental problems. If parents or the child health professional express concern about the child's development, a developmental screening to address the concern specifically should be conducted. This screening may require a separate visit; if so, the visit should be held as soon as possible.

Reassurance has a role in the clinical encounter but varies depending on the progress and outcome of developmental surveillance. Reassurance should be rooted in and reference the findings of developmental surveillance. If, for example, developmental surveillance indicates that the child is at low risk of a developmental disorder, reassurance can be offered with caution and a planned outcome. Specific, simple, age-specific developmental goals can be identified, and parents can be encouraged to schedule recheck appointments if the child is not attaining those goals. In reassuring the parents, the pediatrician should emphasize the importance of continual surveillance and screening.

4. Is This a 9-, 18-, or 30-Month* Visit?

All children, most of whom will not have identifiable risks or whose development appears to be proceeding typically, should receive periodic developmental screening using a standardized test. In the absence of established risk factors or parental or provider concerns, a general developmental screen is recommended at the 9-,

TABLE 1 Developmental Screening Tools

	Description	Age Range	No. of Items	Administration Time	Psychometric Properties[a]	Scoring Method	Cultural Considerations	Purchase/Obtainment Information	Key References
General developmental screening tool									
Ages & Stages Questionnaires (ASQ)	Parent-completed questionnaire; series of 19 age-specific questionnaires screening communication, gross motor, fine motor, problem-solving, and personal adaptive skills; results in pass/fail score for domains	4–60 mo	30	10–15 min	Normed on 2008 children from diverse ethnic and socioeconomic backgrounds, including Spanish speaking; sensitivity: 0.70–0.90 (moderate to high); specificity: 0.76–0.91 (moderate to high)	Risk categorization; provides a cutoff score in 5 domains of development that indicates possible need for further evaluation	English, Spanish, French, and Korean versions available	Paul H. Brookes Publishing Co: 800/638-3775; www.brookespublishing.com	Squires J, Potter L, Bricker D. *The ASQ User's Guide*. 2nd ed. Baltimore, MD: Paul H. Brookes Publishing Co; 1999
Battelle Developmental Inventory Screening Tool, 2nd ed (BDI-ST)	Directly administered tool; designed to screen personal-social, adaptive, motor, communication, and cognitive development; results in pass/fail score and age equivalent; can be modified for children with special needs	Birth to 95 mo	100	10–15 min (<3 y old) or 20–30 min (≥3 y old)	Normed on 2500 children, demographic information matched 2000 US Census data; additional bias reviews performed to adjust for gender and ethnicity concerns; sensitivity: 0.72–0.93 (moderate to high); specificity: 0.79–0.88 (moderate)	Quantitative; scaled scores in all 5 domains are compared with cutoffs to determine need for referral	English and Spanish versions available	Riverside Publishing Co: 800/323-9540; www.riverpub.com	Newborg J. *Battelle Developmental Inventory*. 2nd ed. Itasca, IL: Riverside Publishing; 2004
Bayley Infant Neurodevelopmental Screen (BINS)	Directly administered tool; series of 6 item sets screening basic neurologic functions; receptive functions (visual, auditory, and tactile input); expressive functions (oral, fine, and gross motor skills); and cognitive processes; results in risk category (low, moderate, high risk)	3–24 mo	11–13	10 min	Normed on ~1700 children, stratified on age, to match the 2000 US Census; sensitivity: 0.75–0.86 (moderate); specificity: 0.75–0.86 (moderate)	Risk categorization; children are graded as low, moderate, or high risk in each of 4 conceptual domains by use of 2 cutoff scores	English and Spanish versions available	Psychological Corp: 800/211-8378; www.harcourtassessment.com	Aylward GP. *Bayley Infant Neurodevelopmental Screener*. San Antonio, TX: Psychological Corp; 1995; Aylward GP, Verhulst SJ, Bell S. Predictive utility of the BSID-II Infant Neurodevelopmental Screener (BINS) risk status classifications: clinical interpretation and application. *Dev Med Child Neurol*. 2000; 42:25–31
Brigance Screens-II	Directly administered tool; series of 9 forms screening articulation, expressive and receptive language, gross motor, fine motor, general knowledge and personal social skills and preacademic skills (when appropriate); for 0–23 mo, can also use parent report	0–90 mo	8–10	10–15 min	Normed on 1156 children from 29 clinical sites in 21 states; sensitivity: 0.70–0.80 (moderate); specificity: 0.70–0.80 (moderate)	All results are criterion based; no normative data are presented	English and Spanish versions available	Curriculum Associates Inc: 800/225-0248; www.curriculumassociates.com	Glascoe FP. *Technical Report for the Brigance Screens*. North Billerica, MA: Curriculum Associates Inc; 2005; Glascoe FP. The Brigance Infant-Toddler Screen (BITS): standardization and validation. *J Dev Behav Pediatr*. 2002;23: 145–150
Child Development Inventory (CDI)	Parent-completed questionnaire; measures social, self-help, motor, language, and general development skills; results in developmental quotients and age equivalents for different developmental domains; suitable for more in-depth evaluation	18 mo–6 y	300	30–50 min	Normative sample included 568 children from south St Paul, MN, a primarily white, working class community; Doig et al included 43 children from a high-risk follow-up program, which included 69% with high school education or less and 81% Medicaid; sensitivity: 0.80–1.0. (moderate to high); specificity: 0.94–0.96 (high)	Quantitative; provides age equivalents in each domain as well as SDs	English and Spanish versions available	Behavior Science Systems Inc: 612/850-8700; www.childdevrev.com	Ireton H. *Child Development Inventory Manual*. Minneapolis, MN: Behavior Science Systems Inc; 1992; Doig KB, Macias MM, Saylor CF, Craver JR, Ingram PE. The Child Development Inventory: a developmental outcome measure for follow-up of the high risk infant. *J Pediatr*. 1999;135:358–362

TABLE 1 Continued

	Description	Age Range	No. of Items	Administration Time	Psychometric Properties[a]	Scoring Method	Cultural Considerations	Purchase/Obtainment Information	Key References
Child Development Review-Parent Questionnaire (CDR-PQ)	Parent-completed questionnaire; professional-completed child development chart measures social, self-help, motor, and language skills	18 mo to 5 y	6 open-ended questions and a 26-item possible-problems checklist to be completed by the parent, followed by 99 items crossing the 5 domains, which may be used by the professional as an observation guide or parent-interview guide	10–20 min	Standardized with 220 children aged 3–4 y from primarily white, working class families in south St Paul, MN; sensitivity: 0.68 (low); specificity: 0.88 (moderate)	Risk categorization; parents' responses to the 6 questions and problems checklist are classified as indicating (1) no problem; (2) a possible problem; or (3) a possible major problem	English and Spanish versions available	Behavior Science Systems Inc	Ireton H. *Child Development Review Manual*. Minneapolis, MN: Behavior Science Systems; 2004
Denver-II Developmental Screening Test	Directly administered tool; designed to screen expressive and receptive language, gross motor, fine motor, and personal-social skills; results in risk category (normal, questionable, abnormal)	0–6 y	125	10–20 min	Normed on 2096 term children in Colorado; diversified in terms of age, place of residence, ethnicity/cultural background, and maternal education; sensitivity: 0.56–0.83 (low to moderate); specificity: 0.43–0.80 (low to moderate)	Risk categorization; pass or fail for each question, and these responses are compared with age-based norms to classify children as in the normal range, suspect, or delayed	English and Spanish versions available	Denver Developmental Materials: 800/419-4729; www.denverii.com	Frankenburg WK, Camp BW, Van Natta PA. Validity of the Denver Developmental Screening Test. *Child Dev*. 1971;42:475–485; Glascoe FP, Byrne KE, Ashford LG, Johnson KL, Chang B, Strickland B. Accuracy of the Denver-II in developmental screening. *Pediatrics*. 1992;89:1221–1225
Infant Development Inventory	Parent-completed questionnaire; measures social, self-help, motor, and language skills	0–18 mo	4 open-ended questions followed by 87 items crossing the 5 domains	5–10 min	Studied in 86 high-risk 8-mo-olds seen in a perinatal follow-up program and compared with the Bayley scales; sensitivity: 0.85 (moderate); specificity: 0.77 (moderate)	Risk categorization; delayed or not delayed	English and Spanish versions available	Behavior Science Systems Inc	Creighton DE, Sauve RS. The Minnesota Infant Development Inventory in the developmental screening of high-risk infants at 8 mo. *Can J Behav Sci*. 1988;20 (special issue):424–433
Parents' Evaluation of Developmental Status (PEDS)	Parent-interview form; designed to screen for developmental and behavioral problems needing further evaluation; single response form used for all ages; may be useful as a surveillance tool	0–8 y	10	2–10 min	Standardized with 771 children from diverse ethnic and socioeconomic backgrounds, including Spanish speaking; sensitivity: 0.74–0.79 (moderate); specificity: 0.70–0.80 (moderate)	Risk categorization; provides algorithm to guide need for referral, additional screening, or continued surveillance	English, Spanish, Vietnamese, Arabic, Swahili, Indonesian, Chinese, Taiwanese, French, Somali, Portuguese, Malaysian, Thai, and Laotian versions available	Ellsworth & Vandermeer Press LLC: 888/729-1697; www.pedstest.com	
Language and cognitive screening tools									
Capute Scales (also known as Cognitive Adaptive Test/Clinical Linguistic Auditory Milestone Scale [CAT/CLAMS])	Directly administered tool; measures visual-motor/problem solving (CAT), and expressive and receptive language (CLAMS); results in developmental quotient and age equivalent	3–36 mo	100	15–20 min	Standardized on 1055 North American children aged 2–36 mo; correlations high with Bayley Scales of Infant Development; sensitivity: 0.21–0.67 in low-risk population (low) and 0.05–0.88 in high-risk populations (low to high); specificity: 0.95–1.00 in low-risk population (high) and 0.82–0.98 in high-risk populations (moderate to high)	Quantitative (developmental age levels and quotient)	English, Spanish, and Russian versions available	Paul H. Brookes Publishing Co	Voigt RG, Brown FR III, Fraley JK, et al Concurrent and predictive validity of the cognitive adaptive test/clinical linguistic and auditory milestone scale (CAT/CLAMS) and the Mental Developmental Index of the Bayley Scales of Infant Development. *Clin Pediatr (Phila)*. 2003;42:427–432

Communication and Symbolic Behavior Scales-Developmental Profile (CSBS-DP): Infant Toddler Checklist	Standardized tool for screening of communication and symbolic abilities up to the 24-mo level; the Infant Toddler Checklist is a 1-page parent-completed screening tool	6–24 mo	24	5–10 min	Standardized on 2188 North American children aged 6-24 mo; correlations: 0.39–0.75 with Mullen Scales at 2 y of age; sensitivity: 0.76–0.88 in low- and at-risk children at 2 y of age (moderate); specificity: 0.82–0.87 in low- and at-risk children at 2 y of age (moderate)	Risk categorization (concern/no concern)	English version available	Paul H. Brookes Publishing Co	Wetherby AM, Prizant BM. *Communication and Symbolic Behavior Scales: Developmental Profile*. Baltimore, MD: Paul H. Brookes Publishing Co; 2002
Early Language Milestone Scale (ELM Scale-2)	Assesses speech and language development from birth to 36 mo	0–36 mo	43	1–10 min	Small cross-sectional standardization sample of 191 children; 235 children for speech intelligibility item; sensitivity: 0.83–1.00 in low- and high-risk populations (moderate to high); specificity: 0.68–1.00 in low- and high-risk populations (low to high)	Quantitative (age equivalent, percentile, standard score)	English version available	Pro-Ed Inc: 800/897-3202; www.proedinc.com	Coplan J. *Early Language Milestone Scale*. Austin, TX: Pro-Ed Inc; 1993; Coplan J, Gleason JR. Test-retest and interobserver reliability of the Early Language Milestone Scale, second edition. *J Pediatr Health Care*. 1993;7:212–219
Motor screening tools									
Early Motor Pattern Profile (EMPP)	Physician-administered standard examination of movement, tone, and reflex development; simple 3-point scoring system	6–12 mo	15	5–10 min	Single published report of 1247 high-risk infants; sensitivity: 0.87–0.92 (moderate to high); specificity: 0.98 (high)	Risk categorization (normal/suspect/abnormal)	English version available	See key references	Morgan AM, Aldag JC. Early identification of cerebral palsy using a profile of abnormal motor patterns. *Pediatrics*. 1996;98:692–697
Motor Quotient (MQ)	Uses simple ratio quotient with gross motor milestones for detecting delayed motor development	8–18 mo	11 total milestones; 1 per visit	1–3 min	Single published report of 144 referred children; sensitivity: 0.87 (moderate); specificity: 0.89 (moderate)	Quantitative (developmental age levels and quotient)	English version available	See key references	Capute AJ, Shapiro BK. The motor quotient: a method for the early detection of motor delay. *Am J Dis Child*. 1985;139:940–942
Autism screening tools									
Checklist for Autism in Toddlers (CHAT)	Parent-completed questionnaire or interview and directly administered items designed to identify children at risk of autism from the general population	18–24 mo	14 (No. of questions/items [averaged])	5 min	Original standardization sample included 41 siblings of children with autism and 50 controls 18 mo of age in Great Britain; 6-y follow-up on 16 235 children validated using ADI-R and ICD-10 criteria resulted in low sensitivity, high specificity; revised version in process of being normed ("Q-CHAT"); sensitivity: 0.38–0.65 (low); specificity: 0.98–1.0 (high)	Risk categorization (pass/fail)	English version available	Public domain: www.nas.org.uk/profess/chat	Baird G, Charman T, Baron-Cohen S, et al. A screening instrument for autism at 18 mo of age: a 6-y follow-up study. *J Am Acad Child Adolesc Psychiatry*. 2000;39:694–702; Baron-Cohen S, Allen J, Gillberg C. Can autism be detected at 18 mo? The needle, the haystack, and the CHAT. *Br J Psychiatry*. 1992;161:839–843
Modified Checklist for Autism in Toddlers (M-CHAT)	Parent-completed questionnaire designed to identify children at risk of autism from the general population	16–48 mo	23 (No. of questions/items [averaged])	5–10 min	Standardization sample included 1293 children screened, 58 evaluated, and 39 diagnosed with an autistic spectrum disorder; validated using ADI-R, ADOS-G, CARS, DSM-IV; sensitivity: 0.85–0.87 (moderate); specificity: 0.93–0.99 (high)	Risk categorization (pass/fail)	English, Spanish, Turkish, Chinese, and Japanese versions available	Public domain: www.firstsigns.com	Dumont-Mathieu T, Fein D. Screening for autism in young children: the Modified Checklist for Autism in Toddlers (M-CHAT) and other measures. *Ment Retard Dev Disabil Res Rev*. 2005;11:253–262; Robins DL, Fein D, Barton ML, Green JA. The Modified Checklist for Autism in Toddlers: an initial study investigating the early detection of autism and pervasive developmental disorders. *J Autism Dev Disord*. 2001;31:131–144

TABLE 1 Continued

	Description	Age Range	No. of Items	Administration Time	Psychometric Properties[a]	Scoring Method	Cultural Considerations	Purchase/Obtainment Information	Key References
Pervasive Developmental Disorders Screening Test-II (PDDST-II), Stage 1-Primary Care Screener	Parent-completed questionnaire designed to identify children at risk of autism from the general population	12-48 mo	22 (No. of questions/items [averaged])	10-15 min to complete; 5 min to score	Validated using extensive multimethod diagnostic evaluations on 681 children at risk of autistic spectrum disorders and 256 children with mild-to-moderate other developmental disorders; no sensitivity/specificity data reported for screening of an unselected sample; sensitivity: 0.85-0.92 (moderate to high); specificity: 0.71–0.91 (moderate to high)	Risk categorization (pass/fail)	English version available	Psychological Corp	Siegel B. *Pervasive Developmental Disorders Screening Test-II (PDDST-II): Early Childhood Screener for Autistic Spectrum Disorders*. San Antonio, TX: Harcourt Assessment Inc; 2004
Pervasive Developmental Disorders Screening Test-II (PDDST-II), Stage 2-Developmental Clinic Screener	Parent-completed questionnaire; designed to detect children at risk of autism from other developmental disorders	12–48 mo	14 (No. of questions/items [averaged])	10–15 min to complete; 5 min to score	Validated using extensive multimethod diagnostic evaluations on 490 children with confirmed autistic spectrum disorder (autism, pervasive developmental disorder-not otherwise specified, or Asperger syndrome) and 194 children who were evaluated for autistic spectrum disorder but who did not receive a diagnosis on the autistic spectrum; no sensitivity/specificity data reported for screening of an unselected sample; sensitivity: 0.69–0.73 (moderate); specificity: 0.49–0.63 (low)	Risk categorization (pass/fail)	English version available	Psychological Corp	Siegel B. *Pervasive Developmental Disorders Screening Test-II (PDDST-II): Early Childhood Screener for Autistic Spectrum Disorders*. San Antonio, TX: Harcourt Assessment Inc; 2004
Screening Tool for Autism in Two-Year-Olds (STAT)	Directly administered tool; designed as second-level screen to detect children with autism from other developmental disorders; assesses behaviors in 4 social-communicative domains: play, requesting, directing attention, and motor imitation	24–35 mo	12 (No. of questions/items [averaged])	20 min	Two samples were used: for development phase, 3 children with autism, 33 without autism; for validation sample, 12 children with autism, 21 without autism; validated using CARS, ADOS-G, and DSM-IV criteria; second-level screen; requires training workshop before administration; sensitivity: 0.83–0.92 (moderate to high); specificity: 0.85–0.86 (moderate)	Risk categorization	English version available	Wendy Stone, PhD, author: triad@vanderbilt.edu	Stone WL, Coonrod EE, Ousley OY. Brief report: Screening Tool for Autism in Two-Year-Olds (STAT): development and preliminary data. *J Autism Dev Disord*. 2000;30:607–612; Stone WL, Coonrod EE, Turner LM, Pozdol SL. Psychometric properties of the STAT for early autism screening. *J Autism Dev Disord*. 2004;34:691–701; Stone WL, Ousley OY. *STAT Manual: Screening Tool for Autism in Two-Year-Olds*. unpublished manuscript, Vanderbilt University, 1997
Social Communication Questionnaire (SCQ) (formerly Autism Screening Questionnaire-ASQ)	Parent-completed questionnaire; designed to identify children at risk of autistic spectrum disorders from the general population; based on items in the ADI-R	≥4 y	40 (No. of questions/items [averaged])	5–10 min	Validated using the ADI-R and DSM-IV on 200 subjects (160 with pervasive developmental disorder, 40 without pervasive developmental disorder); for use in children with mental age of at least 2 y and chronologic age ≥4 y; available in 2 forms: lifetime and current; sensitivity: 0.85 (moderate); specificity: 0.75 (moderate)	Risk categorization (pass/fail)	English and Spanish versions available	Western Psychological Corp: www.wpspublish.com	Rutter M, Bailey A, Lord C. *The Social Communication Questionnaire (SCQ) Manual*. Los Angeles, CA: Western Psychological Services; 2003

The AAP does not approve/endorse any specific tool for screening purposes. This list is not exhaustive, and other tests may be available. ADI-R indicates Autism Diagnostic Interview-R; ICD-10, *International Classification of Diseases, 10th revision*; ADOS-G, Autism Diagnostic Observation Schedule-Generic; CARS, Childhood Autism Rating Scale; DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.

[a] Sensitivity and specificity were categorized as follows: low = 69 or below; moderate = 70 to 89; high = 90 or above.

18-, and 30-month* visits. Consideration of a number of factors, including the time available to focus on developmental concerns during a routine pediatric visit, led to these recommended ages.

- Nine months of age: At 9 months of age, many issues involving motor skills development can be reliably identified. A 9-month screening provides an additional opportunity to attend to the child's visual and hearing abilities. Early communication skills may be emerging—evidence suggests symptoms of autism, such as lack of eye contact, orienting to name being called, or pointing, may be recognizable in the first year of life.[23,24] Early intervention to address specific developmental disorders is available to infants from birth and should be accessed to address any delays detected at 9 months.[25] At-risk 9-month-old infants should also be referred to early intervention programs if not previously referred. The 9-month preventive care visit also provides a good opportunity for the child health professional to educate parents about developmental screening and to encourage parents to pay special attention to communication and language skills. Social and nonverbal communication, including vocalizations and gestures, are important aspects of emerging communication that can be assessed at 9 months. Because of the rapid development of motor, language, and cognitive skills, parents should be encouraged to express any concerns they have about their child's progress rather than waiting until the 18-month visit. The AAP brochure *Is Your One-Year Old Communicating With You?*[26] might be distributed at the 9-month visit to educate parents about communication and target any concerns they have. (If practices have eliminated the 9-month visit, this screening should be performed at the 12-month visit.)
- Eighteen months of age: Delays in communication and language development are often evident by 18 months of age. Mild motor delays that were undetected at the 9-month screening may be more apparent at 18 months of age. Medical interventions for motor disorders have been shown to be effective in children at 18 months of age, and effective early intervention for delayed language development is also available.[27] In addition to a general developmental screening tool, an autism-specific tool should be administered to all children at the 18-month visit.[28] Symptoms of autism are often present at this age, and effective early intervention strategies are available.[29]
- Thirty months* of age: By 30 months of age, most motor, language, and cognitive delays may be identified with screening instruments, leading to evaluation of and intervention for those children with delayed development. A 30-month visit focusing on child development and developmental screening would allow the health care provider to devote special attention to this area. Therefore, addition of this preventive care visit to the periodicity schedule is being considered by Bright Futures.

When child health professionals use only clinical impressions rather than formal screening, estimates of children's developmental status are much less accurate.[30] Including developmental screening tools at targeted developmental ages is intended to enhance the precision of the developmental surveillance process. These recommended ages for developmental screening are suggested only as a starting point for children who appear to be developing normally; surveillance should continue throughout childhood, and screenings should be conducted anytime that concerns are raised by parents, child health professionals, or others involved in the care of the child. At the 4-year visit, a screening for school readiness is appropriate.

5a and 5b: Administer Screening Tool

Developmental screening is the administration of a brief standardized tool that aids the identification of children at risk of a developmental disorder. Many screening tools can be completed by parents and scored by nonphysician personnel; the physician interprets the screening results.

Developmental screening does not result in either a diagnosis or treatment plan but rather identifies areas in which a child's development differs from same-age norms. Developmental screening that targets the area of concern is indicated whenever a problem is identified during developmental surveillance. Because development is dynamic in nature and surveillance and screening have limits, periodic screening with a validated instrument should occur so that a problem not detected by surveillance or a single screening can be detected by subsequent screening. Repeated and regular screening is more likely than a single screening to identify problems, especially in later-developing skills such as language. Waiting until a young child misses a major milestone such as walking or talking may result in late rather than early recognition, increasing parental dissatisfaction and anxiety and depriving the child and family of the benefits of early identification and intervention.

Table 1 provides a list of developmental screening tools; a discussion of how to choose an appropriate screening tool is included in "Implementing the Algorithm."

6a and 6b: Are the Screening-Tool Results Positive/Concerning?

When the results of the periodic screening tool are normal, the child health professional can inform the parents and continue with other aspects of the preventive visit. Normal screening results provide an opportunity to focus on developmental promotion. However, when a screening tool is administered because of con-

cerns about development, an early return visit to provide additional developmental surveillance should be scheduled even if the screening-tool results do not indicate a risk of delay.

7. Make Referrals for Developmental and Medical Evaluations and Early Developmental Intervention/Early Childhood Services

If screening results are concerning, the child should be scheduled for developmental and medical evaluations. These evaluations may occur at a different visit or series of visits or often in a different setting by other professionals. The separate box in which these steps are placed in the algorithm (Fig 1) is intended to represent the possibility that these actions will occur at a different time and location. However, they should be scheduled as quickly as possible, and professionals should coordinate activities and share findings.

8. Developmental and Medical Evaluations

Developmental Evaluation

When developmental surveillance or screening identifies a child as being at high risk of a developmental disorder, diagnostic developmental evaluation should be pursued. This evaluation is aimed at identifying the specific developmental disorder or disorders affecting the child, thus providing further prognostic information and allowing prompt initiation of specific and appropriate early childhood therapeutic interventions.

Children with neurodevelopmental disorders also often have other associated developmental or behavior disorders.[31–33] Identification of these disorders can lead to further evaluation and treatment. Pediatric subspecialists such as neurodevelopmental pediatricians, developmental and behavioral pediatricians, child neurologists, pediatric physiatrists, or child psychiatrists can perform the developmental diagnostic evaluation, as can other early childhood professionals in conjunction with the child's primary care provider. Such early childhood professionals include early childhood educators, child psychologists, speech-language pathologists, audiologists, social workers, physical therapists, and occupational therapists, ideally working with families as part of an interdisciplinary team and with the medical home.

Medical Evaluation

In addition to the developmental evaluation, a medical diagnostic evaluation to identify an underlying etiology should be undertaken. This evaluation should consider biological, environmental, and established risk factors for delayed development.[34–37] Vision screening and objective hearing evaluation; review of newborn metabolic screening and growth charts; and an update of environmental, medical, family, and social history for additional risk factors are integral to this evaluation.

A comprehensive medical evaluation is essential whenever a delay is confirmed. This evaluation varies somewhat with the risk factors and findings and may include brain imaging, electroencephalogram (EEG), genetic testing, and/or metabolic testing.[37]

Identification of an etiology may provide parents with a greater depth of understanding of their child's disability. Identifying an etiology also can affect various aspects of treatment planning, including specific prognostic information, genetic counseling around recurrence risk and family planning, specific medical treatments for improved health and function of the child, and therapeutic intervention programming.[38] An underlying etiology will be identified in approximately one quarter of cases of delayed development, with higher rates (>50%) in children with global developmental delays and motor delays and lower rates (<5%) in children with isolated language disorders.[39]

This evaluation can be performed by a trained and skilled pediatrician; a pediatric subspecialist such as a neurodevelopmental pediatrician, child neurologist, or developmental/behavioral pediatrician; or through affiliated medical professionals such as pediatric geneticists or physiatrists. The primary care provider within the medical home should develop an explicit comanagement plan with the specialist(s).

Early Developmental Intervention/Early Childhood Services

Early intervention programs can be particularly valuable when a child is first identified to be at high risk of delayed development, because these programs often provide evaluation services and can offer other services to the child and family even before an evaluation is complete.[25] These services can include developmental therapies, service coordination, social work services, assistance with transportation and related costs, family training, counseling, and home visits. The diagnosis of a specific developmental disorder is not necessary for an early intervention referral to be made. Child health professionals should realize that a community-based early intervention evaluation may not address children with specific medical risks, and further developmental and medical evaluation will often be necessary for children with established delays.

Establishing an effective and efficient partnership with early childhood professionals is an important ingredient of successful care coordination for children within the medical home. The partnership is built on shared interest in the developmental outcomes of children and recognition of the different skill sets of child health professionals and educators. For additional information regarding care coordination, see the AAP policy statement "Care Coordination in the Medical Home: Integrating Health and Related Systems of Care for Children With Special Health Care Needs."[40]

Given the variety of community settings in which health care is provided, the pediatrician may consult

early childhood professionals who work in specialized health care centers, university centers, early intervention programs, early childhood educational programs, or private practices. Whenever possible, communities should coordinate resources; this is especially true in preventing delays in care or unnecessary duplication of service.

The child's medical charts, whether electronic or paper, should be organized to create a system that guarantees continuity of care, especially when the child is referred to specialists and/or community agencies. In addition, a means of incorporating information about a child's developmental status from sources outside the medical home should be available. The child health care chart should be designed to alert the clinician if further attention is needed between regular periodic visits.

9. Is a Developmental Disorder Identified?

If a developmental disorder is identified, the child should be identified as a child with special health care needs, and chronic-condition management should be initiated (see No. 10 below). If a developmental disorder is not identified through medical and developmental evaluation, the child should be scheduled for an early return visit for further surveillance, as mentioned previously. More frequent visits, with particular attention paid to areas of concern, will allow the child to be promptly referred for further evaluation if any additional evidence of delayed development or a specific disorder emerges.

10. Identify as a Child With Special Health Care Needs and Initiate Chronic-Condition Management

When a child is discovered to have a significant developmental disorder, that child becomes a child with special health care needs even if that child does not have a specific disease etiology identified. Such a child should be identified by the medical home for appropriate chronic-condition management and regular monitoring and entered into the practice's children and youth with special health care needs registry.[41] Every primary care practice should create a registry for the children in the practice who have special health care needs.

The medical home provides a triad of key primary care services including preventive care, acute illness management, and chronic-condition management. A program of chronic-condition management provides proactive care for children and youth with special health care needs, including condition-related office visits, written care plans, explicit comanagement with specialists, appropriate patient education, and effective information systems for monitoring and tracking.

Management plans should be based on a comprehensive needs assessment conducted with the family. Management plans should include relevant, measurable, and valid outcomes. These plans must be reviewed on a regular basis and updated as necessary. The child health professional should actively participate in all care-coordination activities for children who have complex health conditions in addition to developmental problems. Decisions regarding appropriate therapies and their scope and intensity should be determined in consultation with the child's family, therapists, and educators (including early intervention or school-based programs) and should be based on knowledge of the scientific evidence for their use.

Children with established developmental disorders often benefit from referral to community-based family support services such as respite care, parent-to-parent programs, and advocacy organizations. Some children may qualify for additional benefits such as supplemental security income, public insurance, waiver programs, and state programs for children and youth with special health care needs (Title V). Parent organizations, such as Family Voices, and condition-specific associations can provide parents with information and support and can also provide an opportunity for advocacy.

IMPLEMENTING THE ALGORITHM

Choosing Developmental Screening Tools

Although all developmental screening tools are designed to identify children with potentially delayed development, each one approaches the task in a different way. There is no universally accepted screening tool appropriate for all populations and all ages. Currently available screening tools vary from broad general developmental screening tools to others that focus on specific areas of development, such as motor or communication skills. Their psychometric properties vary widely in characteristics such as their standardization, the comparison group used for determining sensitivity and specificity, and population risk status.

Broad screening tools should address developmental domains including fine and gross motor skills, language and communication, problem solving/adaptive behavior, and personal-social skills. Screening tools also must be culturally and linguistically sensitive. Many screening tools are available, and the choice of which tool to use depends on the population being screened, the types of problems being screened for in that population, administration and scoring time, any administration training time, the cost of the tool, and the possibilities for adequate payment.

Screening tests should be both reliable and valid, with good sensitivity and specificity.

- Reliability is the ability of a measure to produce consistent results.
- The validity of a developmental screening test relates to its ability to discriminate between a child at a determined level of risk for delay (ie, high, moderate) and the rest of the population (low risk).

- Sensitivity is the accuracy of the test in identifying delayed development.
- Specificity is the accuracy of the test in identifying individuals who are not delayed.

If a test incorrectly identifies a child as delayed, it will result in overreferrals. If a test incorrectly identifies a child as normal, it results in underreferrals. For developmental screening tests, scoring systems must be developed that minimize underreferrals and overreferrals. Trade-offs between sensitivity and specificity occur when devising these scoring systems. Sensitivity and specificity levels of 70% to 80% have been deemed acceptable for developmental screening tests.[42] These values are lower than generally accepted for medical screening tests because of the challenges inherent in measuring child development and the absence of specific curative and clearly effective treatments. However, combining developmental surveillance and periodic screening increases the opportunity for identification of undetected delays in early development. Overidentification of children using standardized screening tools may indicate that this group of children includes some with below-average development and/or significant psychosocial risk factors.[43] These children may benefit from other community programs as well as closer monitoring of their development by their families, pediatric health professionals, and teachers or caregivers.

Table 1 provides a list of developmental screening tools and their psychometric testing properties. These screening tools vary widely in their psychometric properties. This list is not exhaustive; other standardized, published tools are available. We look forward to further evaluation/validation of available screening instruments as well as the continued development of new tools with stronger properties. Child health professionals are encouraged to familiarize themselves with a variety of screening tools and choose those that best fit their populations, practice needs, and skill level.

Incorporating Surveillance and Screening in the Medical Home

A quality-improvement approach may be the most effective means of building surveillance and screening elements into the process of care in a pediatric office.[44] Improving developmental screening and surveillance should be regarded as a "whole-office" endeavor and not simply a matter of clinician continuing education or the addition of tasks to well-child visits. Front-desk procedures, such as appropriate scheduling for screening visits and procedures for flagging children with established risk factors, need to be explicitly designed by the office staff. Nonphysician staff may need training in the administration of developmental screening tools. The input of consumers is crucial to developing an effective system and can be accomplished by adding a parent to an office planning team, by using parent focus groups, or by administering parent questionnaires. Specific to developmental screening could be consumer opinion about preferences for completing questionnaires in the office or before the visit, how they would like to be informed about the results of screening, how parents of children with identified conditions associated with developmental delay would like to have their children's development monitored, or feedback on parental satisfaction with their child's developmental screening or feedback on the referral process.

Screening Payment

Separate *Current Procedural Terminology* (CPT)[45] codes (see Table 2) exist for developmental screening (96110: developmental testing; limited) and testing (96111: developmental testing; extended). The relative values for these codes are published in the Medicare Resource-Based Relative Value Scale and reflect physician work, practice expenses, and professional liability expenses. Table 2 outlines the appropriate codes to use when billing for the processes described in the algorithm. Health plans are encouraged to adhere to CPT guidelines and provide coverage and payment for developmental screening and testing.

Billing processes related to developmental screening and surveillance should be carefully reviewed to ensure that appropriate CPT codes are used to document screening procedures and ensure proper payment. CPT code 96110 for limited developmental testing does not include any payment for medical provider services. The expectation is that a nonphysician will administer the screening tool to the parent and then score their responses. The physician reviews and interprets the screening results; the physician's work is included in the evaluation and management code used for the child's visit. Medicaid may not pay separately for developmental screening when provided as part of early and periodic screening, diagnostic, and treatment services. If non-Medicaid carriers are involved, the preventive care code is used with the modifier 25 appended and 96110 listed for each screening tool administered. The CPT code 96111, extended developmental testing, includes medical provider work. This code would more appropriately be used when the medical provider observes the child performing a task and demonstrating a specific developmental skill.

The codes in Table 2 may be applicable to the phases of developmental surveillance, screening, and evaluation described in the proposed algorithm (Fig 1).

SUMMARY

Developmental surveillance should be a component of every preventive care visit. Standardized developmental screening tools should be used when such surveillance

TABLE 2 **CPT Codes for Developmental Screening**

Services/Step in Algorithm	Notes	CPT Code	Comments
Pediatric preventive care visit	All preventive care visits should include developmental surveillance; screening is performed as needed or at periodic intervals	99381–99394 (EPSDT[a])	
Developmental screening	The expectation is that the screening tool will be completed by a parent or nonphysician staff member and reviewed by the physician	96110	Limited developmental testing, with interpretation and report
Developmental/medical evaluation	If performed by the physician as an outpatient office visit	99210–99215[b] or 96110; or 96111 if objective developmental testing is performed	99214 is used for evaluations performed by the physician that are detailed and moderately complex or take at least 25 min
	Outpatient consultation; typically performed by a tertiary, local out-of-office referral source or another physician with the requisite skills in the same practice as the referring physician; the request for consultation must be recorded in the patient's chart; services/procedures and consulting physician's impressions must be recorded; time spent counseling and coordinating care should be specifically documented; these codes include "reporting" of the consulting physician, if completed by letter or office notes	99241–99245	(with over half spent counseling); 99215 is used for evaluations that are comprehensive and highly complex or take >40 min (with over half spent counseling) 99244 is used for "moderate activities" of up to 60 min; 99245 is used for "high" activity of up to 80 min
	If a more extensive report is developed, this code is used; these costs may not be reimbursable	99080	
Developmental disorder identified	For follow-up visits with the patient and parents to complete the consultation or to discuss the results of the initial consultation; for rendering opinions and addressing questions, not assuming care; once care is assumed, established office-visit coding is used	99241–99245	
Identify as a child with special health care needs, and initiate chronic-condition management	Children with special health care needs are likely to require expanded time and a higher level of medical decision-making found in these "higher-level" outpatient codes; these codes are appropriate for services in the office and for outpatient facility services for established patients; these codes may be reported using time alone as the factor if more than half of the reported time is spent in counseling	99211–99215	99213; 99214; 99215 (see above)
Prolonged services	At any point during the algorithm when outpatient office or consultation codes are used, prolonged physician service codes may be reported in addition when visits require considerably more time than typical for the base code alone; both face-to-face and non–face-to-face codes are available in CPT	99354	99354 for first 30–74 min of outpatient face-to-face prolonged services
		99355	99355 for each additional 30 min
		99358	99358 for first 30–74 min of non–face-to-face prolonged services
		99359	99359 for each additional 30 min
Extended developmental testing/evaluation	Used for extended developmental testing typically provided by the medical provider (often up to 1 h) including the evaluation interpretation and report	96111	Reported in addition to evaluation and management (E/M) services provided on the same date

[a] EPSDT (Early and Periodic Screening, Diagnosis, and Treatment) is the federal Medicaid program for preventive services. States may require physicians to use different codes to report these services. In general, for non-Medicaid commercial insurers, the evaluation and management CPT codes for preventive medicine services (99381-99394) are used for the basic service (history, physical examination, and counseling/anticipatory guidance), with separate CPT codes reported additionally for the additional screening of hearing, vision, development, laboratory services, and immunization administration.

[b] CPT evaluation and management code levels are selected on the basis of the amount of physician work (history, physical examination, and medical decision-making) and/or time used in the encounter.

identifies concerns about a child's development and for children who appear to be at low risk of a developmental disorder at the 9-, 18-, and 30-month* visits.

When a child has a positive screening result for a developmental problem, developmental and medical evaluations to identify the specific developmental disorders and related medical problems are warranted. In addition, children who have positive screening results for developmental problems should be referred to early developmental intervention and early childhood services and scheduled for earlier return visits to increase developmental surveillance.

Children diagnosed with developmental disorders should be identified as children with special health care needs; chronic-condition management for these children should be initiated.

RECOMMENDATIONS

For the Medical Home

1. Perform developmental surveillance at every preventive visit throughout childhood, and ensure that such surveillance includes eliciting and attending to parents' concerns, obtaining a developmental history, making accurate and informed observations of the child, identifying the presence of risk and protective factors, and documenting the process and findings.
2. Administer a standardized developmental screening tool for children who appear to be at low risk of a developmental disorder at the 9-, 18-, and or 30-month* visits and for those whose surveillance yields concerns about delayed or disordered development.
3. Schedule early return visits for children whose surveillance raises concerns that are not confirmed by a developmental screening tool.
4. Refer children about whom developmental concerns are raised to early intervention and early-childhood programs.
5. Coordinate developmental and medical evaluations for children who have positive screening results for developmental disorders.
6. Initiate a program of chronic-condition management for any child identified with a developmental disorder.
7. Document all surveillance, screening, evaluation, and referral activities in the child's health chart.
8. Establish working relationships with state and local programs, services, and resources.
9. Use a quality-improvement model to integrate surveillance and screening into office procedures and to monitor their effectiveness and outcomes.

For Policy and Advocacy

10. Provide appropriate payment for developmental surveillance, screening, and evaluation.
11. Teach child health professionals, through training and continuing education programs, to conduct developmental surveillance and screening as an integral responsibility of the medical home.

For Research and Development

12. Develop information systems and data-gathering tools to automate the algorithm recommended by this policy statement for ease and consistency of use.
13. Expand the evidence base for the effectiveness of developmental surveillance activities.
14. Improve the effectiveness of developmental screening tools in the identification of children with developmental disorders in the medical home.
15. Expand the evidence base for the use and effectiveness of the proposed algorithm, including the optimal timing of the recommended developmental screening.

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ASQ and PEDS Comparison Chart

ASQ	**PEDS**
4 months to 5 years	Birth to 9 years
Parent completes, but may need assistance as well as manipulatives such as crayons and blocks	Parent completes
Number of questions varies by age	The same 10 questions used at all ages
10 to 15 minutes to complete, 1 to 2 minutes to score	5 minutes to complete, 1 to 2 minutes to score
Pass/fail	Pass/fail
Available in several languages	Available in several languages
Cost is one-time $200 fee and then all materials can be copies	Cost is about $1.10 per visit, and materials cannot be copied
There is an online program for parents to use to complete and submit questionnaires prior to the visit. Materials include activities for parents to use to promote development.	Materials include a composite scoring sheet that can be maintained in the medical recrd fir easy reference of developmental status over time.

Birth to Five: Watch Me Thrive!

Birth to 5: Watch Me Thrive! is a coordinated federal effort to encourage healthy child development, universal developmental and behavioral screening for children, and support for the families and
providers who care for them.

Birth to 5: Watch Me Thrive! will help families and providers:

- Celebrate milestones. Every family looks forward to seeing a child's first smile, first step, and first words. Regular screenings help raise awareness of a child's development, making it easier to expect and celebrate developmental milestones.
- Promote universal screening. Just like hearing and vision screenings assure that children can hear and see clearly, developmental and behavioral screenings track a child's progress in areas such as language, social, or motor development.
- Identify possible delays and concerns early. With regular screenings, families, teachers, and other professionals can assure that young children get the services and supports they need, as early as possible to help them thrive alongside their peers.
- Enhance developmental supports. Combining the love and knowledge families have of their children with tools, guidance, and tips recommended by experts can make the most of the developmental support children receive.

The Importance of Developmental and Behavioral Screening

As many as one in four children through the age of five are at risk for a developmental delay or disability. Early identification allows communities to intervene earlier, leading to more effective and cheaper treatment during the preschool years, rather than expensive special education services in later childhood.

This initiative draws heavily on previous developmental and behavioral screening efforts by consolidating materials from a wide array of federal agencies and their non-federal partners. As part of this initiative, we have published a list of research-based developmental screening tools appropriate for use across a wide range of settings. Select your appropriate audience from the list below to view a tailored guide for use with the compendium that addresses the importance of developmental and behavioral screening, how to talk to parents, where to go for help, and how to select the most appropriate screening tool for the population served as well as the provider implementing the screening.

www.acf.hhs.gov/programs/ecd/watch-me-thrive

Compendium of Screening Measures for Young Children