



Submitted on: 08/04/2018  
Approved on: 08/23/2018

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## The pediatrician and the promotion of child development: optimizing the assessment

Clarissa Noer<sup>1</sup>, Ricardo Halpern<sup>1</sup>

### Keywords:

Child Development,  
Developmental  
Disabilities,  
Infant Development,  
Early Intervention,  
Neurodevelopmental  
Disorders

### Abstract

This article aims to address the evaluation of child development in the pediatric office. About 15-20% of the pediatric population will present some challenge regarding neurodevelopment. If intervention is instituted before entering kindergarten, many problems can be prevented and the vast majority is lessened. It is necessary for the pediatrician to appropriate the new paradigms in the field of child development and through evidence-based knowledge deconstruct myths and provide his patient with a current and effective approach. We present in this article a review of how the pediatrician can think of child development in order to include it in their continuous and critical observation in routine health and illness consultations, thus avoiding the loss of opportunities for intervention. Consultation optimization strategies and instruments of surveillance, screening and evaluation will be presented, which may be useful tools for the pediatrician to objectively evaluate and quantify, even when applied to a busy routine of the pediatric office.

<sup>1</sup> Universidade Federal Ciências Saúde Porto Alegre, Programa de Pós-Graduação em Pediatria, Porto Alegre, Rio Grande do Sul, Brazil.

### Correspondence to:

Clarissa Noer

Universidade Federal de Ciências da Saúde de Porto Alegre. R. Sarmento Leite, 245 - Centro Histórico, Porto Alegre - RS, Brazil. CEP:90050-170

E-mail: clarissanoer@hotmail.com / clarissanoer@gmail.com

## INTRODUCTION

Child development can be defined as a multidimensional and integrated process that begins with conception and encompasses physical growth; neurological maturation; behavioral, sensory, cognitive, and linguistic development; and socio-affective relationship development that teach the child to respond to their needs and the environment.<sup>1</sup> Studies estimate a prevalence of 16%–20% of developmental disorders in the pediatric population. These conditions were named a new morbidity in the 1970s, but are still considered by WHO as morbidities of the millennium.<sup>2-4</sup> Despite this knowledge, it is estimated that 43% of children aged < 5 years in developing countries are at risk of not reaching their full potential.<sup>5</sup>

The first years of life are particularly important for the individual: these are critical and sensitive periods of development because of the intense neurobiological activity that manifests through processes such as neurogenesis, apoptosis, synaptic pruning, myelination, and gliogenesis.<sup>6,7</sup> The exuberance of these phenomena, which are responsible for building the foundation of brain circuitry, is what makes this period more pliable for interventions, with a greater probability of success in reshaping some symptoms and trends involving deviations from typical development imposed by genetic and/or environmental changes.<sup>8,9</sup> As the individual grows, neuroplasticity is maintained but to a lesser degree, which requires greater efforts to achieve an expected outcome.<sup>10</sup>

The first doctor who sees the child is the pediatrician, who has the opportunity and ability to follow patients and their families longitudinally, which places him or her in a strategic position for early detection of developmental delays.<sup>11</sup> For pediatricians to be competent in the early detection of irregularities, they must have knowledge of typical child development, which serves as a basis for comparison with alterations and related diseases. This knowledge is so important that the guidance offered by the pediatrician to the child and family at the first signs of developmental delay may be responsible for the patient's prognosis.<sup>12,13</sup> As a result, the pediatrician needs to monitor development in childhood because early intervention for children with developmental delays will make a significant difference in their quality of life. Studies assessing adult status of participants with developmental delays, such as the randomized clinical trials HighScope Perry<sup>2</sup> and Abecedarian<sup>3</sup>, found the following: early intervention leads to better literacy skills, which persist into secondary school, higher graduation rates, lower risk of adult unemployment, and lower rates of criminal conviction.<sup>14</sup>

Currently, despite robust scientific evidence, diagnosis and intervention in developmental irregularities occur later than recommended, frequently at school age.<sup>4</sup> This reality represents a great challenge, namely to translate lessons from studies in clinical contexts and involving public health, where professionals are expected to identify a small proportion of

children with undetected delays that could benefit from intervention. Some perceived difficulties where these rates can be improved are insufficient learning about child development during medical school and residence, little time during consultations to evaluate development, lack of technical knowledge in the subject, and non-reimbursement of testing by health insurance plans.<sup>2,15-17</sup>

The goal of this article is to provide pediatricians with a review on how to approach child development in daily practice.

### 1. Time and myths of child development:

Child development is surrounded by myths and beliefs that need to be reevaluated. There is the need to break paradigms so that the pediatrician can examine the patient in a technical and responsible manner.

#### *“Every child has his/her time”*

This phrase is often heard as a response to parental concerns about any aspect of their child's development. It should be strongly discouraged and replaced with an objective assessment of the complaint: for this, it is necessary to know the point prevalence of development as well as the standards that govern and influence the attainment of milestones. Identification of the point prevalence is made by comparing the patient with a normative sample of children of the same age. For this reason, it is desirable to use standardized instruments to evaluate the skills that 90 out of 100 children in the age range in question have ( $\pm 2$  standard deviations, at the cut-off point).<sup>18,19</sup>

#### *“Wait and see” or “let's give it some time”*

Another paradigm that needs to be broken is the notion that once a delay is detected, time can resolve the issue without harm to the patient. Only a small percentage of patients recover from delays without any intervention; in the case of speech delays, for example, 15% of children at 2 years of age will be diagnosed as late talkers.<sup>20</sup> Intervention therefore must begin when the delay is detected, regardless of diagnosis. In this way, therapy has a better outcome and there is less likelihood of damage.<sup>7,23</sup>

### 2. Early Intervention

Early intervention describes services to benefit child development from birth to 3 years of age, preferably for children at risk of developmental issues or who have disabilities, and to support the adaptation of their families. Early stimulation can be accomplished through monitoring and therapeutic intervention, sometimes using multiple disciplines, for high-risk infants and small children affected by organic diseases. The goal is to achieve the best possible development by mitigating consequences of neuropsychomotor development as well as effects on language acquisition, socialization, and subjective structuring. This may even help structure the bond between the mother and child and in family understanding and

acceptance of these children.<sup>1</sup> Children involved in early intervention programs are more likely to live independently, finish formal education, and incur lower costs on society.<sup>14</sup> Early intervention services should be individualized and focused on the family through the formulation of an individualized therapy plan by the intervention team; in the Brazilian National Health System, this plan is called the “Plano Terapêutico Singular” (PTS; Single therapy plan).<sup>23</sup>

PTS is developed in four stages:

- **Diagnosis:** This stage should include a clinical, psychological, and social evaluation. The “individual” should be assessed with regard to factors such as illness, desires, and interests, as well as work, culture, and family, i.e., professionals should try to understand what the subject does and everything that made him do it.
- **Goal setting:** Once the team has made the diagnoses, proposals are made for short, medium, and long term, which will be discussed with the patient by the staff member who has the strongest bond with the child.
- **Division of responsibilities:** It is important to clearly define each party’s tasks.
- **Reassessment:** In this stage, progress is discussed, and any necessary corrections are made.
- **Studies show that pediatricians tend to appropriately refer children with established diagnoses for EI, but they tend to not refer children with speech or language delays or inappropriate behavior reported by parents.**<sup>24,25</sup>

Pediatric services relevant to children and families in Early Intervention Acquire knowledge of the criteria for referral to early intervention

### 3. Methods for monitoring

Monitoring is an ongoing, flexible, and permanent process: it is part of a longitudinal follow-up and should be included in all health visits to allow the early identification of problems and interventions to prevent them.

This process consists of four steps:

1. Understand and identify risk factors and protective factors for development (biological and environmental).<sup>26</sup>
2. Seek out and value parental concerns; in most cases, parents’ complaints reveal an adequate perception of their child’s development.<sup>12</sup>
3. Monitor milestones with a periodic follow-up. Document and keep a record of development and behavior.
4. Promote development through counseling on healthy emotional development, parenting style, and resilience.

There are three types of monitoring:

1. Normative monitoring accompanies children in routine consultations.
2. Monitoring of children who have risk factors of developmental issues.
3. Monitoring of cases with established diagnoses to maximize capacities and identify difficulties.

### Unstructured monitoring

Here it is important to establish the concept of “therapeutic alliance” developed by Winnicott, which involves the bond with the family, ideally starting in the prenatal period. The pediatrician is an important promotor of mental health because of his or her opportunity to observe the interaction between the mother and baby, father’s role, support network, and mood alterations in the postpartum period, which is a sensitive time for forming bonds.<sup>27</sup>

During anamnesis and physical examination, take the opportunity to assess issues related to development and behavior; these opportunities provide precious semiological elements that can be obtained by observing how the child plays and behaves in the waiting room and office, and the relationship between the family members. It is recommended to have objects for manipulation, such as a table with paper and pens for drawing, cubes, toys, and books. Unstructured play (not guided by an adult) is a fundamental aspect of the physical, cognitive, social, and emotional process in childhood, and the pediatrician can guide parents in this process.<sup>4</sup> Free or directed drawing is also useful. Currently, with the advent of smartphones, parents can show the pediatrician footage of the child in their daily context. Through videos, the pediatrician should look for semiological data on how the child functions: fixing the gaze, shared attention, abnormal global movements, and atypical behavior should be investigated. This feature is particularly important for observation of more subtle characteristics of the autism spectrum disorder. The web page [www.autismnavigator.com](http://www.autismnavigator.com) offers a database of videos showing children with typical and atypical development side by side.

### 6. Structured monitoring:

Structured monitoring uses a standardized instrument. In Brazil, we have a monitoring algorithm that appears in the child health handbook provided by the Ministry of Health, which can be filled out by parents and pediatricians to guide development monitoring according to the main milestones. It has shown good sensitivity as a monitoring method.<sup>28</sup> In this handbook, parents also find suggestions for age-appropriate stimulation, which positions them as involved participants in the monitoring and promotion of development, thereby improving the rates of delay detection.

Another evaluation protocol with warning indicators for early detection of psychiatric and development problems in young children is the Risk Indicators for Child Development (IRDI), which includes validated markers for detecting

development problems and can be an instrument used in the interview.<sup>29</sup>

A promising instrument that was developed with an emphasis on primary care is the Global Monitoring Child Development (GMCD). This was created in a multinational initiative to provide a universal instrument for monitoring and promoting development. It was constructed based on the ecological and transactional models of development, centered on the family, relationships, and capacities, as well as on internationally recognized models for development approaches; namely, New Visions for Development, Bright Future Guidelines, and WHO-ICF. The GMCD is easy to apply, through a brief interview with open, pre-coded questions.<sup>30</sup>

## 7. Screening

A variety of evidence shows that, with clinical assessment alone, only 30% of behavior and development problems in children who pass through the pediatrician's office will be detected.<sup>39</sup> For this reason, the use of screening instruments to assist in assessment is encouraged (Table 1).

Unlike monitoring, screening uses an instrument that allows a cross-section assessment of development and serves to identify and target children who should receive diagnostic investigation or early intervention. A screening instrument should have psychometric features defined by a cut-off point, and statistical properties such as sensitivity, specificity, and positive predictive value to select the children who are more likely to have a problem.<sup>18</sup> Diagnosis, if necessary, is finalized later, ideally in a multidisciplinary evaluation.

### How to choose a screening instrument?

It is important to know the existing screening instruments and to consider the following points when choosing one:

1. Validation (currently, few instruments have been translated and validated for Brazil; therefore, it is important to consider that there may be some cultural differences; for example, in the Denver II assessment, one of the questions asks whether the child prepares his/her own cereal, which may not be culturally appropriate.)
2. Age covered by the instrument.
3. Time of application (this is an important question because the majority of pediatricians have limited time to

**Table 1.** Pediatric services in Early Intervention (Committee on Children with Disabilities, 1999)

Provide monitoring, screening, and diagnosis
Make referrals
Participate in assessments
Provide advice and counseling to parents
Help create individualized therapeutic plan
Auxiliar na criação do plano terapêutico individualizado

Fonte: Committee on Children with Disabilities, 1999.

address all aspects that require a pediatric consultation. The shorter tests tend to take 10 min of consultation time, but because many are questionnaires, they can be given to parents to fill out in the waiting room, which optimizes time use.

4. Cost (most tests must be purchased, but some are in the public domain, such as the M CHAT and the PSC, SNAP IV, GMCD, and CSC.)
5. Training (it is important to know that some tests require specific training, whereas others require less complex training.)

The characteristics of the main screening instruments are described in Table 2. The most commonly recommended instruments for global screening by the AAP are the Parents' Evaluation of Developmental Status and Ages and Stages Questionnaire (ASQ). In Brazil, the most widely used test is still the Denver II, which despite some limitations is comprehensive, has reasonable predictive value, and has been a feasible option for clinical use in the pediatric practice when combined with anamnesis.

### When do you apply a screening instrument?

The AAP recommendations (from 2006) are shown in below. In addition to this information, a screening instrument should be applied whenever monitoring indicates a delay or a risk factor (Table 3).

## 8. Development Assessment

Development is assessed for diagnostic purposes to guide the therapeutic approach. It includes assessment scores for the child's skills and should be applied in patients who already have shown warning signs, children with positive screening, or children referred with suspected atypical development by other health or education professionals (Table 4).

Because it is a more detailed evaluation, the development assessment requires more time and expertise on the part of the pediatrician. Screening tools such as PEDs, ASQ, and Batelle can be used, but there is also a complete evaluation modality. For ASD, there are diagnostic instruments such as ADOS and ADI-R.

The search for a developmental diagnosis must be considered with the support of a multidisciplinary team (psychologists, occupational therapists, speech pathologists, psychiatrists and neuropsychiatrists, educators, and school staff) in conjunction with the family, which is always attempting to achieve a broad, individual-focused qualified view.

In some developed countries, testing is paid for by health plans, which have greatly improved the rates of screening, evaluation, and early detection of neurodevelopmental disorders in these countries.

It is important to bear in mind that development assessment tools measure a "sample" of behavior at a particular moment in time and that poor patient cooperation and motivation can affect performance. The tests are limited to what

**Table 2.** Recommendations for screening. AAP, 2006

Screening	age	observations
Post-partum mood disorder	After birth	During the first year
Global development	9 months	motor area and early social adaptation
	18 months	language and social interaction, important time for signs of autism spectrum disorder
	30 months	expressive and comprehensive language
Autism spectrum disorder	18–24 months	M-CHAT28 é recomendado pela AAP para uso no consultório.
Aptness for kindergarten	4 years	
Mental health and psycho-social function	> 5 years, at each visit	
Substance abuse	at each visit in adolescence	

**Table 3.** Instruments to assess child development

Instrument	characteristic	Age at application	Advantages	Duration	Disadvantages
Denver II	administered directly. Tests the four areas of development	0–6 years	Portuguese; - widely used in Brazil despite no specific validation	15–40 min	Requires training <a href="http://www.denverii.com">www.denverii.com</a>
Parents' Evaluation of Developmental Status (PEDS)	Parent questionnaire addressing development and behavior	0–8 years	Quick. does not require participation of child. Accurate and efficient	10 min	English <a href="http://pedstest.com">http://pedstest.com</a> Testing available online
Ages and Stages Questionnaires (ASQ)	Questionnaire can also be administered through direct observation of skills	4 months to 6 years	Evaluates psychometric features	10–15 min	English and Spanish <a href="http://www.brookespublis-hing.com">http://www.brookespublis-hing.com</a>
Pediatric Symptom Checklist (PSC)	Questionnaire used for behavioral and psychosocial screening	4–18 years	validated for o Portuguese. Does not require child's participation. Suggested by the AAP.	10–20 min	<a href="http://www.massgeneral.org/psychiatry/services/psc/scoring.aspx">http://www.massgeneral.org/psychiatry/services/psc/scoring.aspx</a>
Bayley Infant Neuro-development Screener (BINS)	6–24 months	Administered directly to the child		10 min	English and Spanish <a href="http://www.harcourtassessment-tent.com">www.harcourtassessment-tent.com</a>
Battelle Developmental Inventory Screening Tool (BDIST)	Administered directly: motor, language, cognitive, and personal social screening	newborn till 95 months	High sensitivity and specificity	15 min in < 3 years and 20–30 min in older children	Requires lengthy training <a href="http://www.riverpub.com">www.riverpub.com</a>

**Table 4.** Specific instruments for screening

Autism Spectrum Disorder (ASD)	M CHAT	16–30 min	Validated for Portuguese. Child's participation not required. Recommended by the AAP. Quick questionnaire. Instruments for diagnosing ASD. In the process of validation for use in Brazil.
	CARS	> 24 months	
	ADOS and ADI-R		
Speech and Language	-CSBS DP	6–24 months questionnaire for parents.	English <a href="http://www.brookespublishing.com/csbsdp">www.brookespublishing.com/csbsdp</a> .
ADHD	SNAP IV		Validated for Portuguese. Free. <a href="http://www.tdah.org.br/images/stories/sit_e/pdf/snap-iv.pdf">http://www.tdah.org.br/images/stories/sit_e/pdf/snap-iv.pdf</a>
Postpartum Depression	Beck Depression Inventory II		English and Spanish
	EDINBURGH		English and Spanish/Public domain

they were designed to measure; no test captures all aspects of a child's function.

As shown, the pediatrician's knowledge on prevention and early identification of developmental warning signs is a fundamental competence for today's professionals. Fortunately, with the arrival of the digital era and advancements in knowledge sharing, many resources can be accessed on websites promoting knowledge and training on child development.<sup>31</sup> This table lists some websites that may be useful to pediatricians (Table 5).

## CONCLUSION

Contemporary medicine, as it follows evolution in pediatrics and society, requires physicians to use multiple interfaces that influence child development more intensely. Only in this way can an active practice be achieved in health promotion and prevention of the "new morbidity," especially in early childhood, a sensitive period in which neuroscience has documented the profound influence that experiences have on the developing brain. The intense neuroplasticity during this period permits early intervention with the aid of the family, therapies, and school to enhance the child's quality of life and performance.

The pediatrician is in a strategic position and plays a critical role. Because this professional has a bond of trust with the family, he or she is expected to recognize early signs of psychological suffering and developmental delays, provide the necessary interventions and referrals, and finally coordinate the multiple health measures that the child requires, working to ensure they take place with the family's consent and active participation. Knowledge and application of algorithms to assess development helps to identify these disorders more accurately and as early as possible; the optimization of the child's potential and the promotion of his/her effective and autonomous participation in society largely depends on this.

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**Table 5.** Web sites for pediatricians with resources to promote development and behavior

Bright Futures - AAP	<a href="http://www.brightfutures.aap.org">www.brightfutures.aap.org</a>	Provides early guidance to families, pamphlets, and videos from birth to 16 years. (English)
Healthy Steps	<a href="http://www.healthysteps.org">www.healthysteps.org</a>	Teaches how to optimize consultation with brief moments of intervention to promote development.
At Health	<a href="http://www.athealth.com">www.athealth.com</a>	Information for professionals and includes downloadable handouts
First Signs	<a href="http://www.firstsigns.org">www.firstsigns.org</a>	Provides guidelines for parents and professionals as well as videos showing side-by-side comparison of typical and atypical development (ASD).
Early Brain and Child Development	<a href="http://www.developingchild.harvard.edu">www.developingchild.harvard.edu</a>	Explains transactional models of learning and development, guidelines for promoting resilience
American academy of child and adolescent psychiatry	<a href="http://www.aacap.org">www.aacap.org</a>	Downloadable pamphlets for families on divorce, sleep problems, and specific diagnoses; available in multiple languages
Autism Navigator	<a href="http://autismnavigator.com">autismnavigator.com</a>	Features a database of videos that show side-by-side comparisons of children with typical and atypical development
Ambulatório de desenvolvimento Hospital da Criança Santo Antônio	<a href="http://ambulatoriodedesenvolvimento.com">ambulatoriodedesenvolvimento.com</a>	Presents scientific articles, schedule of courses, and material in Portuguese about child development and behavior

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