

JoVE: Science Education
Newborn Infant Developmental Milestones
--Manuscript Draft--

Manuscript Number:	10145
Full Title:	Newborn Infant Developmental Milestones
Article Type:	Manuscript
Section/Category:	Manuscript Submission
Corresponding Author:	Elizabeth G. Doherty UNITED STATES
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	
Corresponding Author's Secondary Institution:	
First Author:	Elizabeth G. Doherty
First Author Secondary Information:	
Order of Authors:	Elizabeth G. Doherty
	Aimee Knorr
Order of Authors Secondary Information:	

	Social and Emotional	Language/Communication	Cognitive	Movement and Physical Development
2 months	<ul style="list-style-type: none"> ◆ Begins to smile at people ◆ Able to calm themselves briefly (may bring hands to mouth and suck on hand) ◆ Attempts to look at parent/caregiver 	<ul style="list-style-type: none"> ◆ Coos, makes gurgling sounds ◆ Turns head toward sound 	<ul style="list-style-type: none"> ◆ Pays attention to faces ◆ Begins to follow things with eyes and recognize people at a distance ◆ Begins to cry/fuss if activity does not change 	<ul style="list-style-type: none"> ◆ Able to hold head up and begins to push up when lying on tummy ◆ Makes smoother movements with arms and legs
4 months	<ul style="list-style-type: none"> ◆ Smiles spontaneously ◆ Likes to play with people and may cry when playing stops ◆ Copies some movements and facial expressions, ex. Smiling or frowning 	<ul style="list-style-type: none"> ◆ Starts to babble ◆ Babbles with expressions and copies sounds that they hear ◆ Has a different cry for hunger, pain, or tiredness 	<ul style="list-style-type: none"> ◆ Lets you know if they are happy or sad ◆ Responds to affection ◆ Reaches for toy with one hand ◆ Uses hands and eyes together, ex. seeing a toy and reaching for it ◆ Follows moving things with eyes from side to side (tracks) ◆ Watches faces closely ◆ Recognizes familiar people and things at a distance 	<ul style="list-style-type: none"> ◆ Holds head steady, unsupported ◆ Pushes down on legs when feet are on a hard surface ◆ May be able to roll from prone to supine ◆ Can hold a toy and shake it and swing at dangling toys ◆ Brings hands to mouth ◆ When lying on stomach, pushes up on elbows
6 months	<ul style="list-style-type: none"> ◆ Knows familiar faces and begins to know if someone is a stranger ◆ Likes to play with others, especially parents ◆ Responds to other people's emotions and often seems happy ◆ Likes to look at self in a mirror 	<ul style="list-style-type: none"> ◆ Responds to sounds by making sounds ◆ Strings vowels together when babbling ("ah", "eh", "oh") and likes taking turns with parent making sounds ◆ Responds to own name ◆ Makes sounds that show joy and displeasure ◆ Begins to say consonant sounds (jabbering with "m", "b") 	<ul style="list-style-type: none"> ◆ Looks around at things nearby ◆ Brings things to mouth ◆ Shows curiosity about things and tries to get things that are now within reach ◆ Transfers objects from one hand to another 	<ul style="list-style-type: none"> ◆ Rolls over in both directions ◆ Begins to sit with support ◆ When standing, supports weight on legs and might bounce ◆ Rocks back and forth, sometimes crawling backward before moving forward
9 months	<ul style="list-style-type: none"> ◆ May be afraid of strangers ◆ May be clingy with familiar adults ◆ Has favorite toys 	<ul style="list-style-type: none"> ◆ Understands "no" ◆ Makes a lot of different sounds like "mamamama" and "babababa" ◆ Copies sounds and gestures of others ◆ Uses finger to point at things 	<ul style="list-style-type: none"> ◆ Watches the path of something as it falls ◆ Looks for things they see hidden ◆ Plays peek-a-boo ◆ Puts things in mouth ◆ Moves things smoothly from one to another ◆ Picks up things like cereal between thumb and index finger 	<ul style="list-style-type: none"> ◆ Stands, holding on ◆ Can get into sitting position ◆ Sits without support ◆ Pulls to a stand ◆ Crawls
12 months	<ul style="list-style-type: none"> ◆ Is shy or nervous with strangers ◆ Cries when mom or dad leaves ◆ Has favorite things and people ◆ Shows fear in some situations ◆ Hands you a book when they want to hear a story ◆ Repeats sounds or actions to get attention ◆ Puts out arm or leg to help with dressing ◆ Plays games such as "peek-a-boo" and "pat-a-cake" 	<ul style="list-style-type: none"> ◆ Responds to simple spoken requests ◆ Use simple gestures, like shaking head "no" or waving "bye-bye" ◆ Says "mama" and "dada" and exclamations like "uh-oh" ◆ Tries to say words you say 	<ul style="list-style-type: none"> ◆ Explores things in different way, ex. Shaking, banging, and throwing ◆ Finds hidden things easily ◆ Look right at the picture or thing when it's named ◆ Copies gestures ◆ Starts to use things correctly, ex. drinks from a cup, brushes hair ◆ Bangs two things together ◆ Puts things into a container and takes them out ◆ Lets things go without help ◆ Pokes with index finger ◆ Follow simple directions, ex. "pick up the toy" 	<ul style="list-style-type: none"> ◆ Gets to a sitting position without help ◆ Pulls up to stand, walks holding on to furniture ("cruising") ◆ May take a few steps without holding on ◆ May stand alone

Authors: Elizabeth G. Doherty, MD, and Aimee C. Knorr, MD, (Department of Newborn Medicine, Boston Children’s Hospital, and Winchester Hospital)

Clinical Skills Education Title: Newborn Infant Developmental Milestones

Overview

Approximately 1 in 6 children, aged 3 to 17-years-old, has 1 or more developmental disabilities. Examples of developmental disabilities are: hearing loss, impaired vision, developmental delays, intellectual disabilities, and cerebral palsy. Children born premature, small for gestational age, and multiples are all at an increased risk for developmental disabilities. Others at risk are children with genetic conditions, congenital infections, untreated jaundice, and fetal alcohol exposure.

Rolling, sitting unsupported, smiling, and waving “bye-bye” are just a few examples of developmental milestones. Monitoring of these developmental milestones during the first year of life is an important part of the routine assessment of an infant. The assessment is best broken down into 4 areas: Social and Emotional; Language/Communication; Cognitive; and Movement and Physical Development. If a concern arises during the monitoring process, a validated developmental screening test is administered. The American Academy of Pediatrics (AAP) also recommends developmental screening with a validated tool at 9, 18, 24, and 30 months. Developmental monitoring and screening are an integral part in determining the need for further diagnostic assessment and early enrollment in services, such as early intervention.

Procedure

During this developmental evaluation, the Centers for Disease Control and Prevention’s (CDC) “Learn the Signs, Act Early.” Developmental Milestone Checklist is used, while observing a 129-month-old infant. Developmental milestones for the other age groups are summarized in **Table 1**. Table 1 does not represent a standardized or validated screening tool. There is no exact order a developmental assessment must be administered in. It is, however, important to ensure that the infant is in a comfortable and safe environment.

- 1. Introduction.
 - 1.1 Introduce oneself to the parents/caregiver.
 - 1.2 Explain to the parents/caregiver that you are about to do a developmental assessment of their infant.
 - 1.3 Let them know it is a painless exam that helps show how the infant is developing in 4 areas: Social and Emotional; Language/Communication; Cognitive; and Movement and Physical Development.

Commented [DM1]: Anna spoke with the authors about filming and it can be done in 2 months, when the child they plan on examining will be 12 months old, hence the change.

2. Wash your hands.

3. Perform the developmental evaluation. Evaluate developmental milestones in each category as the infant is engaged and assessed.

3.1 Social and Emotional

3.1.1 Observe if the infant is shy or nervous/afraid with strangers.

3.1.2 Observe if the infant cries when the family/caregiver leaves.

3.1.3 Ask the family/caregiver if the infant has favorite things and people.

3.1.4 Ask the family/caregiver if the infant hands them a book when they want to hear a story.

3.1.5 Ask the family/caregiver if the infant repeats sounds or actions to get attention.

3.1.6 Ask the family/caregiver if the infant puts out their arm or leg to help with dressing.

3.1.7 Attempt to play "peek-a-boo" and "pat-a-cake" with the infant.

3.2 Language/Communication

3.2.1 Ask the family/caregiver if the infant responds to simple spoken requests.

3.2.2 Ask the family/caregiver if the infant uses gestures, like shaking their head "no" or "waving bye-bye"; Say "bye-bye" and observe the infant's response.

3.2.3 Make different sounds (*e.g.*, mama, dada, baba, pah, dah, and mah) and gestures (*e.g.*, waving bye-bye or lifting the arms up to be picked up) while playing with the infant, and note if the infant mimics these sounds and gestures.

3.2.4 Ask the family/caregiver if the infant tries to say words they say.

3.3 Cognitive

3.3.1 Hand the infant a toy and observe how the infant explores the toy (*e.g.*, shaking, banging, throwing, etc.).

3.3.2 Hide a toy under a towel and observe if the infant finds it easily.

3.3.3 Play peek-a-boo with the infant and observe if they play or copy the gestures.

3.3.4–3.3.4 Open a book and point out the pictures on the page. Note if the infant looks right at the pictures or things in the book.

3.3.5 Hand the infant a cup, spoon, and brush, and observe if the infant is using the objects correctly and if the infant bangs the two things together.

3.3.6 Hand the infant a cup and some blocks. Observe if the infant places the blocks in the cup and then takes them out.

3.4 Movement and Physical Development

3.4.1 Place the infant prone (on their tummy) and or supine (on their back) and observe if they can get to a sitting position without help. can crawl.

3.4.2 Observe if the infant is able to pull to a standing position and walk around holding on to furniture ("cruising").

3.4.3 Observe if the infant attempts to take a few steps alone without holding on to anything.

3.4.4 Observe if the infant stands alone.

Summary

The overall goal while monitoring developmental milestones is early identification of a problem or concern. The sooner the problem is identified, the sooner intervention may be implemented, ultimately aiding the infant to reach their best potential. Open communication with the family is key to a developmental history and assessment, as a pediatric visit is only a snapshot in time. A practitioner should always attend to the parent's concerns.

The next step in developmental evaluation is administering a standardized and validated screening test aimed to address common questions and efficiently identify infants that need further and more detailed assessment. Screening tests are brief, cost-effective, culturally and linguistically relevant, and do not require highly-specialized training. Screening results should only be used to identify children who may benefit from further assessment.

Should a concern be uncovered during a screening test, the next step is a full diagnostic assessment, which are performed by trained specialists. Diagnostic assessments are norm-referenced, comprehensive evaluations that address specific questions about development and skills. They also contain specialized material designed to be unfamiliar, which is and used to assess different domains. The intention of a diagnostic assessment is to identify and secure appropriate intervention services and targeted interventions, which may include

[early intervention services, medical evaluation and treatment, and genetic counseling and family planning for the parents.](#)

Figures and Legends

Table 1: Developmental milestones assessed in several age groups in infants and toddlers.

References

1. Learn the Signs. Act Early. Developmental Milestones. Adapted from CARING FOR YOUR BABY AND YOUNG CHILD: BIRTH TO AGE 5, Fifth Edition, edited by Steven Shelov and Tanya Remer Altmann © 1991, 1993, 1998, 2004, 2009 by the American Academy of Pediatrics and BRIGHT FUTURES: GUIDELINES FOR HEALTH SUPERVISION OF INFANTS, CHILDREN, AND ADOLESCENTS, Third Edition, edited by Joseph Hagan, Jr., Judith S. Shaw, and Paula M. Duncan, 2008, Elk Grove Village, IL: American Academy of Pediatrics. This milestone checklist is not a substitute for a standardized, validated developmental screening tool.
2. A Guide to Assessment in Early Childhood; Infancy to Age Eight. Washington State Office of Superintendent of Public Instruction, 2008.