CARE FOR KIDS
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Early Motor Development

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Early motor development begins in "fetushood." The perception of fetal movement occurs as early as 16-weeks gestation, beginning as small flutters and advancing to strong kicks and jabs. Fetal movement counts have long been recommended as a means of monitoring the health of the fetus. Decreased fetal movement can be cause for concern and may stem from environmental factors such as infection, decreased placental blood flow, poor oxygenation, medication, and toxins. In some cases it can indicate development of problems within the nervous system (brain malformations, encephalopathy, and neural tube defects) or musculoskeletal system (myopathy, neuromuscular disorder, and arthrogryposis). Neurodevelopmental assessment begins shortly after birth with assessment of tone, movement, and reflexes. More mature babies will generally have more muscle tone than premature or immature

babies. Forward progress in neuromotor development should be evident at each well check. Up until two years of age, development of a premature baby should be assessed in terms of the adjusted age (chronological age minus weeks of prematurity).

The typical gross motor milestones of sitting without support, crawling, and walking without assistance are commonly used to monitor development; however thinking about transitioning between positions is also important. For example, a child may be able to sit without support, yet not be able to get from a horizontal position to a sitting position on his own. Likewise, a child may be able to stand along furniture when placed there, but not be able to pull to a stand. Assessing the necessary transitioning abilities is important to avoid overestimating motor development based only on ability to maintain a position. While there is a broad age range of normal development, if a child is consistently achieving all milestones at the end of the range, he is likely delayed. Referral for physical therapy services and further evaluation with a pediatric neurologist and/or a developmental behavioral pediatrician is warranted. Watchful waiting may lead to additional parental anxiety and a greater lag in the child's development.

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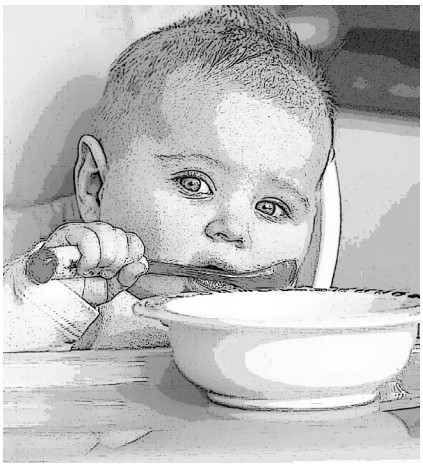
Early intervention through the AEA usually requires a 25 percent delay; however there may be other indications for private PT or OT services, such as muscle weakness or toe walking. Private services may be used in addition to early intervention/Early Access services if more intensive therapy is deemed appropriate.

Knowing when to refer infants for physical therapy services can be tricky in subtle cases unless periodic developmental screening is being done. When infants are behind on milestones, a short course of physical therapy may be all that is needed to move them along. Timely mobility is important for exploring the environment, which promotes language and cognitive development. Motor delay can also be part of a more global delay in developmental disorders, such as autism, which may ultimately involve intellectual disability. In those situations, early intervention can focus on acquisition of milestones in a coordinated effort, focusing on those skills that will be of most benefit in the child's developmental timeline.

According to the 2006 WHO Motor Development Study, 99 percent of children were able to sit without support by 9.2 months, stand with assistance by 11.4 months, crawl on hands and knees by 13.5 months, walk with assistance by 13.7 months, stand alone by 16.9 months, and walk alone by 17.6 months. In this study, 4.3 percent of children did not crawl on hands and knees.[1]

The National Task Force for Early Identification of Childhood Neuromuscular Disorders has provided red flag ages for when to refer to early intervention and when to check creatinine kinase level (CK) and refer to a neurologist. These ages are generally somewhere around the 75 percent and 90 percent norms for motor skill acquisition using the Denver II or the WHO Motor Development Study. The figure on page three incorporates these guidelines and the norms.[2]



There is considerable variation in red flags for referral according to various studies. In general, if a child lacks steady head control while sitting at four months, is unable to sit at nine months, or is unable to walk independently at 18 months, a medical evaluation and more thorough developmental evaluation are recommended. These red flags are listed in the 2010 Pediatrics in Review article, "Developmental Milestones: Motor Development." The article further describes the progression and refinement of neurodevelopment, which generally proceeds from head to toe and from proximal to distal. Arms become supportive for rolling over and for sitting before the smaller muscles of the hands develop for picking up small objects, scribbling, or using spoons.[3] Fine motor development also depends on gross motor, cognitive, and visual development. According to the Denver II, most babies (90 percent) are able to grasp a rattle by four months, pick up a small object with a pincer (thumb-finger) grasp by 10.5 months, and scribble by 16.5 months. Most children can use a spoon for eating at 20 months.

Standardized developmental screening is helpful for assessing whether a child meets criteria for further assessment or early intervention. Many pediatric offices use the Ages and Stages Questionnaire-3rd edition (ASQ-3) for early identification of delays. Considered to be the gold standard for developmental screening, it is used in many different settings, including Child Find and Early Head Start. Infants and toddlers who qualify for early intervention services may receive those without cost to them under Part C of the Individuals with Disabilities Education Act (IDEA). ASQ-3 also identifies three groups of children; those who need to be referred for early intervention, those who need monitoring along with home intervention by parents, and those who are developing typically so parents can be reassured. Administering the ASQ-3 provides an additional benefit of increasing child development awareness in parents, health care providers, childcare staff, and those in medical or caregiver training.[4]

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Motor Skill	75% have acquired the skill by this age	Age to refer for early intervention therapy (if skill not achieved)	Age to obtain CK and refer to specialist for further evaluation (if skill not achieved)	90% have acquired the skill by this age	Study Referenced
Pulls to sit without head lag	4 months	4 months	5 months	6.5 months	Denver II
Sits without support	6.7 months		7 months	7.5 months	WHO Motor Development Study
Gets into sitting position	9.5 months		9 months	10 months	Denver II
Walks alone/ Rise to stand without support	13.1 months	15 months	18 months (or if regression)	14.4 months	WHO Motor Development Study
Runs	18.5 months	20 months	24 months (or if regression)	21 months	Denver II

FIGURE 1: Developmental Milestones

Although timing of motor milestones is important, other factors such as muscle tone, quality of movement, and reflexes (primitive, postural, and deep tendon) are necessary features when looking at motor development. Premature babies may have some tone variation during the first year of life, especially lower tone that can eventually normalize. However two conditions, the first being persistent hypertonia, and the second being hypotonia which evolves into hypertonia, are concerning for cerebral palsy. Hyperreflexia suggests a central nervous system process such as brain injury or cerebral palsy where hyporeflexia is more concerning for a peripheral nervous system or muscular disorder. Absent deep tendon reflexes are very concerning for spinal muscular atrophy in a hypotonic infant.

Babies who develop an early hand preference, drag one leg, or neglect to use one side of the body are showing atypical motor patterns concerning for a unilateral brain injury such as a stroke. Wobbly movements, unusual posturing of limbs or body, excessive tremor, and persistent wide-based gait may be signs of an emerging movement disorder. If a child plateaus in development or regresses or loses motor skills that were previously acquired, he should be promptly referred for further evaluation due to concern for a progressive neurological, muscular, or metabolic disorder, which may be potentially treatable.

Children with neurological conditions associated with gross and/ or fine motor delay may have additional motor impairments involving the mouth and face, such as trouble articulating sounds and forming words (dysarthria), trouble swallowing (dysphagia),

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or drooling (sialorrhea). There may be associated visual findings of strabismus, nystagmus, or cortical visual impairment. It is important to keep in mind the impact of vision on motor development; poor vision can lower confidence and dampen the desire to explore the environment and handle new experiences.

Head circumference, especially in comparison to stature, is an important part of the neuro-developmental assessment, as both microcephaly and macrocephaly can be seen with delayed or atypical motor development and reflect a static or progressive disease process. Hypothyroidism should be considered in the context of hypotonia, especially if there is macrocephaly or delayed closure of the anterior fontanel. Dysmorphic features would raise the likelihood of a genetic condition.

Children with low muscle tone or muscle weakness can be screened easily for neuromuscular conditions and muscular dystrophy by obtaining a creatinine kinase (CK). Signs of muscular dystrophy can be present at birth, but may also emerge around two years of age or older, beginning as proximal muscle weakness, especially in the lower limbs, then gradually involving the arms and more distal extremities. Observation of a child moving from sitting to standing can alert you to proximal weakness if the child uses the legs as a support to push off with the arms, the classic Gowers maneuver. Walking up steps and jumping may also be difficult with proximal weakness. When lifting a young child with proximal arm

weakness, you may feel like the child is going to slip through your hands, the classic "slip-through effect." Children who fatigue easily with activity also may need to be screened. Lordosis, waddling gait, and calf hypertrophy are other signs of muscular dystrophy in children with muscle weakness and developmental delay. To distinguish the waddling gait from the wide-based gait, look for exaggerated drops and elevations in the pelvis with side-to-side swaying. A normal CK (24-180 U/L) does not totally exclude a neuromuscular disease, so clinical suspicion would prevail when deciding upon referral, especially if there are other indicators. Presence of tongue fasciculations and loss of motor skills would be very concerning indicators and cause for referral regardless of CK level. A mildly elevated CK (180-3,000 U/L) should be retested after two to three weeks. If still abnormal, the child should be referred to pediatric neurology. If the CK is grossly elevated (3,000-50,000 U/L), the test should be repeated in one week and referral made to a pediatric neurologist if it is still elevated or there are other concerns. Levels higher than 50,000 indicate rhabdomyolysis which requires hospitalization.[5] Children with muscle weakness should be evaluated for risk of malignant hyperthermia prior to procedures requiring anesthesia. Complete clinical assessment is crucial and should factor in to any referral decisions.

As a final comment, validation of parent or caregiver concerns about motor development is an important part of the developmental evaluation. Using standardized tools such as the ASQ-3 can provide valuable information on which to base referral decisions for those children with mild or isolated delays. If a decision is made to watch and wait, the waiting time should not extend beyond the time when 90 percent of children are performing at that skill level. Developmental intervention is most successful when initiated soon after early identification of delays.

References

1. WHO Motor Development Study: Windows of achievement for six gross motor development milestones. *Acta Paediatrica.* 2006; Suppl. 450:86-95.

2. National Task Force for the Early Identification of Childhood Neuromuscular Disorders. Guide for Primary Care Providers. *http://www.ChildMuscleWeakness.org/files/PrimaryCareProviderPacket.pdf*

3. Gerber RJ, Wilks T, Erdie-Lalena C. Developmental Milestones: Motor Development. *Pediatrics in Review*. 2010; 31(7):266-267.

4. *http://agesandstages.com/about-asq/*

5. Lurio JG, Peay HL, Mathews KD. Recognition and Management of Motor Delay and Muscle Weakness in Children. *Am Fam Physician.* 2015; 91 (1):38-44.

Adolescent Screening for Depression

EPSDT recommends that all adolescents ages 11-21 are screened for depression using the PHQ-2. If it is abnormal, then a PHQ-9 should be completed.

Patient Health Questionnaire-2

Instructions for Use

The PHQ-2 includes the first 2 items of the PHQ-9. The stem question is, "Over the past 2 weeks, how often have you been bothered by any of the following problems?" The 2 items are "Little interest or pleasure in doing things" and "Feeling down, depressed, or hopeless." For each item, the response options are "Not at all," "Several days," "More than half the days," and "Nearly every day," scored as 0, 1, 2, and 3, respectively. Thus, the PHQ-2 score can range from 0 to 6.[2] A score of 3 points or more on this version of the PHQ-2 has a sensitivity of 83 percent and a specificity of 92 percent for major depressive episode.[1]

Screening with the PHQ-2 is only a first step. Patients who screen positive should be further evaluated with the PHQ-9, other diagnostic instruments, or direct interview to determine whether they meet criteria for a depressive disorder.[2]

Score interpretation:

PHQ-2 score	Probability of major depressive disorder (%)	Probability of any depressive disorder (%)
1	15.4	36.9
2	21.1	48.3
3	38.4	75.0
4	45.5	81.2
5	56.4	84.6
6	78.6	92.9

Over the past 2 weeks, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things.

0 = Not at all
1 = Several days
2 = More than half the days
3 = Nearly every day

Feeling down, depressed, or hopeless.

0 = Not at all
1 = Several days
2 = More than half the days
3 = Nearly every day

Total point score:_____

Sources:

1. Thibault JM, Steiner RW. Efficient identification of adults with depression and dementia. Am Fam Physician. 2004;70:1101–1110
2. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003;41:1284–1292
3. Information from Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003;41:1284–1292

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PHQ-9 Quick Depression Assessment

Instructions for Use

for doctor or healthcare professional use only

For initial diagnosis:

1. Patient completes PHQ-9 Quick Depression Assessment.
2. If there are at least 4 ✓s in the two right columns (including Questions #1 and #2), consider a depressive disorder. Add score to determine severity.
3. ***Consider Major Depressive Disorder***
   - if there are at least 5 ✓s in the two right columns (one of which corresponds to Question #1 or #2).

   Consider Other Depressive Disorder
   - if there are 2-4 ✓s in the two right columns (one of which corresponds to Question #1 or #2).

Note: Since the questionnaire relies on patient self-report, all responses should be verified by the clinician, and a definitive diagnosis is made on clinical grounds taking into account how well the patient understood the questionnaire, as well as other relevant information from the patient. Diagnoses of Major Depressive Disorder or Other Depressive Disorder also require impairment of social, occupational, or other important areas of functioning (Question #10) and ruling out normal bereavement, a history of a Manic Episode (Bipolar Disorder), and a physical disorder, medication, or other drug as the biological cause of the depressive symptoms.

To monitor severity over time for newly diagnosed patients or patients in current treatment for depression:

1. Patients may complete questionnaires at baseline and at regular intervals (eg, every 2 weeks) at home and bring them in at their next appointment for scoring or they may complete the questionnaire during each scheduled appointment.
2. Add up ✓s by column. For every ✓: Several days = 1 More than half the days = 2 Nearly every day = 3
3. Add together column scores to get a **TOTAL** score.
4. Refer to the accompanying PHQ-9 Scoring Box to interpret the **TOTAL** score.
5. Results may be included in patient files to assist you in setting up a treatment goal, determining degree of response, as well as guiding treatment intervention.

PHQ-9 SCORING CARD FOR SEVERITY DETERMINATION

(for healthcare professional use only)

Scoring—add up all checked boxes on PHQ-9

For every ✓: Not at all = 0; Several days = 1;
More than half the days = 2; Nearly every day = 3

INTERPRETATION OF TOTAL SCORE

Total Score	Depression Severity
0-4	Minimal
5-9	Mild
10-14	Moderate
15-19	Moderately severe
20-27	Severe

Continues on next page

Patient Health Questionnaire-9

THIS SECTION FOR USE BY STUDY PERSONNEL ONLY.

Were data collected? **No** ❑ *(Provide reason in comments)*

If **Yes**, data collected on visit date ❑ **or** specify date: _____

Comments:

Only the patient (subject) should enter information into this questionnaire.

Over the last 2 weeks, how often have you been bothered by any of the following problems?	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

If you checked off any problems, how difficult have those problems made it for you to do your work, take care of things at home, or get along with other people?

- ❑ Not difficult at all
- ❑ Somewhat difficult
- ❑ Very difficult
- ❑ Extremely difficult

Scoring for use by study personnel only

___0___ + _____ + _____ + _____

= Total Score _____

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer, Inc.

I confirm this information is accurate. Patient's/Subjects's initials: _____ Date: _____

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If you have questions about **billing** related to EPSDT Care for Kids services, please call Provider Services: **1- 800-338-7909**. If you have questions about **clinical issues** and EPSDT Care for Kids services, please call **1 - 800-383-3826.** Please note: Due to budget restraints, the *EPSDT Care for Kids Newsletter* is sent to offices and organizations, rather than to individuals. **The newsletter is also available on line at www.iowaepsdt.org**. Readers are welcome to photocopy or download material from the newsletter to share with others. If you wish to reproduce material from the newsletter in another publication, whether print or electronic, please obtain permission prior to publication by contacting the editor. Please include the following acknowledgment with reprinted material: Reprinted by permission of the Iowa *EPSDT Care for Kids Newsletter.*

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