Most developmental screening is done by health visitors but, if they suspect a problem, they will bring it to the attention of the GP. Hence, even doctors who are not directly involved in developmental assessment must have knowledge of normal development. If a child has failed to reach a milestone at a given time but appears to be on the threshold of achieving it then a safe option is to review the child a month or so later to ascertain the progress made. If the child is nowhere near achievement of the milestone or there are other causes for concern then referral is required.

Gross motor developmental milestones\(^{[1, 2]}\)

This is an approximate guide to some of the gross motor development of a child in the first three years of life but variation is common:

- **6 weeks**: sits with curved back, needs support. Head control developing. In ventral suspension (when held above couch with examiner’s hand supporting the abdomen) can hold head at level of body briefly.
- **3 months**: can hold head at 90° in ventral suspension.
- **6 months**: no head lag when pulled to sit. Can sit with support. When lying face down, can lift up on forearms.
- **9 months**: gets into sitting position alone. Sits unsupported and can pivot. Crawls. (Age of crawling varies widely, and some infants never crawl.)
- **10 months**: pulls to standing and stands holding on.
- **12 months**: stands and walks with one hand held. May stand alone briefly. May walk alone.
- **2 years**: goes up and down stairs alone. Two feet per step. Kicks a ball.
- **3 years**: climbs stairs one foot per step. Able to stand on one foot for a few seconds.

Most children are able to walk alone by 11 to 15 months but the rate of development is very variable. Some children will fall outside the expected range and yet still walk normally in the end. Walking is considered to be delayed if it has not been achieved by 18 months.

**Aetiology\(^{[1]}\)**

Delay in walking may be simply variation of normal. Other common causes include:

**Delay in motor maturation**

- Delayed motor maturation (often familial): this is the term to describe a late walker who is normal in other respects. The motor skills are of normal quality but are delayed. There may be an associated mild hypotonia. It is a diagnosis of exclusion.
- Severe learning disabilities: there is a delay in all developmental areas but gross motor development is often less affected than fine motor skills, language and social skills. There may be some associated dysmorphic features and hypotonia is often present.

**Abnormalities in muscle tone and power**

- Hypertonia: cerebral palsy, which affects about 1 in 400 children in the UK.\(^{[3]}\) Delayed walking may be the first presentation in milder cases (hemiplegia, spastic diplegia).
- Muscular dystrophy: it is common to find a history of delayed walking in Duchenne muscular dystrophy (DMD) but less so in Becker's muscular dystrophy, as it has a later onset. DMD is the most common hereditary neuromuscular disease and it is progressive. Baby boys are often normal at birth and delayed walking may only be identified retrospectively, with symptoms really appearing between 4 and 6 years of age.
Environmental factors
Either by affecting brain development or directly causing delay in walking:

- Maternal antenatal infections or toxins.
- Infections - eg, meningitis, encephalitis, cytomegalovirus.
- Head injury.
- Malnutrition.
- In the extreme form, institutionalised babies kept in cots show delay in gross motor skills but this is rare. However, a similar process can be seen in children who have been ill and bed-bound for long periods of time. Emotional deprivation doesn't tend to affect these skills as much as others.
- Rickets has been reported to delay walking; this is reversible if the disease is not too advanced.\(^4\)

It is worth noting that obesity and developmental dysplasia of the hip are not causes of delayed walking.\(^5\) The issue surrounding baby walkers is not entirely clear but they are unlikely to cause significant harm. Two randomised controlled trials (RCTs) have suggested that they have no effect whereas two smaller cohort studies suggested that they delayed onset of walking by only 11-26 days.\(^6\)

Assessment
In assessing these children ask yourself:

- Is this a true delay or a variation of normal?
- Is the delay isolated or part of a broader developmental delay?
- Are there abnormal neurological findings?
- Are there any aetiological factors?

History
There are a number of essential questions to ask about any child suspected of developmental delay. Most of the answers should be in the "red book", the personal health record of the child.

- Were there any problems in pregnancy? Antepartum haemorrhage or hypertension in pregnancy may be relevant.
- Was the child a full-term normal delivery? Prematurity and problems suggesting possible intrapartum asphyxia should be noted. Relatively few cases of cerebral palsy are due to intrapartum asphyxia.\(^7\) As babies of earlier gestation are surviving they may be contributing to the cases of cerebral palsy.
- Did the child feed well from the outset? A slow, floppy or irritable baby is of note.
- Was there deep jaundice? A degree of jaundice is normal but severe jaundice can lead to kernicterus.

Past medical history

- Has the child had any serious illnesses, such as meningitis?
- Are there any other aspects of development that have been a cause for concern? This includes sitting, fine motor skills, speech and any other parameter.

Family history

- When did the parents walk?
- Are there any significant inherited conditions in the family? A family history of muscular dystrophy or some other neurological disorder may be significant.

Carer circumstances

- Has the mother been trying to get the baby to walk? An overprotective or immature mother may be treating the baby like a doll - just feeding, changing and keeping in the pram or cot. Has the baby had a chance to try to develop motor skills? Has the mother encouraged these?
• Is there untreated maternal postnatal depression to be considered?
**Examination**

Observation: put the child on the floor with some toys within easy reach whilst obtaining the history. Look for the following:

- Does the child look normal? A syndrome like mosaic Down's syndrome may have been overlooked.
- Does the child look well cared for? Neglect and emotional deprivation can cause developmental delay. Note the mother/child relationship.
- Does the child seem alert and attentive? Is he or she interested in this new stranger or unconcerned about surroundings?
- What is the resting posture? Talipes or inversion of the foot can suggest imbalance of muscle tone and neurological abnormality.

Examination is largely neurological and should be thorough. Look for strength, asymmetry of movement and the presence of primitive reflexes. Note particularly:

- Muscle tone. Passively flex and extend the limbs and pick up the child to assess muscle tone and control. Is there any asymmetry between sides? Does the head flop on being lifted? Do tone and muscle control feel normal for a baby of this age? Cerebral palsy is associated with spasticity eventually but at an early stage flaccidity is present.
- Try to get the child to walk. Put the child down on his or her feet, at first keeping some control over the body. Does the child bear weight, or nearly do so, or does he or she flop down? Can the child stand with support but not unaided? Hold the child standing, facing towards the mother and encourage him or her to walk a few steps to her. Make encouraging and congratulatory noises. Is the mother spontaneously doing this too?
- Test the plantar (Babinski) response. The plantar response is extensor at birth but, by the time the child is ready to walk, the neural pathways should have become myelinated and the response should be flexor.

**Investigations**

A full developmental assessment is a very intricate and time-consuming task. A GP should be able to do a few basic tests and should learn the "feel" of a normal or abnormal baby, but full assessment is best left to those with the skills, the training and the time.

If the delay in walking is isolated, with no other developmental delays noted, the only investigation required is a creatinine phosphokinase (CPK), also known as creatinine kinase (CK), level to exclude muscular dystrophy. If cerebral palsy is suspected, the child may need further investigations such as brain imaging to identify the extent of damage or to rule out rare or potentially treatable causes.

**Management**

This largely depends on the underlying causes - follow links.

**General points**

- If the child reached all other milestones normally and seems on the verge of achieving this one: review in one month and, if the child can walk, that is fine. If not, refer.
- If walking seems to be the only significant delay: referral to a community paediatrician may be in order for more detailed assessment but a paediatric physiotherapist or occupational therapist may be able to take a direct referral and offer appropriate management.
- Any other aspects of developmental delay need to be excluded or addressed. If this seems to be part of global delay, refer to a community or general paediatrician to establish the cause.
- Delay due to neglect or poor parenting can usually be reversed provided children are given an opportunity to develop their skills. Management will involve the health visitor and child protection team to monitor and support.
A multidisciplinary approach may be required for more complex cases:

- Children with severe learning disabilities may need physiotherapy to address gross motor development problems and any hypotony.
- In cerebral palsy, community physiotherapy or occupational therapy staff may help parents maximise potential. Education and advice about assistive devices go hand in hand with physical therapy.\[6\]
- DMD patients also need physiotherapy as well as support for school. Genetic counselling is essential in these families.

- If a diagnosis such as Down’s syndrome or cerebral palsy has already been made then an explanation should be given that delayed milestones are to be expected. It may still be appropriate to involve other healthcare professionals to maximise potential.

**Red flags**\[1\]

- Poor head control or floppiness at 6 months.
- Unable to sit unsupported at 9 months.
- Not weight bearing through legs at 12 months.
- Not walking at 18 months.
- Not running at 2 years.
- Not climbing stairs at 3 years.
- Persistent toe walking.
- Increased muscle tone.

### Further reading & references

2. Developmental Milestones; Pediatric Orthopedic Society of North America
3. Cerebral palsy; Scope

**Disclaimer:** This article is for information only and should not be used for the diagnosis or treatment of medical conditions. EMS has used all reasonable care in compiling the information but makes no warranty as to its accuracy. Consult a doctor or other healthcare professional for diagnosis and treatment of medical conditions. For details see our conditions.

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