Early diagnosis – cerebral palsy

Early detection and diagnosis recommendations from best available evidence

STRONG RECOMMENDATION

CONDITIONAL RECOMMENDATION

1 The clinical diagnosis of cerebral palsy can and should be made as early as possible. When the clinical diagnosis is suspected but cannot be made with certainty, the interim clinical diagnosis of 'high-risk' of cerebral palsy should be given.

MOTOR DYSFUNCTION GMs +/- HINE + ABNORMAL NEURO IMAGING MRI +/- HINE + CLINICAL HISTORY

Based on MODERATE QUALITY evidence for infant and parent outcomes.

2 Early standardised assessments and investigations for early detection of 'high-risk' of cerebral palsy should always be conducted in 'high-risk' of cerebral palsy populations, i.e. infants born pre-term, infants with neonatal encephalopathy, infants with birth defects or infants admitted to Neonatal Intensive Care Unit (NICU).

Based on HIGH QUALITY evidence of test psychometrics.

Early detection of cerebral palsy before 5 months corrected age

Option A: The most accurate method for early detection of cerebral palsy in infants with newborn-detectable risks and younger than 5 months corrected age (CA) is to use a combination of a standardised motor assessment, neuroimaging and history taking about risk factors.

MOTOR DYSFUNCTION + ABNORMAL NEURO IMAGING

3 **TEST:** General Movements Assessment (GMs), to identify motor dysfunction [95–98% predictive of cerebral palsy]; combined with neuroimaging.

STANDARDISED MOTOR

TEST: MRI (before sedation is required for neuroimaging) to detect abnormal neuroanatomy in the motor area/s of the brain [80–90% predictive of cerebral palsy].
Note: Normal neuroimaging does not automatically preclude the diagnosis of risk of cerebral palsy.

ABNORMAL NEURO IMAGING

Based on HIGH QUALITY evidence of test psychometrics in newborn-detectable risk populations.

Option B: In contexts where the General Movements Assessment is not available or MRI is not safe or affordable (e.g. in countries of low to middle income), early detection of cerebral palsy in infants with newborn-detectable risks and younger than 5 months (CA) is still possible and should be carried out to enable access to early intervention.

STANDARDISED NEURO EXAM + STANDARDISED MOTOR

4 **TEST:** Hammersmith Infant Neurological Examination (HINE) [HINE<57 at 3 months is 96% predictive of cerebral palsy].

STANDARDISED NEURO EXAM

Based on MODERATE QUALITY evidence of test psychometrics in newborn-detectable risk populations.

TEST: Test of Infant Motor Performance (TIMP).

STANDARDISED MOTOR

Based on LOW QUALITY evidence of test psychometrics in newborn-detectable risk populations.

Early detection of cerebral palsy after 5 months corrected age

Accurate early detection of 'high-risk' of cerebral palsy in those with infant-detectable risks and age 5-24 months can and should still occur as soon as possible, but different diagnostic tools are required.

5 Any infant with:
(a) inability to sit independently by 9 months; or

(b) hand function asymmetry: strong early preference for one side; or

(c) inability to take weight with feet flat on the floor should receive standardised investigations for cerebral palsy.

Based on HIGH QUALITY evidence of motor norms.

Option A: The most accurate method for early detection of cerebral palsy with infant-detectable risks older than 5 months (corrected age) but younger than 2 years old is to use a combination of a standardised neurological assessment, neuroimaging, and a standardised motor assessment with a history taking about risk factors.

STANDARDISED NEURO EXAM + STANDARDISED MOTOR + ABNORMAL NEURO IMAGING

6 **TEST:** HINE (90% predictive of cerebral palsy). HINE scores lower than 73 (at 6, 9 or 12 months) should be considered at 'high-risk' of cerebral palsy. HINE scores lower than 40 (at 6, 9 or 12 months) almost always indicate cerebral palsy; combined with neuroimaging and standardised motor assessments.

TEST: MRI to detect abnormal neuroanatomy in the motor area/s of the brain (sedation required >6 weeks up to 2 years of age).

STANDARDISED NEURO EXAM + ABNORMAL NEURO IMAGING

Specific tests of movement and development called the Developmental Assessment of Young Children (DAYC) and the Alberta Infant Motor Scale (AIMS) are also recommended and can be performed and scored by experienced clinicians.

MOTOR DYSFUNCTION

Based on MODERATE QUALITY evidence of test psychometrics in newborn-detectable risk populations.

LOW-MODERATE QUALITY evidence of test psychometrics in newborn-detectable risk populations.

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Early detection of cerebral palsy after 5 months corrected age (continued)

Option B: In contexts where MRI is not safe or affordable, early detection of cerebral palsy is still possible with infant-detectable risks between 5-24 months (corrected age) and should be carried out to enable access to early intervention.

STANDARDISED NEURO EXAM + STANDARDISED MOTOR

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TEST: HINE [90% predictive of cerebral palsy at 2–24 months of age] HINE scores at 6, 9 or 12 months: <73 indicates 'high-risk' of cerebral palsy. A score of <40 indicates abnormal outcome, usually cerebral palsy.

STANDARDISED NEURO EXAM

Based on MODERATE QUALITY evidence of test psychometrics.

TEST: Developmental Assessment of Young Children (DAYC) to quantify motor delay [83% predictive of cerebral palsy].

STANDARDISED MOTOR

TEST: Motor Assessment of Infants (MAI) to quantify motor delay [73% predictive of cerebral palsy].

STANDARDISED MOTOR

LOW-MODERATE QUALITY evidence

Early detection of motor severity of cerebral palsy

Prognosis of long-term motor severity is most accurate in children over 2 years using the Gross Motor Function Classification System (GMFCS).

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In infants under 2 years old, prognosis of motor severity predictions should be made cautiously and always involve the use of standardised tools, because incomplete development of voluntary motor skills or abnormal tone might confound clinical observations. Motor severity of cerebral palsy under 2 years of age is most accurately predicted using the Standardised Neurological Assessment.

STANDARDISED NEURO EXAM + ABNORMAL NEURO IMAGING

Based on LOW QUALITY evidence.

TEST: HINE. Cut-off scores predict the probable severity.

HINE 40–60

HINE <40

STANDARDISED NEURO EXAM

TEST: MRI Normal imaging does not preclude cerebral palsy, and abnormal imaging does not automatically lead to cerebral palsy.

ABNORMAL NEURO IMAGING

Based on MODERATE QUALITY evidence in newborn-detectable risk populations.

Early detection of motor sub-type and topography of cerebral palsy

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Early detection of motor sub-type and topography can be difficult in infants under 2 years old, but wherever possible it is very important to identify unilateral versus bilateral cerebral palsy early, as the early interventions (e.g. constraint induced movement therapy) and long-term musculoskeletal outcomes and surveillance needs differ (e.g. hip surveillance).

Based on LOW QUALITY evidence.

Early intervention

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Clinical diagnosis of cerebral palsy or the interim diagnosis of 'high-risk' of cerebral palsy should always be followed by a referral to cerebral palsy-specific early intervention (e.g. constraint induced movement therapy and hip surveillance). Parent concern is a valid reason to trigger formal diagnostic investigations and referral to early intervention.

Based on HIGH QUALITY evidence.

Early detection of associated impairments

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Clinical diagnosis of cerebral palsy or interim diagnosis of 'high-risk' of cerebral palsy should always include standard medical investigations for associated impairments and functional limitations (e.g. vision impairment, hearing impairment and epilepsy).

Based on HIGH QUALITY evidence.

Communicating the diagnosis to parents compassionately

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Parents experience grief and loss at the time of diagnosis or 'high-risk' notification; therefore communication with a family should be a series of well-planned and compassionate conversations. Communication should be empathetic and involve the family, face-to-face with both parents or caregivers present (where appropriate), private, honest and jargon-free. This should be followed by written information, identification of strengths, invitation to ask questions, discussion of feelings, recommendations to use parent-to-parent support and arrangement of early intervention.

Based on HIGH QUALITY qualitative parent interviews.

Adapted with permission from: Novak et al 2017. Early, Accurate Diagnosis and Early Intervention in Cerebral Palsy. *JAMA Pediatr.* 2017;171(9):897-907. doi:10. 1001/jamapediatrics.2017.1689 Available from: http://jamanetwork.com/journals/jamapediatrics/article-abstract/2636588

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