, A D

Advances in Diagnosis and Treatment

IMPORTANCE

OBJECTIVES

EVIDENCE REVIEW

cerebral palsy
diagnosis *detection* *prediction* *identification* *predictive validity* *accuracy* *sensitivity*
specificity

FINDINGS

% %
%
%

% %
% %

A

% % % %

% % %

%

1. [illegible]

Recommendation	Strength of Recommendation and Quality of Evidence
1.0 The clinical diagnosis of CP can and should be made as early as possible so that: • The infant can receive diagnostic-specific early intervention and surveillance to optimize neuroplasticity and prevent complications • The parents can receive psychological and financial support (when available)	Strong recommendation based on moderate-quality evidence for infant and parent outcomes
1.1 When the clinical diagnosis is suspected but cannot be made with certainty, the interim clinical diagnosis of high risk of CP should be given so that: • The infant can receive diagnostic-specific early intervention and surveillance to optimize neuroplasticity and prevent complications • The parents can receive psychological and financial support (when available) • Ongoing diagnostic monitoring can be provided until a diagnosis is reached	Strong recommendation based on moderate-quality evidence for infant and parent outcomes
2.0 Early standardized assessments and investigations for early detection of CP should always be conducted in populations with newborn-detectable risks (ie, infants born preterm, infants with neonatal encephalopathy, infants with birth defects, and infants admitted to the NICU)	Strong recommendation based on high-quality evidence of test psychometrics
Early Detection of CP Before 5 mo CA	
3.0 Option A: The most accurate method for early detection of CP in infants with newborn-detectable risks and younger than 5 mo (CA) is to use a combination of a standardized motor assessment and neuroimaging and history taking about risk factors	Strong recommendation based on high-quality evidence of test psychometrics in newborn-detectable risk populations
Standardized motor assessment 3.1 Test: GMs to identify motor dysfunction (95%-98% predictive of CP), combined with neuroimaging	Strong recommendation based on high-quality evidence of test psychometrics in newborn-detectable risk populations
Neuroimaging 3.2 Test: MRI (before sedation is required for neuroimaging) to detect abnormal neuroanatomy in the motor areas of the brain (80%-90% predictive of CP). Note that normal neuroimaging does not automatically preclude the diagnosis of risk of CP	Strong recommendation based on high-quality evidence of test psychometrics in newborn-detectable risk populations
4.0 Option B: In contexts where the GMs assessment is not available or MRI is not safe or affordable (eg, in countries of low to middle income), early detection of CP in infants with newborn-detectable risks and younger than 5 mo (CA) is still possible and should be carried out to enable access to early intervention	Strong recommendation based on moderate-quality evidence of test psychometrics in newborn-detectable risk populations
Standardized neurological assessment 4.1 Test: HINE (scores <57 at 3 mo are 96% predictive of CP)	Strong recommendation based on moderate-quality evidence of test psychometrics in newborn-detectable risk populations
Standardized motor assessment 4.2 Test: TIMP	Conditional recommendation based on low-quality evidence of test psychometrics in at-risk populations
Early Detection of CP After 5 mo CA	
Accurate early detection of CP in those with infant-discernible risks and age 5-24 mo can and should still occur as soon as possible, but different diagnostic tools are required	
5.0 Any infant with: (a) Inability to sit independently by age 9 mo, or (b) Hand function asymmetry, or (c) Inability to take weight through the plantar surface (heel and forefoot) of the feet should receive standardized investigations for CP	Strong recommendation based on high-quality evidence of motor norms
6.0 Option A: The most accurate method for early detection of CP in those with infant detectable risks older than 5 mo (corrected for prematurity) but younger than 2 y is to use a combination of a standardized neurological assessment, neuroimaging, and a standardized motor assessment with a history taking about risk factors	Conditional recommendation based on moderate-quality evidence of test psychometrics in newborn-detectable risk populations
Standardized neurological assessment 6.1 Test: HINE (90% predictive of CP). Those with HINE scores >73 (at 6, 9, or 12 mo) should be considered at high risk of CP. HINE scores <40 (at 6, 9, or 12 mo) almost always indicate CP, combined with neuroimaging and standardized motor assessments	Conditional recommendation based on moderate-quality evidence of test psychometrics in newborn-detectable risk populations
Neuroimaging 6.2 Test: MRI to detect abnormal neuroanatomy in the motor areas of the brain (sedation may be required from >6 wk up to age 2 y). Well-defined lesions can be seen early, but subtle white matter lesions may be difficult to detect owing to rapid growth, myelination, and activity-dependent plasticity. Repeated MRI scans are recommended at age 2 y for infants with initially normal findings on MRI (at 12-18 mo) but persistent motor or neurological abnormality, combined with standardized motor assessments	Conditional recommendation based on moderate-quality evidence of test psychometrics in newborn-detectable risk populations
Standardized motor assessment 6.3 Test: DAYRfor infantp15.15.9(with)-5.9(r)9.7(self-rep5.9()9.7e.9(ag)]TJ 5.9(activi)-9ntify)-215.9(taking-215.9(assessdel5.9(be)-21(89.9(predictiv)9.7(e)-215.9(o)0(f)-215.9(CP).	

foll7(ements)-21* [(•)-215.9(Midf)-215.9(the)]TJ T* 3

2.

U aeaSa cHem ea	• Midf the B aeaSa cD ea	B aeaSa cQ ad ea	D ea	A a a
GM[34]				
• Poor repertoire or cramped synchronized GMs, followed by absent fidgety movements plus an asymmetry in segmental movements (eg, wrist or hand). Note that some cases of hemiplegic CP may be missed by GMs	• Cramped synchronized GMs, followed by absent fidgety movements	• Early onset and long duration of cramped synchronized GMs, followed by absent fidgety movements	• Poor repertoire GMs, followed by absent fidgety movements with circular arm movements and finger spreading	• Unknown
MRI[35,36]				
• Focal vascular insults (24%) • Malformations (13%) • Unilateral hemorrhage (grade IV) with porencephaly • Lesions in the parietal white matter involving the trigone • Middle cerebral artery stroke with asymmetry of myelination of the PLIC	• Bilateral white matter injury (3123 myelination of the PLIC in the GMs,			

%

%

A

Positive Parenting Program

%

%

%

%

%

A A
Accepted for Publication:
Published Online:

Author Affiliations:

Author Contributions:

Study concept and design:

Acquisition, analysis, or interpretation of data:

35

Semin Fetal Neonatal Med

36

Dev Med Child Neurol

37

Eur J Paediatr Neurol

38

Bone Joint J

39

Arch Dis Child

40

Child Care Health Dev

41

Child Care Health Dev

42

Cerebral Palsy in Infancy

43

Dev Med Child Neurol

44 *Cerebral Palsy in Infancy: Targeted Activity to Optimize Early Growth and Development*

45

Dev Med Child Neurol