# Hip Surveillance in CP

<table>
<thead>
<tr>
<th>Title of Guideline</th>
<th>Guideline for surveillance for hip subluxation and dislocation in children and young people with cerebral palsy</th>
</tr>
</thead>
</table>
| Contact Name and Job Title (author) | Janet Corderoy, Senior Physiotherapist  
Jane Williams, Consultant Paediatrician Neurodisability  
Kathryn Price, Consultant Paediatric Orthopaedic surgeon  
James Hunter, Consultant Paediatric Orthopaedic surgeon  
Katharine Halliday, Consultant Radiologist  
Katherine Martin, Consultant Paediatrician Neurodisability |
| Directorate & Speciality | Directorate: Family Health – Children  
Speciality: General |
| Date of submission | September 2018 |
| Date on which reviewed | September 2023 |
| Guideline Number | 1913 - Version 3 |
| Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis) | This guideline applies to all children with Cerebral Palsy or similar diagnosis under the age of 18 years |
| Abstract | This guideline describes hip surveillance for children and young people with cerebral palsy |
| Key Words | Paediatric, Child, Young Person, Hip dysplasia, subluxation, dislocation, cerebral palsy |

**Statement of the evidence base of the guideline – has the guideline been peer reviewed by colleagues?**

1a meta analysis of randomised controlled trials  
1b At least one randomised controlled trial  
2a at least one well-designed controlled study without randomisation  
2b at least one other type of well-designed quasi-experimental study  
3 well –designed non-experimental descriptive studies | X  
4 expert committee reports or opinions and / or clinical experiences  
5 recommended best practise based on the clinical experience |

**Consultation Process**  
All relevant Medical Neurodisability and Paediatric Orthopaedic and Physiotherapy Staff

**Target audience**  
All staff caring for children with the above problem.

*This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.*
Summary of changes for new version:

Nottinghamshire will be adopting the CPIP pathway from April 2018. As such the hip screening protocol is changing to reflect this change.

All children with cerebral palsy will be offered the chance to participate in the CPIP programme. They will receive repeated clinical examinations from a community physiotherapist at standard intervals and will receive x-rays as per a standard timetable based on GMFCS.

X-rays will be ordered by the physiotherapists in the community and reported by the radiographers using the Trauma Cad system. Migration percentage will be recorded in the CPIP database and automatically awarded a rating of red, amber or green based on GMFCS. Referral to an orthopaedic surgeon / paediatrician required if an amber or red score is seen.

Statement of Compliance with Child Health Guidelines SOP
This guideline refers to activities of specific teams and consultation has taken place with relevant members of that team. Therefore this version has not been circulated for wider review.
Maria Moran, Clinical Guideline Lead
18 September 2018
1. INTRODUCTION

1.1 Hip subluxation (dysplasia)/dislocation in children with cerebral palsy (CP) increases with the severity of the impairment and the risk are greatest in children who do not walk independently (1). It is usually associated with bilateral CP, rarely hemiplegia (2).

1.2 Hip subluxation/dislocation occurs in 60% of children with CP who are not walking at 5 years (3). It can result in pain, increasing deformity, inability to sit, functional restrictions, daily living problems and may lead to spinal deformity (1).

1.3 The mechanism of how this deformity develops has not been conclusively established. In children with CP the hip joints appear normal at birth but the effects of delayed motor development and tonal asymmetry lead to changes in the proximal femoral anatomy and the acetabulum. Spasticity and shortening of muscles around the hip joint and lack of ambulation also impact on the bony development and joint position.

1.4 Botulinum toxin has a role in the management of spasticity in this group but there is no evidence that it will absolutely prevent the need for hip surgery (4, 5).
2. HIP SUBLUXATION/DISLOCATION

2.1 There are two elements of hip subluxation/dislocation:
   - acetabular dysplasia
   - femoral head displacement \(^ \text{1)} \).

2.2 For children with CP the most commonly used measure for subluxation (dysplasia) is the migration percentage.

Migration percentage is the percentage of the bony width of the femoral capital epiphysis which fall lateral to a line drawn vertically from the bony lateral margin of the acetabulum, the Perkins line, on an AP pelvis X-Ray \(^ \text{6)} \).

2.3 A hip is usually considered to be subluxed if the migration is \( \geq 33 \% \) \(^ \text{6)} \).

Studies on normal children have established a range of values that can be considered within normal limits (Eklof et al, 1998), which include the annual rate of migration and actual migration. The rate of migration is an important factor in determining risk (Vidal et al) found that increases in annual rates of migration over 7% were indicative of future inability to walk in children with bilateral CP. Scrutton and Baird (1997) outlined clear risk factors detectable at 30 months of age for differing degrees of hip migration.

2.4 A hip migration percentage of 33% or more signifies hip subluxation or dysplasia but the point at which dislocation can be said to occur is controversial \(^ \text{1)} \).
3. INVESTIGATION

Since the hip migration percentage and rate of migration are so important it is evident that the method of measuring needs to be standardised, reliable and repeatable. The attached information outlines the positioning required to achieve an X-Ray that will give an accurate and repeatable measure for the migration percentage (Appendix 1).

3.1 It is possible to forecast the anatomical development of the dysplastic hip from initial X-rays and the progress of hip displacement can give an indication of the level of locomotion that will be achieved (7).

3.2 This can impact on the treatment regime related to surgery, botulinum injections, orthotics and specialist positioning equipment.

3.3 There is evidence to suggest that the acetabulum can adapt advantageously to a centred femoral head up to the age of 4/5 years after which the rate of adaptability decreases and ceases around 9 years.

3.4 Severity of disability has no significant influence on development of hip dysplasia at 18 months. Somewhere around 24-30 months when nearly all children with 'normal' locomotor development would be walking the relationship changes and it is after 30 months that the influences of severity are apparent.
4. IDENTIFICATION OF CHILDREN AT RISK

Hip subluxation can be clinically silent in children with cerebral palsy, but is linked to the severity of disease (GMFCS). The rate of hip dislocation increases with the GMFCS as shown below in Figure 1.

![Figure 1: The rate of hip dislocation in children with cerebral palsy based on GMFCS](image)

All children with cerebral palsy should undergo routine clinical examination and x-ray assessment of the hip at standard intervals to prevent unrecognised hip migration\(^\text{(8,9,10)}\).
5. CEREBRAL PALSY INTEGRATED PATHWAY (CPIP) HIP SURVEILLANCE PROGRAMME

5.1 The CPIP programme has evolved from the CPUP project from Sweden\(^8\). This system incorporated universal clinical examinations by physiotherapists and x-ray assessments at set intervals to identify hip migration at an early stage.

5.2 The rate of hip dislocation dropped to 0.8% after implementation of CPUP in Sweden in comparison to 15% Norway with an unscreened population\(^8,9\).

5.3 The number of children requiring surgical intervention for skeletal contracture or bony deformity fell from 40% to 15% with a shift towards smaller soft tissue surgery after CPUP implementation\(^10\).

5.4 The CPUP programme has been adopted by NHS Scotland (CPIPS) and will be adopted in the Nottinghamshire area from April 2018.

5.5 All children with cerebral palsy will be offered the opportunity to take part in the CPIP programme. They will receive standardised clinical examinations by a physiotherapist and will be referred for hip x-rays as per the protocol based on their GMFCS (Figure 2).

<table>
<thead>
<tr>
<th>Age</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMFCS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **X** - X-ray required
- **X** - X-ray as needed clinically

Figure 2: Protocol for hip x-rays based on GMFCS in CPIP programme
6. HIP RADIOGRAPH (See Appendix 1 for positioning)

6.1 This should be done with a standardised position (Scrutton, Baird 1997) to allow measurements to be repeatable and valid for accurate measure of hip migration percentage over time.

6.2 X-rays will be ordered by the community physiotherapists as per the CPIP protocol. AP pelvis radiographs will be requested stating “CPIP – for migration percentage” in the clinical information.

6.3 CPIP x-rays will be reported by the radiographers using the Trauma Cad system. Reports with the migration percentage will be returned to the physiotherapists to be entered onto the database.

6.4 When the migration percentage for the hip x-ray is entered into the CPIPS database it will automatically be allocated a label of green, amber or red based on the traffic light system (Figure 3).

6.5 Any child with a migration percentage above 33% (amber or red) should be flagged to the orthopaedic and paediatric teams to see if further management is required.

**The Traffic Light System – adapted from CPUP**

- **Green**: indicates what we regard as a normal or almost normal value.
- **Amber**: value should prompt a review of the child’s management strategy.
- **Red**: value may require referral to orthopaedic department for assessment.

Figure 3: The traffic light system for CPIPS from CPIPS manual
7.1 Flow Chart Hip Surveillance Programme
NUH NHS Trust and Notts Community Teaching PCT

All children identified as having Cerebral Palsy referred to CPIP programme

Routine clinical examination and referral for x-ray as per protocol based on GMFCS

AP pelvis x-ray ordered by physiotherapist stating "CPIP for migration percentage" in clinical information

- Green – Migration percentage <33%
  - To continue in CPIP programme

- Amber – Migration percentage 33% - 40%
  - For review by orthopaedics / paediatrics to see if action needed

- Red – Migration percentage >40%
  - For review by orthopaedics / paediatrics for management as needed
Appendix 1 – Positioning for AP pelvic x-ray as per CPIPS Manual\(^{(11)}\)

**Hilgenreiner’s line ‘H’** = a horizontal line joining the triradiate cartilages.

**Perkins line ‘P’** = a perpendicular to Hilgenreiner’s line drawn at the lateral margin of the bony acetabulum.

**Migration Percentage (MP)**

The MP is the proportion of ossified femoral head lateral to Perkin’s line = A/B x 100.

**Standardised radiographic positioning**

1. Legs parallel, patellae facing upwards.
2. Pelvis flat, lordosis reduced.
REFERENCES


4. To Assess the Effectiveness of Postural Management Programmes in Reducing Hip Dislocation in Children with Bilateral Cerebral Palsy. Pountney, Mandy, Green, Barton 1998-2005


