Introduction To The New AACPDM Hip Surveillance Care Pathway For Children With Cerebral Palsy:

What's the Consensus?
How Can It Be Implemented?

AACPDM
September 15, 2017
Montreal Quebec Canada
DEFINITIONS:
Hip surveillance is defined as: “The process of monitoring and identifying the critical early indicators of hip displacement.” Hip displacement refers to the displacement of the femoral head laterally out of the acetabulum and is measured using a migration percentage (MP). Hip subluxation refers to hip displacement where the femoral head is partially displaced from under the acetabulum while hip dislocation refers to hip displacement where the femoral head is completely displaced from under the acetabulum.

IMPACT: WHY IS HIP SURVEILLANCE IMPORTANT?
• Hip displacement and dislocation can lead to pain, reduced function and reduced quality of life.
• Children with cerebral palsy (CP) have an increased likelihood of hip displacement.
• Hip surveillance allows for early detection of hip displacement.
• Early detection enables referral for assessment and/or management.
• Hip surveillance for children with CP should be completed using a systematic approach.

TARGET POPULATION: Pediatric/Children & Youth Population (age ≤19 years) diagnosed with CP or those children not yet diagnosed with CP but for whom there is a clinical suspicion of having CP.

TARGET CLINICAL PROVIDERS: Pediatricians including Pediatric Sub-Specialists, Radiologists and Pediatric Orthopedic Surgeons, Therapists, Radiology Technicians, and Nurses providing musculoskeletal care for children/youth with CP.

ASSESSMENT
Hip surveillance involves a multi-step process for every child with CP.
Surveillance consists of two components: a clinical examination and a radiographic examination which are completed at surveillance intervals which vary according to risk. The clinical examination involves determining/re-confirming, age, Gross Motor Function Classification System (GMFCS) level and Winters, Gage, Hicks (WGH) gait type at each surveillance interval in addition to inquiring re: pain during history taking. Hip abduction passive range of motion (PROM) is also measured with attention given to presence of pain on assessment.

Radiographic examination consists of measurement of migration percentage (MP) from a supine AP pelvis radiograph with standardised positioning.

FREQUENCY
Surveillance frequency is based on a child’s age, GMFCS level, and WGH gait type. Surveillance is ideally initiated by 2 years of age, when a CP diagnosis is provided, or when CP is suspected. Surveillance frequency increases with increasing GMFCS level; frequency modifiers are based on absolute MP value and percentage change in MP.

Discharge criteria vary depending on GMFCS level and WGH gait type. Children at GMFCS levels III to V and those with a WGH Gait Type IV hemiplegia are discharged at skeletal maturity except those with a MP greater than 30% or those with pelvic obliquity in the presence of increasing scoliosis where continued surveillance is recommended. Children at GMFCS levels I and II are discharged earlier if MP is stable and under 30%.

REFERRAL
Referral to a pediatric physiatrist, developmental paediatrician or pediatric orthopedic surgeon with experience treating hip displacement in children with CP is recommended when there is presence of hip pain on history and/or physical examination. When the migration percentage is greater than 30% and/or there is less than 30 degrees of hip abduction with or without other findings, referral to a pediatric orthopaedic surgeon is recommended.
**Child/Youth with Cerebral Palsy OR Clinical Suspicion of Cerebral Palsy**

**Initiate Hip Surveillance**
**Provide Information to Family**

**Complete Clinical Assessment**
- Determine Gross Motor Function Classification System (GMFCS)\(^1\) Level
- Determine Age
- Determine Winters, Gage, Hicks (WGH)\(^2\) Gait Type for children with hemiplegia
- Inquire re: presence of pain in history taking *
- Assess pain during physical examination
- Measure hip abduction passive range of motion

**See Frequency Table to Determine Need for Radiograph**

**Complete Radiological Examination (if indicated)**
- Complete AP Pelvis with standardized positioning
- Measure Migration Percentage from AP Pelvis

**Is one or more of the following present?**
- Positive response to question re: pain *\(^*\)
- Pain on physical examination *\(^*\)
- Migration percentage > 30% on AP pelvis *\(^*\)
- Hip abduction passive range of motion <30°

**Refer to Physician *\(^*\)**
- Physician refers to pediatric orthopedic surgeon, pediatric physiatrist, developmental pediatrician with experience treating hip displacement in children with CP.

**Continue Surveillance**

**Use Frequency Table to Determine Timing of Next Clinical & Radiological Exams Based on:**
- GMFCS
- Age
- WGH Type

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*Do [does] you [your child] have hip pain? You may notice this when you move [your child moves] your [their] hip or after prolonged activity, when changing your [your child's] position, when you move your [your child's] leg or when looking after your [your child's] personal care.


*Clinicians collaborate to ensure planned approach to ongoing surveillance.
## HIP SURVEILLANCE FREQUENCY

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<th>Age (Years)</th>
<th>GMFCS I</th>
<th>GMFCS II</th>
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### Notes re: Initiation

- If CP is diagnosed or suspected after age 2 but before 4 years, begin surveillance immediately. Do not wait until 4 years of age.
- If CP is diagnosed or suspected after age 2, immediately begin 12-monthly schedule for a minimum of 24 months.
- If CP is diagnosed or suspected after age 2, immediately begin 6-monthly schedule and continue for a minimum of 24 months at that frequency.
- If CP is diagnosed or suspected after age 2 but before age 4, begin surveillance immediately.

*If there is any doubt of the GMFCS level, follow the recommendation for the higher level.

### Frequency Modifiers

- Do not reduce from previous higher frequency if:
  1. 24 months of surveillance have not yet been completed based on a child’s surveillance start date;
  2. Stability is not yet achieved over a period of 2 years. Stability is defined as < 10% change in MP over a 12 month period;
  OR
  3. MP > 30%.

### Discharge

- Discharge if MP ≤30% at age 10 (unless WGH Gait Type IV).
- Discharge if skeletally mature and MP ≤30%.

† In the presence of pelvic obliquity associated with clinical or radiographic evidence of increasing scoliosis, the hip/s continue to be at risk and should ideally be monitored even beyond skeletal maturity.

The purpose of this document is to provide health care professionals with recommendations for hip surveillance of children and youth with cerebral palsy. This summary was produced by the AACPDM Hip Surveillance Care Pathway Team (M O’Donnell [team lead], T Mayson [project manager and clinical examination sub-group leader], S Miller [radiology sub-group leader], R Cairns, K Graham, S Love, F Miller, K Mulpuri, U Narayanan, H Read, B Shore, K Stannage, P Thomason, J Vargus-Adams, L Wiggins, K Willoughby, M Wynter). The summary is based on current evidence and expert consensus when evidence was insufficient. The care pathway and the methodology used to create it will be submitted for peer-reviewed publication. However, health care professionals should continue to use their own judgement and take into account additional relevant factors and context. The AACPDM is not liable for any damages, claims, liabilities, or costs arising from the use of these recommendations including loss or damages arising from any claims made by a third party.
Section II: Published Evidence

The published literature was reviewed to determine the effectiveness of hip surveillance in children with cerebral palsy as well as the elements that should be included in hip surveillance and their recommended frequency. The Hip Surveillance Care Pathway is based on this current best evidence as well as expert consensus when evidence was not available. The care pathway and the methodology used to create it will be submitted for peer-reviewed publication.

Evidence for Hip Surveillance Effectiveness:

The literature supports the completion of hip surveillance in children and youth with cerebral palsy.


Evidence for Hip Surveillance Clinical Examination and Hip Health Practical Tool Content:

The literature supports that hip surveillance be based on a child’s age and Gross Motor Function Classification System. The additional content of the clinical examination component of the Hip Surveillance Care Pathway as well as the Hip Health Practical Tool was established through expert consensus after review of the literature.


Evidence for Hip Surveillance Radiographic Examination and Radiography Practical Tool Content:

The literature supports hip surveillance based on a child’s migration percentage as measured on an AP pelvis radiograph taken with standardized positioning. The content of the Hip Surveillance Care Pathway and the Radiography Practical Tool was established through expert consensus after review of the literature. A review of this literature will be submitted for peer-reviewed publication.


Evidence for Hip Surveillance Frequency:

The content of the care pathway was established through expert consensus after review of the literature and comparison of currently existing international hip surveillance programs in Australia (Consensus Statement on Standards of Care), Canada (British Columbia Provincial Hip Surveillance Program; Holland Bloorview Kids Rehabilitation Hospital, Ontario; Grandview Children’s Centre, Ontario); USA (Boston Children’s Hospital, Boston, MA; Alfred I. DuPont Hospital for Children, Wilmington, DW); Sweden (CPUP); United Kingdom (Bristol, Scotland). Program comparisons will be submitted for peer-reviewed publication.

Plain Language Summary for Families

Hip surveillance is a plan for regular check-ups to watch for signs that your child’s hip may be moving out of joint (this is called hip displacement). Your child is at risk for hip displacement if your child has cerebral palsy. Cerebral palsy (CP) affects a child’s ability to move. When children are late to stand and walk or can only do so with help, the hip joint may not develop as expected. In addition, the muscles that pull the legs together and up are often tight or stiff and may affect the muscle balance around the hip. Hip displacement can lead to the hip coming completely out of the joint (hip dislocation). Hip displacement and dislocation can cause pain, difficulty moving the hip, and problems with sitting, standing, and walking.

Hip Surveillance includes clinical examinations and hip x-rays at regularly scheduled times. Clinical examinations include asking you and your child about any hip pain, measuring hip movement and noting any pain on movement. Hip x-rays are done to view the hip joint because hip displacement can occur without any signs or symptoms. Taking part in Hip Surveillance allows your child’s health care team to find hip displacement early and help your child before the hip becomes dislocated.

Your child should begin Hip Surveillance when they are diagnosed or suspected of having CP. How often your child requires Clinical Examinations and x-rays after that depends on their ability to move. We use a scale called the Gross Motor Function Classification System (GMFCS) to help us with this.

The GMFCS is used to describe a child’s ability to move and includes five levels from Roman numeral I (1) to V (5). Your child’s physiotherapist, occupational therapist, family doctor, or pediatrician can help you determine your child’s GMFCS level in just a few minutes.

- Risk for hip displacement is directly related to GMFCS level.
- Children whose ability to move is at GMFCS Level I have the lowest risk of hip displacement. They receive the fewest Clinical Examinations and x-rays.
- Children whose ability to move is at GMFCS Level V have the highest risk of hip displacement (8 out of 10 children that are at GMFCS Level V will have hip displacement). Clinical Examinations and x-rays are done most often for children that are at GMFCS Levels IV and V.
- In addition to GMFCS, children with hemiplegia (one side of the body affected) who walk with one hip turned and pulled inward (this is called a Gait Type IV pattern of walking) are at higher risk for hip displacement.

The table in the care pathway shows how often children need clinical examinations and hip x-rays.

Children at low risk will stop Hip Surveillance at age 6 years (ability to move at GMFCS I) or 10 years (ability to move at GMFCS II). Because hip displacement can occur while children and youth are growing, children who are at higher risk (ability to move is at GMFCS Levels III, IV, and V or a Hemiplegia Gait Type IV pattern of walking) take part in Hip Surveillance until an x-ray determines that their bones have stopped growing.

If your child’s health care team finds signs of hip displacement, they can refer your child to a doctor with experience treating hip displacement in children with CP to determine suitable next steps to prevent hip dislocation.

The following summary, aimed to support parents and families, was provided by the Child Health BC Hip Surveillance Program for Children with Cerebral Palsy in British Columbia, Canada. If replicated please acknowledge appropriately.
**Gross Motor Function Classification System (GMFCS)**

For information regarding the GMFCS, please see:


**Winters, Gage, Hicks (WGH) Type IV Gait Pattern in Children with Hemiplegia**

For information regarding the WGH Type IV gait in children with hemiplegia, please see:


**Hip Health Addendum Practical Tool**

Hip surveillance is one component in the musculoskeletal care of children with cerebral palsy. As part of the ‘Hip Surveillance Pathway’ consensus building process, various measures, tests and clinical questions were identified by the expert panel as being helpful in supporting hip/musculoskeletal health.

While these items were not identified as being necessary for hip surveillance, the consensus panel agrees that the following list of measures are worthy of your consideration as you evaluate hip health on an ongoing basis for children with cerebral palsy.

<table>
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<tr>
<th>Passive Range of Motion</th>
<th>Hip Flexion</th>
<th>Hip Extension</th>
<th>Hip Internal Rotation</th>
<th>Hip External Rotation</th>
<th>Hip Abduction</th>
<th>Popliteal angle</th>
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<td>Question re: Decrease in Ability to Weight-Bear through Hip</td>
<td>Question re: Deterioration in Ability to Walk</td>
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<td>Other</td>
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Radiography Addendum Practical Tools

1. Antero-posterior (AP) Pelvis Radiograph Positioning

A supine AP pelvis radiograph in a standardized position is required to accurately measure migration percentage (MP). MP values can be impacted by hip abduction (MP may measure low) and adduction (MP may measure high) so femurs should be positioned in neutral adduction/abduction. Measurement of MP requires that the triradiate cartilages be visible and therefore anterior and posterior pelvic tilt must be corrected. Position with neutral pelvic obliquity and flattened lordosis. Position as close to optimal as possible.

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2. Field of View & Gonad Protection

An AP pelvis radiograph is recommended for hip surveillance. The ideal field of view will include the proximal femurs; this allows for the assessment of whether the femurs were positioned in neutral abduction/adduction, as required for measuring migration percentage. Visualization of the iliac crests is recommended as it may be helpful in determining pelvic obliquity and in assessing skeletal maturity using the Risser sign. Local gonad protection guidelines should be adopted. An example of the preferred field of view is provided.
3. **Measuring Migration Percentage**

Reimer’s migration percentage (MP) is the recommended measurement to assess hip displacement. MP represents the portion of the ossified femoral head that is not covered by the ossified acetabular roof.

1. Draw Hilgenreiner’s line (H), a horizontal line between the superior aspect of the triradiate cartilages. When the triradiate cartilages are closed, after skeletal maturity, the most useful horizontal line is through the most inferior points of the acetabular teardrops.
2. Draw Perkin’s line (P), perpendicular to Hilgenreiner’s line, at the lateral edge of the acetabulum (*see notes on identification of Gothic arch*).
3. Draw lines, parallel to Perkin’s line, along the medial and lateral side of the ossified femoral head.
4. Measure distance between medial and lateral sides of the femoral head (B).
5. Measure distance between Perkin’s line and lateral side of the femoral head (A).
6. Calculate MP (A/B \times 100%).

4. Identification of Gothic Arch

A “Gothic arch” results when eccentric pressure from a displaced femoral head causes the inhibition of ossification of the superolateral aspect of the cartilaginous acetabulum (Parrott et al., 2002). When present, there is a risk that the measurement of MP could be underestimated. If a gothic arch is observed on x-ray, significant acetabular dysplasia is present, hip migration is likely significant, and it is recommended the child be referred to a pediatric orthopaedic surgeon. It is recommended that the midpoint of the arch be used when placing Perkin’s line (Parrott et al., 2002; Hagglund et al., 2007).
## Section IV: Acknowledgements

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<th>Name</th>
<th>Affiliation(s)</th>
<th>Location</th>
<th>Specialty Expertise</th>
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<tbody>
<tr>
<td>Maureen O’Donnell (Lead)</td>
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What's the Consensus? How Can It Be Implemented?

September 15, 2017
Montreal Quebec Canada

Formal Course Objectives
1. Describe the evidence in support of hip surveillance and the clinical components of hip surveillance.
2. Understand the evidence behind, process for development of and content of the new international pathway.
3. List additional “hip health” adjunctive tips that were created by the international consensus group and may be useful to clinicians.
4. Describe practical “tips” for implementing hip surveillance in a variety of disciplines perspectives and variety of practice settings, including clinic, community, and state/province.
Our “Real” Goal Today...

• Is to introduce the care pathway
• To have a practical conversation about implementation – raise issues, barrier bust...
• That involves you!

AACPDM Care Pathway Team

- Robyn Cairns, Vancouver BC, Pediatric Radiology
- Kerr Graham, Melbourne Australia, Pediatric Orthopedics
- Sarah Love, Perth Australia, Physical Therapy
- Tanja Mayson, Vancouver Canada, Physical Therapy (Project Manager & subgroup lead)
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- Laura Wiggins, Glasgow Scotland, Physical Therapy
- Kate Willoughby, Melbourne Australia, Physical Therapy
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AACPDM Care Pathway Team – Intro’s

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- Kate Willoughby, Melbourne Australia, Physical Therapy
- Meredith Wynter, Brisbane Australia, Physical Therapy
Session Outline – First 1/2

1. Overview of the session including AACPDM care pathway intro  • Maureen
2. Why undertake hip surveillance? What’s the evidence??  • Kate
3. Review of the new care pathway  • Stacey
4. What about other “hip health” assessments?  • Ben and Pam

10 min break

Session Outline - Second 1/2

Panel Presentation/ Discussion – with you!

- “How to” from three jurisdictions perspective (US example, Australia, BC in Canada)
- Including questions for the panel...
  ... how do families feel about this?
  ... how to “find” all potential kids?
  ... how to ensure radiology quality?
  ... your questions!

Session Outline – First 1/2

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10 min break
Care pathways work began in 2014
- Working group created
- Created process for all care pathway development
- ID'd 6 inaugural care pathways

What is an AACPDM “Care Pathway”?

It is a ...
- Structured
- Multi-disciplinary
- Plan for care (of an individual child)
- Aimed to support the implementation of clinical guidelines and best evidence
- Includes a step-wise sequencing of care (aka algorithm)

What’s the difference from a clinical practice guideline again?

What are Clinical Practice Guidelines?
The IOM (2011) defined clinical practice guidelines as “statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options.” Trustworthy guidelines should be based on a systematic evidence review, developed by panel of multidisciplinary experts, provide a clear explanation of the logical relationships between alternative care options and health outcomes, and provide ratings of both the quality of evidence and the strength of the recommendations.

Accessed September 3, 2017
https://www.nhlbi.nih.gov/health-pro/guidelines/about
Care Pathway Development

The Process in a Nutshell

- ID area of need
- Assemble multi-disciplinary, (international) working group
- "Define the parameters of the question/project well (Project charter)"
- Review/assemble best evidence
  - Literature – SR’s, specific lit review re: each branch in algorithm
  - International jurisdictional review of guidelines and programs
- Come to consensus - meetings using tele-conferencing, Go-to-meeting, online survey tools
- Assemble supportive documents

Hip Surveillance

- "The process of monitoring and identifying the critical early indicators of hip displacement."
The Process in a Nutshell

- ID area of need
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- *Define the parameters of the question/project well (Project charter)*
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Key Decisions in the Project Charter

- Hip surveillance should be based on:
  - Age
  - GMFCS level
  - Classification as WGH gait type IV or not
  - Migration percentage
- Surveillance should consist of radiological exams & clinical assessments
- Pathway represents minimum requirements for only hip surveillance
- Pathway will guide care for individual children; NOT about how to operationalize surveillance (case finding, data management, care coordination)
e.g. Comparison of Clinical Exam Content

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
<th>Region 4</th>
<th>Region 5</th>
<th>Region 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure</td>
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<td></td>
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</tr>
</tbody>
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The Process in a Nutshell

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Session Outline – First 1/2

1. Overview of the session including AACPDM care pathway intro
   - Maureen
2. Why undertake hip surveillance? What’s the evidence?
   - Kate
3. Review of the new care pathway
   - Stacey
4. What about other “hip health” assessments?
   - Ben and Pam

10 min break

Why undertake Hip Surveillance? What’s the evidence?

Kate Willoughby
Melbourne Australia

Hip Surveillance: Effectiveness

- Significant decrease in the incidence of hip dislocation
- Southern Sweden: 2 children had hip dislocation at 2014 audit date
Hip Health in CP: More than just ‘dislocation’

A healthy hip:
- Has satisfactory morphology,
- Is mobile,
- Does not limit function,
- Is PAIN FREE

Classifying Hip Morphology

A classification system for hip disease in cerebral palsy

Quantitative Radiographic Measure
- Migration percentage

Qualitative Radiographic Features
- Break in Shenton’s line
- Shape of the femoral head
- Development of lateral acetabular margin
- Presence of pelvic obliquity

Hip Health at Skeletal Maturity

Associations:
- GMFCS and hip morphology (MCPHCS)
- MCPHCS and Pain (Likert scales)
- MCPHCS and Hip Surveillance
Hip Health at Skeletal Maturity

- Pain severity increases as hip morphology worsens
- Pain severity higher at MCPHCS 5/6 (severe subluxation/dislocation)
- No association between MCPHCS and GMFCS
- Relationship between hip radiographs and a better outcome
- Those under hip surveillance had a better hip morphology at skeletal maturity

Hip Health at Skeletal Maturity

- Most bilateral dislocated or severely displaced hips were painful
- Pain reported by ambulant young adults with milder hip displacement
- Unilateral dislocations with windswept deformity were always painful
- Hip surveillance strongly associated with a better outcome

Session Outline – First 1/2

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4. What about other “hip health” assessments?  • Ben and Pam

10 min break
Clinical Exam

If child has hemiplegia, identify if WGH Gait Type IV

Clinical Exam

Complete Clinical Assessment

- Determine Gross Motor Function Classification System (GMFCS) Level
- Determine Age
- Determine Winters, Gage, Hicks (WGH) Gait Type for children with hemiplegia
- Inquire re: presence of pain in history taking *
- Assess pain during physical examination
- Measure hip abduction passive range of motion

AACPDM Hip Surveillance Care Pathway

See Frequency Table to Determine Need for Radiograph

- Complete Radiological Examination (if indicated)
- Complete AP Pelvis with standardized positioning
- Measure Migration Percentage from AP Pelvis
### Initiation of Surveillance

<table>
<thead>
<tr>
<th>Age Group</th>
<th>GMFCS I</th>
<th>GMFCS II</th>
<th>GMFCS III</th>
<th>GMFCS IV &amp; V</th>
<th>Any GMFCS (need with V ~ CP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years or at 3</td>
<td><img src="image1" alt="Diagram Image" /></td>
<td><img src="image2" alt="Diagram Image" /></td>
<td><img src="image3" alt="Diagram Image" /></td>
<td><img src="image4" alt="Diagram Image" /></td>
<td><img src="image5" alt="Diagram Image" /></td>
</tr>
</tbody>
</table>

**Notes:**
- GMFCS I is diagnosed or suspected after age 2 but before age 5. Start surveillance immediately. Do not reduce from previous higher frequency if:
  - (2) stability is not yet achieved over a period of 2 years. Stability is defined as ≤ 10% change in MP over a 12 month period.
  - OR
  - (3) MP > 30%.

### GMFCS IV & V

**Do not reduce from previous higher frequency if:**

1. 24 months of surveillance have not yet been completed based on a child’s surveillance start date.
2. Stability is not yet achieved over a period of 2 years. Stability is defined as ≤ 10% change in MP over a 12 month period.

OR

3. MP > 30%.
Do not reduce from previous higher frequency II:

1. 24 months of surveillance have not yet been completed based on a child's surveillance start date; OR
2. Stability is not yet achieved over a period of 2 years. Stability is defined as <10% change in MP over a 12 month period; OR
3. MP > 30%

GMFCS I

GMFCS II

GMFCS III
Radiological Exam

- AP pelvis (supine)
- Positioning
  - Abduction/adduction: Neutral
  - Hip rotation: Patellae up
  - Neutral Pelvic Obliquity; Flattened lordosis

AACPDM Hip Surveillance Care Pathway

See Frequency Table to Determine Need for Radiograph

Complete Radiological Examination (if indicated)

- Complete AP Pelvis with standardized positioning
- Measure Migration Percentage from AP Pelvis

Any GMFCS Level with Winters Gage Hicks Gait Type IV

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Radiological Exam

- Measure: Migration Percentage (MP)
- Abnormal MP: MP >30%
- Stable MP: no Δ in MP >10% in a 12 month period
- Skeletal Maturity: Closure of triradiate

Radiological Exam

- Optimal Field of View
- Gonad Protection
  - Per local guidelines
Discharge/Continue Surveillance

Clarifications?

Session Outline – First 1/2

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   • Ben and Pam

10 min break
What else to consider for the hip?

“Hip Health”

Ben Shore
Pam Thomason

Hip Health in CP

• Hip surveillance
  – One component of musculoskeletal care
  – Primary measures GMFCS and MP

• Musculoskeletal assessment
  – part of a comprehensive care for children with CP
  – Primarily not required for hip surveillance
  – But important to evaluate hip health

Hip health in CP

• The hip joint should be:
  – Flexible
  – PAIN FREE
  – Not limit function

• Femoral head covered by acetabulum
**Hip health in the context of the child**

- Mobility
  - Goals vary depending on GMFCS
- Pain
- ADL
- Weight bearing
- Bone health
- Medication

- Mood / anxiety
- Cardio-respiratory
- Oro-motor function
- Constipation
- Reflux
- Epilepsy
- Nutrition
- Sleep

---

**Questions?**

- Family best source of information
- Deterioration or change in:
  - Ability to care
  - Weight bear through hip
  - Stand and step
  - Walk or walking pattern

---

**Physical examination**

Range of motion
- Hip abduction
- Hip flexion-extension
- Hip rotation
- FNA
- Popliteal angle

Muscle tone
- Hip adductors
- Hip flexors
- Hamstrings
Importance of symmetry

- Spinal deformity
- Pelvic obliquity
- Leg length discrepancy

Pelvic obliquity: Prevalence and long term consequences

Pelvic obliquity
Pelvic obliquity

1. High prevalence but majority mild
2. Increased SAA and MP always high side
3. Unilateral dislocation always high side

Classification of Hip Morphology

- Quantitative Radiographic Measure
  - Migration percentage
- Qualitative Radiographic Features
  - Break in Shenton’s line
  - Shape of the femoral head
  - Development of lateral acetabular margin
  - Presence of pelvic obliquity

Melbourne Cerebral Palsy Hip Classification Scale - Expanded and Revised

Melbourne Cerebral Palsy Hip Classification Scale - Expanded & Revised

- Normal hip
- Near Normal Hip
- Dysplastic Hip
- Dysplastic - Mild Subluxation
- Mod-Severe Subluxation
- Dislocated
- Salvage Surgery
Hip Health at Skeletal Maturity

1. Pain severity increases as hip morphology worsens
2. No association between MCPHCS and GMFCS
3. Most bilateral dislocated and severely displaced hips painful
4. Unilateral dislocations with windswept deformities always painful
5. Hip surveillance associated with a better outcome

Session Outline – First 1/2

1. Overview of the session including AACPDM care pathway intro
   - Maureen
2. Why undertake hip surveillance?
   - Why’s the evidence??
   - Kate
3. Review of the new care pathway
4. What about other “hip health” assessments?
   - 10 min break

Session Outline - Second 1/2

Panel Presentation/Discussion – with you!

- “How to” from three jurisdictions perspective (US example, Australia, BC in Canada)
- Including questions for the panel...
  ... how do families feel about this?
  ... how to “find” all potential kids?
  ... how to ensure radiology quality?
  ... your questions!
Let's introduce our panel...

Three examples - from three different contexts

How to implement?

Thing to consider when implementing...

- The decision to start surveillance is made by... (e.g., who starts things? How does a child get "enrolled")?
- Information for families at the time of initiation/enrollment is provided by or through...
- The routine clinical exams of surveillance are done by...
- The x-ray is ordered by...
- The x-ray is read by...
- The person who is responsible for putting together the information from the clinical exam and x-ray (and who shares this with the family is)
- If there are problems with the x-ray or concerns with the clinical exam and a referral to doc is needed, this referral is done by...
- The way we make sure that kids get the follow-up in the right frequency is/will be...
- We know the population of children with CP in our "jurisdiction" or "catchment" are getting surveillance done because...
- An important thing or two that I would say is a final lesson learned from our approach is...
Implementation: a US example

How Hip Surveillance is Currently Practiced in the United States

Benjamin Shore MD MPH FRCSC
Boston Children’s Hospital

Questions we will address

• When does hip surveillance begin?
• Who initiates surveillance?
• Who places the x-ray orders and who interpretes them?
• Who is the person who organizes care?
• How do we know who our population is?
• Who establishes frequency of follow up and treatment if necessary?
Boston Children’s Hospital

- 415 bed hospital
- 160 MDs
- 1300 RNs
- 16,000 inpatient admissions/yr
- 60,000 ED visits/yr
- >20,000 outpatient surgeries/yr

Boston Children’s Hospital – CP Center

OTHER CLINICS
- NEUROLOGY
- NEUROSURGERY
- COMPLEX MEDICINE
- ORTHOPEDICS
- ORTHOPEDICS/PHYSIATRY
- PHYSIATRY
Boston Children’s Hospital

- Developed hospital guidelines
- Educated providers
- Created order-sets for radiology

Practicing Hip Surveillance: Challenges in the USA

- High costs
- Lack of Hip Surveillance Education
- Health Care Fragmentation
- Health Care Disparities
- Insurance Variability/Restriction

Current Practice

- Hip surveillance in the US currently run by
  - Orthopedic Surgeons
  - Physiatrists
  - Neurologist
- Inverted pyramid of care
- “Hip Screening” Not “Hip Surveillance”
Moving Forward

- Transition from “Screening to Surveillance”
- Improve education
- Establish a point of entry at the therapist level
  - School based enrollment similar to scoliosis
- Create national guidelines and benchmarks

Implementation – Australia’s approach/es

Implementing... Australia style

- The decision to start surveillance is made by... (e.g., who starts things? How does a child get “enrolled”?)
- Information for families at the time of enrollment is provided by or through...
- The routine clinical exams of surveillance are done by...
- The x-ray is ordered by...
- The provider who is responsible for putting together the information from the clinical exam and x-ray (and who shares this with the family is)
- If there are problems with the x-ray or concerns with the clinical exam and a referral to doc is needed, this referral is done by...
- The way we make sure that kids get the follow-up in the right frequency is/will be...
- We know the population of children with CP in our "jurisdiction" or "catchment" are getting surveillance done because...
- An important thing or two that I would say is a final lesson learned from our approach is...
Implementation –
A Canadian province’s approach

Building Consensus in BC
- Provincial meetings in 2011 & 2012
- 50 participants
- All regions represented
- Inter-disciplinary
  - Parents
  - Pediatric orthopaedic surgeons
  - Pediatricians
  - Developmental Pediatricians
  - GPs
  - Physiotherapists
  - Occupational Therapists
  - Nurse
  - Radiology
  - Health administrators
  - Policy makers
BC Hip Surveillance Program

Any clarifications requested of our presenters?
Implementation: Ask our Panel

Implementation question:

What has been your experience regarding how families respond to or feel about hip surveillance?

Implementation question:

What solutions or tips do you have to offer with respect to getting kids enrolled at diagnosis or before age 2 years?

How much does having the "diagnosis" of CP play into this? How do you manage that?
Implementation question

Regarding radiology...

What are your practical tips for x-rays done well – i.e. with good positioning? Or is this even an issue?
Read/reported well? Or is this even an issue?

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Implementation question – from participants

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Implementation question (if time permits)

Practical tips for making sure that the clinical exam information and the x-ray information get put together and shared with family?

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In your experience, what can most help PT’s contribute to and/or drive hip surveillance?

What’s your one final quick tip to those undertaking hip surveillance?
Formal Course Objectives

1. Describe the evidence in support of hip surveillance and the clinical components of hip surveillance.

2. Understand the evidence behind, process for development of and content of the new international pathway.

3. List additional “hip health” adjunctive tips that were created by the international consensus group and may be useful to clinicians.

4. Describe practical “tips” for implementing hip surveillance in a variety of disciplines perspectives and variety of practice settings, including clinic, community, and state/province settings.