CPIPS
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CPIPS

- Cerebral Palsy Integrated Pathway Scotland
CPIPS

• What is ‘CPIPS’?

• **CPIPS** is a follow-up programme for children with cerebral palsy or suspected cerebral palsy, allowing early detection of changes in muscles and joints with the option of earlier treatment for the child. This may help prevent problems developing in the future.
"Dislocation of the hip in cerebral palsy is preventable"

M.O. Tachdjian 1956
Hip Displacement in Cerebral Palsy

- Cerebral Palsy is a non-progressive neurological condition
- Progressive orthopaedic condition
- Reasons for hip displacement are multifactorial
- The hip should never be viewed in isolation
Hip dislocation
Migration percentage of Reimers
Migration Index = \( \frac{a}{D} \times 100\% \)
Hip Displacement (MP>30%) & GMFCS

Soo et al., JBJS 2006
Prevalence

• Prevalence of displacement MP > 30% is similar in all studies at 32%
• Prevalence is directly related to GMFCS
• But not to Movement Disorder
  Spastic = Dyskinetic = Hypotonic = Mixed
• Direction of dislocation
  cranial 93%  posterior 5% anterior 2%
Patho-anatomy

• Acetabular dysplasia develops with problems of acetabular shape and volume
• Deformities of femoral head both medial and lateral flattening (Dunce’s cap deformity)
• Scoliosis and pelvic obliquity interact
• End stage: total dislocation of hip MP100%, pain, premature degenerative arthritis and varying degrees of fixed deformities
Hip dislocation
Surgery

• Prevention- iliopsoas and adductor release
  Sweden use MP of 33% as an indication for surgical intervention, no hip with an MP of greater than 42% returned to normal without operative treatment.
• Corrective Surgery – femoral and/or pelvic osteotomies

• Salvage Surgery
CPUP
Follow-up programme for Cerebral Palsy

1994
Before CPUP

10% of hips dislocated in CP population
CPUP

• Lower extremity
• Upper extremity
• Hip
• Spine
• Surgery
• Neuropaediatrician Form
Lower limb PT form

- Gross motor function (GMFCS)
- Mobility FMS
- Sitting – standing
- Orthotic treatment
- Pain
- Range of motion, spine examination
- Spasticity
- Physiotherapy
- Physical activities
Upper extremity – occupational therapist form

- Manual ability (MACS)
- Bimanual ability
- Orthotic treatment
- Pain
- Range of motion
- Occupational therapy interventions (CIT etc)
- Assistive device
Prevent contractures  Prevent hip dislocation
Surveillance — Early detection — Early Prevention
• CPUP saves money
• CPUP = Preventive treatment
Results - hip dislocation

• Dramatic reduction in no. of hip dislocations

• J Bone Joint Surg 2005;87B:95-101

G. Hägglund,
S. Andersson,
H. Düppe,
H. Lauge-Pedersen,
E. Nordmark,
L. Westbom
Contractures and operations for contracture

- 60% reduction in contractures
- 80% less surgery

J Pediatric Orthop B 2005;14:269-273

Prevention of severe contractures might replace multilevel surgery in cerebral palsy: results of a population-based health care programme and new techniques to reduce spasticity

Gunnar Hägglund, Sofia Andersson, Henrik Düppe, Henrik Lauge Pedersen, Eva Nordmark and Lena Westbom
• Windswept reduced by 40%
• Scoliosis reduced by 40%
Aims of CPUP (Sweden)

• Through continual assessment of joint range in conjunction with (as required) early intervention/ treatment to try to prevent the occurrence of hip dislocation & severe contractures therefore optimise function and improve quality of life for people with CP

• Increase knowledge of CP and the effects of different treatment methods

• Improve joint working between professionals working with people with CP
CPIPS-how it started

• 2009 Swedish Paediatric Orthopaedic Society and Scottish Paediatric Orthopaedic Club meeting
• 2010 Liverpool CP hip consensus meeting
• June 2010 a small group of surgeons from the Scottish Paediatric Orthopaedic Club met to consider a hip surveillance programme based on the CPUP model
But we didn’t know

• 1. How many children with CP lived in Scotland
• 2. How they accessed an orthopaedic surgeon
• 3. If referral pathways were similar
• 4. If clinicians had a hip surveillance protocol
• 5. If standard positioning for hip x-rays was used
Orthopaedic surgeons

• Agreed a protocol for hip radiography for children with CP at risk of hip displacement
• Agreed a protocol for X-ray technique
• Proposed a data set of clinical and radiological measures for hip surveillance
Physiotherapy

- Meetings with Physiotherapy representatives from all health boards in Scotland began in November 2011
- Very enthusiastic response
- By February 2012 we had an agreed orthopaedic and physiotherapy dataset based on traffic light system
- Cerebral Palsy Integrated Pathway Scotland CPIPS
Physiotherapy

• ‘Train the trainers’ days
• Handbook and dvd of physical examination
Core database for children with CP aged 2 years and above

- GMFCS, FMS, range of motion lower limbs, spine, postural aids, physiotherapy intervention, activity
- Radiological examination - Orthopaedic Surgeons
- Migration percentage
Clinical examination - Physiotherapists

• Six monthly for children between 2-6 years

• Annually for children over 6 years

• More frequently if red flag signs
Dataset

- An annual record of lower limb range of motion, spinal deformity, functional category and MP
- A referral mechanism for orthopaedic referral
- Patterns of therapy provision across the country
- Orthotic prescription patterns
Funding and the database

- Three years’ funding obtained from the Robert Barr Trust, Brooke’s Dream and Scottish Government
- Health Informatics Centre Dundee (CHI number)
- Trialled in Lothian in Spring 2013
Aim is to provide a high quality, standardised follow-up programme for children with CP that will identify musculoskeletal problems by regular physical and radiological examinations to enable effective management of these problems during childhood.
And then……….

• Annual CPIPS meeting
• Upper limb
• Secure long term funding
Clinical examination: Passive ROM

**HIP JOINT**
Thomas test
Abduction/knee extended Abduction knee flexed
Internal /external rotation
Popliteal Angle
Extension
Duncan Ely

**KNEE JOINT**
Flexion/extension

**ANKLE JOINT**
Dorsiflexion/knee flexed
Dorsiflexion/knee extended
Muscle tone

Tardieu scale – *dynamic component*

• Adductors
• Hamstrings
• Rectus femoris
• Gastrocnemius
Muscle tone

• Spastic tone – velocity dependent
  Tardieu scale
• Assessment of dynamic range of movement
• R1 angle of catch following fast velocity stretch
• R2 passive range of movement following slow velocity stretch

V1- velocity as slow as possible
V2- velocity of limb falling under gravity
V3- velocity as fast as possible
Tardieu
Problem !

Watch out !

OK !
TEAM

- EDUCATION
- PHYSIO
- OT
- ORTHO
- FAMILY/CARERS
- NEUROLOGIST
- ORTHOTIST
- WHEELCHAIR/WESTMARC
24 hour postural management
Dave Brailsford: the aggregation of marginal gains

“Small performance factors that, when aggregated together, can make a significant cumulative impact”
CPUP

• Data collected shows large variations in treatment methods, orthotic use, spinal jackets, ortho surgery and Botox treatment between regions

• Several projects taking place to look at and analyse the data

• Currently working on a system to put together report from information received

• Even working on system where the person with CP can log in and receive a report about their health and how it is developing
Thanks for listening

Questions?