From Trial to Application: Constraint Induced Movement Therapy (CIMT) in Paediatrics

Constraint induced movement therapy: A randomised controlled Trial in Children with Hemiplegic cerebral palsy – CATCH Trial

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Aims

• To discuss our involvement in the CATCH trial

• Critically evaluate the trial and literature in relation to practice

• Where next in our service?

• Questions at end
Cerebral Palsy: most common childhood neuromotor disability - prevalence 2 per 1000 children born in Europe (Johnson, 2002)

Hemiplegia cerebral palsy (HCP) most common presentation (Stanley et al, 2000 cited by, Sakzewski et al, 2011)

Lack of strong evidence base for treatment approaches (Sakzewski et al, 2009a)
What do you know about CIMT?

- Taub’s monkeys — de-afferented peripheral sensory nerve

- Established in Adult stroke rehabilitation

- Now in paediatrics growing body of evidence > 6 years
A randomised controlled Trial in Children with HCP

- Research Project (multi-site): largest UK CIMT RCT in paeds to date (n=60)

- Cast vs. manual constraint - control (1hr/day)

- Children with HCP aged 18 months – 4 years old

- Application pragmatic and transferable to National Health Service (NHS)
CATCH Trial

• A RCT to compare two methods of upper limb constraint induced movement therapy

• Power calculation: Sample size of 29 in each group 80% power to detect an effect size of 0.75 at 24 weeks (p=<0.05, 2tailed t-test)

• Null Hypothesis:
Using CIMT with casting in pre-school children with HCP has no significant effect on improving functional abilities compared to manual restraint
Parents/guardians of suitable participants are approached

Exclusion: Parent not wanting to participate continue with normal therapy input

Informed Consent

Baseline Assessments

Randomisation

Control arm (2-4 weeks after randomisation)

Outcome measure post intervention (10 weeks)

Outcome measure at 24 weeks

Intervention arm (2-4 weeks after randomisation)

Outcome measure post intervention (10 weeks)

Outcome measure at 24 weeks

Exit Study
Our Participants (n=4)

- Heterogenous

- Too severe?
  - Most studies select higher level clients (Huang et al, 2009)
  - Children with less hand function can benefit more (Sakzewski et al, 2009b)

- Lack of potential engagement?
  - Research needs to be representative (Greenhalgh and Wessely, 2004)
Pre and Post Outcome Measures

- Assisting Hand Assessment (AHA)
- Quality of Upper Extremity Skill Test (QUEST)
- PEDsSQL and PEDs CP questionnaires
- Parental and Nursery Feedback
Casting

• Soft cast with crepe bandage

• Or splint with crepe bandage
Therapy Intervention

• 6 weeks of active CIMT within 10 weeks, 2 week active – 2 week rest

• Therapy 1x/week

• Input - training nursery and clinic/home to carry out home programme

• Daily diaries
Therapy (with home programme – 1 hour/day)

• Therapy through play (follow child):

  • Aim (Choosing achievable tasks with achievable motor patterns):
    » Spontaneous use/activity
    » Reduced inattention affected side
    » Reaching
    » Finger extension
    » Gross grasp
    » Etc...
Observations

- **Parent feedback**
  “His hand is more open and he uses it more as a support.”

- **Nursery feedback**
  “She uses her hand during eating and is looking at her hand now”.

- **Therapy observations**
  Reduced tone in affected hand/arm
  Increased active range of movement
  Increased spontaneous use of assisting hand to support activity
Effect of Unilateral Cortical Lesion on Corticospinal Tract (CST)

Normal development

Neonate

- CST ipsilateral and contralateral connectivity in spinal cord

2 years

- Cortical activity drives CST refinement
- CST predominantly contralateral connectivity (10% ipsilateral connections)

(Martin et al, 2011)
CST ipsilateral and contralateral connectivity in spinal cord

Non-effected Cortical hemisphere activity predominantly drives CST refinement

Abnormal connectivity - Increased ipsilateral connections from non-effected hemisphere

Aberrant Ipsilateral connectivity associated with decreased fine motor function (Eyre et al, 2007).
**Literature Overview**

**No Significant effect:**

- **Cast 2 hours/day**
  - 1hr wk OT/ 6weeks
  - (Sung et al, 2005: n=31; <96mths)

- **Mitt 2 hours/day**
  - 8 weeks
  - (Wallen et al, 2011; n=50)

**Significant Effect:**

- **Splint glove 2 hours/day**
  - 2 hours therapy/ day
  - 8 wks
  - (Eliasson et al, 2005; n=41)
  - 6 hours sling/day
  - PT/OT - 6hr/d
  - 10 days
  - (Gordon et al, 2006; n=20),
  - (Charles et al, 2006; n=22)
  - **CIMT compared with Bimanual training** (same protocol as above)
  - (Sakzewski et al, 2011; n=63)
  - CIMT significantly greater effect

**Significant effect:**

- **Cast 24 hours/day**
  - PT/OT - 6 hrs/d
  - 21 days
  - (Taub et al, 2004; n=18)
  - (De Luca et al, 2006; n=18)
Reflection
Is our thinking constrained?

• More intensive = more effective

• Therapy input crucial

• But is boot camp therapy input realistic on NHS?

• Will each child tolerate 24 hours cast

• Argument for 6-12 month age application
  • before changes to CST and learned non-use (Martin et al, 2011)
Our Reflections

- Impairment level
- Personal and environmental factors
- Intensity of Therapy Time

Meaningful change to activity
Service Development

- Protocol
  - Pre-assessment
    - 4 treatment session over 3 weeks while cast -> 1 week bimanual tasks
  - Post treatment outcome measure assessment
- Parent Information Sheet/Consent form
- Therapist competencies and training
- Treatment Pathway
- Evaluate service (future: school aged children/groups)
Conclusions

• CIMT protocol transferrable to NHS

• Further consideration of therapy input intensity

• Treatment and research available for clients of all backgrounds

• Exciting new effective treatment available for children with hemiplegia in Hackney!
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References


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