CHANGEMAKERS 2021
Community implementation of developmental disability practices
Kids+ Conference

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BASIC, BETTER, BEST

Changes in intervention for people with neurodisability

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Talk outline.....

- Intervention evolution
- The evidence dilemma
- How can the evidence dilemma be tackled?
- An ongoing challenge to do the BEST…… to enable optimal participation for all.

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INTERVENTION EVOLUTION

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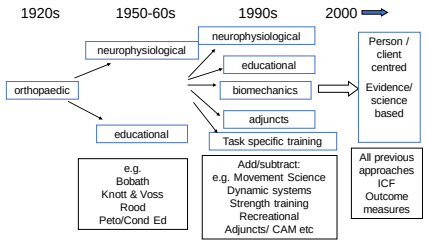
Therapy for people with neurological impairment: evolution

(Mayston, 2007)



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The guiding principles of Bobath Concept …….

Problem solving: observe, analyse, interpret, experiment
What the child can do with some help = potential
See the person as a whole- CP therapists
The family must be involved. Provide intervention which they can easily do, that makes life easier……. better
Activity is paramount: hands-on for hands-off; more effective motor coordination = reduction of atypical tone
The CNS adapts to experience: "learn the sensation of movement/action"

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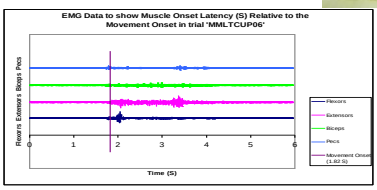
Movement Science: Schmidt, Gentile, Shepherd



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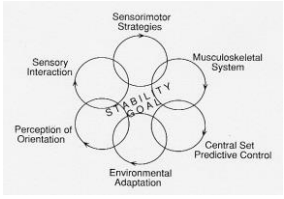

Systems= controlling the degrees of freedom; dynamic = movement emerges out of complex interactions: constrained by tasks performed (see Galea, 2004). But, may not be ideal for testing predictions because of multiple interactions; less emphasis on CNS development factors (Hadders-Algra, 2000).

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Current views about motor control

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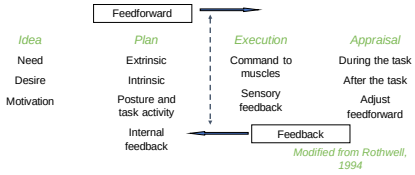
Information processing model



Modified from Rothwell, 1994

"…one can only control what one senses…." McCloskey & Prochazka, 1994

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Rich resource for all!

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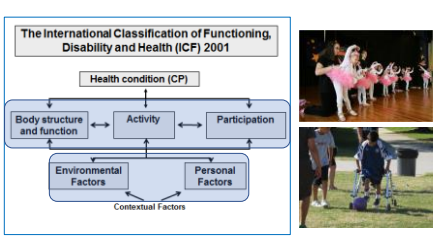

Extended to ICF-CY (2007)

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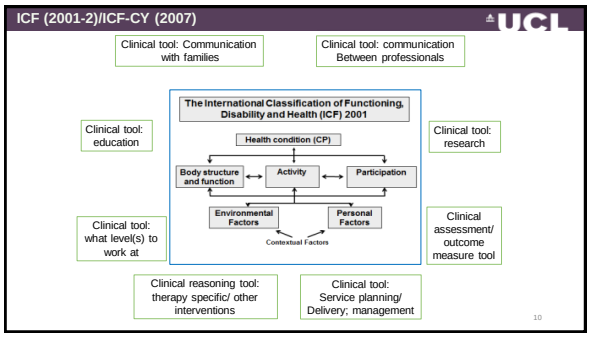
ICF (2001-2)/ICF-CY (2007)
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Clinical tool: Communication with families
Clinical tool: communication Between professionals
The International Classification of Functioning, Disability and Health (ICF) 2001
Health condition (CP)
Body structure and function
Activity
Participation
Environmental Factors
Personal Factors
Contextual Factors
Clinical tool: education
Clinical tool: research
Clinical tool: what level(s) to work at
Clinical assessment/ outcome measure tool
Clinical reasoning tool: therapy specific/ other interventions
Clinical tool: Service planning/ Delivery; management
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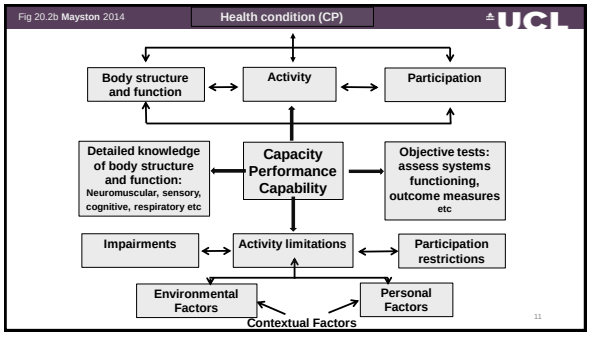
Fig 20.2b Mayston 2014
Health condition (CP)
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Body structure and function
Activity
Participation
Detailed knowledge of body structure and function: Neuromuscular, sensory, cognitive, respiratory etc
Capacity Performance Capability
Objective tests: assess systems functioning, outcome measures etc
Impairments
Activity limitations
Participation restrictions
Environmental Factors
Personal Factors
Contextual Factors
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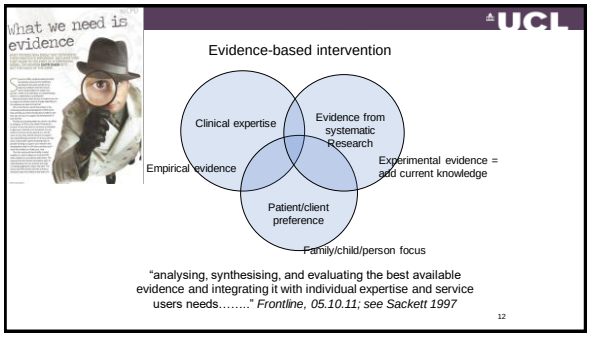
what we need is evidence
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Evidence-based intervention
Clinical expertise
Evidence from systematic Research
Empirical evidence
Experimental evidence = add current knowledge
Patient/client preference
Family/child/person focus
"analysing, synthesising, and evaluating the best available evidence and integrating it with individual expertise and service users needs……." Frontline, 05.10.11; see Sackett 1997
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Evidence from systematic research

Evidence……. what is there?

- Experimental studies: RCT, A-B-A etc
- Quantitative vs qualitative vs blended
- Single case studies
- Systematic reviews:
  - Morgan et al 2016: early intervention
  - Novak et al 2013;2020: CP interventions
  - Franki et al 2012: CP interventions as per the ICF
  - Antilla et al 2008: CP interventions based on RCTs
  - Kruijsen-Tempstra et al 2016: parental perspectives of PT/OT

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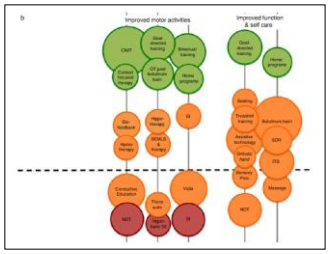
Intervention expansion …….

'Summary of the evidence for intervention' Report from …….. Novak et al 2013



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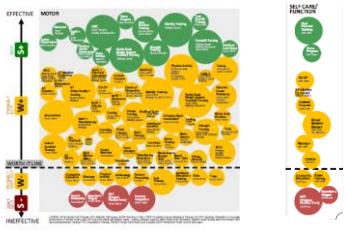
An explosion of modes of intervention……

Updated report …….. Novak et al 2020



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Evidence summaries - are these really the answer?

- What about the many variables such as age, GMFCS level, clinical topography, culture, family, location……..
- When to do it?
- How long to do it?
- How to do it?
- What about regular review and evaluation?
- How robust is the methodology?

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NICE National Institute for Health and Care Excellence

NICE guideline

Cerebral palsy in under 25s: assessment and management

NICE guideline
Published: 25 January 2017
www.nice.org.uk/guidance/ng62

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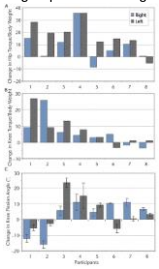
Problems of group data: heterogeneity of CP.



Damiano et al 2010

Research objective: evidence based practice: "The ultimate aim is to transform intervention prescription from a one-size fits all approach to an evidence based individualized care plan where every child and family can choose to participate in or receive only those interventions likely to maximize motor benefit, in accordance with their life goals and desires."
Damiano 2014

Meaningfulness of mean group results for determining the optimal motor rehabilitation program for an individual child with cerebral palsy

DIANE L. DAMIANO

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How can best intervention be selected……..?

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Interpretation & utilization of the traffic light system: Novak et al 2020

7 year old. unilateral spastic CP, male

- MACS III
- GMFCS II
- MT R1/R2 pl flexors: -10 /+10; Forearm flexors: 65/120:
- Personal goal: play football:

Prescribed intervention:

- CIMT
- BoNTA
- Treadmill training
- Balance training- esp. dynamic SLS
- Fitness/sport: football practice weekly

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London calls……
The Bobath course:
What? How? Why?

What I learnt…….
What, how, why, experiment….
i. Typical Dev: horizontal & vertical
ii. Atypical tonal patterns.
iii. The importance of activity!
iv. It is about living life- families are paramount; home programmes
v. Independence…… "do not take away what you cannot replace". Quality must not be at the expense of quantity
vi. Inter- & transdisciplinary
vii. Open to new ideas and learning from others e.g. Rood, Peto, orthotics etc

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Typical development

Not about:

- aiming for normality/typical performance (Rosenbaum & Gorter 2011)
- following the usual sequence of development

Relevance:

- Inter-relationship of different aspects: cognitive, motor, sensory, perceptual, behavioural, social
- reference point
- understanding essential elements underlying activities: horizontal & vertical
- 3 main areas: Mobility, communication, manipulation/arm support
- ideas for intervention

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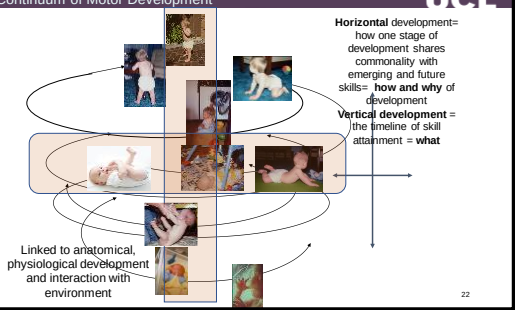
Spiral & Continuum of Motor Development



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Stages = horizontal development (Bobath & Bobath, 1984)


Development of arm support:

- Enables upright activity (links early on floor activity to upright)
- Facilities co-activation of trunk flexors/extensors for postural stability
- Improves alignment of head on trunk for use of vision; interaction with environment- visually, physically reaching out
- Improved shoulder stability improves forward reach to play, explore body, and embrace carer
- Improves activation of abdominals for thoracic/trunk/pelvic stability especially in prone; influences breath control
- Increases pelvic stability for more selective knee/ankle movement
- Weight bearing develops small muscles and arches of hand……

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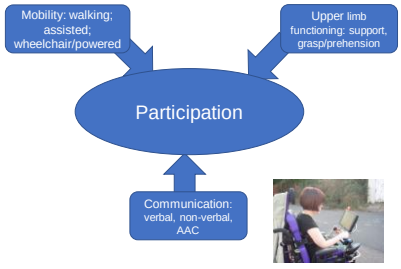
TD & ATD: 3 main goal areas:



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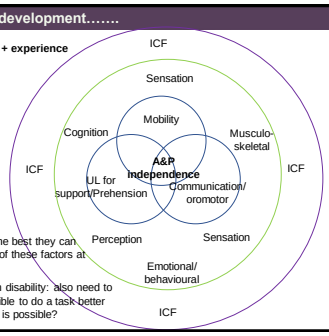
A view of typical development…….

Structure + function + experience = Participation



The child/person does the best they can on the basis of the sum of these factors at any point in time.

For the person with disability: also need to explore if it is possible to do a task better or to attain it- what is possible?

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Ch 20: Dan, Mayston, Paneth, Rosenbloom (2014)

TABLE 20.1
A general guide to main elements of intervention at different developmental stages

Age range	*Focus of development at this stage*	*Therapy focus: Gross Motor Function Classification System (GMFCS) levels I–III*	*For GMFCS levels IV and V consider in addition:*
0–20mo	Early floor mobility and exploration	Many ways of moving on the floor to enable discovery of the self with respect to others and the environment. Likes/dislikes: cause/effect. Mobility and exploration mediate learning. Introduce early communication with gestures, signs, simple pictures; self-feeding. Begin to monitor musculoskeletal status and provide aids/orthoses as appropriate.	Consider use of assisted power mobility to enable exploration. Monitor positioning for eating/drinking; check for reflux.
Toddler (20–36mo)	Mobility and peers	Realization that one is not the centre of the world and needs to interact with others. Provide alternate means of mobility as needed with supportive equipment to enable upright postures and participation in the world. Continue communication/ musculoskeletal management as needed (this is ongoing through all life stages). Behavioural: needs to learn boundaries like any children with typical development.	Children in GMFCS level V achieve 90% of their motor development by 3y so future management plans can be formulated at this stage. Independent walking is not an option. Consideration of mobility options.
Nursery school 3–5y	Need to fit a structure; peer interaction	Required to fit in with group activities and attend as needed. Often requires a reliable floor sit position: needs to develop variety of ways of doing activities, for example sitting postures/standing/ mobility. Importance of work on standing for later standing transfers if at all possible.	Children in GMFCS level IV have achieved 90% of their motor development by 3.5y and future management plans can be set out now. Introduce technology early– this will be important for the future. Switching, etc.
School years (ages 6–11y)	Independence in and outside the classroom	Mobility in and outside the classroom and independence at recreational times. Making friends; acceptance. Hip surveillance always very important (in GMFCS levels III–V) but more so at this stage as more time in sitting and greater mobility demands to keep up with the group. Recreational/physical education activities important.	Positioning, transfers, and musculoskeletal management are to the fore. Hoisting may be started and this requires good caregiver training about risk assessment.
Puberty (age ~12y)	Growth spurt: mobility challenged	Important transition to secondary school and further development of independence and choice. Early mobility options may need to be questioned, and will be again in the future. Another critical	Surgical intervention may be necessary to enable optimal positioning in sitting as standing devices that are useful to

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Application of the Bobath Concept:

- Determine child/family goals
- Observe activity/participation (ICF): how and why……***clinical reasoning***
- Hypothesize
- Test out hypotheses: ***clinical reasoning***
- Try out ways of modification- hands-on/ hands-off; part/whole task training: ***clinical reasoning***
- Interpret- the past, present and future implications: ***clinical reasoning***
- Classify- GMFCS; MACS, EDACS, CFCS, Bobath: ***clinical reasoning***
- Embed within the ICF & summarize all levels.
- Measure using valid tools as available
- Construct programme of do-able home activities/environmental factors: ***clinical reasoning***
- Train child/family/person/carers/
- Regular review and update: ***clinical reasoning***

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Child's age and classification: GMFCS/MACS/CFCS/EDACS level:

Activity and participation/ limitations & restrictions What the child can and cannot do: How and why	Body structure and function /impairments
	Neuromuscular system Tone Patterns Balance Co-ordination
	Musculoskeletal system Strength ROM
	Somatosensory and perceptual
	Cognitive
	Cardiovascular/respiratory
	Gastrointestinal
Contextual	
Environmental	Personal

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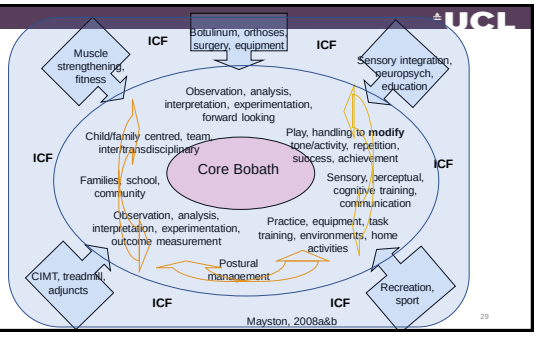

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Activity was always important……

Bobath, 1965: "…… unless you stimulate or activate your patient in the way in which new activities are possible, you have done nothing at all. So the *handling techniques as such are only the very first step in treatment*, though they are very important."

The best tone reduction (previously referred to as inhibition), is the child/client's own *more* normal (*typical*) activity, (or we could say the child/client's optimal activity). "Permanent reduction of increased tone can only be obtained by activating more normal (*typical*) co-ordination, which when established can modify and weaken the spastic hypertonia" K Bobath, 1989

These statements suggest that the Bobaths' considered that activity was of paramount importance for short and long term outcomes.

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Everything is for function!

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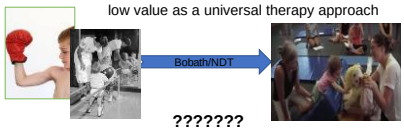
DEVELOPMENTAL MEDICINE & CHILD NEUROLOGY EDITORIAL

Bobath and NeuroDevelopmental Therapy: what is the future?

Bobath/NDT = high heritage value
low value as a universal therapy approach



???????

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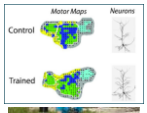
Bobaths were in some ways ahead of their time:

1. Change is possible in CNS organization & functioning which is dependent on the person's own activity i.e. activity dependent reorganization/ adaptive plasticity: now known as *neuroplasticity*
2. The movement "goes wrong before it starts" (Bobath B, 1978): now known as *feedforward* system (open loop)
3. Feedback is essential for learning (closed loop): 'we learn the *sensation* of a movement/action.'
4. Activities need to be practised- *home activities are essential*: CP/stroke = a way of life.

But……. the scientific basis was generally out of date



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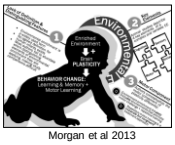
Neuroplasticity is one of our greatest allies:



Morgan et al 2013

Activity!

ACTIVITY!!

ACTIVITY!!!

NOVELTY !!!!!!!

Neuroplasticity is activity dependent..... and is present throughout life. See Johnston 2009; Ruff et al 2013; Kolb

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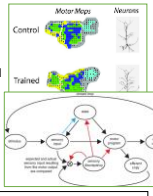
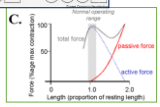
Areas of knowledge which can provide rationale for intervention

- Typical development
- Muscle physiology and biomechanics
- Motor control/motor learning theory
- Neuroplasticity





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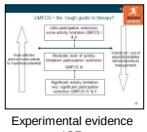
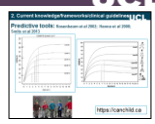
Add: Frameworks, functional classifications, guidelines





Experimental evidence
ICF
Family Centred Service/practice
Clinical guidelines
Functional classification

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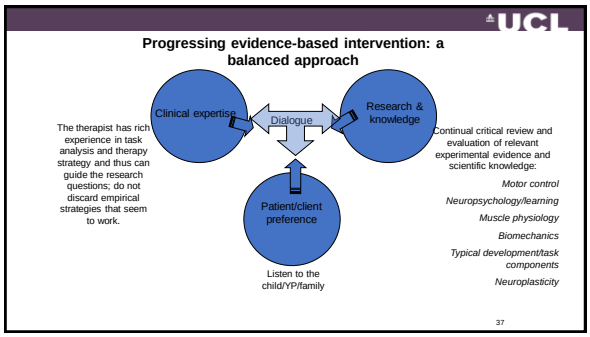
Progressing evidence-based intervention: a balanced approach
Clinical expertise
Dialogue
Research & knowledge
Patient/client preference
The therapist has rich experience in task analysis and therapy strategy and thus can guide the research questions; do not discard empirical strategies that seem to work.
Listen to the child/YP/family
Continual critical review and evaluation of relevant experimental evidence and scientific knowledge:
Motor control
Neuropsychology/learning
Muscle physiology
Biomechanics
Typical development/task components
Neuroplasticity
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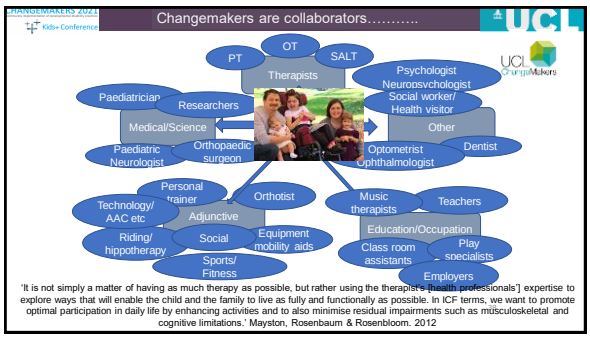
Changemakers are collaborators…….
OT
PT
SALT
Therapists
Psychologist
Neuropsychologist
Social worker/ Health visitor
Paediatrician
Researchers
Medical/Science
Other
Paediatric Neurologist
Orthopaedic surgeon
Optometrist
Ophthalmologist
Dentist
Personal trainer
Orthotist
Technology/ AAC etc
Adjunctive
Music therapists
Teachers
Education/Occupation
Riding/ hippotherapy
Social
Equipment mobility aids
Class room assistants
Play specialists
Sports/ Fitness
Employers
'It is not simply a matter of having as much therapy as possible, but rather using the therapists' [health professionals'] expertise to explore ways that will enable the child and the family to live as fully and functionally as possible. In ICF terms, we want to promote optimal participation in daily life by enhancing activities and to also minimise residual impairments such as musculoskeletal and cognitive limitations.' Mayston, Rosenbaum & Rosenbloom. 2012

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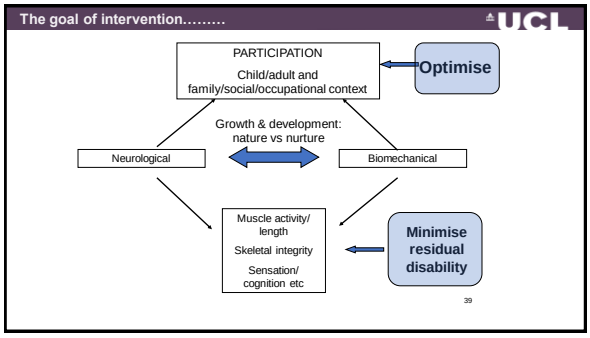
The goal of intervention……
PARTICIPATION
Child/adult and family/social/occupational context
Optimise
Growth & development: nature vs nurture
Neurological
Biomechanical
Muscle activity/ length
Skeletal integrity
Sensation/ cognition etc
Minimise residual disability
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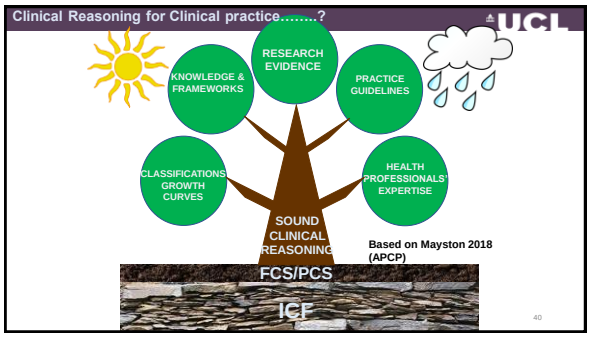
Clinical Reasoning for Clinical practice……..?
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KNOWLEDGE & FRAMEWORKS
RESEARCH EVIDENCE
PRACTICE GUIDELINES
CLASSIFICATIONS GROWTH CURVES
HEALTH PROFESSIONALS' EXPERTISE
SOUND CLINICAL REASONING
Based on Mayston 2018 (APCP)
FCS/PCS
ICF
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Good, better, best..
Best
Happy families & happy participating children/adults = THE BEST!
Better
Basic/Good
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