Assessment and Management for Children with Motor Clumsiness/ Developmental Coordination Disorder

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Motor Clumsiness/ Developmental Coordination Disorder DCD/ Dyspraxia

Definition

- Developmental disorder which results in marked impairment in motor skills which in turn has a significant impact on activities of everyday living and playing sports (American Psychiatric Foundation 2013)
- Performance in daily activities that requires motor coordination is substantially below that expected given the person's chronological and measured intelligence. The disorder may be manifested by marked delays in motor milestones (e.g. walking, crawling, sitting), dropping things, poor performance in sports or poor handwriting (DSM-IV)
- The acquisition and execution of coordinated motor skills is substantially below that expected given the individual's chronological age and opportunity for skill learning and use.(DSM-V)

DCD/ Dyspraxia Prevalence

- Around 5 to 6% of school age children, with boys over presented compared with girls(Blank, Polatajko, & Wilson, 2012)
- They encounter difficulties in gross motor skills which lead to clumsiness in daily living and may adversely affect academic achievement
- Some DCD children experience fine motor problems, while other children experience gross motor problems (Noordstar etal ,2014, Vaivre, Douret et al, 2011)

DCD/ Dyspraxia

- Many cases with DCD, their impairments persist well into adolescence
- 50%-70% children continue to have motor difficulties (Cantell etal 1994)
- DCD associated with learning (Dyslexia) or behavioural disorders (eg. ADHD)
- Adults with DCD, a range of non motor problems are reported (executive functioning , attention, anxiety, low self esteem)
- Reduced in physical activities affects their participation in society

DCD Features:

- Easy fall / bump to objects
- Highly distractible, move around
- Avoid block building toys e.g Lego
- Poor bilateral coordination
- Short verbal memory
- Poor writing

Developmental Coordination Disorder(DCD)

- Video on
- Gross motor skill

Objective assessment of motor proficiency with standardized tests

- Bruininks-Oseretsky Test of Motor Proficiency (BOT-2)

- Movement Assessment Battery for Children (Movement ABC-2)

BOT 2

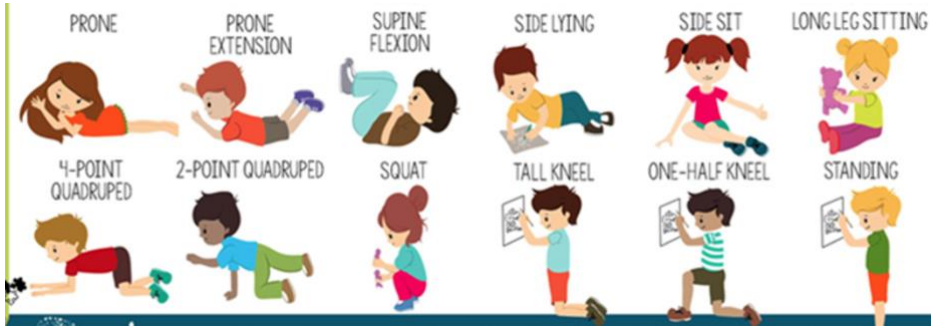
- Age from 4 to 21 years old
- Four domains
- Fine Manual Control
- Manual Coordination (Manual Dexterity, Upper Limb Coordination)
- Body Coordination (Bilateral Coordination, Balance)
- Strength and Agility (Running Speed and Agility, Strength)
- Good to excellent inter rater , test retest reliability

Movement ABC-2

- Aged 3-16 years old
- Eight tasks
- Assess manual dexterity (three tasks include placing pegs, threading lace, drawing trail)
- Aiming and catching (two tasks include catching with two hands, throwing beanbag into mat)
- Balance (three tasks include one board balance , walking heel to toe forward, hopping on mats)
- Good to excellent inter rater reliability and test retest reliability

Clinical Assessment

- Subjective complaint from child and parents
- Focal Neurological signs
- Muscle tone, Reflexes , Clonus
- Posture and Balance Reactions
- Sensory Motor Functions (Vision, Proprioception, Tactile, Vestibular)
- Motor planning function
- Musculoskeletal (ROM, tightness and muscle power)



DCD intervention

- Children with DCD have difficulty in learning new skills, inconsistency in motor performance and difficulty in generalizing motor learning
- Strategies to enhance how to learn, motor planning and problem solving are important
- Intervention should increase participation, and enjoyable

Intervention strategy

- Task oriented principles (top down strategies)
- Use of concrete activities e.g. skipping as chosen by child
- Graded activities (broke task into component parts such as small jumps, stepping in place and jump in place, jumping over a moving stick, turning the rope, practice arm movements)
- Once the parts well mastered, encourage practice of whole skipping
- Task performance in real life environment (practice at home)

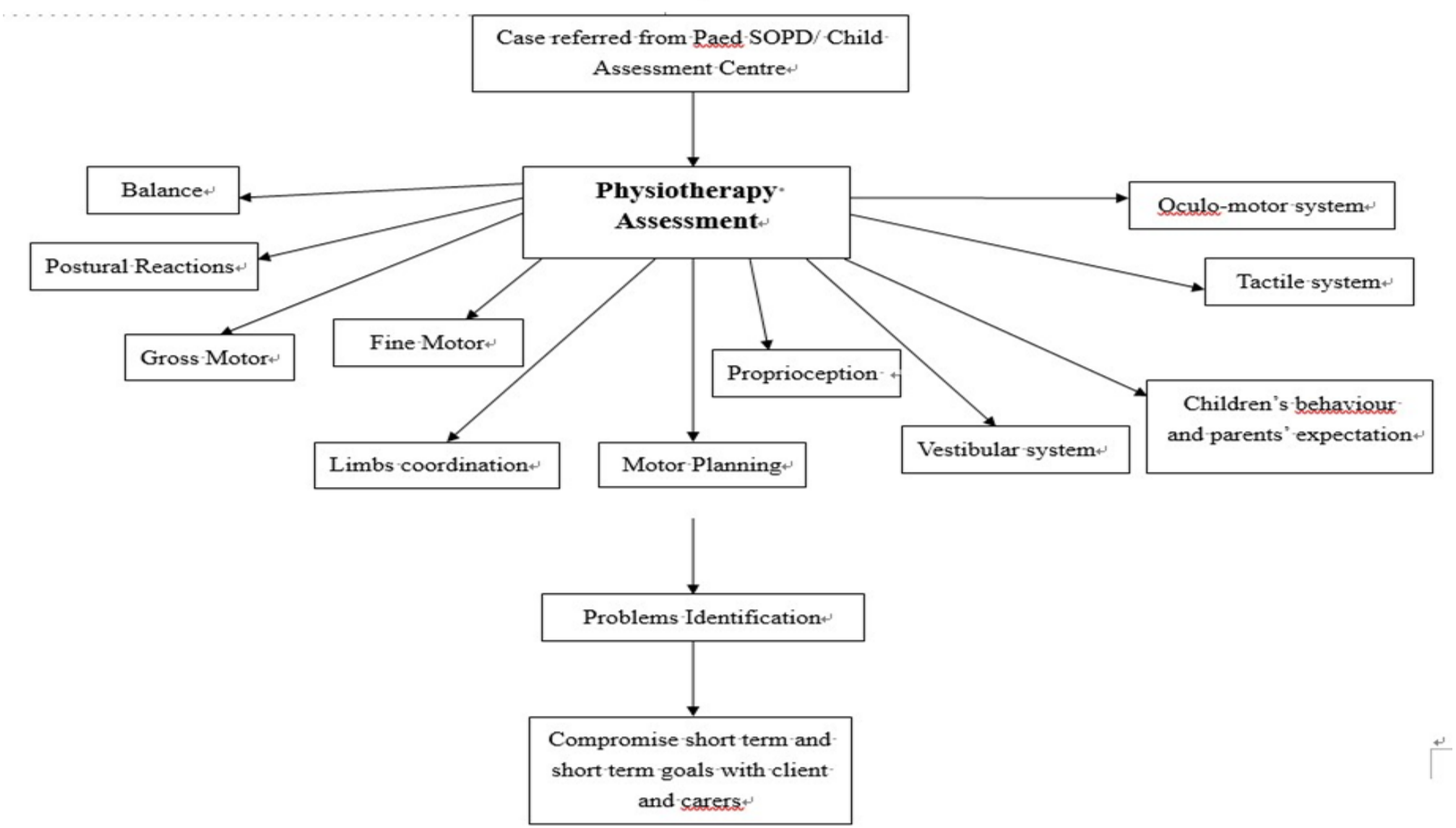
Task oriented principles

- E.g. cycling, ball skills, skipping

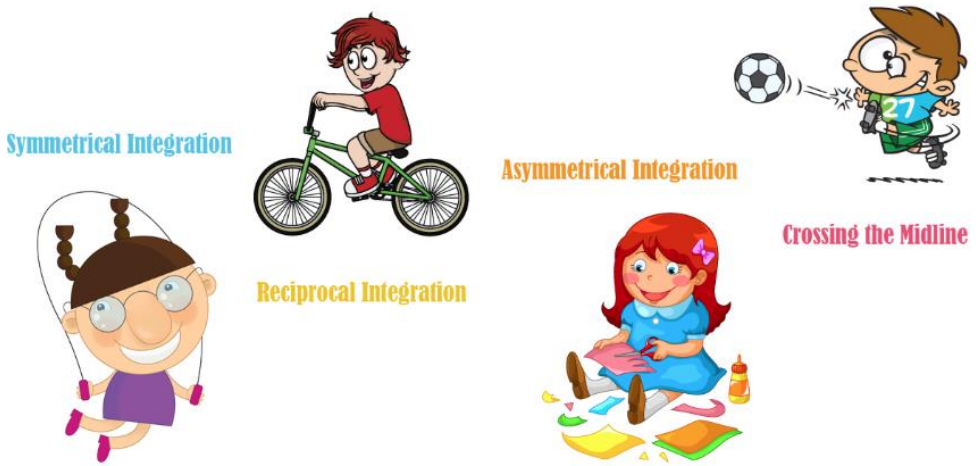
Motor learning principles

- Verbal Instructions to facilitate understanding of the task
- Practice
- Verbal feedback
- Refine on timing, sequencing , and force control to improve motor performance

DCD management



Physiotherapy Intervention



- Core stability and strengthening
- Balance strategy and training
- Force control in jumping
- Bilateral coordination (eye-hand, eye-foot coordination)
- Motor planning and motor learning
- Sensori-motor training, eg. Oculomotor, Vestibular & propriocetive training
- Advanced motor tasks (including skipping, ball skills)

CASE SHARING ON DCD

Client : Pang _____

- Sex/Age : M/6 yrs 8 months old (Primary 2 student)
- Dx: Developmental coordination disorder(DCD)
- Referred by: Child Assessment Centre(PYCAC)

Parent's complaint

- Frequent falls off chair while sitting, eating
- Frequent falls, easily bumps onto furniture
- Heavy steps in walking and running
- Unable to catch balls or dribble ball
- Unable to perform skipping
- Teased by schoolmates for clumsy in running and ball skills
- Low self confidence

BOT-2 (Initial Assessment)
Age 6 yrs 8 mths

Subtest items	Age equivalent	
Upper limb coordination	4 yrs 3 months	Below average
Bilateral coordination	4 yrs 7 months	Below average
Balance	Below 4 yrs	Below average
Running Speed and Agility	5 yrs 5 months	Below Average
Strength	5 yrs 5 months	Below average

Initial Gross motor Ax : Balance

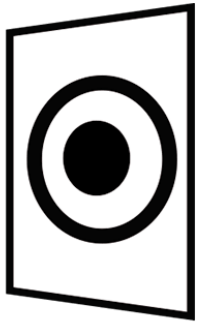
- SLS (EO) 3 seconds *Norm: > 8sec
- SLS (EC) 1 seconds
- SL hopping: 10 times (head wobbles, heavy landing, heels barely off ground)

Initial Gross Motor Ax : Strength

- Sit-ups: 0 times
- Wall sit: 10 seconds
- Knee push up: 0 times
- V- up: 0 sec

Initial Gross Motor Ax : Upper limb coordination

- Dropping and catching ball: 0 catches (both hands or one hand)
- Dribbling ball: 0 dribbles (both hands/ one hand)
- Throwing ball at a target(7 ft): 3 throws out of 5



Initial Gross Motor Ax : Bilateral coordination

- Jumping in place: same side weak
- Jumping in place: Opposite side weak
- Taping feet and fingers: Opposite side synchronized (unable yet)

Problems

- Weak in balance/ bilateral coordination
- Weak in core muscle strength
- Weak in eye hand/ eye foot coordination
- Weak in ball skills and force control
- Weak in proprioception
- Fair in sitting posture adjustment
- Tightness of gastrocnemius and hamstrings

Treatment Focus

- Balance strategy/training and postural perturbation
- Force and directional control
- Bilateral coordination/ Upper limb coordination
- Oculo-motor training
- Core stability training
- Vestibular training
- Stretching exercise to Hamstrings and Gastrocnemius
- Task oriented training (balls skills, skipping)

Post Assessment on Gross motor performance

BOT-2 (Pre and Post) 7 yrs old

Subtest items	Age equivalent Initial Ax	Age equivalent (Progress after 6 months training)
Upper limb coordination	4 yrs 3 months	4 yrs 9 months (Below Average)
Bilateral coordination	4 yrs 7 months	6yrs 11 months (Average)
Balance	Below 4 yrs	4 yrs 9 months (Below average)
Running Speed and Agility	5 yrs 5 months	6 yrs 5 months (Average)
Strength	5 yrs 5 months	5 yrs 5 months (Below Average)

Hopping

Initial

- Single leg Hopping :10 times
- Two legs side hopping: 10 times/30 sec

Progress

- Single leg Hopping :15 times
- Two legs side hopping: 20 times/30 sec

Balance

Initial

- Single leg standing(EO): 3 sec
- Single leg standing(EC): Unable to perform

Progress

- Single leg standing(EO): 30 sec
- Single leg standing(EC): 3 sec

Upper limb coordination (Progress)

- Dropping and catching ball: 4 catches (both hands) and 0 catch for one hand
- Catching a tossed ball : 1 catch
- Dribbling ball: 3 dribbles

Strength

Initial

- Sit-ups: 0 times/30 sec
- Wall sit: 10 seconds

Progress

- Sit- ups: 15 times/ 30 sec
- Wall sit: 12 sec

Bilateral coordination

- Jumping in place: same side synchonized
- Jumping in place: opposite side not synchonized

Functional tasks and behaviour

- Able to catch tossed ball
- Able to skip ropes , though not in consecutive pattern
- Much happier in attending PE lessons
- Start cycling outdoor

Early refer for physiotherapy training

- Early identification of specific problems and early tailor-made intervention
- Improve in different sensori-motor domains, including physical fitness and strength
- Catch up to his/her motor performance
- Improve self efficacy and self esteem
- Increase physical activity and less sedentary
- Enjoy physical activity with peers
- Decrease prolong disability and carry over in adulthood

Present situation

- Primary school children are heavy in school work
- Heavy in school work till 9:00-11:00pm (feedback from parents)
- Need to study after school, default easily
- Came late for physiotherapy training, but they do enjoy the play time with peers
- Only could perform exercise before sleep or weekend
- Sedentary activity during school time
- Affect their progress in physiotherapy training

Physiotherapy training in school

- Meanwhile there is OPRS at kindergarten
- Physiotherapy given to children with doctors' referral
- PT provide training for children in kindergarten
- In the long run, more effective & efficient treatment if PT could provide training for primary school children with DCD problems in school
- Provide early intervention and training to DCD children to catch up their motor performance and physical fitness, may also help in education to peers/teachers, advice on PE lessons or class logistics, screening for children with mild clinical features

Q & A


THANK
YOU