

# Neuroscience and Child Development

## ECDA conference

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# Summary of Presentation

- Developmental milestones and red flags
- Define Developmental delay/disorders
- Early identification and Management
- Role of Care givers/educators in promoting child development
- Case scenarios

# Child Development

## Developmental Milestones & Red Flags



# Child Development



- Refers to the biological, psychological and emotional changes that occur in human beings between birth and the end of adolescence
- Continuous process with a predictable sequence, yet having a unique course for every child
- Does not happen at the same rate
- Extrinsic and intrinsic influencing factors and their interaction

# Development

Stages of Brain Development in an Infant



# Early development



- Is the baby looking and following you
- Smiling reciprocatively
- Turns to voice
- Startled at loud noises
- Moving hands and legs equally
- Coos – 3 months
- Babbles
- Social reciprocity

# Child Development



- At the end of the first year the child can usually:
  - sit without support, crawl, pull to stand, stand with support
  - babble with a wide range of sound, first words
  - make a special sound to attract attention
  - clearly distinguish strangers from family
  - enjoy simple games like peek-a-boo.

# Child Development



- By two years of age the child can usually:
  - walk well
  - scribble with pencil and crayon, copy lines
  - build a tower of three-six blocks
  - use a number of single words to 2 word sentences
  - recognise a few pictures of common objects
  - understand when told not to do something.
  - imitate simple everyday activities; e.g. feeding a doll
  - temper tantrums



# Child Development



- By three years of age the child can usually:
  - jump, getting both feet off the floor
  - draw a circle
  - join words into simple sentences
  - follow 2-3 stage instructions
  - knows some colours, shapes
  - put on and take off some articles of clothing
  - join in play with another person; e.g. rolling, kicking a ball, pretend play with toys

# Child Development



- By five years of age the child can usually:
  - hop
  - hold a pencil with mature grasp
  - speak fluently and clearly
  - begin to count
  - recognises alphabets and numbers
  - dress without assistance
  - understand the rules of game play (turn taking, 'in' and 'out').
  - play co-operatively, such as sharing or taking turns



# HEALTH BOOKLET

Name: \_\_\_\_\_  
(as in BC)

Birth  
Certificate or  
Identification No: \_\_\_\_\_



# Health booklet

## SCREENING AT 4 - 8 WEEKS

Date of Screening: \_\_\_\_\_ Age: \_\_\_\_\_ Main caregiver: \_\_\_\_\_

<b>DEVELOPMENTAL CHECKLIST (TO BE COMPLETED BY PARENTS)</b> <i>Please tick "Yes"/"No"</i>		<b>YES</b>	<b>NO</b>	<b>Age (mths) when 90% achieve the milestone</b>
<b>Personal Social</b>				
1	When you face your baby lying on his back, he looks at you and watches you. (Regards face)	<input type="checkbox"/>	<input type="checkbox"/>	1
2	When you talk and smile to your baby, he smiles back at you without you tickling or touching him. (Smiles spontaneously)	<input type="checkbox"/>	<input type="checkbox"/>	1
<b>Fine Motor-Adaptive</b>				
3	When your child is on his back, he can follow the movement of an object, from one side to facing directly forwards. (Follows to mid-line)	<input type="checkbox"/>	<input type="checkbox"/>	1.5
4	When your child is on his back, he can follow the movement of an object, from one side, past the mid-line to the other side. (Follows past mid-line)	<input type="checkbox"/>	<input type="checkbox"/>	2.5
<b>Language</b>				
5	When your child hears a bell sound that he cannot see, i.e. outside his line of vision, he responds with eye movements, changes in breathing pattern or changes in activities. (Responds to a bell)	<input type="checkbox"/>	<input type="checkbox"/>	1
6	Your child makes sounds other than crying, such as small throaty sounds or short vowels sounds like "UH", "OO", "EH", "AH"...(Vocalises)	<input type="checkbox"/>	<input type="checkbox"/>	1.5
<b>Gross Motor</b>				
7	While your child is lying on his back, he moves his arms and legs equally. (Equal movement)	<input type="checkbox"/>	<input type="checkbox"/>	1
8	When your child is placed on his stomach, he lifts his head momentarily off the surface. (Lifts head)	<input type="checkbox"/>	<input type="checkbox"/>	1
9	When your child is placed on his stomach, he can lift his head so that the angle between his face and the surface he is lying on is approximately 45 degrees. (Head-up 45 degrees)	<input type="checkbox"/>	<input type="checkbox"/>	3

Comments of Doctor/Nurse on Developmental Checklist completed by parents:

\_\_\_\_\_



# Red Flags

- Not meeting the expected milestones- refer to health booklet
- Seems floppy/very stiff
- Not sitting without support at 10 months
- Not walking at 18 months
- No single words at 18 months
- Not using 2 word phrases by 2 years
- Doesn't imitate actions or words at 2 years
- No alphabet/number recognition by 4 years

# Social development- red flags



- Does not use spontaneous (non-echoed/non-initiated) 1-2 word phrases by 24 months
- Has lost any language or social skills
- Does not point to show things that he is interested in
- Does not follow when someone is pointing something out to him/her
- Does not respond to affection
- Prefers to play alone
- Likes to play with circular objects like the wheels
- Sensory issues

# Define Developmental Delay Prevalence Rate and Causes



# What is Developmental Assessment



## Domains of assessment

- Gross motor- how children move
  - Fine motor- manipulate objects and use their hands
  - Speech and language- communicate, understand and use their language
  - Cognitive/intellectual development- understand, think and learn
  - Social and emotional development- relate to others and develop independence
- 
- Global - Delayed in 2 or more areas of development
  - Isolated delay



# What is Developmental Delay



- Transient delay- physical illness, prolonged hospitalisation, social environmental related
- Persistent developmental delay
- Developmental disabilities effect 5%-10% (Shevell MI, 2003) of childhood population
- Prevalence of Global developmental delay- 1%-3% (Shevell MI, 2003 ) of children <5 yrs
- GDD terminology reserved for <5 yrs
- Intellectual impairment used for >5 yrs old

# Developmental Regression



- Definition: A child loses an acquired skill or fails to progress beyond a prolonged plateau after a period of normal development
- One of the few unequivocal red flags
- Motor- “was walking well and now tends to fall down often”
- Speech – “was speaking single words at 18 months, now lost all the words and does not speak/communicate at all”
- Behaviour- “was fully toilet trained at 3 yrs of age, and now started bed wetting”
- ADL- “was able to eat his food well, started having choking episodes while eating”

# Causes of Developmental Delay



- Genetic – chromosomal abnormalities or gene defects
  - Down's syndrome
  - Fragile X
- Biological
  - endocrine
  - traumatic brain injury
  - infections
  - brain malformations
- Environmental
  - Antenatal
    - maternal- infections, nutritional, drugs/toxins
  - Perinatal - deprivation of oxygen
  - Postnatal - infections

# Early Detection and Management



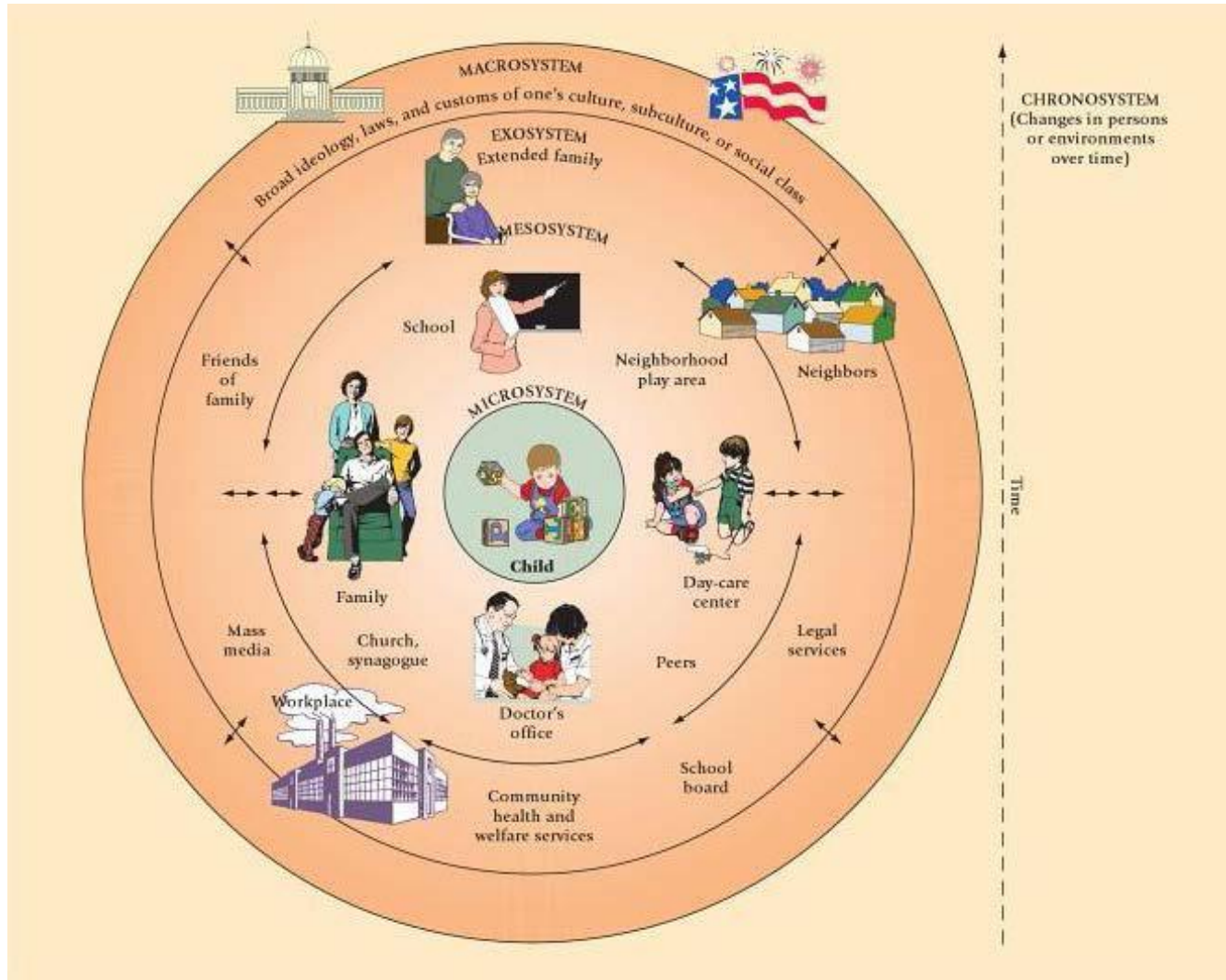
# Purpose of Developmental Assessment

## ‘A stitch in time saves nine’

- Early identification – Neural circuits that create the foundation for learning, behaviour and health are most ‘plastic’ during the first few years
- Early intervention- more effective and less costly. Better than late rehabilitation
- Primary, secondary and tertiary prevention



# Environment



# Every Child Matters



Its main aims are for every child, whatever their background or circumstances, to have the support they need to:

- stay safe
- be healthy
- enjoy and achieve
- make a positive contribution
- achieve economic well-being

# Role of Care Giver and Child Care





# To Optimise Child Growth & Development

- **‘It takes a village to raise a child’**
  - No family alone, therapist alone, health professional alone can make a difference.
  - Families need to be supported
  - The success of any intervention programme comes from empowering families
- “Coming together is a beginning; keeping together is progress; working together is success”- Henry Ford**



# High quality child care



- Specific experiences affect specific brain circuits during specific developmental stage, referred to as ‘sensitive periods’. Important to take advantage these early opportunities in the developmental/building process.
- Emotional well being and social competence provide a strong foundation for emerging cognitive abilities
- For a child to reach his/her full potential, its important to support the capacity of all families to ensure that they are able to provide a variety of stimulating and appropriate experiences in the earliest years.

# Stimulation activities



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# Stimulation activities





# Activities



# Activities



- Role play
- Imaginary play
- Puzzles
- Story telling
- Reading
- Field trips
- Physical activities

# KIDS 0-3 Programme



# Kids Integrated Development Service

- KIDS 0-3 programme initiated and funded by Temasek Cares and led by KK Women's and Children's Hospital in close collaboration with Ang Mo Kio Family Service Centre and Community Partners
- Starts antenatally to provide education to pregnant mothers
- Mental wellness assessments
- Regular health and developmental assessments of the children from 0-3 years
- Provide child stimulation activities
- Social support to the families and linking them with available support services
- Family centered practice, empowering families



# Summary



- Universal and specialized care
- Early identification of developmental delay/disorder
- Family involvement
- Seek help early

# Case scenarios

- Case 1

Aaron is a 4 year old child, started school 2 weeks ago. This is his first pre-school. He is unable to sit still throughout the 3 hrs class, very active. He is not interested in any school work. Aaron has not made any friends, will hardly communicate except occasional single words.

- What are your thoughts about this child?
- Plan of action?
- What will you discuss with the parents?

# Case scenarios

- Case 2

Simon is a 3yrs 9 months old child. He started pre-school in February this year. He is happy coming to school.

There are no academic concerns. Infact, he loves alphabets and numbers. He doesn't have any friends, will not play with any child. Does not communicate at all. Not causing trouble in class.

- What are your thoughts about this child?
- What will you discuss with the parents?
- Management and plan of action?

# Vision



