Child Development I - Normal Development

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Objectives

- The listener will be able to:
  - List key developmental milestones for children
  - State the key elements for developmental surveillance for young children
  - List tools used to assess specific areas of development
Growth of Body Tissues

Percent of Overall Adult Size

Age - In Years

Lymphoid
Brain
General/ Somatic
Reproductive

Growth “Pearls”

- Normal head circumference 35cm term
- 12 months old, HC 35 + 12 = 47cm

- Birth Weight
  - Doubles by 5 months
  - Triples by 1 year
  - Quadruples by 2 years

Normal Development Questions

- In general
  - Cover children under 3 years of age, and in particular under 1 year
  - Knowing gross motor milestones is most important
  - Are sometimes accompanied by data on weight, height, head circumference
  - Answers are often in consecutive months (e.g., is the child 4, 5, 6, 7 or 8 months old?)
Why 1 month intervals?

- Developmental quotients less than 70 are distinctly abnormal and warrant evaluation

\[ \text{DQ} = \frac{\text{MOTOR AGE}}{\text{CHRONOLOGIC AGE}} \times 100 \]

Gross Motor Milestones

- First Year of Life
  - 3 Months- Support chest in prone on outstretched arms
  - 6 Months- Sits with trunk support only (no hands)
  - 9 Months- Creeping
  - 12 Months- Walking

Monthly Motor Milestones

- 1  Turns and lifts head up in prone
- 2  Lifts head and chest up in prone
- 3  “Puppy prop” weight supported on forearms with head up, chest clears mat, some head lag on pull to sit
- 4  Chest off the mat with weight bearing on extended arms in prone, rolls front to back, head even on pull to sit
Monthly Motor Milestones

- 5 Rolls back to front, leads with head on pull to sit
- 6 Tripod sitting
- 7 Sits without support, commando crawl
- 8 Assumes sitting and can reach from quadruped (hands and knees)
- 9 Pull to stand, creeps on hands and knees
- 10 Cruises, 11 stands without support, 12 walk

Gross Motor Milestones

- 18 Months- Runs, pushes large object, throws ball from standing
- 24 Months- Runs well, kicks ball, jumps in place, throws ball overhand
- 36 Months- Pedals a tricycle (3 years/3 wheels)
- 4 Years- Hops 5 times; balances on one foot for five seconds

Later Motor Milestones

- 5 Years - Skips by alternating feet; hops in place 10 times; balances on one foot for over 10 seconds
- 6 Years - Hops on one foot for 15 feet; running broad jump of 2-3 feet
- 7 Years - Rides a bike
**Gross Motor Milestones**

- Stair climbing abilities
  - 18 months: Can ascend and descend with one hand held
  - 2 years: Ascend and descend by placing both feet on each step
  - 3 years: Ascend by placing one foot on each step (alternating feet); descend by placing both feet on each step
  - 4 years: Ascend/ descend by alternating feet

**Gross Motor Red Flags**

- Rolling before 3 months
- Poor head control at 5 months
- Not sitting by 9 months
- Persistence of Moro, ATNR or tonic labyrinthine reflex past 6 months
- Lack of development of protective supportive reactions at appropriate ages
- Hand dominance before 18 months
- Not walking independently by 18 months

**Fine Motor Milestones**

- 3 Months:
  - Hands unfisted most of time

- 6 Months:
  - Transfers hand to hand across midline

- 9 Months:
  - Inferior pincer grasp of pellet

- 10 Months:
  - Mature pincer grasp of pellet

- 12 Months:
  - Release of cube voluntarily into a cup

- 16 Months:
  - Release of pellet into container
Fine Motor Milestones

- **Tower Building Skills**
  - 14 Months: Tower of 2 cubes
  - 16 Months: Tower of 3 cubes
  - 18 Months: Tower of 4 cubes
  - 22 Months: Tower of 6 cubes
  - 36 Months: Tower of 9 cubes

Fine Motor Milestones

- **Gesell Figures (Arnold Gesell, Yale)** - Ages in Years
  - 2: scribbling, vertical vs horizontal orient
  - 3: circle
  - 4: cross
  - 4.5: square
  - 5: triangle
  - 6: diamond

Gesell figures

- 2: scribbling, vertical vs horizontal orient
- 3: circle
- 4: cross
- 4.5: square
- 5: triangle
- 6: diamond
Importance of Fine Motor Delays

- Usually, fine motor delays are coupled with global, or gross motor delays
- If isolated, evaluate vision, and specifically binocular vision
- Fine motor achievement is important to development of self care skills that contribute directly to independence and development of self esteem.
- Fine motor skills are key to school achievement

Receptive Language Milestones

- 4 Months- Looks toward voice
- 6 Months- Turns toward voice
- 10 Months- Comprehends no, Orients to name
- 12 Months- Follows command with gesture
- 14 Months- Follows command without gesture
- 15 Months- Points to body part
- 18 Months- Points to 3 body parts and self
- 24 Months- 2 step commands, Understands me/you

Expressive Language Milestones

- 2 Months- Social smile, Cooing
- 6 Months- Babbles
- 9 Months- Waves bye
- 10 Months- Dada/ Mama appropriate
- 11 Months- First word
- 14 Months- Names 1 object, Says no meaningfully, Protodeclarative pointing
- 18 Months- 10-25 Words
- 24 Months- 50+ words
Expressive Language Milestones
Bottom Lines

- Vocabulary
  - 1 Year: 2 Words
  - 2 Years: 2 Word Sentences

- “Understandability”
  - 2 Years = 50% (2/4)
  - 3 Years = 75% (3/4)
  - 4 Years = 100% (4/4)

Language milestones

- Language development is more predictive of cognition and school achievement than any other milestone
- It is also remediable when delays are caused by lack of stimulation and exposure, hearing impairments.
- Failure to address language impairments snowballs to impact social development and behavior.
- There is more variability in the age at which children attain language skills, so it is harder to write exact questions about them on the Boards.

Social/ Emotional Development

Pertinent issues:

By a year of age, object permanence should allow children to have a stable mental picture of the parent to allow both objection to separation from her/him, and a change in response to strangers.

By 18 months at the latest, children should be pointing to share interest with caregivers in addition to making needs known.
Social/Emotional Milestones

- 15-18 Months  Awareness of self with coyness, awareness of shame and guilt
- 18-21  Begins to associate feelings with verbal symbols (e.g. happy/ sad) for them, Initiates interactions with adults
- 21-24  Imitates to please others, parallel play, modulation of emotional expression by social/cultural influences

Social-emotional delays

- Consider abuse/neglect
- Consider parental mental health
- Consider pervasive developmental disorders/ autism
- Consider sensory impairments

Developmental Screening

- Cross sectional analysis
- Tests administered to whole population to identify those not meeting standard expectations
- Results must be interpreted within the context of the environment, social, biological, and historical risks to the child
Developmental Screening

- AAP Guidelines 2006
  - All children, most of whom do not have identifiable risks, should receive periodic developmental screening using a standardized test.
  - In the absence of established risks or parental concerns,
    - 9 months (focus on motor)
    - 18 months (focus on communication)
    - 30 months (focus on language and cognitive) *
      - * may substitute 24 months but intent is before 3 yrs

References

- Comparison of specific screening instruments

Five Surveillance Components (AAP, 2006)

1- Eliciting and attending to parents concerns about development
   - Do you have concerns about development, behavior, learning in your child?
2- Documenting and maintaining an ongoing developmental history
   - What changes have you seen since our last visit in development?
   - Age specific queries such as walking, pointing, word production to make needs known.
Five Surveillance components (AAP, 2006)

3- Make accurate observations of the child
   - PE and parent child observations within preventative visits
4- Identify risks and protective factors
   - Environmental, genetic, social and demographics
   - Children with established risk factors may be referred directly for intervention, or may be evaluated
   - Identify protective factors
5- Maintain an accurate record of the surveillance process and findings
   - Schedule earlier follow up visits, schedule specific visits to discuss developmental concerns, refer to intervention specialists

Developmental Screening Instruments

General Developmental Screening:
- Ages and Stages Questionnaire (ASQ)
- Parents’ Evaluation of Developmental Status (PEDS)
- Child Development Inventory (CDI)
- Denver II Developmental Screening Test
- Bayley Infant Neurodevelopmental Screener (BINS)

Domain Specific
- Gross Motor
  - Early Motor Pattern Profile (EMPP)
  - Motor Quotient (MQ)
- Communication/Cognition
  - Capute Scales (Cognitive Adaptive Test/Clinical Linguistic Auditory Milestone Scale aka CAT-CLAMS)
  - Language Development Survey (LDS)
  - Early Language Milestone Scale (ELMS -2)
Developmental Screening Instruments

- Disorder Specific
- Autism and Pervasive Developmental Disorders
  - Autism Behavior Checklist (ABC)
  - Modified Checklist for Autism in Toddlers (M-CHAT)
  - Pervasive Developmental Disorders Screening Test-II Stage 1 Primary Care (PDDST-II)
  - Social Communication Questionnaire (SCQ)

Developmental Evaluation

- Aimed at identifying the specific developmental disorder or disorders
- Assess milestones in multiple domains not just the area of concern
- Identify:
  - Delays: slower rate, correct sequence
  - Dissociation: differing rates among domains
  - Deviancy: skills attained out of sequence and widely varying rates
  - Regression: Plateau in acquisition of new skills or loss in developmental skills

Early Intervention

- Created by IDEA (Individuals with Disabilities Education Act), allows each state to provide a system in which children can receive evaluations for developmental delay and service coordination to find assistance
- In Ohio, the Department of Health EI program for 0-3 year olds is “HELP ME GROW”
- At age 3, nationally, the public school system becomes federally mandated to provide assessments for developmental delays and to provide appropriate preschools with intervention for Children with Developmental Delays.
Tips and Tricks

- Triage the questions on the exam—Don’t waste precious time on anything.
- Pick one good source to review and know it well.
- Review the pictures in an Atlas (e.g. Zitelli and Davis) as well as Smith’s.
- Make up flash cards for items that require rote memorization (toxins and ingestions/syndromes/development).
- Make a list of most commons, or all #1 cause of X.
- Consider making a list of causative genes.

- Look at the ABP web site (www.abp.org) and review the content specifications for holes in your knowledge base.
- ID is 5%.
- Neonatology, Allergy, and Normal Development are all 4.5% each, Abnormal Development is 2.5%.
- Know Statistics! It is 1% of the total questions. Page 322 and 323 of the book. Know it!
- Sleep well and relax the night before the exam.
1. An infant remains in a seated position when placed on your exam table by his mother. He stiffens his body when you push him laterally with a gentle nudge on each shoulder. He falls backward without protecting himself when you gently push on his chest. When placed in a prone position he picks up his mother's keys and immediately transfers them to his other hand. His mother places a piece of cereal in front of him and he picks it up between the palmar aspect of his thumb and the anatomic lateral aspect of his index finger. He turns towards you when you speak, but his mother reports that he does not seem to know his name nor has he used any expressive word approximations. He has been babbling for approximately two months. He clearly enjoys your efforts to amuse him, and displays no stranger anxiety. This infant is performing closest to the development expected at:  
   a. 6 months  
   b. 7 months  
   c. 8 months  
   d. 9 months  
   e. This is not typical development for any age

2. While obtaining history on a toddler at her well child visit you note that she is able to walk about with an unsteady gait, taking as many as 5 steps at a time. Her mother reports that she has been waiting for approximately 3 weeks. She runs quickly between objects in the room at times. She picks up raisins with a mature pincer grasp. She can point to her name after being shown a tracing of it. When given a crayon she first places the end in her mouth, but then holds it in her fist and rubs it on paper in imitation of you. She clearly responds to her name when called. She has been babbling for approximately 2 months. Her mother is able to keep her occupied by allowing her to play with a toy that has figures which pop up when buttons are pressed. She makes a sound you when you play "peek-a-boo" with her while performing your physical exam. Although she was shy apprehensive when you first came near her. She has been using "Dada" and "Mama" non-specifically for approximately 2 months, and her mother believes that she is beginning to use these words appropriately. This toddler is performing closest to the development expected at:  
   a. 10 months  
   b. 11 months  
   c. 12 months  
   d. 13 months  
   e. This is not typical development for any age

3. A child is brought into your office for a well child visit. He runs down the hallway and into the exam room, following his older sibling. He begins to climb up onto a chair in the room, and screams his protest when his sister pulls herself down and sits herself there instead. His mother reports that he has been constant vigilance at home, or else he will "invent new ways to cause trouble." He is able to climb up stairs, but hasn't tried yet to walk up them. He is beginning to throw balls and other objects outward, but cannot quite yet kick a ball. He is able to feed himself, despite being quite messy at it. He loves to scribble. His favorite toy is one in which a small plastic hammer is used to activate various cause and effect mechanisms. His mother estimates that he has a 15 word vocabulary, most of which consists of labeling familiar objects. He can point to his hair, eyes, and mouth when asked to do so. He again screams in protest and points to crackers which his sister has removed from the mother's bag and has not yet shared with him. He also grunts and points to a familiar cartoon character painted on the wall looking at his mother while doing so. His mother places him on the floor so you can examine him and he sits with your approval. She asks him to remove his shoes, which he promptly does, throwing them to the floor. He then says his toy truck for him. This child is performing closest to the development expected at:  
   a. 16 months  
   b. 18 months  
   c. 20 months  
   d. 22 months  
   e. This is not typical development for any age
4. A child is brought in for assessment prior to preschool entry. Physical examination, including growth parameters, is typical for age. Her mother reports that she can dress and undress by herself, and is able to help with simple tasks at home, such as preparing the dinner table. She is able to ascend and descend stairs by placing one foot on each step, and recently began riding a bicycle with training wheels. You draw various figures for her in an attempt to have her imitate you, and she is able to copy a circle and a cross, but not a square. Her speech is completely understandable. She is also able to relate a personal event, and can identify 4 colors. This child is performing closest to the development expected at:
   a. 36 months
   b. 42 months
   c. 48 months
   d. 54 months
   e. This is not typical development for any age

Answers
1. c
2. c
3. b
4. c