

Clinical Assessment in Pediatrics

Growth and Development

Psychomotor Development

Pediatrics

- the branch of medicine that covers the childhood years
- deals with:
 - all organ systems
 - differences in maturity of organs function
 - history taking problems
 - emotional response of patients & 3rd party
 - unique areas: growth and development
 - ...

Childhood

- Prenatal period
- Newborn period - first **28 days** /perinatal - first 7 days/
- Infancy - to the end of the **1st yr**
- Toddler age - to the end of **3rd yr**
- Preschool age - to the end of **6th yr**
- School age - to the end of **15th yr**
- Adolescence - to **18th yr + 364 days**

Newborn period

- transition to the neonatal physiology occurs at the birth
- separation by the clamping the umbilical cord

- Apgar score

Signs	0	1	2
Heart rate	0	<100/min	>100/min
Respiration	None	Weak cry	Strong cry
Muscle tone	None	Some flexion	Full flexion
Irritability	None	Some motion	Withdrawal
Color	Blue	Blue extremities	Pink all over

- resuscitation

Infancy

- dramatic growth and psychomotor development
- transfer from breast/bottle feeding to normal diet
- mother as the center of world shared with people/objects
- fear of separation and outsiders

Toddler age

- first fight for independence
- development of speech
- games are played amongst children not with children
- know right from wrong

Preschool age

- second fight for independence
- games are played with other children
- complex movement patterns
- period of the slowest growth

School age

YOUNGER up to 12

- maturation of early developmental skills
- cognitive development
/imagination + creativity/
- puberty starts

OLDER from 12 to 15

- puberty in full speed
- hormonal „dysregulation“
- **SOCIALIZATION**
- **FIGHT** for independence

Adolescence

- sexual and psychological maturity
- decrease of growth velocity, increase of muscle strength
- soared mental performance
 - professional orientation
- peers groups of same interests

All organ systems

- starting from the minute the child is seen for first time
- seize the opportunity

OBSERVE ! OBSERVE! OBSERVE! OBSERVE!

- **traumatic procedures should be left to the end**

Maturity of organs function

- „**Child is not small adult!**“
- the younger the child the more differences
- differences in maturity of organ systems in the patient
- differences in children according to sex and personal development /e.g. puberty/

History taking problems

- 3rd party /parent or caregiver/
- „high expectations“ of parent and child
- extra components /pregnancy, birth, feeding, schooling.../
- „timing“ of history taking

Emotions

- establishing rapport with the patient according to the age

Growth & Development

- combination of increase in the number of cells and in the size of cells
- exactly measured
- an increase in complexity of the organism
- modification in functional capacity of organs
- difficult to quantify

History taking

- presenting complaint
- previous medical history
- perinatal history
- developmental history
- family history
- social history
- review of systems

Presenting complaint

- record problems in the family's own words
„What is worrying you about your child?“
- get an exact chronology
„When was she/he last completely well or her/his normal self?“
- probe for specific information with open question
„Tell me more about the cough.“

Previous medical history

Ask about:

- all admissions to hospital including accidents
- all illnesses and details of any medication
- allergies and their severity
- asthma, eczema and hay fever specifically
- immunizations

Perinatal history

- **a history of the pregnancy**
/any problems e.g. hypertension, nutrition, use of medications and alcohol, smoking/
- **details of the birth, type of delivery and condition at birth**
/gestation, birth weight and other measurements, use of forceps or caesarean section, Apgar score, use of oxygen therapy/
- **course in first few weeks**
/details of weight gain and feeding, any breathing problems, illnesses e.g. jaundice/

Developmental history

Ask about:

- psychomotor milestones
- day-time and night-time continence
- school performance

- growth
- age at menarche and information about period

Family history

Who is in the family and who lives at home?

Is there a member of the „family“ with a similar condition to that being complained of by the child?

Does any member of the „family“ have a disability, and have there been any deaths in childhood?

Social history

Ask about:

- which school or nursery does the child attend
- jobs and try to get a feel for the financial situation
- factors that might adversely affect the child e.g. smoking
- factors that may influence management decisions

Review of systems

- make sure that you have not missed any details
- screening questions for symptoms within other systems

General

Cardiovascular

Respiratory

Gastrointestinal

Genitourinary

Neurological

Skin

Musculoskeletal

ENT

Examination of child

Principles:

- rapport
- observation => palpation => percussion => auscultation
- ask the mother to undress child to underwear
- be flexible but systematic

Examination of child

Notes:

- Symptom
- Observation
- Assessment
- Plan

Examination of child

Observation:

- **state of „clinical wellbeing“** Well or ill? Any breathing difficulties?
- **dysmorphic features or asymmetry**
- **nutritional state**
- **level of consciousness**
- **behavior** Appropriate for age? Watch play!
- **skin** Hygiene? Pallor, jaundice, cyanosis, rashes, bruises, injuries, finger clubbing?

Examination of child

Head and neck – special points:

- measure and plot occipito-frontal circumference under 2 yr
- feel fontanelles for size and tension /anterior close 9-18 mo/
- enlarged cervical nodes are common and most commonly caused by tonsil or, less commonly, middle ear infection
- Ear-Nose-Throat examination left towards the end

**DO NOT EXAMINE THE THROAT OF CHILD WITH
POSSIBLE EPIGLOTTITIS !!!**

Examination of child

Head and neck – special points:

**DO NOT EXAMINE THE THROAT OF CHILD WITH
POSSIBLE EPIGLOTTITIS !!!**

- try to get the child's cooperation to open mouth voluntarily
- number and state of teeth

Examination of child

Cardiovascular system – special points:

- growth according to centile charts
- it is easier to assess the right brachial pulse in young children than the radial + always feel the femoral pulse
- measure the blood pressure with appropriate cuff size
- sinus arrhythmia is normal in children
- a systolic ejection murmur denotes no cardiac pathology in at least 50% of cases

Examination of child

Cardiovascular system – special points:

- blood pressure centile charts according to sex, age, height

Age	Pulse rate	Age	Pulse rate
Newborn	140-180	6 yr	90-95
6 months	130-135	8 yr	80-85
1 yr	120-125	10 yr	75-80
5 yr	95-100	14 yr	70-75

Examination of child

Respiratory system – special points:

- the observation of respiratory distress is more important than auscultatory findings grunting, tachypnea, intercostal indrawing
- percussion can be omitted in neonates and infants
- the quality of the breath sounds in infants is more harsh /“bronchial“ called as puerile rather than vesicular/
- transmitted sounds from the upper airways may be easily confused with adventitious sounds

Examination of child

Respiratory system – special points:

Age	Respiratory rate at rest
Newborn – preterm	40-60
Newborn – term	35-40
Infants	30-35
5 yr	20-25
12 yr	15-20

Examination of child

Abdomen – special points:

- growth according to centile charts
- always ask first if it hurts anywhere
- small children can be examined on their parent's lap
- a protuberant abdomen is normal in toddlers
- the liver edge is normally palpable in children below 2 yr
/in neonates up to 2 cm in medioclavicular line/

Examination of child

Abdomen – special points:

- in infant boys is important to palpate the testes otherwise, genitalia are not usually examined unless there is a reason
- buttock shape and napkin rash
- **rectal examination is NOT part of the normal physical examination in children**

Examination of child

Further tests – special points:

- small veins + much lower pain threshold
- exposure to radiation

„Why do I order the test?“

„What am I going to look for in the results?“

„How will results affect the management of the patient?“

Growth

Factors:

- genetic
- prenatal environment
- postnatal nutrition
- health
- psychosocial environment - nurture
- normal hormonal functions

Growth – length/height

- genetic target height or mid-parental height – MPH
- $boys = \frac{fathers\ height + mothers\ height}{2} + 7,5\text{ cm}$
- $girls = \frac{fathers\ height + mothers\ height}{2} - 7,5\text{ cm}$

Growth – weight

- normal in term newborns weight is 2500-4500 g
- weight loss in first few days is 5-10 % of birth weight
/return to birth weight: 7-10 days of age/
- birth weight is usually doubled in 6th mo, tripled in 1 yr
- eutrophic infant = normal weight + skin fat layer 1-3 cm

Growth – proportionality

- proportions are different depending on the age
- head circumference is indicator of brain growth in infancy

Age	Average head circumference	Average chest circumference	BSA
Newborn	34 cm	33 cm	0.25sqm
6th month	43 cm	43 cm	0.35sqm
1 year	47 cm	48 cm	0.45sqm

Growth or Development?

- osseous and dental age
- puberty includes: - acceleration of linear growth
- development of sexual characteristics

Puberty scoring system by Tanner:

- Breast development in girls /B1-B5/
- Genital changes in boys /G1-G5/
- Pubic Hair in both sexes /PH1-PH5/

Psychomotor Development

Fields:

- gross motor skills
- vision & fine motor skills
- hearing, speech and language
- social, emotional and behavioral skills
- cognitive functions

Psychomotor Development

Factors:

- genetic – determine potential
- environmental – determine extent to which potential is achieved

- environmental:
 - prenatal /metabolic disorders, teratogens, infections, nutrition/
 - perinatal /prematurity, asphyxia, metabolic disorders/
 - postnatal:
 - medical: infections, anoxia, trauma, metabolic disorders, malnutrition
 - psycho-social: intrinsic /personality, motivation, social interactions/
extrinsic /stimulation, opportunity to learn, CAN Sy./

Psychomotor Development

Patterns:

- acquisition of developmental abilities
- developmental directions: cephalocaudal & proximodistal

Psychomotor Development

Developmental milestones:

- set of functional skills or age-specific tasks that most children achieve at a certain age range
- median age: half of a standard population achieve that level (median milestones)
- limit ages: $> 2SD$ from the mean
 - negative milestones /red flag signs/

Gross motor skills

- movement of large body muscles or muscle groups and body itself
- postural control & locomotion
 - sit, creep, crawl, stand, walk, run, jump...
 - keep balance and change positions
- movement sensation
 - kinesthesia, vision, vestibular input

Vision & Fine motor skills

- control of the **hand** /reaching & grasping/
- object manipulation & release
- dexterity
- oral motor skills /chewing/
- clear speech
- visual perception guidance
- self – care skills /feeding, un/dressing/
- drawing, writing

Hearing, speech and language

- reactions to loud sounds, bubbling, syllabling, words, sentences
- hearing and auditory processing
- receptive language
- expressive language
- pragmatic language: socially interactive conversation

Social, emotional and behavioral skills

- expression of needs, emotions, personal interactions...
- cognitive development
 - higher mental function /thought processes, attention, concentration/
 - intelligence testing
 - performance – e.g. puzzles
 - verbal intelligence