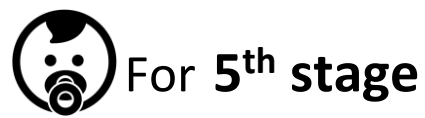


Pediatric



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Part1: Pediatric History

#Identification

- Name of baby (triple name)
- Age and date of birth
- Gender
- Blood group
- Source of history (mother – father – grandmother)
- Occupation of parents
- Residence of parents
- Religion of parents

#Date of admission

#Date of examination

#Chief complaint

- Mention the main reason that brings the patient to the hospital (up to 3 chief complaint)
- Duration of chief complaint

#History of present illness

- Last time the patient was **well**
- The **story** (take it from the source like the mother, ask her to tell you the full story then summarize it and write it in her words)
- **Analysis** of the symptoms
- Complete the **same system**
- **Relevant systems** (ask about any system related to the involved system)
- **Routine questions**: always ask about (fever, sweating, urine output, feeding, activity, sleep, weight loss)
- Ask about attention to **private doctor or primary health centers PHC** (ask about investigations, treatment, improvement or not)
- **Admission** (ask about investigations, treatment, improvement or not)
- Any **new event** that may occur during hospitalization ((worsening of baby condition ask about sleep + activity (smile/fatigue) + feeding all will decreased))
- **Outcome** (the condition of patient at the moment of taking history)

((convert these points to story and write it))

#Systems review (questions here depend on the age of baby)

- **GIT** → abdominal pain, diarrhea, constipation, vomiting, hematemesis, melena, jaundice, nausea and loss of appetite (the last two describe as poor feeding)
- **Respiratory** → dyspnea, noisy breathing, cough, hemoptysis, sputum
- **CVS** → dyspnea, palpitation (the mother could feel palpitation of her baby), cyanosis
- **Genitourinary** → color and amount of urine, hematuria, pyuria, dysuria, frequency, any abnormality in the genitalia
- **Nervous system** → headache, convulsions, abnormal movements
- **Loco-motor** → joint pain and stiffness, joint swelling, waking, abnormal movements, restricted movements
- **Hematology** → epistaxis, bruises, petechiae
- **Skin** → dryness, discoloration, pigments, itching, rash, lump, hair and nail changes

#Pre-natal (Ante-natal)

- ANC (does the mother attend regular visits to private doctor or PHC)
- Disease of mother during pregnancy (infections like Toxoplasma-HIV-Rubella-Cytomegalovirus-Chickenpox-Hepatitis --- TORCH infection appear as fever + skin rash + joint swelling --- other diseases like D.M and hypertension and anemia)
- Drugs taken during pregnancy
- Exposure to radiation during pregnancy
- Smoking
- Bleeding
- Previous abortion or neonatal death
- Admission to hospital for any reason
- Vaccine
- Number of child

#Natal

- Place of delivery (at home or hospital)
- Type of delivery (vaginal or caesarian section CS) if CS what is the indication? Elective or emergency?
- Duration of delivery (normal or prolonged)
- Any complication during labor
- Instrument use in the delivery
- Gestational age (pre-term or term or post-date or post-term)
- Weight of the baby (normal AGA , Small SGA , Large LGA)

#Post-natal (first 28 days of life)

- Immediate crying

- Time of discharge from the hospital (24 hours – 48 – more)
- NICU admission
- When the baby passed urine (within first 24 hours) and meconium (the first stool) (within first 48 hours)
- Movement
- Neonatal jaundice, Cyanosis (fetal distress), Fit, bleeding
- Baby developed other diseases? Treatment?

#Past-medical history

- Previous similar disease
- Previous admissions
- Chronic diseases
- Previous infections (measles, others)
- Blood transfusion

#Past-surgical

- Previous operations (indication, type, outcome)
- Circumcision in male and ear piercing in female (at which age, any complications)
- Hospitalization

#Drug history

- Drug taking by mother (chronic use)
- Drug taking by baby (chronic use)
- Allergy to drug and other substances

#Feeding history

1- Breast feeding

- Way of feeding (using both right and left breast each feeding time)
- Regular (at least every 3 hours) or on demand
- Any problem with feeding (large nipple, others)

2- Bottle feeding

- Way of feeding
- Way of preparation
- Type of formula use (lactose free, soy milk formula, others)
- Way of sterilization of the bottle (boiling, Washing, brushing)
- Number of bottles
- Number of feeding
- Regular (at least every 3 hours) or on demand
- Any problem occur after bottle feeding (diarrhea, others)
- Put the bottle in freeze for cooling

- 3- Mixed feeding (breast and bottle feeding)
- 4- Semi-solid or solid food → at which age start solid food? Type of it?
 - At which time given
 - Type
 - Any problem occur after this feeding
- 5- Weaning: at which age milk was taken off his diet
- 6- Pica: Ask if the child eat soil, wood or other things (caused by iron deficiency anemia – Ca deficiency – lead poisoning)

#Immunization history

- Take the vaccines on regular Iraqi schedule or not?
- On national immunization day only?
- Type of vaccine? , At which age?
- Any complications (fever, pain, convulsion, rash, excessive crying) pertussis vaccine cause convulsion – shock
- Time of last vaccine
- Notes: RV not give to baby after 3 and 8 months of age / BCG not give to baby after 1 year of age / BCG should return if the scar (ندبة) not appear

Age	VACCINE
24 hours after birth	BCG, HBV , OPV
2 months	DTP-HepB-Hib, OPV, RV
4 months	DTP-Hib, OPV, RV
6 months	DTP-HepB-Hib, OPV, RV
9 months	Measles, Vit.A 100,000 U
15 months	MMR
18 months	DTP-Hib, OPV, Vit.A 200,000 U
4-6 years	DTP, MMR, OPV

Name	In Arabic	Type	Route
BCG	بي سي جي	Live attenuated TB bacteria	ID
HBV	إلتهاب الكبد الفيروسي ب	Inactivated hepatitis B virus	IM
OPV	شلل الأطفال فموي	Live attenuated Polio virus	Oral
RV	الفايروس العجلي	Live attenuated Rotavirus	Oral
Measles	الحصبة المنفردة	Live attenuated measles virus	SC
MMR	الحصبة المختلطة	Live attenuated, mumps, rubella viruses	SC
DTP	اللقاح الثلاثي	Diphtheria and Tetanus Toxoid + inactivated pertussis bacteria	IM
DTP-Hib	اللقاح الرباعي	DTP + Inactivated Influenza virus	IM
DTP-HepB-Hib	اللقاح الخماسي	DTP + Inactivated Influenza virus + Inactivated hepatitis B virus	IM

#Developmental

- Gross motor (sit, stand, walk) or crawl
- Fine motor (Grasp, move object from hand to hand, etc.)
- Social (smile, laugh, etc.)
- speech
- vision
- hearing

#Family history

- health of parents, brothers and sisters
- family history of same illness
- family history of chronic disease or infectious disease
- family history of unexplained death
- order of baby in the family
- age of the baby before or after him
- any illness in the family

#Social history

- rural or urban
- source of water
- income
- level of education and occupation of parents
- crowding index → (number of persons/number of rooms) → below 3 is normal and above 3 is crowding
- any domestic animals
- ventilation
- smoking
- sewage disposal

#Obstetrical and gynecological history

- for girls because pediatric age up to 18 years

Part2: Pediatric general examination

#Setting

- Introduce yourself
- Gel
- Good light
- Right side
- Patient lie flat and central
- Exposure from nipple to mid-thigh

#General

- Age and sex
- Consciousness (conscious, lethargic, unconscious)
- Alert or not, irritable or sleepy, oriented (in older children)
- Posture (lying in bed, or in lap of his mother)
- Any external corrections (cannula, IV fluid, oxygen mask)
- Built (average build, thin, emaciated, obese)

#Examination of head

1- Shape of the head:

- Normal
- Brachiocephaly
- Scelocephaly

2- Hair:

- Distribution
- Fragile or not
- Thick or silky
- Discoloration → reddish color of the hair in malnutrition, failure to thrive
- Alopecia (loss of hair) → localized as in skin disease or generalized as SLE

3- Fontanel:

- Examine it when baby is sitting and not crying
- Size → normal 2.5 cm → if large → decrease of bone → hypothyroidism
- Depressed or sunken → dehydration
- Bulging → increased intra-cranial pressure ICP – hypernatremia – fluid therapy
- Anterior fontanel → diamond shape – close in 6-18 months
- Posterior fontanel → triangular shape – close in 3 months

4- Face Skin color:

- Pallor → anemia (pallor check), nephrotic syndrome (off colored), hypopituitarism, shock
- Jaundice → increased serum bilirubin ((jaundice appears clinically when increase more than 3.5 mg/dl in child and 5 mg/dl in neonate))
- Plethoric face (red color face) → polycythemia, vasodilation, vascular overload
- Pinkish color face → polycythemia, chronic hypoxia
- Earthy pale complexion → uremia
- Pigmentation → racial, actinic, in disease like Addison's
- Malar flush → in mitral stenosis

5- Eye:

- Anemia → look at palpebral conjunctiva
- Polycythemia → congested conjunctiva
- Jaundice → look at sclera
- Puffiness (edema of the eyelids) → in renal disease and myxedema and allergic
- Xanthelasma → yellowish plaques around the eye
- Sub-conjunctival hemorrhage → in bleeding tendency, conjunctivitis, severe cough
- Sunken eye → dehydration
- Tears on crying or not
- Any discharge (like pus)
- White spots in the iris → Vit. A deficiency
- Signs of dehydration → sunken eye + dryness (tears and glistening)

6- Ear:

- Discharge
- Large or small ears
- Low set ears
- Boat ear (congenital)

7- Nose:

- Nasal discharge
- Look inside for any polyps
- Bleeding
- Flaring of ala nasi (sign of respiratory distress)

8- Lips:

- Cyanosis
- Ulcer
- Herpes labialis
- Angular stomatitis and cheilosis → Iron deficiency anemia & vitamin deficiency

9- Gums:

- Red + swollen + suppuration → gingivitis
- Gingival hypertrophy → in scurvy, leukemia, drugs like phenytoin

- Bleeding gums → inflammation, Vit. C deficiency
- Chelosis → vitamin deficiency

10- Teeth:

- Number of teeth
- Dental caries
- Teeth loss

11- Tongue:

- Color → red in glossitis, pale in severe anemia, yellow in jaundice, blue in central cyanosis
- Moisture → dry tongue in dehydration and air and drugs like anticholinergic
- Fur → in air breathers
- Smooth tongue → in anemia

12- Buccal mucosa:

- Thrush → candida infection
- Aphthous ulcer
- Petechial hemorrhage → bleeding tendency and infection
- Pigmentation → Addison's disease
- Pallor → anemia
- Dryness of the mouth → sign of dehydration

13- Congenital anomalies:

- Cleft lip and cleft palate and Cleft uvula

#Examination of Neck

- Lymphadenopathy ((L.N in neck + axillary + inguinal + epi-trochlear L.N near elbow → enlargement of two L.N in non-adjacent site called generalized lymphadenopathy))
- Neck mass and Thyroid
- Swelling → midline or lateral
- Using of accessory muscle in respiration → sign of respiratory distress

#Examination of Chest

- Abnormal shape
- Rachitic rosary → beaded ribs in rickets
- Signs of dyspnea → flaring of ala nasi – cyanosis – dusky – suprasternal, intercostal, subcostal recession

#Examination of Abdomen

- Abdominal distention → distention (5F) – flat – scaphoid
- Skin rash → allergy, contact dermatitis, candidiasis
- Signs of wasting → loss of muscle + loss of subcutaneous fat + look at thigh, buttock, arm and pectoralis major muscle

- Signs of dehydration → skin turgor – elasticity

#Examination of Groin

- Wasting → loss of muscle bulk
- Thinning → loss of subcutaneous fat (exam thickness of skin fold)
- L.N
- Hernia → in pediatric (indirect inguinal hernia = swelling of the scrotum)

#Examination of lower limbs

- Joint swelling and deformities (knee joint swelling) and Muscle wasting
- Edema (on the shaft of the tibia – dorsum of foot → pressure at least for 1 min)
- Bowing of leg → in rickets
- Ankle joint widening in rickets
- Color → jaundice, pallor, cyanosis
- Nails → pallor – koilonychias (chronic iron deficiency anemia) – leukonychia (in liver disease and hypo-proteinemia)
- Fungal infection of the foot

#Examination of Back

- Sacral edema
- Pigmentation and Rash
- Meningocele and myelomeningocele
- Vertebral column → pass your finger along the vertebral column

#Examination of upper limbs

- Abnormal movements and Joint swelling and deformities
- Muscle wasting (wasting of thinner or hypo-thinner muscles)
- Skin color → anemia, cyanosis, jaundice, pigmentations
- Skin lesions → purpura, petechiae, purpuric spots, ecchymosis, hematoma
- Palmer erythema, spider naevi, central pallor of the palm
- Nails → clubbing, koilonychias, onycholysis ((GIT causes of clubbing in pediatric are: celiac disease, cystic fibrosis, liver cirrhosis, IBD))
- Hand moisture
- Skin retraction
- Creases → indicate Hg less than 7 – pallor → indicate Hg less than 12
- Widening of wrist joint → on rickets

#Examination of vital signs (all of them calculated by chart or using the following method)

1- Blood pressure

- (75/55) + age in years

2- Temperature

- 36.5 – 37.5 = normal
- < 36.5 = sub-normal
- < 35 = hypothermia
- > 37.5 = febrile
- less than 38 = Low grade fever
- more than 38 = High grade fever
- > 39 = hyperthermia
- > 41 = hyperpyrexia

3- Pulse rate

- Newborn (< 1 month) → 120-160 bpm
- infant (1-12 month) → 80-140 bpm
- toddler (1-3 year) → 80-130 bpm
- preschooler (3-5 year) → 80-120 bpm
- school age (6-12 year) → 70-100 bpm
- adolescent (> 13 year) → 60-100 bpm

4- Respiratory rate

- 2 months age → 60/min
- 2 months – 1 year → 50/min
- 1 year – 5 years → 40/min
- 5 years – 10 years → 30/min
- More than 10 years → 20/min

5- Anthropometric measures

- Weight
 - Normal Birth weight 2.5 - 4.5 kg
 - <2.5 kg low birth weight
 - <1.5 kg very low birth weight
 - <1 kg extremely low birth weight
 - Baby double his weight at 6 months
 - Triple at 1 year
 - Quadruple at 2 year
 - Every year 3.5 kg increase (10 g/day)
- Height
 - Normal birth → 50 cm
 - First year → 75 cm
 - Second year → 85 cm
 - Forth year → 100 cm

- After that → 6 cm/year
- OFC = occiputo-frontal circumference
 - At birth 35 cm
 - 2 cm per month in the first 3 months
 - 1 cm per month in 3-6 months '
 - 0.5 cm per months in 6 months – 1 year
 - 12 cm in one year
 - 10 cm in the rest of life
 - At birth = 35 cm
 - At 6 months = 44 cm
 - At 1 year = 47 cm

Notes:

#Indication for measuring blood pressure below 3 years:

- Cardiac case
- Renal case
- CNS case

#OFC in chart:

- 95-5 → normal
- Below 5 → microcephaly
- Above 95 → macrocephaly – megalcephaly – hydrocephaly

#Height in chart:

- 95-5 → normal
- Below 5 → short stature
- Above 95 → long stature
- Measure length (lying) if baby less than 2 years
- Measure height (stand) if baby more than 2 years

#Weight in chart:

- 95-5 → normal
- Below 5 → marasmus – kwashiorkor – marasmus on kwashiorkor
- Above 95 → obese

Causes of macrocephaly: Familiar, big ventricles, fluid (hydrocephalus), big bone (rickets or thalassemia major).

General examination related to respiratory system

#General:

- Introduce yourself
- Name-age-sex-occupation of the patient
- Alert or not (Old child → oriented// young child → alert)
- Condition of patient: well, depressed, crying, comfortable, no abnormal posture,
- Build → obese (steroids), thin (TB, asthma, bronchiectasis, cystic fibrosis), macrosomia (occur in baby for mother with gestational diabetes)
- Environment (cannula, I.V fluid, catheter)
- Congenital anomalies
- Color of the child: Polycythemia, dusky color, jaundice, pale (physiological anemia, breast milk not contain high amount of iron, premature baby)
- Rapid assessment of dehydration (fontanel, eyes, skin turgor, drinking, urine output)
- Rapid assessment of malnutrition (Subcutaneous fat of abdomen and thigh and buttock, wrinkling, old face baby)
- Respiratory problems (Dyspnea, Tachypnea, wheezing)
- Anemia → conjunctiva, mucus membrane, nail bed, palmer creases
- Face: mongolian face, site of ear, eye distance
- Mouth: cyanosis, dental carries, mouth breathing, gum hypertrophy (in CHD)
- Nose: nasal discharge, nasal obstruction
- Ear: otitis media
- Neck: tonsils, thyroid, lymphadenopathy (generalized lymphadenopathy → 3 groups of lymph nodes involvement)
- Hand: drumstick clubbing, cyanosis, pallor, koilonychia, leukonychia
- Leg: bilateral edema, cyanosis, sacral edema common in children
- Peripheral cyanosis in neonate → could be acrocyanosis, due to cold, should disappear after warming up
- Jone-way lesions → rheumatic fever "red macules in the palm"

#Finger clubbing:

- Grading of clubbing:
 - I:** obliteration of angle between nail and nail bed (fluctuation test: +Ve)
 - II:** Parrot beak
 - III:** Drum stick
 - IV:** Hypertrophic osteoarthropathy
- Causes:
 - pulmonary: TB, Cystic fibrosis, bronchiectasis, lung abscess, bronchogenic carcinoma

- Cardiac: congenital heart disease, infective endocarditis, Tetralogy of Fallot (severe drum stick), fibrosing arteritis
- Idiopathic - Familial

#Cyanosis:

- It is bluish discoloration of skin and mucus membrane due to increased deoxygenated hemoglobin > 5 g/dl it is not hypoxia (associated with CO₂)
- Acro-cyanosis: peripheral (hands), normally occur in neonate, newborn, cold
- Cardiac cyanosis: central (involves tongue), In central cyanosis there should be peripheral cyanosis with it
- **5T** cyanosis:
 - **T**OF: tetralogy of Fallot
 - **T**GA: transposition of great arteries → D(dextro)type/ L(incompetent with life)type
 - **T**otal anomalies pulmonary venous return
 - **T**ricuspid atresia
 - **T**runcus arteriosus
 Also: Ebstein's anomaly, pulmonary atresia or stenosis

Cyanosis: From birth it is mostly → TGA

Cyanosis: 3-6 months later → TOF

Cyanosis: Associated with H.F → TGA

Cyanosis: Not associated with H.F → TOF

#Vital signs:

1- Temperature:

- Tympanic membrane (more common)
- Oral
- Axillary (+0.5)
- Rectal (-0.5)
- One degree increase lead to 10 beat increase in the heart rate

2- Pulse rate:

- Rate

- Tachycardia: Fever, shock, drugs (salbutamol), sinus tachycardia, anemia, thyrotoxicosis
- Bradycardia: sick sinus syndrome, athletes, cretinism, drugs (propranolol), sleeping, heart block, heart failure
- Rhythm:
 - Regular – regular
 - Regular – irregular (ectopic)
 - Completely irregular
 - Radio-femoral delay: post ductal coarctation of aorta
 - Radio-radial delay: pre ductal coarctation of aorta
 - Brachio-femoral delay
- Character:
 - Jet of pulse: e.g. big and thrusting pulse
 - Watson's water hammer pulse
 - Gallop rhythm: can be assessed by palpation, we find S1, S2, S3, tachycardia
DDx: heart failure and valvular heart disease
- Volume: small volume, normal volume, large volume
- Pulsus paradoxus: decrease in systolic blood pressure >15 mmHg with inspiration, occur in asthma and acute pericarditis
- Non-cardiac causes of large volume pulse:
 - Thyrotoxicosis
 - Severe anemia
 - Stress
- Cardiac causes of small volume:
 - Aortic stenosis
 - Coarctation of aorta
 - Pericardial effusion
 - Cardiac tamponade
- Causes of radial pulse absence:
 - Arteriovenous fistula
 - TAR: Thrombocytopenia-absent radius syndrome → Thrombocytopenia, absence of radial artery, congenital absence of radius bone
- Tachycardia + small volume → in shock or diarrhea
- Water hammer (collapsing pulse) → large volume, dorsum of hand
- Differential cyanosis: cyanosis present in foot, but not hand → coarctation of aorta
- By ending of pulse examination: 80 bpm, regular, normal character, good volume, no radio-femoral delay, normal peripheral pulsation

Post ductal coarctation:

Bluish discoloration of the lower limbs but not the upper limbs and head

3- Blood pressure:

- 5 methods:
 - Auscultation: cuff = 2/3 of arm circumference
 - Palpitatory method: only systolic
 - Flushing → pale → red
 - Osmometry
 - Doppler
- There is special chart for blood pressure: $\frac{\text{Age in years} + 90}{\text{Age in years} + 60}$

Example: 4 years child → BP = $\frac{4+90}{4+60} = 94/64$ mmHg

4- Respiratory rate:

- At least for 1 min (because of irregular respiration in childhood)
- 1-2 months → 60/ min
- 2 months – 1 year → 50/ min
- > 3 years → 20-30/ min
- Periodic breathing: occurs when the breath pause for up to 10 seconds at time, there may be several such pauses close together, followed by series of rapid shallow breaths, then breathing returns to normal. This is common condition in premature babies in first few weeks of life. Even healthy full term babies sometimes spells periodic breathing, usually after sleeping deeply. Home care: supine position, avoid soft pillows and smoking, never shake your baby to breath → brain injury.

Periodic breathing	Apnea
Breathing stops up to 10 seconds	Stops more than 20 seconds
No	Infant may become limp
No cyanosis	Cyanosis
No change in heart rate	Decrease heart rate

5- Anthropometric measurements

- OFC → microcephaly, macrocephaly
- Wight → underweight, overweight
- Height → short stature, long stature
- In acute illness → weight is most affected anthropometric measure
- In chronic illness → length is most affected anthropometric measure
- TB and bronchiectasis → decrease weight
- Asthma → increase weight (due to steroids use) and cause short stature

Part3: GIT: history

#History of bowel motion (diarrhea)

- **Amount** → increased (watery or loose) in small intestine disease and infections like V.Cholera or decreased (small and bulky) in large intestine disease like Colitis
 - **Frequency** → low frequency in large intestine and high frequency in small intestine
 - **Color** → normal color either yellow, brown or green – white color indicate biliary obstruction (no bile)
 - **Presence blood or mucus**
 - **Consistency**
 - **Odor** → not important except for fish odor stool in small intestine disease and infections like V.Cholera and viral // bacterial & amebic stool is offensive odor
 - **Day or night** → only at night it means UTI or Typhoid – only day it means related to feeding – day and night it means not related to feeding and it is secretory type related to infection like TB, Typhoid, UTI, Brucellosis.
 - **Associated features** → colic – fever – sweating – anorexia – Tenesmus (occur during or after defecation)
- Viral infection (Rota virus) = flu like illness then vomiting then diarrhea (high amount + loose + high frequency more than 10) + low grade fever or no fever
 - V.Cholera = large amount + watery + loose + high frequency
 - Bloody diarrhea = caused by E.coli, Shigella, Salmonella, Campylobacter, Yersinia
 - Parenteral diarrhea = due to systemic cause rather than GIT like meningitis, UTI, Otitis
 - How to know parenteral = normal general stool + stool culture –ve + source of infection
 - Tenesmus = feeling of incomplete defecation + pain during and after defecation
 - Bloody diarrhea + Tenesmus = shigellosis
 - No-infectious cause of diarrhea = diverticulum – ischemic colitis – hemorrhoids
 - Secretory diarrhea not affected by feeding – osmotic diarrhea affected by feeding
 - Amebic dysentery = no fever / bacillary dysentery = with fever
 - Metabolic acidosis occur in diarrhea due to loss of HCO₃⁻ cause deep and decrease breathing to waste CO₂
 - Significant colors of stool: black – white rice – clay in color
 - Toddler diarrhea: diarrhea relived by fasting (celiac disease – lactose intolerance – fructose intolerance – disaccharide deficiency)
 - Toddler diarrhea is frequently due to excessive sweets & juices consumption by the baby
 - Fresh, large amount of blood per-rectum == fissure in ano
 - Diarrhea + abdominal distention + weakness = hypokalemia
 - Diarrhea + cough = Rotavirus – adenovirus – cystic fibrosis - TB
 - Amebic dysentery = features of large intestinal diarrhea // bacillary dysentery = features of small intestinal diarrhea

#Vomiting

- Amount
- Color
- Consistency
- Day/night
- Projectile or not
- Content
- Frequency
- Aggravated factors (food – other)
- Associated with fever, fit, others
 - Vomiting = forceful emptying of the gastric content
 - Regurgitation = effortless emptying of the gastric content (it is partial empty of gastric content)
 - Post-tussive emesis = vomiting after cough → occur in pertussis infection and mycoplasma pneumonia
 - White vomiting → milk / yellow vomiting → gastric juice / green vomiting → bile
 - Bacterial → diarrhea then vomiting // viral → vomiting then diarrhea
 - Vomiting after eating by 6 hours + fever at night → staph infection
 - Vomiting after eating by more than 12 hours → E.coli and it's group
 - Vomiting after eating by more than 24 hours → Salmonella and it's group

#Fever

- Continuous fever (typhoid) Intermittent fever (malaria) Remittent (infective endocarditis) Pel-ebstein fever (Hodgkin's lymphoma)
- site
- severity (low grade – high grade)
- time (during night like TB which associated with sweating or during day)
- associated with sweating, shivering, Rigor
- Shivering → associated with muscle activity // Rigors → uncontrolled muscle activity
- aggravating factors

reliving factors: spontaneously or by anti-pyrol

Part4: GIT: examination

Examination of GIT = Abdominal examination + General examination

#Sequence of examination (from Macleod's)

- Remove the nappy.
- Inspect the abdomen, including the umbilicus and groins, noting any swelling.
- From the infant's right side, gently palpate with the flat of your war right hand. Palpate superficially before feeling for deeper structures.
- Palpate for the spleen. In the neonate it enlarges down the left flank rather than the right iliac fossa.
- Palpate for hepatomegaly:
 - Place your right hand flat across the abdomen beneath the right costal margin.
 - Feel the liver edge against the side of your index finger.
 - If you feel more than the liver edge, measure the distance in the mid-clavicular line from the costal margin to the liver's edge. Describe it in fingerbreadths or measure it with a tape in centimeters.
- Look at the anus to confirm that it is present, patent and in abnormal position
- Digital rectal examination is usually unnecessary and could cause an anal fissure. Indications include suspected rectal atresia or stenosis and delayed passage of meconium. Put on gloves and lubricate your little finger. Gently press your fingertip against the anus until you feel the muscle resistance relax and insert your finger up to your distal interphalangeal joint.

#Normal findings (from Macleod's)

- Distention from a feed or swallowed air is common
- You may see the contour of individual bowel loops through the thin anterior abdominal wall in the newborn, particularly with intestinal obstruction.
- The umbilical cord stump usually separates after 4-5 days. A granuloma may appear later as a moist, pink lump in the base of the umbilicus.
- A small amount of bleeding from the umbilicus is common in neonate.
- The liver edge is often palpable in healthy infants.
- In the neonate the kidneys are often palpable, especially if ballotted.
- Normal liver palpable up to 2 cm under the costal margin in neonate.
- Liver span in child is 2.4 - 6.4 cm but in old child up to 7.4 cm

#Abnormal findings (from Macleod's)

- In **excessive bleeding** from the umbilicus, check that the infant received vitamin K, and consider clotting factor XII deficiency.
- **Spreading erythema** around the umbilicus suggests infective omphalitis, and requires urgent treatment.
- **Umbilical hernias** are common, easily reduced, have very low risk of complication and close spontaneously in infancy.
- An **omphalocele**, or **exomphalos** is a herniation through the umbilicus containing intestine and other viscera covered by a membrane that includes the umbilical cord. It may be associated with other malformations or a chromosomal abnormality.
- **Gastroschisis** is a defect in the anterior abdominal wall with intestinal herniated thought it. There is no covering membrane. The commonest site is above and to the right of umbilicus.
- A **hydrocele** is a collection of fluid beneath the tunica vaginalis of the testis and/or the spermatic cord. Most resolve spontaneously in infancy.
- **Inguinal hernias** are common in the newborn, especially in boys and preterm infants.
- Meconium in the nappy does not guarantee that the baby has a patent anus because meconium can be passed through a **recto-vaginal fistula**.
- Hypokalemia → paralytic ileus → reduce bowel sound
- Intestinal obstruction → bowel sound increase in intensity and frequency

#Causes of hepatosplenomegaly

- Viral infection: viral hepatitis – HIV
- Bacterial infection: brucella – typhoid
- Protozoal infection: kala-azar – malaria
- Hematological diseases: thalassemia
- Malignancy: lymphoma – leukemia
- C.T disease

#Causes of massive (huge) splenomegaly

- Kala-azar
- Myeloid leukemia
- Schistomiasis
- Gaucher's disease

#Complete abdominal examination (like that of adult) (OSCE_2010)

1- GETTING READY

- Greet the patient respectfully and with kindness.
- Explain the procedure to the patient.

- Ask the patient or care giver to undress from the nipple line to the mid-thigh, and cover with a clean sheet. If this is embarrassing, examine the genitalia first and then cover them before examining the rest of the abdomen.
- Wash hands thoroughly and dry them (alternatively use antiseptic gel).
- The patient's position: ask the patient to lie flat on his back with the legs extended. *Older children need to flex the hips to 45° and the knees to 90°. (In very young infants you can examine the infant in the mother's lap).*

2- INSPECTION

- Abdominal movements with respiration
- Breasts
- Pulsations (Epigastric pulsations)
- Hernias
- Umbilicus
- Divercation of recti
- Scars or pigmentations
- Veins
- Visible peristalsis
- Genitalia – Tanner stage

3- PALPATION

- Stand by the right side of the patient (unless you are left handed)
- Make sure that your hand is warm and ask the patient to flex the hips and knees in order to relax the abdomen. (not needed in very young)
- Ask the patient whether there is a painful area or a mass. Always start palpation in the region diagonally opposite to any lesion or pain, and proceed systematically to other regions approaching the affected area last of all.
- Begin in the left iliac fossa and proceed to left lumbar, left hypochondrium, epigastrium, umbilical, suprapubic, right iliac fossa, right lumbar and lastly right hypochondrium. Then palpate more deeply in the same areas.

#Superficial palpation:

- Tenderness
- Rigidity
- Swelling: (relation to diaphragm and if intra or extra abdominal)
- Hernia orifices: Examine the anatomical sites of hernia for swelling (repeat while standing)
- Dilated veins: Determine the direction of the flow by placing two fingers on the vein, sliding one finger along the vein to empty it and then releasing one finger

#Deep palpation:

A. Palpation of the liver:

- Place your right hand on the right iliac fossa (MCL) resting transversely parallel to the costal margin
- Ask the patient to take a deep breath.
- Keep your hand still during inspiration
- As the patient to expire, slide the hand a little nearer to the right costal margin till you palpate lower border of the right lobe of the liver.
- Put your hand in the midline and repeat the above steps till you palpate the lower border of the left lobe of the liver.
- Percussion is done to get the upper border of the liver.
- Record the findings:
 - The degree of enlargement (span in cm between upper and lower borders in MCL)
 - The character of the border (sharp or rounded).
 - The surface (smooth or nodular)
 - The consistency (soft like a lip, firm like a nose, hard like a bone or heterogeneous)
 - The presence of pulsations
 - The presence of tenderness
 - Hepato-jugular (abdomino-jugular) reflux

B. Palpation of the spleen:

- Start palpation from the right iliac fossa with the tips of your hand directed towards the left axilla, and moving toward the left hypochondrium until you feel the spleen
- Record the findings:
 - The consistency
 - The degree and direction of enlargement
 - The character of the border (sharp or rounded), the presence of notch
 - The surface (smooth or nodular)
 - Tenderness

C. Palpation of the kidneys:

1- Bimanual palpation of both kidneys

- Put your hand behind the patient's loin
- Lift the loin and the kidney forward.
- Put the other hand on the lumbar region and ask the patient to take a deep breath.
- During expiration push your hand deeply but gently and keep it still during inspiration
- Repeat as the patient takes his breath.

2- Ballottement is done to confirm renal origin of a swelling (by pushing renal angle upwards, and palpate the kidney by the other hand)

D. Palpate for other Abdominal Swellings:

Differentiate intra-abdominal from parietal swellings:

- Relation to the costal margin.
- Behavior on contraction of the abdomen.

4- PERCUSSION:

- Rub your hands together and warm them up before placing them on the patient
- Percuss for ascites and over any masses.
- In the abdomen only light percussion is necessary.
- Start from resonant to dull in the midline

A. Percussion of the liver (span of the liver):

- Determine the upper border of the liver by heavy percussion starting from the 2nd intercostal space opposite the sternocostal junction
- Percuss down along each inter-costal space in the MCL and when you reach the dullness ask the patient to take a deep breath and hold it
- Percuss again, ((tidal percussion), if it became resonant this will denote infra diaphragmatic cause (liver). If it remain dull, this will denote supra diaphragmatic cause(pleural effusion)
- Measure the distance between the upper border (by percussion) and lower border (by palpation) in the right mid- clavicular line, this is the span of the liver.

B. Percussion of the Spleen:

- Percussion of the Traube space { Area defined by the anatomical apex (5th ICS in MCL), left sixth and eighth ribs superiorly, the left midaxillary line (9th, 10th&11th ICS) laterally, and the left costal margin inferiorly }.
- If Traube area is dull: the spleen may be enlarged, full stomach, pulmonary or pleural disease or cardiac dullness.

C. Percussion for Ascites (Shifting Dullness)

- Instruct the patient to lie in the supine position
- Place your fingers parallel to the flanks. Start percussion from the region of the umbilicus down to the flank till you elicit a dull tone.
- On detecting dullness, ask the patient to turn to the opposite side, while keeping the examining hand over the exact site of dullness. Keep your hand in position till the patient rests on the opposite side. Repeat percussion; if the flank returns a resonant note and percussion at the umbilicus returns a dull note, that indicates the presence of moderate free ascites.
- Testing for MINIMAL ascites in the knee elbow position: (If shifting dullness is negative) Percuss around the umbilicus while the patient is kneeling in the knee-elbow position.
- In case of MASSIVE ascites: Detect ascites by FLUID THRILL - Detect organomegaly by DIPPING method

5- AUSCULTATION: for intestinal sounds

- It is performed before percussion or palpation as vigorously touching the abdomen may disturb the intestines, perhaps artificially altering their activity and thus bowel sounds.
- Exam is made by gently placing the pre-warmed (accomplished by rubbing the stethoscope against the front of your shirt) diaphragm on the abdomen and listening for 15 or 20 seconds. Practice listening in each of the four quadrants. Normally,

peristaltic sounds are heard every 10 to 30 seconds. Comment on presence intestinal sounds

6- EXAMINATION OF THE BACK

- Ask the patient to sit
- Inspect for any swellings, deformities or scars
- Palpate for edema over the sacrum
- Palpate for tenderness over vertebrae

7- EXAMINATION OF GENITALIA AFTER PERMISSION

Part5: GIT: Important topics

#Cleaning and sterilization of bottle

- First wash bottle with cold water + detergent (to remove protein - albumin)
- Brush it
- Wash it by hot water (to remove lipids - carbohydrate)
- Take off the tit and put the bottle in already boiling water for 10-15min
- Put the tit for 3-5 min in the boiling water
- Then put the bottle in the refrigerator till you will use it
- Types of sterilization:
 - Boiling
 - Steam Sterilizer
 - Using chemicals (that are for sterilizing baby feeding equipment)
- Number of bottles = number of feeds + 1

#Calories calculation for baby

- Normal baby need (100-120 kcal/kg) – preterm baby (150) – less than 6 months age (110) – after one year (100)
- Each ounce = 30 cc of water = 20 kcal
- We multiply the number of daily requirement of calories (100-120 kcal/kg) by the ideal weight of the child
- To calculate the ideal weight you should use the chart or use the following equation
ideal weight of the infant = $(\text{age in months} + 9)/2$
- Then we divide it by 20 (the number of ounces that the milk spoon carry)(Ounce=20 Kcal), the result will be the numbers that the child should feed in the day
- e.g. in the child ideal wt. is 5kg , $5*100 = 500$ kcal/day , divided by 20, this equals to 25 numbers , that means if the child feeds 5 times/day every bottle should contain 5 numbers

#Breast feeding

1- Benefits

- Correct fat-protein balance
- Nutritionally complete
- Promotes healthy growth patterns
- Diseases protection
- Better jaw and tooth development

- Ensues digestibility
- Easier transition to solid food

2- Down sides

- Vitamin K deficiency
- Hypernatremia (at end of first week in babies with inadequate intake)
- Inhibits modern control culture

3- Contraindications

- Galactosaemia
- Maternal HIV infection
- Anti-neoplastic drugs
- Tetracycline
- Lithium

#Types of milk

- Infant formulas (cows milk)
- Whey based milk
- Casein based milk
- Soya infant milk
- Follow on formulas
- Specialized formulas (lactose free, phenylalanine free)

#Signs of good feeding

1- For baby:

- Urination and bowel motion start to work
- Smile and not cry
- Good activity
- Sleep after feeding

2- For mother:

- Disappear of pain
- Disappear of depression
- Keep her cloths clean

#Causes of faltering growth

1- Organic causes

- Inability to feed (cleft palate, cerebral palsy)
- Increased losses (diarrhea, vomiting, GERD)

- Malabsorption (cystic fibrosis, post-infective, allergic enteropathy)
- Increased energy requirements (Cystic fibrosis, malignancy)
- Metabolic (hypothyroidism, congenital adrenal hyperplasia)
- Syndromes

2- Non-organic causes

- Insufficient breast milk or poor technique
- Maternal stress / maternal depression / psychiatric disorder
- Disturbed maternal-infant attachment
- Low socio-economic class
- Neglect

#Approach and management to faltering growth

- Recheck wright-plot weight against centile chart
- Check type and amount of feeding
- Observe feeding technique
- Assess stool
- Examine for underlying illness – appropriate investigations
- Consider admission to observe response to feeding
- Dietician involvement
- Inform general practitioner / health visitor / community nurse

#Acute gastroenteritis

1- Definition: diarrhea associated with nausea and vomiting and abdominal pain

2- Causes:

- Viral (50-70%) → caliciviruses – rotavirus – adenovirus – parvovirus → one day of high fever followed by vomiting and watery diarrhea ^{هام جداً}
- Bacterial (15-20%) → Shigella – salmonella – C.jejuni – E.coli – V.cholera – Yersinia enterocolitica
- Parasitic (10-15%) → Giardia – Amebiasis – cryptosporidium – cyclospora
- Food-borne toxigenic diarrhea → preformed toxin (S.aureus, B.cereus) postcolonization (V.cholera, C.perfringens, enterotoxigenic E.coli, Aeromonas)
- Drug-associated diarrhea → Antibiotics – laxatives – colchicine – quinidine – cholinergic – sorbitol

3- History:

- Fever
- vomiting
- pain

- stool (large volumes in enteric infection, small stool in colonic infection, presence of blood in colonic ulceration, white bulky feces that float in small intestine disease, copious (rice water) diarrhea in cholera)
- Extra-intestinal causes (parenteral diarrhea) → history of recent surgery or radiation, food or drug allergies, endocrine or gastrointestinal disorders, it caused by systemic infections like UTI, rheumatic carditis, pneumonia, meningitis, bronchitis, and other infections
- Dehydration → orthostasis – lightheadedness – diminished urine formation – marked dehydration – electrolyte loss

4- Physical examination:

- Hydration and nutritional status: diminished skin turgor – weight loss – resting hypotension – tachycardia – dry mucus membrane- decreased frequency of urination – changes in mental status – orthostasis – absence of tears – poor capillary refill – sunken eyes – depressed fontanel – increased axillary skin folds – dry diapers – muscle wasting – signs of neural dysfunction
- Abdominal examination → to exclude causes of diarrhea
- Signs of bacteremia or sepsis

5- Diagnosis:

- Stool studies and culture: blood and leukocyte in stool , stool culture
- Routine laboratory test: CBC, electrolytes, renal function, BUN, Decreased serum bicarbonate, acidosis secondary to bicarbonate loss, hypokalemia
- ELISA

6- Treatment:

- Rehydration: oral or IV
- Empiric therapy for infectious diarrhea: supportive treatment and drugs like metronidazole
- Anti-emetic
- Anti-diarrheal (anti-motility agents)

7- Complications:

- Dehydration
- Acidosis = vomiting after treatment + rash / the cause of acidosis is secondary lactose intolerance / give lactose-free milk for 6 weeks
- Hemolytic-uremic syndrome = anuria + edema + petechia + ecchymosis + coma appear after treatment / caused by any bloody diarrhea and it lead to hematuria and renal failure
- Guillen-Barry syndrome = weakness of lower limbs / caused by campylobacter infection / appear after treatment
- Convulsion (Below)

#Causes of convulsion in a child (GIT causes)

- Electrolyte disturbance → hypocalcemia, hypoglycemia, hypomagnesaemia, hypo or hypernatremia (last two lead to convulsion + gastroenteritis) but not hypokalemia
- Meningitis and encephalitis → vomiting + diarrhea
- Shigellosis → small bloody diarrhea with mucus+ convulsion + fever
- Hyper-viscosity of blood (hypovolemia) → cerebral thrombosis (rare)
- Febrile convulsion →
 - 1- Typical febrile convulsion
 - Age: 6 months – 6 years
 - The type is generalized tonic clonic convulsion
 - Duration: less than 15 min
 - High fever: equal or more than 38 c
 - Single attack
 - No focal neurologic signs
 - 2- Atypical febrile convulsion
 - Age: less than 6 months – more than 6 years
 - Associated with focal neurologic signs
 - Fever: less than 38 c
 - Duration: more than 15 min
 - Frequent (twice or more)
 - Return to normal

#Sterile pyuria

- Sterile pyuria is the presence of elevated numbers of white cells (>10 white cells/mm³) in urine which appears sterile using standard culture techniques
- Causes:
 - A recently (within last 2 weeks) treated urinary tract infection (UTI) or inadequately treated UTI.
 - UTI with 'fastidious' organism (an organism that grows only in specially fortified artificial culture media under specific culture conditions), e.g. *Neisseria gonorrhoeae*.
 - Renal tract tuberculosis, chlamydial urethritis.
 - False negative culture due to contamination with antiseptic.
 - Contamination of the sample with vaginal leukocytes.
 - Interstitial nephritis: sarcoidosis (lymphocytes not neutrophils).
 - Urinary tract stones.
 - Renal papillary necrosis: diabetes, sickle cell disease, analgesic nephropathy.
 - Urinary tract neoplasm, including renal cancer and bladder cancer.
 - Polycystic kidneys.

- Interstitial cystitis.
- Prostatitis.
- Other reported associations include appendicitis, systemic lupus erythematosus and Kawasaki disease.

#Dehydration

- Assessment of dehydration → the following table **هام جداً**

Plan	Plan A	Plan B	Plan C
Severity	5% Mild	5-10% Moderate	>10% Severe
Appearance	Active, alert	alert, thirsty	looks sick
Consciousness	Fully	Drowsy - irritable	lethargic and unconscious
Fontanel	Normal	Depressed	Severely depressed
Lips and M.M	Normal	Dry	Severely dry
Eyes	Normal	Sunken, decrease tears	Severely sunken, no tears
Pulse	Slightly increased	Fast, low volume	Very fast, thready
Blood pressure	Normal	Hypotension	Severely hypo
Respiration	Normal	Fast	Fast and deep
Skin turgor	Normal	Equal or more than 3 sec	More than 3 sec
Capillary refill	Normal	Up to 3 sec	More than 3 sec
Urine output	Slightly decrease	decreased	Oliguria <400/24h or anuria
Drinking	Normal drinking	Eager to drink	Unable to drink
Weight loss	Up to 5%	6-10%	More than 10%

- Mild dehydration → very thirsty – eager to drink – may lose weight
- Severe dehydration is shock state
- Any cause of vomiting or diarrhea do clinical assessment of dehydration
- Diarrhea → dehydration → acidosis → acidotic breathing → tachycardia
- Causes of polyuria in dehydrated patient = UTI + Parenteral diarrhea + Respiratory infection + Hypokalemia
- How to assess dehydration from history only? By asking about sleep, activity, feeding, urine output, weight loss
- Indication of antibiotics in patient with dehydration: patient below 3 months age – immunocompromised patient – febrile patient – bloody diarrhea – parenteral diarrhea – shock state
- Treatment Plan A →
 - rehydration by ORS (oral rehydration solution)
 - give 50 cc after each vomiting and diarrhea
 - if the cause is viral → no treatment is required
 - if the cause is bacterial → give antibiotics

- Treatment Plan B →
 - If mild dehydration → give ORS 50 cc/Kg within 4 hours
 - If moderate dehydration → give ORS 100 cc/Kg within 4 hours
 - Then do reassessment of dehydration again
 - If the condition not treated → consider it as Plan C
- Treatment Plan C →
 - Hospital admission
 - IV fluid
 - Start IV fluid as bolus dose ((20 cc/kg)) normal saline or ringer → within one hour for infant or within half an hour for child
 - Then repeat the reassessment again → if still severe dehydration repeat the bolus dose ((you can repeat the bolus dose 3 times only))
 - Then calculate 3 things → First is maintenance dose (give glucose saline as 100 cc/kg for first 10 Kg then 50 cc/kg for second 10 Kg then 20 cc/kg for remaining Kg for example if the patient is 24 kg then give 1580 cc) Second is deficit dose (if severe dehydration → 100 cc/kg -- if moderate dehydration → 50 cc/kg) Third is ongoing dose (give 20 cc for each vomiting and diarrhea for example if baby has 2 vomiting and 1 diarrhea then give 60 cc)
 - Now calculate: Final maintenance dose = (Maintenance+Deficit+Ongoing) – bolus then divide it in to 2 doses the first one is given within 8 hours and the second one is given within 16 hours
 - Give potassium (K) = 2 mmol/100cc
 - Note: give all of these doses within 24 hours

#Assessment of malnutrition

- Mild malnutrition → abdominal sub-cutaneous fat is decreased
- Moderate malnutrition → Thigh and buttock sub-cutaneous fat is decreased
- Severe malnutrition → old face appearance
- Protein and calories deficiency:
 - Kwashiorkor (protein deficiency) → change in mod – dull patient – loss of appetite – skin change (dermatitis) – change in skin color – thin hair – wasting – liver enlargement - focal edema (swelling in the limbs and belly)
 - Marasmus (calories deficiency) → good appetite – alert – low weight – severe wasting – little or no edema – minimal subcutaneous fat – severe muscle wasting
 - Marasmic-Kwashiorkor (Protein and calories deficiency) → weight less than 60% of ideal weight – edema
- Vitamins deficiency:
 - Vit A → white spot in the eye
 - Vit B2 → angular stomatitis – glossitis
 - Vit B6 → neurological change

- Vit B12 → Megaloblastic anemia
- Vit C → gum hypertrophy
- Vit D → rickets rosary – widening of wrist – developmental delay – bowing of the lower limbs
- Vit E → ecchymosis – petechia
- Minerals deficiency:
 - Iron → iron deficiency anemia
 - Zinc → acro-dermatitis in napkin area ((also occur with candidiasis and atopy like contact dermatitis))
- General signs of malnutrition:
 - Face → moon face (kwashiorkor) – simian face (marasmus)
 - Eye → dry eye – pale conjunctiva – Bitot's spots (Vit A) peri-orbital edema
 - Mouth → Angular stomatitis – cheilitis – glossitis – parotid enlargement – spongy bleeding gums (Vit C)
 - Teeth → enamel mottling – delayed eruption
 - Hair → dull – sparse – brittle – hypo-pigmentation – flag sign – alopecia
 - Skin → loose and wrinkled (marasmus) – shiny and edematous (kwashiorkor) dry – poor wound healing – erosions – hypo or hyper pigmentation
 - Nail → koilonychia – thin and soft nail plates – fissures or ridges
 - Musculature → muscles wasting (buttocks and thigh)
 - Skeletal → deformities (Vit C, Vit D, Calcium deficiency)
 - Abdomen → distended – hepatomegaly - fatty liver – ascites
 - Cardiovascular → bradycardia – hypotension – reduced cardiac output – small vessel vasculopathy
 - Neurologic → global developmental delay – loss of knee and ankle reflexes – poor memory
 - Hematological → pallor – petechiae - bleeding diathesis
 - Behavior → lethargic – apathetic
- Causes of malnutrition:
 - Major causes → poverty – food process – dietary practices
 - Consequences of health issues like gastroenteritis – chronic illness – HIV
 - Diarrhea and other infections
 - Parasitic infections
 - Abnormal nutrient loss
 - Lack of adequate breast feeding

#Edema in child

- Location:
 - eye puffiness
 - ascites
 - leg swelling → due to DVT or Pre-eclampsia in mother may be normal in baby
 - scrotal edema

- sacral edema
- pleural effusion
- Non-pitting edema → due to lymphatic obstruction – hypothyroidism
- Most common causes of edema:
 - Nutrition → kwashiorkor ((start at leg and continue upward))
 - Renal → nephrotic syndrome ((start from above and continue downward))
 - Heart failure and Liver dysfunction (less common)

#Most common causes of hematemesis in child

- Repeated vomiting → Mallory-Weiss syndrome
- Ulcer (peptic)
- Systemic disease → bleeding disorder

#To assess the severity of disease in child

- Sleeping
- Activity
- Feeding
- Weight loss

#Causes of fever developed in hospital

- Drug induced fever
- Nosocomial infection (pneumonia)
- Phlebitis fever

#In history of present illness: Mention urine output in the following conditions:

- Parenteral diarrhea
- Antibiotic associated diarrhea
- Dehydration
- Hypokalemia → polyuria

#Contraindications of vaccination

- Immunocompromised patient
- Allergy to egg (do not give measles vaccine)

#Serious signs requiring immediate attention

- poor perfusion (indicating shock)
- reduced capillary refill (indicating shock)
- cool peripheries (indicating shock)
- petechial rash over the trunk (suggesting meningococcal septicemia)
- headache, photophobia or neck stiffness (suggesting meningitis)
- dyspnea at rest (indicating loss of respiratory reserve due to pneumonia, asthma)

#Clinical signs associated with severe illness in children

- fever >38 c
- drowsiness
- cold hands and feet
- petechial rash
- neck stiffness
- dyspnea at rest
- tachycardia
- hypotension

#signs that may suggest child neglect or abuse

1- behavioral signs

- frozen watchfulness
- passivity
- over-friendliness
- sexualized behavior
- inappropriate dress
- hunger, stealing food

2- physical signs

- identifiable bruises (fingertips, handprints, belt buckle, bites)
- circular (cigarette) burns or submersion burns with no splash marks
- injuries of differing age
- eye or mouth injuries
- long bone fractures or bruises in non-mobile infants
- posterior rib fracture
- sub-conjunctival or retinal hemorrhage
- dirty, smelly, unkempt child
- bad nappy rash

#Notes from the doctor

- Diarrhea = frequent loose motion
- In diarrhea → take about amount, frequency, semi-form, watery, blood, pus
- Watery + high amount diarrhea = severe fluid loss
- Tensmus + small amount + blood + mucus stool = disease in the colon (colitis)
- Watery stool = disease in small intestine
- Loss of appetite = poor feeding
- Dehydration => ask about urine amount
- If the symptoms of infection disappear in 3 days this means that the infection subside and healed then the patient may develop new infection or still healthy
- If the milk still for one or two hour in the bottle it could lead to infection
- Breast feeding → slime baby + good immunity
- Bottle feeding → obese baby + poor immunity
- Vomiting + diarrhea + polyuria → caused by UTI (cystitis, pyelonephritis)
- Not mention palpitation, chills, rigor, septum during pediatric history taking
- Adenovirus cause respiratory infection with GIT symptoms
- Hypokalemia cause → hypotension + paralytic ileus + arrhythmia
- Don't said diarrhea or cyanosis in pediatric history
- Diarrhea term means → increase amount + increase frequency + increase fluidity
- > 12 hours prolongation of labor after rapture of membrane may cause neonatal sepsis (E.coli, Group B strept.)
- Gastroenteritis cause weakness due to hypokalemia and hypotonia in muscles
- Ejection of milk in one breast is 3 min but baby still sucking the nipple to stimulate milk for next time
- Start solid food at 4-6 month but egg and banana start at 9 month due to allergy
- Dilution of milk → cause vomiting and not give enough calorie
- Hypokalemia – paralytic ileus → lead to decreased bowel sound
- Bad odor of urine normally due to presence of uric acid and may be due to D.M which make purification or inborn error of metabolism or mouse like odor
- At examination you will find clear chest except in Rotavirus or adenovirus infection you will find abnormal breath sound on auscultation
- High body temperature in shigellosis and typhoid fever, mild in adenovirus
- Under-weight baby → due to chronic disease or poor nutrition
- Chronic use of steroid cause obesity, used in asthma – nephrotic syndrome – Crohn's disease – ulcerative colitis
- In children less than 3 years → UTI manifested as diarrhea and vomiting
- First thing affected between anthropometric measures is wright then height (chronic problem) then head circumference (very chronic: months to years)

Part6: Respiratory & CVS: History

#Ask about

- Cough, sputum, Cyanosis, Shortness of breath, Noisy breathing
- Sneezing, Expectoration, Hemoptysis, Post-tussive, Nasal discharge
- Chest pain, Chest tightness (respiratory and cardiac problems)
- Fever, Abdominal distention, Abdominal movement
- Daily activity, Difficulty in feeding, Crying

#Cough

- Source → carina // center → medulla oblongata
- Onset (sudden, gradual)
- Duration:
 - < 2 weeks → acute (bronchiolitis, pneumonia, asthma)
 - 2 weeks – 2 months → acute prolonged cough (pertussis, chronic sinusitis)
 - > 2 months → chronic (foreign body, GERD, Tracheo-esophageal fistula, cystic fibrosis, bronchiectasis, mucociliary dyskinesia)
- Continuous or intractable
- Wet or dry?
 - If productive (with sputum) ask about: color, amount, consistency, contains blood or clot
 - If productive: mostly lower respiratory tract problem // dry: upper problem
- Character:
 - Group, LaryngoTracheoBronchitis → barking
 - Pertussis → paroxysmal post-tussive vomiting
 - Bronchiolitis, asthma → wheezing
- Timing:
 - Nocturnal → allergy, asthma
 - Midnight → sinusitis
 - Early morning → Bronchiectasis, COPD, chronic bronchitis, adenoid, smoking
 - Exercise → asthma
 - All over the day → allergy, foreign body
- Associated symptoms:
 - Feeding → may suggest Tracheo-esophageal fistula
 - Suffocation, Apnea, Fever, Dyspnea

#Cyanosis

- Bluish discoloration of skin and mucus membrane
- Central or peripheral (lips, tip of tongue, peripheries)
- Respiratory causes: T.B, respiratory distress syndrome, asthma, pneumonia, pneumothorax, bronchiectasis, lung abscess, cystic fibrosis, asbestosis, familial (10%)
- Acute cyanosis: pneumonia (respond to O₂)
- Chronic cyanosis: Tetralogy of Fallot (not respond to O₂)
- Signs of chronic cyanosis: finger clubbing, polycythemia (due to chronic hypoxia), gingival hyperplasia

#Shortness of breath

- Onset
- Duration
- Day/night
- Feeding – activity – sleeping
- Fever
- Bluish discoloration
- Aggravating and relieving factors

#Fever

- High grade fever (in bacterial infection) or low grade fever (in viral infection)
- At day time or night
- Intermittent or continuous
- Associated with sweating, chills, shivering, rigors
- DDX: T.B, pneumonia, dehydration, SIADH, others (CNS infection and UTI)

#Noisy breathing

- At which level?
- **Nose** → snoring "inspiratory", adenoid hypertrophy, common in pediatric
- **Epiglottis** → Grunting "expiratory", sign of respiratory distress
- Grunting:
 - Pulmonary:
 - Effusion, pneumothorax
 - Dramatic response to O₂ for 10 minutes
 - Extra-pulmonary:
 - Cardiac: e.g. acute heart failure
 - Metabolic acidosis: e.g. gastroenteritis, diarrhea, diabetic ketoacidosis, salicylate
 - Severe blood loss: anemia
 - Expiratory phase due to respiratory failure
- **Larynx** → Strider "inspiratory", e.g. croup

- **Trachea and major bronchus** → Crepitation (by stethoscope), Rattling (by ear)
"Inspiratory and expiratory" causes:
 - Bronchiolitis: viral (RSV), less than 1 year, peak at 6 months
 - Pneumonia: more than 1 year, inflammation of lower respiratory tract
- **Minor bronchioles** → wheezing "mainly expiratory", causes: bronchiolitis, asthma, heart failure, pulmonary edema

#Relation of other systems to respiratory system:

- GIT → chest infection + frequent bowel motion = adenovirus
- GUS → chest infection + UTI = adenovirus
- CNS → chest infection + meningitis = adenovirus / Fit due to hypoxia (anxious or lethargic)
- Skin → respiratory infection + rash = measles or as complication of poliovirus vaccine

#Past medical history:

- The most important problem that affect the neonate and that 100% ends with asthma is → Broncho-pulmonary dysplasia

#Feeding:

- Unfortified milk → may lead to rickets – iron deficiency anemia // cow milk allergy

#Family history:

Usually 4 types of atopy

- Allergic conjunctivitis
- Allergic rhinitis (annual or seasonal)
- Asthma
- Allergic dermatitis (Eczema)

#Social history:

- Type of heating → trigger gas irritant for asthma patient
- Animal contact → irritant for child and asthma patient
- Ventilation → factory near house, fresh air from trees
- Type of house cleaning

#Effects of feeding on respiratory problems:

- 1st common → aspiration pneumonia
- 2nd common → Tracheo-esophageal fistula
- 3rd common → cow milk protein allergy (dyspnea, skin rashes, diarrhea, microscopically bleeding or rectal bleeding)

Respiratory distress:

- Mild: flaring of ala nasi and tachypnea
- Moderate: use of accessory muscles
- Severe: Grunting
- More severe: all of above + cyanosis + conscious level (irritability)
- Other signs:
 - Cyanosed face
 - Tachypnea (increased O₂ wash → alkalosis → retention of CO₂ → acidosis)
 - Asymmetrical movement of the chest
 - Recession (suprasternal, supraclavicular, intercostal, subcostal)
 - Harrison's sulcus → permanent indentation of chest wall along the costal margins where diaphragm inserts, due to chronic dyspnea in asthma, COPD, bronchiolitis obliterans, heart diseases, also occur in rickets
 - Tracheal Tag → pulling of thyroid cartilage towards the sternal notch in inspiration
- Associated symptoms:
 - Nasal discharge (rhinorrhea)
 - Sneezing
 - Otagia
 - Ear discharge (otorrhea)
 - Dysphagia
 - Chest pain (if child can explain)
 - Pulsus paradoxus → fall in systolic BP > 15 mmHg during inspiration
- Ask about: activity, sleeping pattern, feeding
- General information:
 - RDS is a condition that need admission postnatally and its effect is long-lived
 - Surfactant formation starts at 28 weeks and complete at 37 weeks
 - For maturity of lung of the baby → dexamethasone is replaced by betamethasone (one injection/ 24 hours before delivery)
 - Causes of respiratory distress:
 - Reparatory: pneumonia, bronchiolitis, bronchitis, asthma, plural effusion, pneumothorax → relieved by O₂
 - Cardiac → not respond to O₂
 - Metabolic: diabetic ketoacidosis, acute renal failure, dehydration
 - Neurological, drugs (opioids), severe anemia
- Differential diagnosis of chronic cough + respiratory distress syndrome:
 - Infections → Pertussis (most common), TB
 - Asthma, Bronchiectasis
 - Sinusitis, Foreign body
 - Bronchiolitis, obliteration
 - Congenital anomaly

Part7: Respiratory: Examination

1- Setting:

- Full exposure of the chest
- Good light
- Take permission
- In children < 2 years old → the examination includes inspection and auscultation only

Hyperoxia test: (give 100% O₂)

- Used to differentiate between cardiac and respiratory causes of cyanosis
- Response (absence of cyanosis after O₂) → pulmonary
- No response (persistent of cyanosis after O₂) → cardiac (R to L shunt)

2- Inspection:

- Shape of the chest:
 - Hyper-inflated chest: in bronchiolitis, asthma, emphysema
 - Barrel chest: antero-posterior diameter = transverse diameter → normally in young baby
 - Pectus excavatum (Funnel chest)
 - Pectus carinatum (Pigeon chest)
- Symmetry of the chest
- Movement with respiration, and respiratory rate
- Type of respiration: abdominal, thoraco-abdominal, periodic respiration // abdominal breathing is normal in small children
- Space between 2 nipples
- Scars:
 - On left or right side of the chest → Thoracotomy
 - On sternum → cardiac surgery
- Abnormalities:
 - Polymastia
 - Absence of pectorals (Poland syndrome)
 - Absence of sternum
 - Absence of intercostal muscles (or wasted) → starvation
 - Hemangioma
 - Rachitic rosary: in rickets patient, bead like knobs in the costochondral joint
 - Visible pulsation
- Posterior inspection for: kyphosis, scoliosis → respiratory compression → decreased lung volume → right sided heart failure // kyphoscoliosis in COPD and heart failure

3- Palpation:

- Areas:
 - Anteriorly → clavicle (above) + 3 areas (ICS)
 - Laterally → 2 areas (in axillary region)
 - Posteriorly → supra-clavicular, inter-scapular, infra-scapular
- Palpation for any mass or tenderness
- Trachea:
 - use one finger (unlike adult) → Put index finger in the suprasternal notch
 - normally centrally located and slightly deviated to the right
 - If you suspect deviation of the trachea → palpate the apex beat (could be deviated)
 - Fibrosis, consolidation, collapse → pull
 - Pneumothorax, hemothorax, plural effusion, emphysema → push
 - Only trachea deviated → upper lobe lesion, neck mass (L.N, Tumor)
 - Only heart deviated → left ventricular hypertrophy, dextrocardia
- Apex beat:
 - Under 7 years: normally at 4th ICS at mid-clavicular line
 - Above 7 years: normally at 5th ICS lateral to mid-clavicular line
 - Shifting of apex beat (cardiac or respiratory cause) → plural effusion, pneumonia, pneumothorax, cardiomegaly (toward axilla)
- Chest expansion: by tape measure below the nipple (use tape measure < 4 years // use hands > 4 years) normally 1-3 cm → bilateral
- Vocal fremitus:
 - Need cooperative child, you could know it from crying in young baby
 - Decreased in: emphysema, plural effusion, pneumothorax, collapse
 - Increased in: consolidation
 - Done at 7 areas
 - Mitral area
 - Tricuspid area
 - Suprasternal area
 - Left upper and lower sternal border
 - Right upper and lower sternal border

4- Percussion:

- Dull, Resonant, Hyper-resonant → normally resonance
- Site of percussion:
 - Anterior wall → one apical over clavicle, three anterior chest wall in ICS
 - Lateral wall → two at mid-axillary line
 - Posterior wall → one apical, one interscapular, one subscapular
- Start from supraclavicular area and same regions of auscultation
- Supra-clavicular (apex of lung) important → most common site of T.B → increase O₂

- Percuss direct on clavicles – 2nd space – anterior and posterior
- Dull areas: cardiac (3,5,6 ICS) liver (7th ICS)
- Resonance → normal
- Hyper-resonance → pneumothorax, emphysema
- Dull → consolidation, fibrosis, tumor
- Stony dull → plural effusion

5- Auscultation:

- Areas: Mammary region (supra-mammary, mammary, infra-mammary) Axillary region (superior, inferior) and same sites of percussion
- First check the nose patency
- Air entry or not? Unilateral or bilateral? Type of respiration? Breathing sounds?
- First: expose patient, warm stethoscope, ensure that nostrils are patent
- Silent chest:
 - No air entry all over the chest
 - In status asthmaticus, in severe eczema (or emphysema), in pleural effusion
- Bronchial breathing: found normally over trachea, over main bronchus, in neonate // abnormally hear over lung in pneumonia
- Added sounds: wheezes (rhonchi), crepitation (rales, crackles), plural rub
- Plural Friction rub:
 - Occur at the end of inspiratory phase when pleura become in contact with chest wall
 - Causes: pleurisy, pleural effusion
 - friction rub with respiration → pneumonia
- Neonatal stridor:
 - High pitched (harsh), inspiratory, biphasic (in foreign body), upper respiratory problem (partial obstruction of large airways)
 - Infectious strider: viral , bacterial (epiglottitis, croup)
 - Non-infectious strider: hypocalcemia, edema, allergy to penicillin, foreign body
 - In congenital laryngeomalacia, laryngeal foreign body, infection (like croup), angioedema, hypocalcemia (stridor, convulsion, spasm)
 - If cyanosis occur with stridor → emergency
 - Most common cause in pediatric is → laryngeomalacia
- Wheezing:
 - Musical, medium pitched or low pitched - transmission of air through narrow spaces (partially obstructed airway)
 - In pediatric = small diameter bronchi → mainly expiratory / severe → diffuse expiratory and inspiratory
 - Differential diagnosis: heart failure (cardiac asthma), pneumonia, foreign body, infection
 - Localized rhonchi: foreign body

- Generalized rhonchi: asthma, bronchiolitis
- Most common cause of wheezing: bronchiolitis (<1 year), asthma (>4 year)

- Crepitation:
 - High pitched sound (inspiratory)
 - Produced by mucus filled alveoli which fill during inspiration and collapse on expiration
 - Fine: inspiratory, occur in pulmonary edema (heart failure), pneumonia, foreign body
 - Course: inspiratory and expiratory, occur in fibrosis, asthma, bronchiolitis

- Vocal resonance:
 - Heard by stethoscope at same sites of percussion while the patient say 44
 - Increase in: consolidation
 - Decrease in: plural effusion, collapse

Part8: Respiratory: Important topics

#Presentation of respiratory system

- Super-acute:
 - Short attack within minutes
 - May be due to: aspiration, poisoning with CO or Kerosin, Foreign body inhalation
- Acute:
 - Within hours
 - May be due to acute respiratory infection (upper or lower as in strider, croup, bronchial asthma)
- Sub-acute:
 - Within several weeks
 - May be due to pertussis, TB
- Chronic:
 - May be due to T.B, COPD, Bronchiectasis, Asthma

#Asthma

#General information

- Asthma is disease of small and large airways, but mostly of small airways
- Definition: it is recurrent episodes of dyspnea respond to bronchodilators and there is family history
- Chronic inflammatory airway disorder, characterized by:
 - Airway obstruction: that is reversible either spontaneously or by medications
 - Airway hypersensitivity to variety of stimuli (most commonly in children are viral infections)
- Recurrent disorder, characterized by:
 - Chest tightness
 - Wheezing
 - Breathlessness
 - Cough
- Deferential diagnosis:
 - 1st attack → pneumonia, heart failure, bronchiolitis
 - 2nd attack → allergic bronchitis
 - 3rd attack → asthma
- Epidemiology :
 - Most common health problem in children
 - 80% of them have symptoms < 5 years

- High in African American than white
- Asthma needs acute (rescue) treatment and chronic management (if asthma not treated sufficiently → complicated as fibrosing alveolitis)

#Etiology Not well understood

- Family history: Genetic factor (chromosome 15)
- Environmental factors (viral infection)
- Atopy (atopic dermatitis) or type I hypersensitivity reaction (Exposure to allergens or chemicals)
- Increase risk in (Low Body Weigh < 2.5 Kg) and (Meconium aspiration)
- Diet: protective → Chinese food // aggravative → egg- banana – fish – Cow's milk

#Environmental risk factors

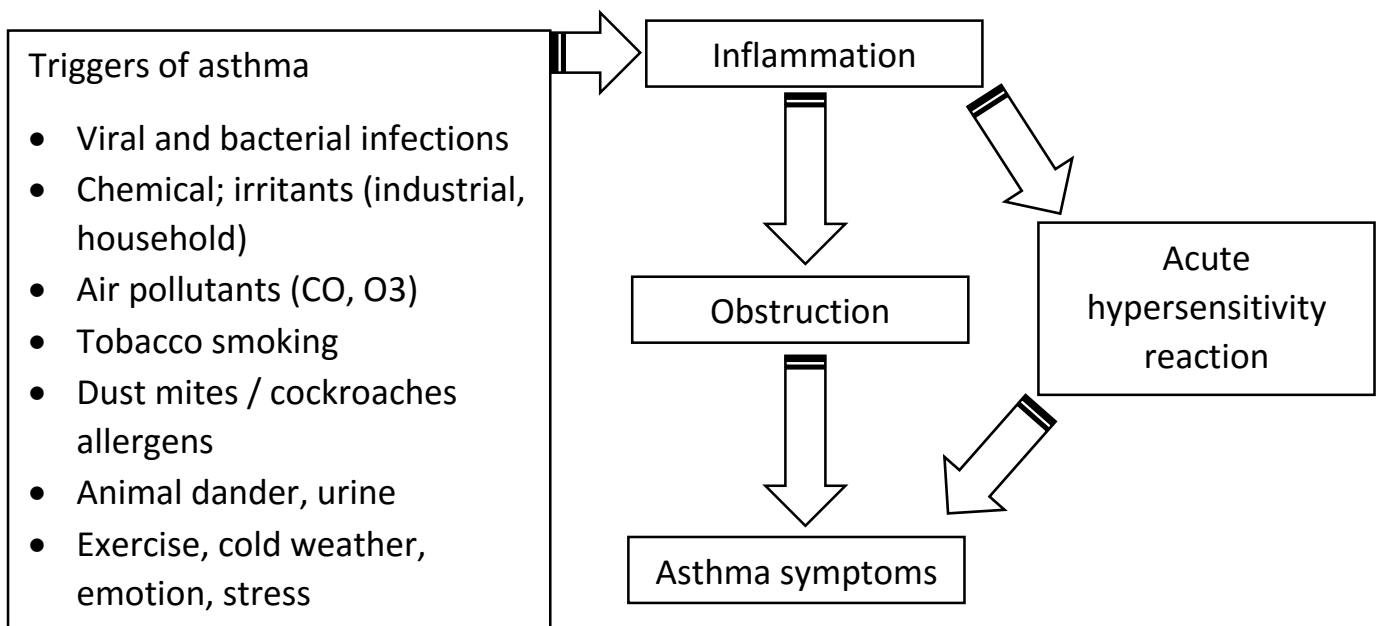
- Perinatal asthma: male, maternal smoking, passive neonatal illness, Low body weight, meconium aspiration
- Early childhood: Lower respiratory tract infection (adenovirus, pneumonia, bronchiolitis), Food allergy, Low socio-economic status, Exposure to household mites
- Later childhood: diet, air pollution, mites and pets

#Why common at night?

- Anatomically: diameter of bronchioles at night less than at day
- Exposure to antigens at bed and pillows
- Decrease secretion of cortisol

Q: Why immunosuppressive agents not very effective in treatment of asthma in pediatric age? Because most common triggers in children is viral infection

#Pathophysiology



#Models of inflammatory response leading to asthma

Phase I

- Sensitization of immune system
- Repeated exposure to allergen
- Production of IgE by immune system → bronchospasm
- Treatment: bronchodilators
- Lasts 6 hours

Phase II

- immediate hypersensitivity to subsequent exposure
- IgE recognize and binds to allergen → inflammatory mediators released by immune cells (eg: histamine)
- Histamine: smooth muscles contraction, increase secretion of mucus from airway tract glands, fluid leakage (edema) in airway wall
- Treatment: corticosteroids
- Lasts 24 hours

Airway limitation in asthma:

- 1- Mucus plug
- 2- Airway edema
- 3- Bronchospasm
- 4- Airway remodeling

Bronchiolitis has same pathophysiology except: airway remodeling

#Types

- **Intermittent:**
 - More than 2 attacks (at day)/ month and 1 or more attacks (at night)/ month
 - Treatment: No daily treatment (only on demand inhaler or nebulizer)
- **Mild persistent:**
 - More than 2 attacks (at day)/ month and more than 2 attacks (at night)/ month
 - Treatment: low dose of steroid inhaler
- **Moderate persistent:**
 - Daily attack mostly / month and more than 4 attacks (at night)/ month
 - Treatment: low or moderate dose corticosteroids + aminophylline or bronchodilator
- **Severe persistent:**
 - More daily attacks and frequent attacks at night
 - Treatment: low dose of oral corticosteroids or long acting beta agonist (LABA)

Note → Mild: low dose inhaler, Moderate: systemic steroids, Severe: high dose corticosteroids

Note → With frequent monitoring and ask about school performance

#Clinical manifestations

- History:
 - Wheezing, cough, chest tightness, breathlessness
 - Worsening at night

- Provoking factors, relieving factors
- Risk factors: allergic rhinitis, atopy, family history
- Documented airway obstruction: PEF (peak expiratory flow) or spirometry (FEV,VC) {>5years}
- Demonstration of reversibility of obstruction and symptoms: by giving bronchodilators → improved? → asthma
- Exercise test

#Differential diagnosis

- Bronchiolitis
- Bronchitis
- Pneumonia
- Cystic fibrosis
- Tracheal stenosis
- Laryngeal stenosis
- Laryngeal webs
- Uvula disease
- Lymphadenopathy
- Foreign body
- Pulmonary embolism
- Viral infection
- GERD
- Congestive heart failure
- Pulmonary eosinophilia

Asthma	Allergy
Recurrence	May but less
Response to bronchodilator	No
Eosinophilia	No
+ve family history	No

Asthma	Bronchiolitis
Recurrent attacks	1 st attack
Positive family history	Negative family history
Respond to bronchodilators	Not respond
Older children	Small children
Over all year	Winter and early spring
Eosinophilia	No

#Lung Function Test

1- Spirometry:

- Air flow limitation: low FEV1 → FEV1/FVC < 0.8
- Response to bronchodilators: B2 agonist > 12% of FEV1
- Exercise challenge : worsening in FEV1 > 15%

2- Peak expiratory flow meter: the difference between morning and night is > 20%

3- Exercise test:

- Stop treatment for 24-72 hours
- At early morning and dry weather
- Exercise for 15 minutes
- First 6 hours accompanied by bronchodilators due to cholinergic stimulation
- Before-After exercise worsening: FEV1 > 15% → diagnostic
- Give bronchodilators: if there's improvement > 15% → diagnostic

- Needs cooperative child (5 years old or more)

4- Other tests:

- Eosinophils
- Allergic test 'Chest x-ray
- Diffusing capacity
- Broncho provocation (give patient histamine → bronchospasm → risk of status asthmaticus)
- Blood gases:
 - Hypoxia + hypocapnia
 - Hypoxia + normal capnia
 - Hypoxia + hypercapnia

#Reliving factors of asthma

- Reduce activity
- Give bronchodilators
- Give Antibiotics
- Avoid allergens

#Notes:

- Criteria of asthma → dry cough (respond to bronchodilators), positive family history, no strider, presence of wheezing or rhonchi
- FVC normal in asthma → so FEV1/FVC decreases
- In fibrosis → FVC decreased, FEV1 decreased, normal FEV1/FVC
- PEFM (peak expiratory flow meter):
 - Green → Asthma in good control
 - Yellow → Liable to develop asthma
 - Red → patient has asthma
- Rhonchi:
 - Mild asthma → expiratory rhonchi
 - Moderate asthma → expiratory and inspiratory rhonchi
 - Severe asthma → silent chest

#Acute respiratory infection

- Patient come with cough or dyspnea
- Acute → < 30 days (4 weeks)
- Age → < 5 years
- Assessment:
 - Ask → fever, feeding, fit, sleeping disturbance
 - Look → respiratory rate, chest indrawing, malnutrition

- Listen → strider, wheezing
- Respiratory rate:
 - < 2 months (60/min), 2 months – 1 year (50/min), 1 year – 5 year (40/min)
 - Periodic respiration because of immature brain center
- Chest indrawing:
 - Intermittent lower chest movement due to acute dyspnea
 - Movement of chest inward during fetus breathing in (inspiration)
 - Occur in acute illness
- Sulci → permanent indrawing of lower chest (most lower ribs) due to chronic dyspnea occur in rickets, COPD
- Sub-costal recess → one line of indrawing of muscles below the ribs immediately
- Malnutrition:
 - Wasting → loss of muscle bulk (thigh and buttocks)
 - Thinning → loss of subcutaneous fat (skin of thigh)
- Strider: harsh noise due to upper respiratory tract obstruction, either inspiratory or biphasic (in severe obstruction) never be expiratory alone
- Wheeze: musical sound due to lower respiratory tract obstruction, either expiratory or biphasic and never be inspiratory alone
- **Categories from 2 months – 5 years**
- Category 1:
 - When patient come with cough or dyspnea with any of dangerous sign of the following:
 - Fit
 - Sleeping disturbance
 - Feeding disturbance
 - Strider in calm child (and wheezing)
 - Malnutrition
 - Diagnosis: very severe illness
 - Treatment: 1st dose antibiotic → refer urgently to hospital
- Category 2:
 - Patient come with cough or dyspnea with no dangerous sign but tachypnea or chest indrawing
 - Diagnosis: severe pneumonia
 - Treatment: 1st dose antibiotic → refer urgently to hospital
- Category 3:
 - Patient come with cough or dyspnea with tachypnea only
 - Diagnosis: pneumonia
 - Treatment: oral antibiotic (5days) then reassess after that then return within 2 days if no response
- Category 4:
 - Patient come with cough or dyspnea with nothing

- Diagnosis: coryza (cold + cough)
- Treatment: at home → clear nose + keep child warm + enhance breast feeding + give soft home remedies
- **Categories from 0 – 2 months**
- Category 1 and category 2 like above
- Category 2:
 - Patient come with cough or dyspnea with nothing
 - Diagnosis: coryza
 - Treatment: at home → clear nose + keep child warm + enhance breast feeding
- Types of drugs used:
 - Oral antibiotics: Trimethoprim – sulfamethoxazole
 - Injection antibiotics: Penicillin – Benzathine – Ampicillin + Amoxicillin
 - For wheezing we use → oral salbutamol
 - For fever we use → paracetamol (oral)

#Pneumonia

- It is disease of parenchyma (once parenchyma affected → sleeping feeding activity not well)
- Pneumonia → inflammation with consolidation // pneumonitis → inflammation without consolidation
- Causes:
 - Newborn (0-30 days): Streptococcus pneumonia, Listeria monocytogens, E.coli, Klebsiella pneumonia
 - Infants and toddlers: mostly viral → RSV, para-influenza virus
 - Pre-school (5 years): Mycoplasma pneumonia
 - Other causes: osteomyelitis (hematological spread), foreign body, aspiration, viral, hematological spread (leukemia)
- Organisms:
 - Pneumococcus pneumonia → most common
 - Staphylococcus pneumonia → most serious, lead to lung abscess and sepsis
 - Streptococcus pneumonia
 - Para-influenza virus
 - Mycoplasma pneumonia → atypical pneumonia, peri-school age, afebrile paroxysmal, spasmodic, not toxic, Investigations (CXR → lobar pneumonia / Serology → +ve agglutination test), treated by erythromycin
 - Viral → low grade fever/ mild toxicity/ CBP lymphocytosis/
 - Bacterial → high grade fever/ high toxicity/ CBP neutrophilia, increased ESR & CRP
- Types of pneumonia:
 - **Lobar pneumonia** → bacterial, one lobe, unilateral in chest x-ray, bronchial breathing, increased vocal resonance
 - **Interstitial pneumonia** (acute bronchiolitis) → viral, granular, pattern

- **Broncho-pneumonia** → small foci of consolidation along distribution of bronchioles, bilateral, fine crepitation, expiratory wheezing, multiple small patches on chest x-ray, Causes:
 - Viral → mild fever, high paroxysmal cough, involve the bronchi (granular interstitial small foci), lymphocytosis, negative culture of blood
 - Bacterial → toxic, less episodes of mild cough, lobar CXR, leukocytosis, increased ESR, increased protein, positive culture of blood
- Indications of hospitalized patient in pneumonia:
 - Age: < 6 months
 - Immune compromised
 - Vomiting and dehydration
 - Patient with chronic disease
 - Congenital heart diseases CHD
 - Non-competent / not educated parents
- Recurrent pneumonia:
 - 2 attacks of pneumonia/6 months or 3/1 year, with complete resolution between attacks
 - Causes:
 - Cardiovascular → CHD
 - pulmonary → kartagener syndrome (dextrocardia and immotile cilia), Tracheo-esophageal fistula, GERD, hernealoccele, cystic fibrosis, bronchiectasis
 - Immunodeficiency
 - Others: croup, asthma
 - Recurrent lobar pneumonia at same site → DDx: foreign body
- Stages of pneumonia:
 - Congestion
 - Red hepatization
 - Gray hepatization
 - Resolution (crepitation)
- Signs and symptoms of consolidated lung (like in lobar pneumonia)
 - Decrease air entry and bronchial breath
 - Dull percussion
 - Decrease chest expansion
 - Increase vocal fremitus
 - Increase vocal resonance (while decrease vocal fremitus and resonance in plural effusion → e.g. atelectasis)
- Neonatal pneumonia usually bacterial → mostly staphylococcus
- Aspiration pneumonia → bad feeding practice (especially in neonate), at right apical area
- Pneumonia always with fever except in: immunocompromised patient or atypical pneumonia caused by mycoplasma

- Mycoplasma pneumonia:
 - School aged children
 - Causes lobar pneumonia
 - Diagnosis: cold agglutinin
 - Complications of M.Pneumonia:
 - Erythema multiforme
 - Steven-Jensen syndrome (sloughing of skin)
 - Hemolytic anemia (may produce jaundice)
- Management of pneumonia:
 - IV fluid if there is vomiting because it causes dehydration
 - Oxygen due to hypoxia
 - Antibiotics mostly macrolides or antiviral or anti-TB
 - Chest drainage if there is para-pneumonic effusion
 - Steroids
- Indication for hospital admission in pneumonia:
 - Signs of respiratory distress
 - Less than 6 months
 - Fever, vomiting, chronic disease
 - Poor response to oral treatment
 - Poor family situation
- Complications of pneumonia:
 - Para-pneumonic effusion
 - Respiratory failure
 - Myocarditis
 - Paralytic ileus
 - Meningismus (neck rigidity without other features of meningitis)

#Common cold (Nasopharyngitis)

- Rhinorrhea (watery discharge from nose) if greenish → give antibiotics
- Low grade fever (High fever suggests complications such as: sinusitis, otitis media)
- Simple infrequent cough
- No disturbance of sleeping
- Post nasal drip → cough
- Not need hospital admission
- Doing well (activity + feeding + sleeping)

#Pharyngitis (Oropharyngitis)

- Include Tonsillitis
- Most common microorganism → Group A beta-hemolytic streptococci
- Dysphagia but no dyspnea

- Fever, sore throat, vomiting, abdominal pain, mouth breather, adenoid, malaise
- Not well
- Why abdominal may develop in tonsillitis? due to involvement of mesenteric lymph nodes
- Tonsillectomy not resolve (Rheumatic fever) problem due to involvement of pharynx, so prophylaxis of rheumatic fever is antibiotics not tonsillectomy

#Laryngitis

- Mostly viral, mild in bacterial
- High pitched sound (teacher, singer) → dysphonia, aphonia (management → rest)
- Cough: stellate cough
- Irritating
- Cold exposure
- Low grade fever
- No malaise
- Affect old age

#Laryngeo-Tracheo-Bronchitis

- Viral → benign // bacterial → serious and emergency
- Viral:
 - Mostly para-influenza, 1-3 years of age, low grade fever, no dyspnea, moderate activity
 - Barking cough (caw sound) → due to dryness of the area (no moisture due to: croup, foreign body) at late night increase dryness so increase severity
 - Dramatic response to hot path vaporation and hot soup
 - Note: strider sound with inspiration sign of upper respiratory tract problem
- Bacterial :
 - Haemophilus influenza → most common cause
 - Specific dangerous site → epiglottis → suffocation
 - Barking cough, stridor, fever, dyspnea, cyanosis, open mouth, extended neck, dysphonia, even aphonia, drooling of saliva
 - You shouldn't exam mouth especially tongue depressor
 - At causality unit: cannula, I.V fluid, antibiotics, tracheostomy

#Croup

- Affect infants, in winter,
- Barking cough + well activity + stridor at night + low grade fever
- Para-influenza virus, Respiratory syncytial virus
- Haemophilus influenza, Diphtheria, Staph.aureus, Strept.pneumoniae

- Complications of RSV: acute respiratory distress syndrome, bronchiolitis obliterans, congestive heart failure, myocarditis, chronic lung disease
- Management of croup: epinephrine, mist therapy, steroids (dexamethasone 0.4 mg/kg/day to decrease edema)

#Epiglottitis

- Toxic and dangerous and patient not well
- Nasal discharge (within 6 hours)
- Fever, extended neck, drooling saliva, air hunger, barking cough, suffocation, dyspnea
- Under general anesthesia in surgical room for investigation
- In chest x-ray → thumb printing
- Acute epiglottitis may be caused by H.influenza
- Epiglottitis and foreign body (cause sudden strider) are emergency conditions
- Need hospital admission → oxygen + IV line (fluid and antibiotics) + assessment of circulation, monitor of urine output + not use tongue depressor + ay need tracheostomy

#Otitis media

- High grade fever
- Unexplained crying
- Rubbing ear

#Sinusitis

- High grade fever
- Nasal discharge is purulent > 10 days

#Pertussis

- It is infection of the respiratory system caused by bordetella pertussis
- Signs and symptoms:
 - Common cold: running nose, sneezing, mild cough, low grade fever
 - After 1-2 weeks: the dry irritating cough evolves into coughing spells (the child may return red or purple) then the child make a characteristic whooping sound when breathing in or may vomit (post-tussive) // cyanosis // reddish discoloration
 - Between spells the child usually feels well
- At first patient come with burst gum cough then continuous cough then cyanosis then whooping cough
- Paroxysmal cough > 5-6 times accompanied by post-tussive emesis, repeated episodes, if more than 8 times → DDx: pertussis
- Not all patients come with whooping cough especially young babies, because it requires strong contraction

- Baby come with immature respiration → so can't produce enough force to produce whooping
- Pertussis → at any age from birth or at 2 months or 4 months age due to its relation with cellular immunity
- Definitive diagnosis: culture, atypical lymphocytosis
- Treatment: antibiotics for 2 weeks, mist therapy, rest

#Bronchitis

- Acute bronchitis → usually viral in origin // bacterial occur in infants & malnourished
- Not common in pediatrics, but small trees (bronchiolitis) is common {in adult بالعكس} because length of tree shorter in pediatrics
- Common especially < 2 years – winter – viral
- All lower respiratory infection → dyspnea
- Mostly it is precede by nasopharyngitis
- Cough: firstly dry then productive
- Fever, spasm, looks like asthmatic patient, recurrent episodes
- Signs: rhonchi and moist crepitation
- It is not associated with respiratory distress

#Bronchiolitis

- 0 month – 2 years (usually 2-6 months)
- Viral causes → RSV, adenovirus, para-influenza virus
- During winter and early spring
- Diagnosis: wheezy cough, acute respiratory distress in infant around 6 months old
- Clinical features: begins with high grade fever and nasal discharge and then with cough and severe dyspnea, patient not well, no barking cough, no strider
- Auscultation: Fine crepitation, expiratory wheezing, decreased air entry
- Bronchiolitis may lead to decrease urine output due to dehydration with yellow color (Tachypnea, poor feeding, fever, SIADH)
- In bronchiolitis: after first diagnostic CXR for evaluation of the child we use oximetry and respiratory rate instead of CXR
- Q: how to differentiate between bacterial Broncho-pneumonia and bronchiolitis? by leukocytosis and C-reactive protein in pneumonia
- To differentiate between bronchiolitis and heart failure:
 - Murmur
 - Enlarged left or right ventricle (apex beat)
 - On abdominal examination → if palpable liver: do liver span because bronchiolitis may push liver downward or hepatomegaly due to heart failure
- Management: steroids (no benefit), beta-agonist (no benefit), albuterol, only O2 therapy improves the condition

- Serious condition called → bronchiolitis obliterans
- Viral cause → low grade fever – less toxic – ESR & CRP normal – normal X-ray – Elevated lymphocytes
- Bacterial cause → High grade fever – more toxic – ESR & CRP elevated – patchy consolidation in X-ray - elevated neutrophils and leukocytosis

Important conditions to know:

- Laryngeomalacia → short neck, the patient come with stridor due to congenital atrophy of the larynx
- Tracheo-esophageal fistula → the patient come with history of respiratory tract infection
- Cystic fibrosis → the patient come with repeated chest infection and diarrhea → because patient can't spit up sputum and cause chest infection
- Meconium ileus → abdominal distention due to cystic fibrosis

#Diagnosis of:

- Left side heart failure:
 - Percussion: normal
 - Vocal fremitus: Normal (resonant)
 - Breath sound: normal
 - Added sounds: crepitation, wheeze
- Plural effusion:
 - Percussion: stony dull
 - Vocal fremitus: decreased (diminished)
 - Breath sound: decrease in site of effusion
 - Added sounds: no
- Pneumonia (consolidation):
 - Percussion: dull
 - Vocal fremitus: increased
 - Breath sound: bronchial
 - Added sounds: rales
- Emphysema (COPD in late stage):
 - Percussion: hyper-resonant
 - Vocal fremitus: decreased
 - Breath sound: decrease vesicular breathing
 - Added sounds: no
- Pneumothorax:
 - Percussion: hyper-resonant
 - Vocal fremitus: absent
 - Breath sound: absent

- Added sounds: no
- Atelectasis (obstruction):
 - Percussion: dull
 - Vocal fremitus: decreased or absent
 - Breath sound: decreased or absent
 - Added sounds: no

#Drugs:

- Vancomycin → most frequent antibiotics used to treat patient with chest infection → given as slow drip (over 1 hour) because it may cause cardiogenic shock
- Nebulizer:
 - Nebulizer administration after 2 months (not before 2 months) because smooth muscles of bronchioles are not well developed and also the receptors of bronchodilator is not mature
 - Nebulizer → distilled water is replaced by normal saline because the tonicity of the later is similar to that of the blood
 - Ventolin (Salbutamol) 1 ml contains 5 mg → we give 0.15 mg/kg → If 10 kg baby we give $10 \times 0.15 = 1.5$ mg/kg → thus give about 1/2 cc for 10 kg
- Steroid harmful in adenovirus → oblitrance bronchiolitis

Notes:

- Upper respiratory tract (nasal cavity, pharynx, larynx) Lower respiratory tract (Trachea, bronchi, Lungs)
- Clinical features of: Upper respiratory tract (Rhinorrhea, Barking cough, Normal feeding, Normal activity) Lower respiratory tract (Irritable, significant dyspnea, significant cough, poor feeding)
- Nasopharynx → (nasopharyngitis, tonsillitis, pharyngitis)(no dyspnea, no cyanosis)
- Lymphoma (common malignancy in children) → clinically: abdominal mass, dyspnea, wheezing (compression), CXR (mediastinal widening)
- NTD: affects lower limbs and bladder sphincter at lower level and affect phrenic nerve (c3,4,5) at upper level
- Cystic fibrosis: lethal inherited (autosomal recessive) disease, affect exocrine glands, 90% respiratory tract, also affect the pancreas and multiple organs.
- Vesicular breathing is bronchial, but due to septae it will change, thus in consolidation and congestion bronchial not heard
- Tachypnea part of dyspnea, but dyspnea not synonymous with tachypnea
- Neonatal sepsis → Group b beta-hemolytic streptococci, listeria, E.coli
- Group A beta-hemolytic streptococci → lead to scarlet fever (red skin rash – sore throat-fever) , tonsillitis, rheumatic fever
- alpha-hemolytic streptococci → in oral cavity lead to infective endocarditis

- Examine membrane cover the tonsils or pharynx:
 - Diphtheria → gray - toxic – fever – membrane cover the whole nasopharynx tonsils even may include soft and hard palates, difficult to be removed – when remove cause blood oozing, diphtheria could lead to myocarditis
 - Beta-hemolytic streptococci → covers pillars and tonsils, gray to red, easily removed, doesn't reach the hard palate
 - Infectious mononucleosis
- Staphylococcus (first 2 months) / Mycoplasma pneumonia (in school age)
- Fever: viral (sudden, less severe) bacterial (gradual, more severe)
- Chronic cough > 1 months → trachitis
- Toxic infant + drooling saliva → epiglottitis
- Pneumonia + severe cough with sudden deterioration may indicate → pneumothorax
- How can we know the patient's condition is stable? assessment of vital signs (especially respiratory rate), skin color, feeding, urine output // if not stable and become worse suggest abscess development (developing of sepsis) indicators of infection (patient in shock, with high fever, tachypnea, increase O2 demand, poor oxygenation, decreased mentality and stability) → do investigations (see cytokines, leukocytopenia suggest overwhelming infection)
- While measles for example → After 6 months due to its relation with humoral immunity from mother
- Congenital rubella → microcephaly + cardiac disease
- Viral infection (with adenovirus) → sticky eyes, conjunctivitis, dry cough, febrile, frequent bowel motion, chest infection / treatment by cold exposure to relieve spasm and inflammation
- The only virus that cause fever after dyspnea → adenovirus
- Nasal discharge without cough, without fever → common cold
- Watery nasal discharge → green thick (nasopharyngitis)
- Fever + nasal discharge + pain → pharyngitis
- Fever + dysphonia → laryngitis
- Chest x-ray → vertebrae adjacent to costocondrial junction are the only visible, when all vertebral column is shown → bad exposure
- Over inflated chest: flat diaphragm or more than 8 ribs on CXR
- Congenital diaphragmatic hernia on left side more common due to site of liver
- Diaphragmatic hernia: cyanosis, dyspnea, scaphoid abdomen
- Cow milk may cause: diarrhea, allergy (wheezing, rhonchi)
- Acute tracheitis caused by S.aureus
- Children < 1 month → may have hypothermia
- Edema may occur because RSV may cause inappropriate secretion of ADH
- How would you know that the infant have sputum with cough? usually if there is sputum, you can see that with vomiting

- Causes of irritability associated with breathlessness? dehydration, hypoxia
- Infectious mononucleosis: it is viral infection caused by EBV and causes suppurative pharyngitis (rare below 2 years) called glandular fever, may involve trochlear lymph nodes.
- Ampicillin and amoxicillin may cause skin rashes
- Q: when the child swallow organic particle or inorganic one, which of them is more dangerous? organic substance is more dangerous because the body immune response rapidly develop (more rapid than inorganic particle)
- DDx of cough + fit → febrile convulsion, hypoxia, severe dyspnea → caused by rotavirus
- CVS relation with environmental cold → peripheral cyanosis (acrocyanosis)
- Respiratory problem + decreased urine output: SIADH, asthma, cystic fibrosis, dilution hyponatremia
- Neonate with heart failure have neither ankle edema nor raised JVP → because of small neck
- Rule of 60 in neonate: 60 breath/min, 160 mmHg, cardiothoracic ratio is 60%, PCV = 60%
- White sputum seen in: viral infection, asthma, other types of allergy
- Infantile colicky → occurs in first 3 months because of overfeeding
- Poor ventilation and crowding → TB and other communicable diseases
- The optimal interval between feedings is about 2-3 hours, because gastric emptying in pediatrics lasts about 2-3 hours
- Normal oxygen saturation is from 94 to 100 % ((SpO₂))
- Signs of poor circulation → increase heart rate, cyanosis, pale face, cold skin, decrease in the BP and temperature and urine output and capillary refill and O₂ saturation
- In pediatrics there is no tracheitis alone, in adult yes
- Dyspnea occur in asthma, pneumonia, bronchiolitis
- High grade fever with shivering → pus anywhere / UTI
- Low grade fever with sweating and rigor → rickettsia / TB
- Traveler fever → flu like illness
- Persistent fever → chronic infection
- BCG → look for scar
- Breath holding attack → benign condition, psychological cause, baby not cry, become cyanosed, disappear after the age of 5 years
- Down's syndrome → congenital heart disease and recurrent pneumonia
- Hypocalcaemia → strider, convulsions, carpopedal spasm
- Wheezing chest + GIT problems:
 - Seen in parenteral infection (rotavirus), cystic fibrosis, cow's milk allergy (cause eosinophilia because it is IgE mediated allergy)
 - Clinical features: failure to thrive, dyspnea, wheezy chest, diarrhea, colicky abdominal pain, abdominal distention

- Diagnosis of hypertrophy without ECG:
 - PMI = point of maximal impulse = apex beat → normally in the mitral area but not necessarily be in mitral area
 - Left ventricular hypertrophy → if we feel apex beat displaced downward → the cause mostly is congestive HF
 - Right ventricular hypertrophy → if we feel apex beat displaced upward → the cause mostly is TOF
- Diagnosis of pneumonia without X-ray:
 - Hear bronchial breathing with added sound, but bronchial breathing without added sound is plural effusion
- Hyper-dynamic circulation → PDA, Aortic regurgitation, HF, thyrotoxicosis, anemia
- Dilated cardiomyopathy → 30% return normal, 30% have restrictive myocarditis, 30% will die.
- Most common causes of H.F in children: VSD, PDA, ebstein anomaly, common AV channel (in Down's syndrome)
- Timing table in heart diseases in pediatric:
 - 12 hours → all cyanotic CHD like TGA and tricuspid atresia (presented as tricuspid stenosis)
 - 1 – 2 weeks → PDA discovered as Heart failure
 - 8 – 12 weeks → VSD
 - 6 months → Secundum ASD
 - 6 – 9 months → TOF
- Cough + choking = tracheoesophageal fistula
- Croup = relieved by cold air
- Hyperactive airway disease = aggravated by cold
- Productive cough = sputum – profuse or small amount
- Dry cough in pneumonia
- Small tinctuous = in bronchial asthma
- Bad odor in bronchiectasis
- White color in asthma
- Dyspnea = in infant crying and feeding is exercise / in toddler: running and walking
- Respiratory distress → mild (tachypnea + flaring ala nasi) moderate (using accessory muscle) sever (cyanosis) very severe (loss of conscious + coma)
- Flu like illness = upper respiratory tract infection
- Bronchodilator nebulizer → give O2 because the bronchodilator drug will lead to ventilation-perfusion dissociation
- Fine crepitation → in pneumonia – heart failure

Part9: CVS: Examination

#Cardiac examination

1- Settings:

- Take permission
- Hand washing
- Good light support
- Patient in sitting or semi-supine position
- Exposure from the neck to the umbilicus

2- Inspection:

- General look for:
 - Signs of cyanosis or distress
 - Continuous O2 administration
 - Medication types
 - How many pillows below the head of the patient
 - Jaundice, hydration status
- Any thoracic cage abnormality like Precordium bulging:
 - Unilateral bulge: pneumothorax, plural effusion
 - Bilateral bulge: massive collapse
- Scars: indicates open heart surgery
 - Axillary → coarctation of aorta
 - Femoral → catheterization
 - Scapular → PDA
 - Radial → A-V shunt
 - Middle sternotomy → CABG, aortic valve replacement
 - Infra-clavicular scar → Pacemaker
 - Sub-mammary → mitral valvotomy
- Visible pulsations: at apex, aortic, tricuspid, left side of sternum, epigastric , carotid
- Bulged beat → cardiomegaly
- Apical pulse:
 - Apex beat → outermost, lowermost
 - If you don't find the pulsation → look at the axilla (left side), if you still don't find the pulsation → see the right side (dextrocardia)
 - Causes of absent apex beat: obesity, thick chest wall, pericardial effusion, dextro
- Other pulsations: hyperactive dancing pericardium in severe left to right shunt in patient with VSD

- Note: Telangiectasia: distributed blood vessels in face and thorax, disappear at pressure, Ataxia telangiectasia syndrome // doesn't disappear on pressure → spider navi

3- Palpation:

- Apex beat:
 - Apex beat + character: example → apex beat is palpable at 5th ICS mid-clavicular line with normal character
 - Under 7 years: normally at 4th ICS at mid-clavicular line
 - Above 7 years: normally at 5th ICS lateral to mid-clavicular line
- Thrill (by palmer surface of 4 fingers) → suprasternal thrill → coarctation of aorta
- Heave → parasternal or epigastric (right ventricular hypertrophy) apical (left ventricular hypertrophy)

4- Percussion: only in plural effusion or pericardial tamponade

5- Auscultation:

- 4 regions in auscultation:
 - Mitral (Apex) area → 4th left ICS in mid-clavicular line or 5th ICS in older child
 - Aortic area → 2nd ICS right to the sternum
 - Pulmonary area → 2nd ICS left to the sternum
 - Tricuspid area → left sternal border in 4th ICS or 5th ICS in older child
- Finding: S1, S2, Added sounds (S3, S4, ejection click), Murmur
- 1st heart sound (S1) → Mitral area (normal, soft, loud)
- 2nd heart sound (S2) → Pulmonary area (normal, splitting, loud, single)
- Mitral (apex) area auscultation abnormalities:
 - S1, S3, S4
 - Mitral regurgitation
 - Pan-systolic murmur (presented in first month of life) → may be normal in infants < 7 weeks but always pathological in infants > 7 weeks
 - Mitral stenosis: most common cause of opening snap
- Aortic area auscultation abnormalities:
 - Aortic stenosis → head at apex and all over chest and can radiate to neck
 - Coarctation of aorta (also heard from the back)
 - Innocent murmur
 - Ejection systolic murmur (early aortic diastolic murmur) due to aortic regurgitation and also radiated to pulmonary area
- Pulmonary area auscultation abnormalities:
 - Pulmonary stenosis
 - Pulmonary innocent murmur
 - Pulmonary hypertension
 - Atrial septal defect (ASD)

- Ventricular septal defect (VSD)
- Ejection click systolic murmur in pulmonary area
- Tricuspid area auscultation abnormalities:
 - Tricuspid regurgitation → radiate laterally to mitral area
 - Pan-systolic murmur
 - Tricuspid stenosis → rare condition cause opening snap

5- Murmur:

- Abnormal musical heart sound due to abnormal valve or abnormal (turbulent) blood flow through normal valve
- Roll the patient left lateral → bring the heart to the chest wall then sitting → hear back and ask the patient to take inspiration and expiration → **Murmurs related to the back (PDA, Aortic regurgitation, coarctation of aorta)**
- Murmurs:
 - Types (systolic-diastolic)
 - Time (ejection systolic, pan systolic, early diastolic, late diastolic)
 - Site, Intensity, Radiation, Grade, Character
 - Relation to respiration: murmur of right side (higher during inspiration like aortic stenosis) murmur of left side (higher during expiration like pulmonary stenosis)
 - Propagation (radiation of pulse)
 - Pitch of sound (harsh, soft, high)
 - Change with position: mitral (left side), aortic (forward)
- Murmur grades:
 - G1: fairly heard
 - G2: heard without difficulty
 - G3: there is thrill
 - G4: loud murmur
 - G5: heard without stethoscope
- Types of murmurs:
 - Innocent murmur → only systolic, murmur that change or disappear with position change, change with inspiration and expiration, change in hyper-dynamic condition, diminished with liver decompression
 - Ejection click → in aortic stenosis
 - Opening snap → in mitral stenosis / in early diastolic phase with left ventricular contraction and stenosed valve (soft sound)
- Pan-systolic murmur:
 - Ventricular septal defect → radiate all over the precordium
 - Mitral regurgitation (apex) → radiate to the axilla
 - Tricuspid regurgitation (left lower sternal border) → no radiation
 - Coarctation of aorta → radiate to the back

Murmur	Systolic	Ejection systolic murmur	Pulmonary stenosis
			Aortic stenosis
			Atrial septal defect ASD
		Pan- systolic murmur	Mitral regurgitation
			Tricuspid regurgitation
			Ventricular septal defect VSD
	Systolic + diastolic	Machinery murmur	Patent ductus arteriosus PDA
	Diastolic	Early diastolic murmur	Pulmonary regurgitation
			Aortic regurgitation
		Mid-diastolic murmur	Mitral stenosis
		Tricuspid stenosis	

#Diagnosis of VSD by examination

1- Inspection:

- Hyperactive precordium (dancing precordium)
- In large VSD > 5 mm → there is Harrison sulcus, deviated apex beat, dancing, bulging precordium
- Shifting apex beat

2- Palpation:

- Shifted apex beat
- Epigastric thrill
- Apical heave

3- Auscultation:

- S1: normal
 - S2: not splitting, strong, fixed
 - Murmur: more harsh, less loud in large VSD // less harsh, more loud in small VSD
- Large VSD → > 5 mm → treated surgically, if there is heart failure we afraid of complications like pulmonary hypertension and cardiac arrhythmias
 - Small VSD → < 3 mm → close spontaneously 40% in the first year and 60% in the followed 4 years

Part10: CVS: Important topics

#Congenital heart disease (CHD)

1- History presentation of CHD:

- Acute: cyanosis, dyspnea, cardiogenic shock
- Chronic: chest pain, fatigability, sweating

2- Types:

- Cyanotic (15%): 6T
 - Tetralogy of Fallot (TOF) → 65%
 - Transposition of great vessels (arteries) TGA
 - Total anomalous pulmonary venous return
 - Truncus arteriosus
 - Tricuspid atresia
 - The pulmonary atresia or stenosis
- Acyanotic (85%) → 90% VSD

3- Patent ductus arteriosus (PDA)

- Lead to Machinery murmur (systolic and diastolic)
- Normally ductus arteriosus is opened in the 1st week and then closed
- If not closed → treated medically then surgically
- Prostaglandins: the opening of PDA is maintained by it, thus given in TGA until surgery performed, while indomethacin closes it thus given in PDA

4- Atrial septal defect (ASD)

- Functioning foramen ovale is closed at 1 week to 1 month
- If not closed → lead to shunt with pulmonary stenosis usually
- After 6 months present as ejection systolic murmur and accidentally discovered
- ASD: usually asymptomatic with excellent prognosis
- Clinical features of ASD: 1st and 2nd degree heart failure, arrhythmia, acyanotic
- Ostium primum → may present at 3 months
- Secundum type of ASD → can't be seen before 6 months, and may be presented at 30 years as arrhythmia and heart failure, hypertension, tachycardia

5- Ventricular septal defect (VSD)

- Presented at 1st month → complex heart lesion + VSD
- Presented up to 3 months → pan-systolic murmur of VSD

- Recurrent admission to hospital because of Congenital heart defect indicated large VSD

6- Tetralogy of Fallot (TOF)

- Presented up to 9 months → during activity (as feeding)
- Pink TOF → when pulmonary cyanosis is not severe enough to cause bluish discoloration, presented during 2-3 months due to feeding
- May present at one year with right ventricular hypertrophy (boot shaped heart)
- Surgical treatment is preferred but may be treated medically
- Decrease lung vascularity → Tetralogy of Fallot TOF (Don't **DROP** the baby)
 - Defect (VSD)
 - Right ventricular hypertrophy
 - Overriding aorta (aorta over interventricular septum)
 - Pulmonary stenosis
- Pulmonary stenosis determines the severity of Tetralogy of Fallot
- Clinical features:
 - Central cyanosis (1-2 months after birth) usually aggravated by sulking and crying
 - Hyper-cyanotic spells: deep cyanosis aggravated by crying, infection, iron deficiency anemia, followed by weakness, sleep, convulsion, unconscious
 - Finger clubbing (before 1-2 years)
- Signs:
 - Left parasternal pulsation due to right ventricular hypertrophy
 - Systolic thrill at 2nd left intercostal parasternal spaces
 - Single S2 and loud at pulmonary area
 - Ejection (mid systolic) murmur: usually heard over pulmonary area due to pulmonary stenosis
 - Heart failure is unusual

7- Left to right shunt → clinical features:

- Frequent chest infection
- Cardiomegaly
- Left axis deviation
- Pericardial bulge
- No cyanosis or clubbing
- Easy fatigability and sweating
- Chest lead on left ventricle
- Plethoric lung in chest x-ray (increase lung vascularity) → occur in Patent ductus arteriosus PDA, Transposition of the Great Arteries TGA

8- Right to left shunt → clinical features:

- Polycythemia

- Cyanosis and Clubbing
- With or without cardiomegaly
- Oligemic lung

9- Congenital heart conditions without shunt:

- Patent ductus arteriosus
- Aortic stenosis and regurgitation
- Pulmonary stenosis and regurgitation

10- How to differentiate between congenital/ aortic problem:

- Time of appearance of clinical features
- Failure to thrive (FTT)
- Easy fatigability
- Psychological problem

Notes:

- Right ventricular hypertrophy (on palpation):
 - Apex don't shift
 - Thrusting (diffuse pulsation)
 - Heave
 - May find murmur
- Left ventricular hypertrophy (inside the chest):
 - Apex has shifted to the axilla
- Both right and left ventricular hypertrophy:
 - Precordium bulging
 - Diffuse pulsation
 - Shifting apex beat
- Ejection click + innocent murmur found in:
 - Aortic stenosis
 - Pulmonary stenosis
 - Pulmonary hypertension
 - Atrial septal defect
- Ejection click is not found in:
 - Coarctation of aorta
 - Aortic regurgitation
- Cyanosis start from the beginning in:
 - Mitral condition
 - Tricuspid condition
 - Transposition of great vessels
- Severe pulmonary atresia and TGA without VSD → 1st day, 1st hour, severe cyanosis
- 2-3 months → nearly most cyanotic heart diseases

- > 3 months → supra-ventricular tachycardia, Intra-uterine event that mimic condition of CHD and causes heart failure (give intrauterine adenosine during pregnancy)
- > 2-3 years → Rheumatic fever (rheumatic carditis), aortic stenosis and mitral regurgitation
- Infective endocarditis → rare in children because of insidious progression (diagnosed by culture only)
- Patient with myocarditis have → enlarged heart, muffled S1 and S2, low voltage
- Any lesion in the right side of the heart increase with inspiration and in the left side of the heart increase with expiration
- If baby diagnosed as one of these anomalies or other, mention that at the beginning of history with time.
- Infective endocarditis risk for lifelong → 2%
- all chronic heart diseases do not interfere with patient activity except aortic stenosis in which patient is exhausted with any activity
- In ostium secundum ASD and PDA of 6 mm → close after 2 weeks → if not, it need surgical correction
- squint → CVA
- bad hygiene of mouth → endocarditis
- Congenital heart defect ((1- CVA < 4 years // 2- Abscess > 4 years)) associated with CNS history
- History of heart failure in 2 months old baby is: feeding difficulty + sweating
- Investigations in CVS: CXR, Echo, ECG, Catheterization
- ASD → there is fixed splitting S2 and functional pulmonary stenosis with it.
- Murmur in aorta:
 - Aortic stenosis: hear everywhere in the chest, occur suddenly
 - Coarctation of the aorta: hear better in the back, not suddenly, there is difference in the upper and lower limb
- Non-pathological murmur:
 - Functional murmur → in fever, thyrotoxicosis, anemia, increased metabolic rate
 - Innocent murmur → characteristics (10S)
 - S1 = systolic
 - S2 = small area
 - S3 = short duration
 - S4 = Symptoms free
 - S5 = signs free
 - S6 = severity G1 or G2
 - S7 = study (investigations) like ECG, Echo, CXR => are normal
 - S8 = sternal depression
 - S9 = sitting standing variation
 - S10 = smooth

Part11: CNS: General information

#Common CNS symptoms in pediatric:

- Headache.
- Abnormal body movements.
- Loss of consciousness.
- Mental status (ask about school performance).
- Blurred vision.
- Diplopia, paresthesia, numbness.
- Pain.

#Abnormal body movements:

- Type: describe.
- Onset, duration, unilateral or bilateral.
- Associated with loss of consciousness or not.
- Cyanosis or not.
- Aggravating and relieving factors.
- Differentiate it from: breath holding attack and pseudo-epilepsy.

#Loss of consciousness:

- Any fit + loss of consciousness = generalized epilepsy until proven otherwise.
- Focal abnormal movement + loss of consciousness = partial epilepsy.

#No loss of consciousness:

- Rigor: symptom precede the elevation of body temperature (increase muscle contraction → increase energy production → increase temperature) due to any cause like: Any Abscess, Any Sepsis, Brucellosis, Malaria.
- Shivering: when you hold part of body → movement stops (in fit not stop).

#Sequence of typical generalized seizure:

- Aura.
- Loss of consciousness.
- Tonic phase.
- Clonic phase.
- Postictal phase (headache, confusion, amnesia, sleep)

#Headache:

- Onset and duration.
- Site (uni or bilateral).
- Aggravating and relieving factors.

- Associated with fever, vomiting, visual problems.

#Migraine attack:

- Onset and timing.
- Number of attacks per month.
- Aggravating and relieving factors.
- Medications.
- Eating contraindicated substances.

#Other symptoms:

- Diplopia: due to increased intracranial pressure for any cause.
- Unilateral numbness: one limb (one hand or one leg).
- Bilateral numbness: two limbs (two hands or two legs or one hand + one leg).
- Symmetrical numbness: two upper limbs or two lower limbs.
- Asymmetrical numbness: one hand and one leg contralaterally or ipsilaterally.
- Hemiplegia: half → asymmetrical.
- Monoplegia: one limb.
- Tetraplegia: all limbs.

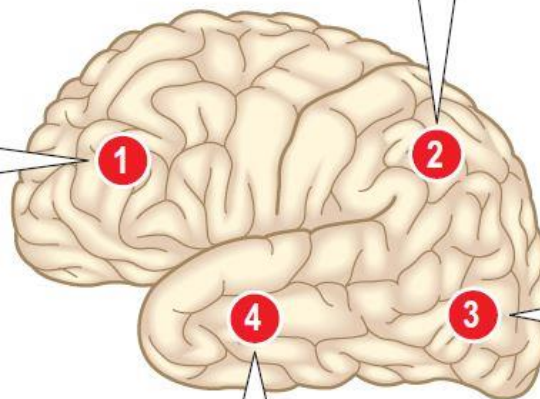
#Higher cerebral functions:

2 Parietal lobe

Dominant side		Non-dominant side	
FUNCTION Calculation Language Planned movement Appreciation of size, shape, weight and texture	LESIONS Dyscalculia Dysphasia Dyslexia Apraxia Agnosia Homonymous hemianopia	FUNCTION Spatial orientation Constructional skills	LESIONS Neglect of non-dominant side Spatial disorientation Constructional apraxia Dressing apraxia Homonymous hemianopia

1 Frontal lobe

FUNCTION Personality Emotional response Social behaviour	LESIONS Disinhibition Lack of initiative Antisocial behaviour Impaired memory Incontinence Grasp reflexes Anosmia
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3 Occipital lobe

FUNCTION Analysis of vision	LESIONS Homonymous hemianopia Hemianopic scotomas Visual agnosia Impaired face recognition (prosopagnosia) Visual hallucinations (lights, lines and zig-zags)
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4 Temporal lobe

Dominant side		Non-dominant side	
FUNCTION Auditory perception Speech, language Verbal memory Smell	LESIONS Dysphasia Dyslexia Poor memory Complex hallucinations (smell, sound, vision) Homonymous hemianopia	FUNCTION Auditory perception Music, tone sequences Non-verbal memory (faces, shapes, music) Smell	LESIONS Poor non-verbal memory Loss of musical skills Complex hallucinations Homonymous hemianopia

A

#Neurological exam:

- Bulk of muscle of both legs: atrophy (neuropathy), hypertrophy (tumor), pseudohypertrophy (fat deposition).
- Shape of muscle.
- Deforming.
- Contracture.
- Movement abnormality: waddling gait, stamping gait, ...
- Tremor: fine or course (intention tremor).
- Absence of bone.
- Absence of some muscles.
- Joint swelling.
- Examine the tone (passive movement) and power (active movement).
- Reflexes: deep (knee jerk, ankle jerk) superficial (planter)
- Clonus: when there is Hyperreflexia → ankle and knee → sustained vibration.

#Notes:

- Demyelinating disease affecting both sexes at age of 20-40 years.
- Multiple sclerosis is disease of white matter.
- Seizure is disease of cerebral cortex.
- Intention tremor is cerebellar symptom.
- Causes of cataract: idiopathic, retinoblastoma, congenital rubella, galactocemia.
- Bell's palsy: is benign disease due to viral infection.
- Werdnig hoffman syndrome: tongue fasciculation, hypotonia, recurrent chest infection, death after one year.
- Rombergs sign → in peripheral neuropathy, B12 deficiency, tertiary syphilis.
- Chicken pox may lead to cerebellitis.
- Truncal ataxia is sign of vermis lesion.
- Most common cause of abnormal gait is drug poisoning.
- In case of bilateral lower motor neuron lesion there will be no movement (no gait).
- History of CNS divided into:
 - Acute: in case of meningitis, encephalitis to differentiate between them → in meningitis consciousness is present while it is absent in encephalitis.
 - Subacute: in case of T.B., meningitis, sarcoidosis, leukemia, brain tumor.
 - Chronic: could be progressive or non-progressive in cerebral palsy.
- level of consciousness :
 - Seizure
 - Anxious (air hunger)
 - Irritable
 - "normal"
 - Lethargic
 - Delirium
 - Semi conscious
 - Coma

#Cerebellum signs:

- Ataxia = drunken gait.
- Hypotonia.
- Nystagmus: vertical, horizontal, rotary // abnormal rhythmical oscillatory movement of the eye.
- Dysidokinesia: inability of the cooperative child to perform rapid alternating movement (pronation and supination) of the one hand over the fixed and extended other hand.
- Dysarthria (slurred speech).
- Dysmetria: overshooting of finger-nose.
- Intention tremor.
- In-coordination.

#Cerebellum examination:

- Assessment of slurred speech and dysarthria.
- Dysidokinesia (حركة الخباز): impairment of ability to make movements exhibiting a rapid change of motion that is caused by cerebellar dysfunction.
- Overshooting (dysmetria): ask child to catch something you hold (toy).
- Intention tremor: detected during hand shaking.
- Dysmetria: finger-nose test.
- Gait: ataxia.
- Co-ordination: heel-shin test (abnormal when they are unable to keep foot on shin).

#Reflexes examination:

- Knee reflex → appropriate exposure, tap the tendon, see the contraction of quadriceps.
- Ankle reflex → appropriate exposure, tap the tendon, see the contraction of calf muscles.
- Babinski reflex → one of the reflexes occur in infants, responses when body receives certain stimulus, after sole of foot firmly stroked → big toe upward and others fan out → normal in children up to 2 years and disappear as child gets older, may disappear as early as 12 months.

Part12: CNS: Seizure

Seizures and Epilepsy in Children

#Define the following: seizure, fit, convulsion, epilepsy.

Seizure is abnormal electrical discharge from the brain could be motor or sensory or both.

Fit=convulsion is motor seizure means there is tonic with or without clonic phase.

Epilepsy is recurrent seizures.

#What is a Seizure?

Seizures are sudden events that cause temporary changes in physical movement, sensation, behavior or consciousness. They are caused by abnormal electrical and chemical changes in the brain.

There are many different types of seizures. Some last for only a few seconds, while others may last a few minutes. The specific type of seizure a person has depends on where in the brain the seizure starts, how the seizure spreads and how much (and what part) of the brain is involved. Seizures might include:

- Loss of consciousness
- Convulsions (whole body shaking)
- Confusion
- Brief periods of staring
- A sudden feeling of fear or panic
- Uncontrolled shaking of an arm or leg
- Flexing, stiffening, jerking, or twitching of the upper body
- Nodding of the head

#What is Epilepsy?

The term epilepsy is used to describe seizures that occur repeatedly over time without an acute illness (like fever) or an acute brain injury. Sometimes, the cause of the recurring seizures is known (symptomatic epilepsy), and sometimes it is not (idiopathic epilepsy).

A doctor would likely diagnose a child with epilepsy if the following were true:

- The child has had one or more unprovoked seizures.
- The doctor thinks the child is likely to have a seizure again
- The child's seizures are not directly caused by another medical condition, like diabetes, a severe infection or an acute brain injury.

#Other Disorders That Can Look Like Seizures:

Some children experience sudden episodes that might masquerade or imitate seizures, but are really not. Examples include:

- Breath holding
- Fainting(syncope)

- Facial or body twitching (myoclonus)
- Sleep disorders (night terrors, sleepwalking, and cataplexy)

They may occur just once or may recur over a limited time period. Again, although these episodes may resemble epilepsy, they are not, and they require quite different diagnostic tests and treatment.

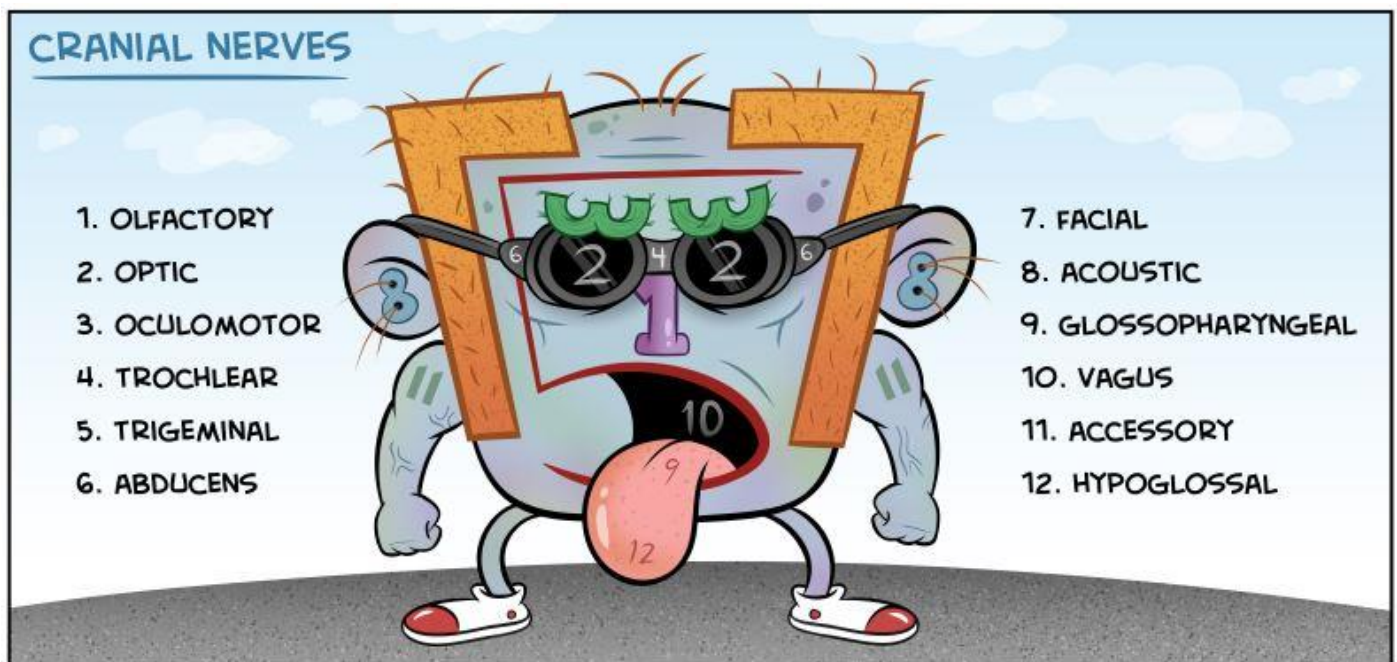
#Notes:

- Fit: generalized tonic clonic convulsion.
- Tonic: spastic / Clonic: movement.
- Convulsion can occur in neonate due to electrolyte disturbance like hypoglycemia, hypocalcaemia.
- Fit in neonate is different from that in adult, in neonate it is not always pathological, partial convulsion may be due to electrolyte disturbance, generalized convulsion always pathological.
- Timing of convulsion is important because it cause anoxia to the brain (no O₂ reaching the brain) so the time of fit determine the extent of injury to baby's brain.
- Febrile convulsion is benign, it occur in the beginning of fever not in the peak of fever.
- Note baby at early time of fever and give him anti-pyretic to avoid febrile convulsion.
- Baby at convulsion may bite his tongue, so put the baby at semi-position + extension to avoid aspiration.
- Witness is important in giving right history.

#At emergency room give:

- IV line.
- Give O₂: if the baby still having convulsion, to avoid brain anoxia.
- Semi-position, extension.
- Give diazepam (short acting) lorazepam 0.3 mg/ Kg.
- If fit continue → give him another dose of diazepam or lorazepam after 5 min and continue giving O₂.
- If there is response, give baby drug at maintenance dose (Phenobarbiton 7 mg/Kg as infusion) and do investigations.
- If there is no response after 5 min also give diazepam 0.3 mg/Kg, after 5 min if there is no response give another dose.
- Give loading dose of phenobarbitone 15 mg/Kg if there is no response occur give 7 mg/Kg.
- If generalized tonic clonic convulsion continued after giving these drugs give baby glucose.

Part13: CNS: Cranial nerves



#Examination of the cranial nerves

Start by general exam for example: the baby is conscious alert (small child) or oriented (older child), normal posture or lying supine or in the lab of his/her mother, no sequent, no nystagmus, no fascial asymmetry, no deformity.

#Olfactory nerve (I):

- Function: Smell.
- Anatomy: It starts as small nerves in the upper part of the nasal cavity passes upward through the cribriform palate, then these small nerves converge together to form the olfactory nerve which pass to the frontal lobe (area of olfaction), and has no nucleus.
- Examination:
 - 1-Exam each nostril separately
 - 2-You should confirm that the nostril is patent (Rhinitis (increased secretion), foreign body obstructing the nostril interfere with smell)
 - 3-Bring familial odors as apple or tea or others in tubes specific for smell examination
 - 4-Never use irritant smell because its sensed by the ophthalmic division of the V cranial nerve not olfactory nerve.
- Causes of Anosmia or parasomia:
 - 1-Rhinitis
 - 2-Foreign body
 - 3-Subfrontal tumor
 - 4-Fracture to the base of the skull or fracture in the nose.
 - 5-Aging (don't mention in pediatrics!)

#Optic nerve (II):

- Function: Vision
- Anatomy: It starts from the optic disc then form the optic nerve passes posteriorly and form optic chiasma with contralateral optic nerve, from optic chiasma optic tracts emerge (right and left) passes posteriorly to enter into the lateral geniculate nucleus from the later optic radiation(right and left) emerge which ends into the primary visual cortex in the occipital lobe.
- Examination: It has five components to be examined:
 - 1-Visual acuity:**

Above 4 months you can use Fixation and follow test, this done by holding an interesting toy about one meter in front of the baby, once baby fixes his vision to it, you start to move it in an arc, if the baby follow it, consider that this baby has normal vision.

Below 4 months, the baby can follow faces and light only.

Above 7 years (cooperative child), we can use Snellen chart

Sometimes Allen’s chart (pics of animals with different sizes) can be used below 7 years.
 - 2-Visual field** (in cooperative child):

One meter distance between doctor and baby then the doctor closes one eye by his hand and the child asked to close the eye opposite to the doctor eye, then the doctor start to test upper, lower and right and left fields of each eye separately by comparing with his eye considering that the doctor has normal visual fields.
 - 3-Color vision:** (in cooperative and old child):

This can be tested by using Ishihara test, which consist of book containing different figures with different colors, and the child is asked about these figures (considering that the child knowing these figures e.g. numbers, pictures etc.)
 - 4-Fundoscopy:**

Right hand funduscopy → right hand and right eye.

Left hand funduscopy → left hand and left eye.

In small child this can be done only under general anesthesia.

In old cooperative child you can do it easily.

Purpose is to examine the optic disc for papilledema.

Causes of papilledema: high intracranial pressure, hemangioma, mass, hemorrhage.
 - 5-Pupillary reflex:**

Optic nerve form the sensory (afferent) part of this reflex, while the motor (efferent) part is oculomotor (will be discussed next)
- Abnormalities in optic nerve function occurs due to:
 - 1-Optic neuritis
 - 2-Brain tumor
 - 3-Retinoblastoma
 - 4-Chronic papilledema (chronic increase in intracranial pressure)
 - 5-Pituitary tumors (mainly in adults, don’t mention in pediatrics)

#Oculomotor, trochlear and abducent (III, IV, and VI):

- Function: Eye movement, Accommodation and pupillary reflex.
- Anatomy: 3rd and 4th CN originates from the midbrain, while 6th CN originates from the pons.
- Examination: These nerves should be examined simultaneously, their examination consist of three components:

1-Eyeball movement:

One meter between the child and examiner:

1-In small child move an interesting toy in H shape pattern and look at the child if he follow the toy by his eyes, in the same time you should look for sequent and nystagmus with each movement.

2-In older cooperative child you can move your finger or any object in H shape pattern and asking him/her to follow, in every movement you should look for sequent and nystagmus and ask about diplopia.

2-Accommodation:

1-In small child, move an interesting toy toward the nose, normally there will be ptosis, conversion and meiosis of both eyes.

2-In older child, you can move your finger or any other object same as above.

3-Pupillary reflex:

Afferent: optic nerve

Efferent: Oculomotor nerve

This test has two parts:

1-Direct: By using light torch, come out of the visual field and direct the light toward the pupil, normally the pupil size will decrease

2-Indirect (consensual): the same maneuver but this time you put a barrier between the two eyes, then direct the torch toward one eye and look at the other eye for pupil constriction (normal consensual reflex).

- Abnormalities and interpretations of pupillary reflex:

If the direct reflex was negative, put barrier and direct the light torch toward the eye again (which had negative direct reflex), and look for the contralateral eye if there is pupil constriction (consensual reflex +) means that the optic nerve of the eye examined first is intact, but the lesion is in the oculomotor nerve of that side, but if the consensual reflex is also negative, means that the lesion in the optic nerve of that eye!

- Notes:

Types of squint: diversion squint and conversion squint.

Diplopia: as patient looks downward like step down a ladder.

Dilated pupil → atropine // no reaction → cataract or blindness.

3th cranial nerve lesion lead to → upward diversion squint + ptosis + lack of accommodation (mydriasis) + lacrimation also affected.

#Trigeminal nerve (V):

- Function: motor, sensory, reflexes.
- 1-Motor: supply the muscles of mastication by the motor fibers of the mandibular division which includes:
 - a-Masseter muscle, temporalis muscle: closing the mouth (clenching the mouth)
 - b-Lateral pterygoid muscles: open the mouth and moving the lower jaw from side to side (lesion in the nerve causes deviation of the jaw toward it).
- 2-Sensory: Supply the skin of the face by the three division as follow:
 - a-Ophthalmic; supply the skin above the imaginary line that runs from the middle of cranium downward to the lateral angle of the eye.
 - b-Maxillary; supply the skin below the imaginary line as described above and above an imaginary line from anterior third of the lateral part of the cranium to the angle of the mouth.
 - c-Mandibular: supply the skin below the imaginary line as described in b.
- 3-Reflexes:
 - a-Corneal reflex:**
 - Afferent: Ophthalmic division of trigeminal.
 - Efferent: Branch from facial nerve causes blinking of the eye.
 - Two ways of examination:
 - 1-Blowing on the child eye (usually not done due to risk of transmit infection to child as respiratory infection) its positive when the child blink his eyes.
 - 2-By using cotton, bring it out of the field of the child and touch rapidly the corneoscleral junction, positive when the child blink his eye(also not done due to risk of corneal ulceration)
 - b-Jaw jerk:**
 - Afferent: 5th CN mandibular division.
 - Efferent; 5th CN mandibular division.
 - Ask the child to slightly open his mouth, put your index finger on the the chin and by tapping it by the hummer, you will notice slight or no upward movement of the jaw normally, while brisk upward movement seen in upper motor neuron lesion.
 - Anatomy: Its nucleus in the pons.

#Facial nerve (VII):

- Function: motor supply for fascial muscles and sensation of taste of the anterior two thirds of the tongue.
- Anatomy: nucleus in the pons.
- Examination: In facial nerve you should examine 3 components:
 - 1-Motor**: fascial muscles (4 muscles which are; frontalis, orbicularis oculi, cheek muscles and orbicularis oris) and this done as follow:
 - a-Ask the child to look upward while fixing his neck in normal anatomical position, check for forehead wrinkles bilaterally
 - b-Ask the child to close his eyes as much as he can till the eyebrow is buried, then try to open his eyes by your hands to check for resistance.

c-Ask the child to blow against closed mouth, also check the resistance by pushing his cheeks with your fingers

d-Ask the child to smile, look for the angle of the mouth if they are normal or there is mouth deviation.

If there is a lesion in the right facial nerve, the mouth will be deviated toward the normal side.

All muscles affected in upper motor neuron lesion, while only cheek muscles and orbicularis oris muscles are affected in lower motor neuron lesion, because the upper two muscles supplied by nerve fibers that come from the upper half of fascial nucleus, and the lower two muscles supplied by nerve fibers that originate from the lower half of fascial nucleus, the upper half has innervation from both cerebral hemispheres therefore when the fibers come from one hemisphere affected, the branched from the other side will take its place, while lower half of the nucleus take innervation only from the ipsilateral hemisphere, therefore when its fibers damaged nothing take its place!

2-Sensory: it takes taste sensation of the anterior two thirds of the tongue by its sensory branch, chorda tympani.

To examine this typically the tongue should be pulled by forceps out of the mouth, and then put drops of specific taste on its specific area of sensation (sweet on the anterior part of the tongue, salty and sour on the lateral side and bitter on the posterior part of the tongue)

#Note: Ramsay Hunt syndrome, its herpes zoster of the sensory part of the facial nerve of part of the external auditory canal.

- Note:
 - Glabellar reflex: elicited by repetitive tapping on the glabella (area on the forehead between the eyes) normally person blinks in response to several taps then no response, if persistent → cerebral palsy (abnormal) Myerson's sign.
 - Facial nerve palsy:
 - Upper motor neuron lesion: only lower part affected (toward lesion).
 - Lower motor neuron lesion: Bell's palsy, all sites of face, no wrinkling, deviation of mouth toward same side.

#Vestibulocochlear nerve (VIII):

- Function: Hearing and balance
- Anatomy: Pons
- Examination: You should examine two components in this nerve:

1-Hearing:

a-Audiometry; it's a device that needs cooperative child > 5 years

b-Tuning fork; used in children > 5 years, also needs cooperative child.

c-Distraction test; could be used in babies > 4 months, this can be done by two examiners one stand in front of the child having an interesting toy in his hand and the other examiner stand behind the baby, when the child fixes his vision to the toy in

front of him/her, the examiners behind will produce a sound, if the child turn his head toward him, means his hearing is ok.

2-Balance:

a-Nystagmus: there are 3 types, transverse, vertical and arc movement.

You can examine for it by two methods:

1-Water caloric test:

a-warm water (44C and above) introduced in the external auditory canal, head will turn to the ipsilateral side, both eyes will turn toward contralateral side with horizontal nystagmus toward the ipsilateral ear.

b-Cold water (30 C or below) introduced in the external auditory canal, head will turn to the contralateral side, both eyes will turn toward the ipsilateral side with horizontal nystagmus toward the contralateral ear.

2-Hallpike test; Check Macleods for further information

b-Ataxia: Incoordination of body movement.

#Glossopharyngeal and vagus nerves (IX and X):

- Function: supply muscles of swallowing, laryngeal muscles (voice production), taste and general sensation of the posterior two third of the tongue.
- Anatomy: nucleus in the medulla oblongata
- Glossopharyngeal; mainly sensory, while Vagus mainly motor.
- Examination: You should examine these nerves together and start as follow:
1-The Uvula, should be central, if there is lesion in one side the uvula should deviated to the normal side. Ask the baby to say Ahh to demonstrate the uvula clearly.
2-Gag reflex; by touching the posterior wall of the pharynx by tongue depressor (afferent by glossopharyngeal), this will cause contraction of the pharyngeal muscles (efferent by vagus nerve), this reflex induces sense of vomiting.

#Accessory nerve (IX):

- Function: pure motor for the sternocleidomastoid muscle and trapezius muscle.
- Anatomy: its nucleus found In the medulla oblongata (cranial root).
- Examination: Can be examined as follow:
1-Ask the baby to elevate or shrug his shoulder, and push against his shoulders by your hands.
2-If the child is small, move an interesting toy in front of him from side to side to check for sternocleidomastoid muscles
3-If the child is old and cooperative ask him to look to the side, the push his jaw by your hand and ask him to push against your hand.

#Hypoglossal nerve (XII):

- Function: pure motor for the muscles of the tongue
- Anatomy: nucleus in the medulla
- Examination: (you need cooperative child):
 - 1-Examine the tongue in resting and look for:
 - a-Wasting
 - b-Fasciculation (fibrillation when seen on EMG, but in tongue examination we can use both words)
 - 2-Examine the tongue after asking the baby to protrude his tongue out of the mouth and look for
 - a-Weakness
 - b-Deviation (deviation is toward the abnormal side)
 - 3-Then ask the baby to close his mouth and push his cheeks by his tongue.

#Baby during feeding uses 9 cranial nerves:

- Eye to eye contact with mother by optic nerve (indirectly related).
- Eye movement by 3rd, 4th and 6th cranial nerves (indirectly related).
- Muscles of mastication by V CN (directly related).
- Facial muscles (sucking muscles) by VII CN (directly related).
- Muscles of deglutition by IX and X CNs (directly related).
- Swallowing (tongue) by XII CN (directly related).

#Causes of Cranial nerves disorders:

- Infection like meningitis or encephalitis.
- Infarction.
- Hemorrhage.
- Trauma.
- Tumor.
- Demyelination.

Note: 10, 9, 7 cranial nerves lesion → deviation toward side of lesion, the other cranial nerves lesions → deviation to the opposite of the lesion.

Note: upper motor neuron for all cranial nerves is from the origin of the nerve till the nucleus and lower motor neuron is from the nucleus till the end of the nerve.

Part14: CNS: Milestone

#Neonates (below 30 days):

- Gross motion: Asymmetrical movement of the four limbs, turns hand from side to side, lies in flexed attitude, head sags on ventral suspension and lags on pulling to sit.
- Fine motion: follows objects up to 90 degree, hand fisting.
(Clinical note: because fixation of the baby eyes to the roof of the room may signify seizure!)
- Speech: startles in response to loud sounds and cry.
- Social: visual preference for human face.

#2nd month:

- Gross motion: Same as above + head control to start to develop and complete at 4 months, legs more extended, holds chin up.
- Fine motion: follows objects up to 90 - 180 degree, no hand fisting.
- Speech: cooing.
- Social: Smiles responsively, and if absent may be needed to be evaluated again at 4 months, and if it is absent at 4 months it signify developmental problem.

#3rd month:

- Gross motion: lifts head and chest with arms extended, head above plane of body on ventral suspension.
- Fine motion: reaches toward and misses objects, waves at toy.
- Speech: says "aah. ngah".
- Social: Laughs, sustained social contact, listen to music.

#4th month:

- Gross motion: no head lag when pulled to sitting position, head steady, legs extended.
- Fine motion: hands in midline, reaches and grasps objects and bring them to mouth.
- Speech: laughs out loud.
- Social: excited at sight of food and by toys, may show displeasure if social contact is broken.

#6th months:

- Gross motion: legs bear most of body weight & bounces activity on standing.
- Rolling over (This is more complex than walking and occurs due to axial muscles development, when this occur the baby definitely will walk, even if delayed).
- Fine motion: grasp uses one hand approach (palmar grasp), transfers objects from hand to hand.
- Speech: babbling.
- Social: enjoy mirror. Takes everything to mouth (mouthing).

#7th month:

- Gross motion: sits briefly with support of pelvis.
- Fine motion: transfers objects from hand to hand, grasp uses radial palm.

- Speech: forms polysyllabic vowel sounds.
- Social: prefers mother.

#8th month:

- Gross motion: sits steady on hard surface, crawls or creeps.
- Fine motion: scissor and grasp with thumb and fingers.
- Speech: responds to name when called.
- Social: Drink from cup and holds own bottle.

#10th month:

- Gross motion: sits up alone and indefinitely without support with back straight, cruises or walks holding onto furniture.
- Fine motion: grasps objects with thumb and forefinger.
- Speech: repetitive constant sounds "mama" "dada".
- Social: waves bye-bye.

#1st year:

- Gross motion: walks with one hand held, rises independently, takes several steps.
- Fine motion: picks up pellet with unassisted pincer movement of forefinger and thumb (pincer grasp).
- Speech: says a few words besides mama, dada.
- Social: plays simple ball game, makes postural adjustment to dressing.

#15th month:

- Gross motion: walks alone, crawls up stairs.
- Fine motion: makes tower of 2-3 cubes, makes a line with crayon inserts raisin in bottle.
- Speech: jargon, follows simple commands, may name a familiar object (ball).
- Social: hugs parents, indicates some desires or needs by pointing.

#18th month:

- Gross motion: runs stiffly, sits on small chair, walks up stairs with one hand held.
- Fine motion: makes tower of 3-4 cubes, imitates scribbling and vertical stroke.
- Speech: 10 words (average), names pictures, identifies one or more parts of body.
- Social: seeks help when in trouble, may complain when wet, kisses parents with pucker.

#2nd year:

- Gross motion: runs well, walks up and down stairs, one step at a time, opens doors, climbs on furniture, jumps.
- Fine motion: makes tower of 7 cubes, scribbles in circular pattern.
- Speech: puts 3 words together (subject, verb, object).
- Social: handles spoon well, often tells about immediate experiences, listens to stories when shown pictures, helps to undress.

#2.5 years:

- Gross motion: goes up stairs alternating feet.
- Fine motion: makes tower of 9 cubes, makes vertical and horizontal strokes.
- Speech: refers to self by pronoun "I" and knows full name.

- Social: helps put things away, pretends in play.

#3rd year:

- Gross motion: rides tricycle, stands momentarily on one foot.
- Fine motion: makes tower of 10 cubes, copies circle, imitates cross.
- Speech: counts 3 objects correctly, knows age and sex.
- Social: plays simple games, helps in dressing (unbuttons clothing and puts on shoes), washes hands.

#4th year:

- Gross motion: Hops on one foot, throws ball overhand, climbs well, use scissors to cut out pictures.
- Fine motion: copies bridge from model, copies cross and square, draws man with 2 to 4 parts besides head.
- Speech: counts 4 pennies accurately, tells story.
- Social: social plays with several children, goes to toilet alone.

#5th year:

- Gross motion: skips, walks on narrow line.
- Fine motion: draw triangle from copy.
- Speech: names 4 colors.
- Social: dresses and undresses, engages in domestic role-playing, asks questions about meaning of words.

#General note:

- Once a child can copy square and triangle then he is ready to learn in the school.
- Vision is tested by Allen's test before 4 years, after 5 years by Snellen chart
- Walking can be delayed up to 1.5 year after that is abnormal unless the child is obese
- At 2 months if no head control and no smiling this indicate significant problem
- At 8 months if the baby can't sit without support, or no palmar grasp this indicate Significant problem
- After 8 months, the child should respond to own name.
- Up to 1.5 years if no pincer grasp or no walking, indicate significant problem.
- Sitting with support means that the child uses his hands to maintain his sitting position.
- With the development of gross motor skills, the infant is first able to control his or her posture, then proximal musculature, and lastly distal musculature.
- Stranger anxiety develops between 9 and 18 months of age, when infants normally become insecure about separation from the primary caregiver.

Part15: Infant Reflexes and Stereotypies

Press on the link in this page www.muhadharaty.com/lecture/3388 and see the videos.

Infant vs. Lifespan Reflexes:

- Most “infant” reflexes do not last beyond the first year.
- Infant reflexes may not completely disappear.
 - May be inhibited by maturing CNS.
 - May be integrated into new movements.
- Infant reflexes and stereotypies are very important in the process of development.

Why is the study of infant reflexes important?

- Dominant form of movement for last 4 months prenatally and first 4 months postnatally.
- Primitive reflexes critical for human survival.
- Postural reflexes believed to be foundation for later voluntary movements.
- Appearance and disappearance helpful in diagnosing neurological disorders.

Role of Reflexes in Developing Future Movement:

- Postural reflexes are related to the development of later voluntary movement.
- Reflexes can determine level of neurological maturation.

Infant Reflex	Future Voluntary Movement
Crawling	Crawling
Palmar grasp	Grasping
Stepping	Walking

Primitive Reflexes:

- Palmar Grasp
- Sucking
- Rooting
- Moro reflex(Startle reaction)
- Asymmetric Tonic Neck
- Symmetric Tonic Neck
- Plantar Grasp

- Babinski reflex
- Parachute reflex
- Landau reflex
- Glabellar reflex

Reflexes as Diagnostic Tools:

Reflex	Concern
Moro reflex	if lacking or asymmetric→ 1. brachial plexus paralysis (Erb's palsy) 2. clavicle injury. 3. fractured arms. 4. cerebral paralysis.
Asymmetric tonic reflex	May indicate cerebral palsy if persists past normal time.

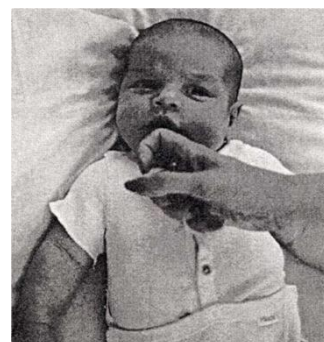
1- Palmar Grasp:

Stimulus / Response	S: Palm stimulated R: 4 fingers (not thumb) close
Duration	4 or 6 months postpartum
Concerns	No palmer grasp may indicate(spasticity).
Other	Grasping may predict handedness in adulthood Voluntary reaching to the objects



2- Sucking:

Stimulus / Response	S: touch of lips R: sucking action
Duration	3 to 4 months postpartum
Other	Often in conjunction with searching reflex



3- Search or rooting reflex:

Stimulus / Response	S: touch cheek or side of mouth by the edge of finger . R: head moves toward stimuli
Duration	3 to 4 months postpartum
Concerns	No reflex problematic for nutrition No reflex or lack of persistence may be sign of CNS or sensorimotor dysfunction.
Other	Often in conjunction with sucking reflex.



4- Landau reflex:

Landau reflex	<p>S:- position of the infant when held horizontally in the air in prone position.</p> <p>R:- maintain a convex arc with the head raised and the legs slightly flexed</p>
Duration	Appears at 3 months after birth and lasts until up to 12 months to 24 months of age
Concern	An abnormal Landau reflex may indicate hypotonia or hypertonia and may indicate a motor development issue



5- Glabellar reflex:

Glabellar reflex	<p>S:-repetitive tapping on the forehead. ,near the eyes.</p> <p>R:Subjects blink in response to the first several taps.</p>
Duration	4-6months



6- Moro:

Stimulus / Response	<p>S:head is supported by the palm (2cm above the table)& then suddenly released (the other palm will receive the dropping head)</p> <p>R:Normal response of baby will be →(startle reaction). he/she spreads his/her arms (abduction & extension of arms);he will open his hands. he pulls his arms in but his legs are extended . sometimes he cries</p>
Duration	4-6 months postpartum
Concerns	<p>An asymmetrical response indicate →</p> <ol style="list-style-type: none"> 1-brachial plexus paralysis (Erb's palsy) 2-clavicle injury. 3-fractured arms. 4-cerebral paralysis.



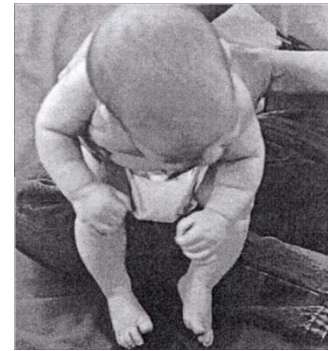
7- Asymmetric Tonic Neck:

Stimulus / Response	<p>S: Prone/supine position, turn head to one side</p> <p>R: Limbs flex on one side, extend on other side</p>
Duration	3-4 months
Concerns	<p>Facilitates bilateral body awareness</p> <p>Facilitates hand-eye coordination</p>
Other	Also called 'fencer's' position



8- Symmetric Tonic Neck:

Stimulus / Response	S: Baby sitting up and tip forward R: Neck and arms flex, legs extend S: Baby sitting up and tip backward R: Neck and arms extend, legs flex
Duration	3-4 months
Concerns	Persistence may impede many motor skills and cause spinal flexion deformities



9- Plantar Grasp:

Stimulus / Response	S: Touching the ball of foot R: Toes grasp
Duration	Birth – 1 year
Other	Must disappear before the baby can stand or walk. Issue of shoes versus no shoes?



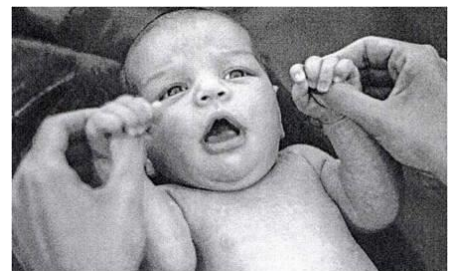
10- Babinski:

Stimulus / Response	S: Stroke bottom or lateral portion of foot R: Great toe turns downward
Duration	Birth – 4 months
Concern	Test of the pyramidal tract (i.e. ability to perform conscious / voluntary movement)



11- Palmar Mandibular:

Stimulus / Response	S: Pressure to both palms or hair to hand R: Eyes close, mouth opens, and/or neck flexes (which tilts the head forward)
Duration	Birth – 3 months
Other	Also called the <i>Babkin reflex</i>



12- Palmar Mental:

Stimulus / Response	S: Scratch base of palm R: Lower jaw opens and closes
Duration	Birth – 3 months



Postural Reflexes

- Stepping
- Crawling
- Swimming
- Head and Body Righting
- Parachuting
- Labyrinthine
- Pull Up

1- stepping:

Stimulus / Response	S: Infant upright with feet touching surface R: Legs lift and descend
Duration	6months.
Concerns	Essential forerunner to walking
Other	Developmental changes in reflex over time



2- Crawling:

Stimulus / Response	S: Prone position on surface, stroke alternate feet R: Legs and arms move in crawling action
Duration	Birth – 3-4 months
Concerns	Precursor to later voluntary creeping



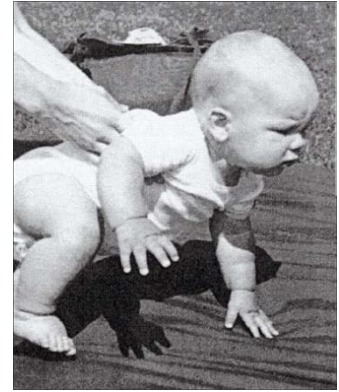
3- Swimming:

Stimulus / Response	S: Infant held horizontally R: Arms and legs move in coordinated swimming type action
Duration	2 weeks after birth – 5 months
Other	Recognition of reflex led to popularity of infant swim programs



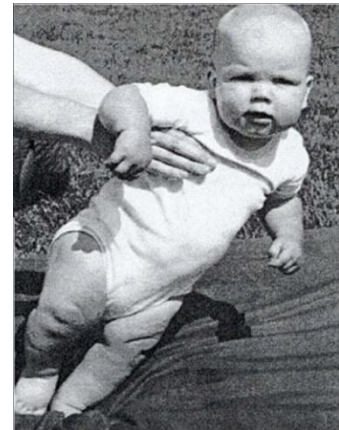
4- Parachuting:

Stimulus / Response	S: Off balance in upright position Protective movement in direction of fall	R:
Duration	Appears at 9months & never disappear	
Other	Also called <i>propping reflex</i> Occurs downward, sideways, & backward	



5- Labyrinthine:

Stimulus / Response	S: Baby held upright, tilted in one direction R: Baby tilts head in opposite direction
Duration	2-3 months – 1 year
Concerns	Related to upright posture
Other	Also considered primitive reflex



6- Pull Up:

Stimulus / Response	S: Sitting/standing, hold hands, tip in one direction R: Arms flex or extend in to maintain upright position
Duration	3 months – 1 year
Concerns	Related to upright posture



Part16: Miscellaneous

Features of hypothyroidism in pediatric age group:

1. Hussey cry.
2. Coarse faces.
3. Constipation
4. Obese (puffy).
5. Pale.
6. Umbilical hernia.
7. Jaundice at birth.
8. Mental retardation if NOT treated early.

Lumbar puncture procedure:

Fine needle inserted at level of two iliac crest (between L4&L5) → after completing the drawing of CSF → pack the area to close it → because as CSF leaks → child will have severe headache.

Features of CSF exam:

1. Appearance: turbid in infection.
2. Chemistries:
 - a-proteins: high in bacterial.
 - b-glucose: low in bacterial.
3. Cells: the count less than 5 normally.
 - a-neutrophils: high in septic meningitis.
 - b-lymphocytes: high in perimeningeal infection.

HYPERACUSIS:

- In degenerative diseases → treatment is only supportive, some recommend immunotherapy (it is equivocal).
- In grey matter degenerative disease → vision will be affected.
- In speech delay → ask about the family (this may be normal *familial*).
- Bulbar palsy → problems in deglutition & swallowing.

Hip dislocation tests:

(developmental dislocation of Hip*DDH*) → these tests only performed for those below the 3 months age → put your finger on greater trochanter, then move the thigh backward & outward,, then inward & forward → if +ve → click sound will be heard (indicates dislocation of head of femur from acetabulum);; for those over 3 months if you performed it → tear of capsule occurs, so don't do it.

Phototherapy:

Types of phototherapy:

1. Single light source.
2. Double light source (which is in use nowadays).

Aim of phototherapy:

- 1- To prevent Hb from falling to a level that causes HIE.
- 2- To prevent bilirubin passing BBB as this leads to kernicterus.

Contraindication of phototherapy:

- 1-direct hyperbilirubinemia → Bronze baby syndrome.
- 2-porphyrria.

Notes:

- 1- Keep in mind that phototherapy never substitute for blood transfusion when it is indicated.
- 2- In phototherapy: cover the eyes, genitalia and increase fluid intake to avoid dehydration. After you control the patient's bilirubin level, let the patient remain in hospital for 24 hours (because rebound phenomenon is common).

Notes:

- We must measure OFC to determine whether this infant is microcephalic or NOT & always before deciding → compare with the parents shape (may be familial microcephaly).
- In acute illnesses → weight is affected more than height, if height is diminished in corresponding to the weight → it is chronic (OFC also will be affected).
- If all small since birth → means intrauterine disease (Torchs).

- Squint normally is up to 6 months, if remain → abnormal sign.
- Distended abdomen NOT always an ascites, sometimes it is an indication for hypotonia & wasting.
- Weakness + hypotonia → LMN lesion.
- Weakness + hypertonia → UMN lesion.
- In cerebral palsy → child will be spastic (opsthitonous) with persisting fisting posture after 3 months of age.
- Some cases of cerebral palsy are NOT elected at birth, they will develop as the child/infant grows, because infection such as meningitis during the first years of life.

Development:

Definition: development is the acquisition of new skills & maturation of organs function.

Examples:

- Development of hand function:
 - At birth → hands has reflex grasp (you can hold the baby by his grasp to your fingers) this has no importance.
 - At 4th months → active grasp: by his intention he will couch the objects.
 - At 8th month → scissor grasp or radial assisted grasp (with thumb and fingers).
 - At 10th month → pincer grasp with thumb and forefingers.
 - At 1st year → like adult he couch objects.
- Development of speech:
 - In the beginning → throaty sound.
 - After 4 months → vowels.
 - After 8 months → consonants.
 - 1 year → 2 words.
 - 2 years → 200 words.
 - 4 years → all speech must be compressible.

Developmental history:

- Four questions to be asked in developmental History:
 1. Gross motor → roll over? Sit? Crawl? Walk? Going up stairs?
 2. Fine motor → movements of fingers, couching objects, shoe tie, buttoning, unbuttoning.
 3. Social adaptation → smile, knows his mother, clapping, bye-bye, annoyed when being taken from his mother, control his urination & defecation.
 4. Language or speech.
- Examples:

- Social smile → smile in response to social contact (not during sleep) → at 3-6 weeks "21days" if delayed → serious CNS problem.
- Head control → 12-16 weeks.
- Active grasp → 4 months
- At 5.5 months → transfer object from one hand to another , roll over "supine, prone"
- At 7 month → sit with support
- At 8 month → sit without support
- At 9 month → waving bye – bye, creeping and crawling الزحف كالدودة
- At 10 month → respond to his name
- At 1 year → says few word beside mama , baba & Drink by bottle
- At 9 month - 2 year → separation anxiety
- At 12 month → Walk assisted
- At 20 month → Walk Without assisting

Important steps in general examination of a child:

1. Position
2. Consciousness
3. Orientation
4. Respiration
5. State of nutrition & hydration.
6. Vital signs
7. Measurements
8. Special things if present

#Position:

- Flexed with fisted hands "as the patient we saw in the ward".
- Extended posture "frog like".
- Opisthotonus "his head & his heels on the bed while his body is arched commonly seen in kernicterus "bilirubin encephalopathy"
- Tetanus neonatorum, decerberate & decorticate posture.

#Consciousness: conscious, lethargic, comatose, lethargic with crying on examination only (implying serious problem).

#Orientation: in child of more than 4-5 years old >> ask about (place, time, person)

#Respiration:

- Regular or not, seek about sign of respiratory distress if present (infrasternal or intercostals recession).
- Chyne stokes breathing → hyperpnea + pause → indicates severe brain insult
"Respiratory failure or heart failure" → type 1 hypoxia is imminent, PO₂ <92% while type 2:- PCO₂>45mmHg + hypoxia.
- Chyne stokes breathing pattern is normal in premature or in neonate (1 week) old age.

#State of nutrition and dehydration:

- CHO deficiency.
- Protein deficiency >> edema
- Fat deficiency >> medial aspect upper thigh & buttock "sites of storage of fat"
- Vitamins and minerals:
 1. B1 (thiamine) deficiency → beriberi "dry & wet"
 2. B2 deficiency → normocytic anemia, cheilitis, stomatitis.
 3. B3 (Niacin) deficiency → pellagra "diarrhea, dementia, dermatitis".
 4. B7 (Biotin) deficiency → hypotonia, ataxia.
 5. B9 (Folate) deficiency → anemia.
 6. B12 (Cobolamin) deficiency → anemia with stomatitis & tongue soreness.
 7. Vitamin A deficiency → dry & scaly skin.
 8. Vitamin D Deficiency → rickets.
 9. Vitamin K deficiency → bleeding.
- Water and electrolytes (signs of dehydration) → sunken eye, depressed fontanelle, dry mouth, dry buccal cavity, absence of tear, poor skin turgor.
- **Note:** wrinkling of skin in the area around the thigh is sign of wasting → look for abdominal distension + eversion of umbilicus.

#Vital signs:

- Respiratory rate.
- Pulse rate (if examined from any site other than the heart) >> for 1 minute
- Heart rate (if taken from the heart) >> for 1 minute, difference between heart rate & pulse rate → pulse deficit.
- Temperature (we must take the core temperature (rectally)) but usually taken from axilla and corrected by adding 0.5 to it.
- Blood pressure.
- Capillary refill.
- Pulse oximetry.

#Special things if present: Hydrocephalus, clubbing, cyanosis, down syndrome features.

#Measurements:

- Height (if measured on ground) / length (if measured on bed)

- Weight: 50 centile (ideal)
 - Less than 1 year = (age in month + 9) / 2
 - 1-7 years = (age in year + 4) * 2
 - More than 7 years = (age in year) * 3
- OFC: from most prominent area in the occiput to the 1 inch above glabella.
 - At birth: 35 cm (in full term baby).
 - At 1st year: 35cm +
 - 2 months >> +4
 - 4 months >> +3
 - 6 months >> +2
 - 8 months >> +1
 - 10 months >> +1
 - 12 months >> +1
 - So at 1 year it will equal 49 cm
 - At 2 years (+ 2.5 cm)
 - Next 5 years (+ 0.5 cm / year)
 - Next 5 years (+ 0.3 cm / year)
- Tiny child vs. stunted growth:
 - In tiny child the height and weight both decreased in a similar manner and often there is a history of tinny child in family (seek about similar condition in family).
 - While in stunted growth the height and weight are severely decreased and may be not the same and there is no similar condition in the family and often associated with other diseases.

Craniotabes

- Is a softening of the skull bones.
- Can be a normal finding in infants, especially premature infants.
- It may occur in up to one third of all newborn infants.
- It is harmless in the newborn, unless it is associated with other problems → these can include rickets and osteogenesis imperfecta (brittle bones).
- Maneuver → press the bone along the area where the bones of the skull come together "posterior parietal". The bone often pops in and out, similar to pressing on a ping-pong ball if the problem is present. No testing is done unless osteogenesis imperfecta or rickets is suspected.



Acidotic breathing in child with dehydration (causes of acidosis in children):

- Gastroenteritis with dehydration → low renal perfusion → ↓GFR → ↓ excretion of acids by kidney (pre-renal failure).
- Gastroenteritis with diarrhea → loss of inlet juice → losing bicarbonate (HCO_3) → no compensatory loss of acids by kidney due to ↓ GFR (which is the only organ can excrete acids from the body) → acidosis.
- Renal failure due to diseased kidney:
 - Congenital >> Horse shoe kidney, renal agenesis, duplication.
 - Acquired >> Chronic glomerulonephritis, nephritic syndrome, nephritis.
- Ketoacidosis → DM.
- RTA → (renal tubular acidosis):
 - Proximal RTA → problem in reuptake of HCO_3 . inefficient proximal tubules → no recollection of CHO → acidosis.
 - Distal RTA → problem in excretion of H ion & retaining Na ions.

Notes:

- Do not forget nutritional and hydration state during general examination.
- Do not misdiagnose hyperventilation for dyspnea.
- Respiratory failure type 1 → $\text{PO}_2 < 92$ mmHg.
- Respiratory failure type 2 → hypoxia + hypercapnia.
- Bronchiolitis → not recurrent.
- Asthma → recurrent.
- Chyne stock respiration >> period of hyperventilation then period of apnea which is normally seen in neonate especially if preterm.



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