Pediatrics For OSCE

Some Information About Common Pediatric Cases

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تمت الطباعة في مكتب المنتظر للحاسبات – البصرة – ناحية الشهيد عز الدين سليم - السوق

Index

بسم الله الرحمن الرحيم

تحية من القلب لكم إخوتي وأخواتي طلبة كلية الطب جامعة البصرة

إنَّ المعلومات في هذه الملزمة هي حصيلة ما تمكنت من جمعه خلال فترة التدريب السريري في المرحلة السادسة مع الاعتماد على ملزمة فرع الأطفال في مواضيع الفحص السريري بالإضافة إلى بعض كتب الأطفال في علاج بعض الحالات ولكن لم يسعفني الوقت لتنقيحها لذلك أضعها بين أيديكم كما هي وأعتذر لكم عن أي أخطاء مطبعية أو علمية.

سائلاً الله تعالى ان يوفقنا وإياكم إلى كل ما فيه الخير والمنفعة وأن يمن علينا وعليكم بالصحة والعافية انه سميع مجيب الدعاء.

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History

Identity

1- Name

2- Age (Date of birth)

3- Sex

4- Address

5-Source of information - next of kin

6- Date of admission & Time

7-Source of referral

Chief complaint:

Symptom & duration

History of Present illness

- **Try to use open questions and use direct questions if necessary**
- **For most symptoms ask about:**

1. Onset
2. Duration
3. Course
4. Frequency, pattern
5. Analysis of the symptom
6. Aggravating and relieving factors, and severity
7. Associated symptoms
8. Review the involved system & exclude other differential diagnoses and ask about risk factors
9. Family reaction , hospitalization
10. Patient condition now

Table 1 : **Review of systems**

CNS	CVS:	Respiratory system:
1- Headache 2- Dizziness 3- Vertigo 4- Visual disturbance 5- Syncope 6- Loss of consciousness 7- Limb weakness 8- convulsion 9- Tremor 10-Paresthesia 11- funny turns	1- Chest pain 2- Dyspnea 3- Claudication 4- Orthopnea 5- PND 6- Palpitation 7- faints 8- Fatigue 9- cyanosis 10- Ankle edema	1- Chest pain 2- Dyspnea 3- Cough 4- Sputum 5- Haemoptysis 6- Wheeze 7- Stridor
GUT:	**GIT:**	
1- Dysuria 2- Enuresis 3- Frequency 4- Nacturia 5- Urgency 6- Urine retention 7- Polyuria 8- Haematuria 9- Incontinence 10- Loin pain 11-Intermittent stream 12-Post micturition dripping 13- age of menarche 14-dysmenorrhea	1- Appetite 2- Abdominal pain 3- Altered bowel motion (diarrhea or constipation) 4- Flatulence 5- Nausea & vomiting 6- Haematemesis 7- Jaundice 8- Dysphgia 9- Melaena 10- Bleeding per rectum	
ENT	**Locomotor system:**	**development**
1- Earache 2- Hearing impairment 3- Recurrent sore throat 4- Enlarged glands	1- Joint pain 2- Joint swelling 3- Joint Stiffness 4- Joint locking 5- Muscle weakness 6- Deformity 7- Myalgia	1- Gross motor 2- Fine motor 3- Language and speech 4- social
General	**Skin:**	**Note:**
1- Activity 2- Sleep 3- School absence 4- Weight loss 5- Fever	1- pallor 2- Echymosis or any lesions 3- Itching 4- Skin rash	Some of these symptoms are not suitable for certain age groups

Past history

Prenatal, natal and post natal

1- Maternal age during pregnancy, G… P… +…

2- Any problem during pregnancy (at which trimester)

3- Maternal diseases

4- Exposure to radiation

5- Drug use during pregnancy

6- Anemia, tetanus vaccination , trauma , infection, ANC, chronic diseases like diabetes mellitus, hypertension

7- Fate of previous pregnancies

8- Normal vaginal delivery or caesarian

9- Instrumental delivery

10- Term or preterm

11- Place of delivery at home or at hospital

12- Prolong labor

13- Presentation (breach, vertex ,face)

14- Birth trauma

15- Complication during delivery

16- Birth weight

17- neonatal progress

18- Cry immediately or not

19- Cyanosis

20- Asphyxia

21- Meconium aspiration

22- Admission to NCU
23- Pass Meconium
24- Voiding urine
25- Early feeding practice
26- Vitamin k prophylaxis
27- Receiving Drug or oxygen
28- Jaundice at which day how long it last
29- Tetanus or neonatal convulsion

Past medical and surgical History

1- Pervious same symptoms or similar attack
2- Previous hospitalization (when, why)
3- Previous operation(when ,why name of the hospital)
4- Previous blood transfusion(NO. of units ,reason, complications)
5- Previous investigations and screening tests
6- childhood Illnesses (measles , whooping cough , mumps)
7- Chronic illnesses should be listed in chronological order

If there is chronic illness

Ask about:

1- Age of diagnosis.
2- Initial clinical features and investigations
3- Initial hospitalization : cause, duration, name of the hospital, progression in the hospital)
4- Frequency of hospitalization => severity
5- Period between the attacks or hospitalizations
6- Drugs details : name , type, dose, rout of administration ,who responsible for administration, any side effect ,any change in the drug or it's dose. follow up, special investigations
7- Other measures they did (according to the disease)
    a. Blood transfusion
    b. Dialysis
    c. B.M biopsy or Aspiration
    d. CSF analysis
8- Hx of last attacks
9- Progression of the symptoms

Example about chronic diseases that frequently repeated in OSCE

1- Thalassemia

2- Bronchial asthma

Feeding History

- ❖ In most OSCE stations Ask about name , age , sex of the child
- ❖ Introduce yourself
- ❖ Explain to the mother what you are going to ask

Ask about type of feeding

1f :

Breast feeding:

1- Duration of exclusive breast feeding
2- On demand or on schedule
3- How often he/she feed
4- night feeding
5- Duration of each feeding
6- Whether she use one or both breasts
7- Proper feeding technique
8- Satisfaction of mother and baby
9- Breast engorgement , oozing of milk from other breast during the feeding
10- Sleeping after feeding, weight gain and how often he wet his napkin
11- If there is excessive crying
12- Were there any problems
13- Was she complement breast milk with any food (semisolid or solid)
14- Whether she Washes her hand before and after each feeding?
15- Medication that took by the mother

Bottle feeding

1- Whether preceded by breast feeding (for how long?)

2- When she start bottle feeding

3- Formula or unmodified cow's milk or medical formula

4- Type of the formula that the child is receiving now

5- How was it prepared

6- Type of water that the mother uses

7- How long that the milk can take to be over

8- How often the child feed

9- On demand or on schedule

10- The amount of milk that the child consumes in each feeding (how many ounce and how many scopes per ounce ?)

11- Volume of the residual milk

12- Average duration of each feeding

13- Sleeping pattern and sleeping after feeding ,weight gain & how often he wet his napkin

14- Satisfaction of mother & baby

15- Number of bottles that the mother has

16- Method of sterilization

17- If there is any allergy or problems associated with feeding (diarrhea, colic)

18- Is the mother complement bottle feeding by any food , type of that food

Dietary History:

1) Number of meals
2) Content of meals (Animal or plant)
3) Number of snacks
4) Favorite food
5) Food that the child forbidden from it (why?)
6) Allergy to food
7) Weight gain, sleeping , activity
8) Whether the child has a tendency or craving to eat substances other than normal food ? (Pica)

Weaning :

1. When it start
2. Type of weaning foods
3. By spoon or by bottles

Vaccination History

1. Is the mother herself responsible for taking the child for vaccination
2. Whether the child has vaccination card? And whether the mother is bringing it with her now ?
3. Whether the child completed his vaccinations or not?
4. was there missed vaccine? Why ?
5. was there delayed vaccine ? why ?
6. Rout of administration of each received vaccine
7. Is there allergy to any vaccine ?
8. Ask in detail about complications of each vaccine (fever, convulsion...)
9. Ask about BCG scar
10. Ask about additional vaccines? And why?
11. Chronic diseases: SCA, recurrent chest infection

Developmental History

Table 2 : Developmental Milestones in the First 2 Yr of Life

MILESTONE	AVERAGE AGE OF ATTAINMENT (MO)	DEVELOPMENTAL IMPLICATIONS
GROSS MOTOR		
Holds head steady while sitting	2	Allows more visual interaction
Pulls to sit, with no head lag	3	Muscle tone
Brings hands together in midline	3	Self-disCovery of hands
Asymmetric tonic neck reflex gone	4	Can inspect hands in midline
Sits without support	6	Increasing exploration
Rolls back to stomach	6.5	Truncal flexion, risk of falls
Walks alone	12	Exploration, control of proximity to parents
Runs	16	Supervision more difficult
FINE MOTOR		
Grasps rattle	3.5	Object use
Reaches for objects	4	Visuomotor coordination
Palmar grasp gone	4	Voluntary release
Transfers object hand to hand	5.5	Comparison of objects
Thumb-finger grasp	8	Able to explore small objects
Turns pages of book	12	Increasing autonomy during book time
Scribbles	13	Visuomotor coordination
Builds tower of 2 cubes	15	Uses objects in combination
Builds tower of 6 cubes	22	Requires visual, gross, and fine motor coordination
COMMUNICATION AND LANGUAGE		
Smiles in response to face, voice	1.5	More active social participant
Monosyllabic babble	6	Experimentation with sound, tactile sense
Inhibits to “no”	7	Response to tone (nonverbal)
Follows one-step command with gesture	7	Nonverbal communication
Follows one-step command without gesture	10	Verbal receptive language (e.g., "Give it to me”)

MILESTONE	AVERAGE AGE OF ATTAINMENT (MO)	DEVELOPMENTAL IMPLICATIONS
Says “mama” or “dada”	10	Expressive language
Points to objects	10	Interactive communication
Speaks first real word	12	Beginning of labeling
Speaks 4–6 words	15	Acquisition of object and personal names
Speaks 10–15 words	18	Acquisition of object and personal names
Speaks 2-word sentences (e.g., "Mommy shoe”)	19	Beginning grammaticization, corresponds with 50+ word vocabulary
COGNITIVE		
Stares momentarily at spot where object disappeared	2	Lack of object permanence (out of sight, out of mind) [e.g., yarn ball dropped]
Stares at own hand	4	Self-disCovery, cause and effect
Bangs 2 cubes	8	Active comparison of objects
UnCovers toy (after seeing it hidden)	8	Object permanence
Egocentric symbolic play (e.g., pretends to drink from cup)	12	Beginning symbolic thought
Uses stick to reach toy	17	Able to link actions to solve problems
Pretend play with doll (e.g., gives doll bottle)	17	Symbolic thought

Table 3 : Rules of Thumb for Speech Screening

Age (yr)	Speech Production	Articulation (Amount of Speech Understood by a Stranger)	Following Commands
1	1-3 words		One-step commands
2	2- to 3-word phrases	½	Two-step commands
3	Routine use of sentences	¾	
4	Routine use of sentence sequences; conversational give-and-take	Almost all	
5	Complex sentences; extensive use of modifiers, pronouns, and prepositions	Almost all	

Table 4: Emerging Patterns of Behavior During the 1st Year of Life[*]

NEONATAL PERIOD (1ST 4 WK)	
Prone:	Lies in flexed attitude; turns head from side to side; head sags on ventral suspension
Supine:	Generally flexed and a little stiff
Visual:	May fixate face on light in line of vision;“doll's-eye” movement of eyes on turning of the body
Reflex:	Moro response active; stepping and placing reflexes; grasp reflex active
Social:	Visual preference for human face
AT 1 MO	
Prone:	Legs more extended; holds chin up; turns head; head lifted momentarily to plane of body on ventral suspension
Supine:	Tonic neck posture predominates; supple and relaxed; head lags when pulled to sitting position
Visual:	Watches person; follows moving object
Social:	Body movements in cadence with voice of other in social contact; beginning to smile
AT 2 MO	
Prone:	Raises head slightly farther; head sustained in plane of body on ventral suspension
Supine:	Tonic neck posture predominates; head lags when pulled to sitting position
Visual:	Follows moving object 180 degrees
Social:	Smiles on social contact; listens to voice and coos
AT 3 MO	
Prone:	Lifts head and chest with arms extended; head above plane of body on ventral suspension
Supine:	Tonic neck posture predominates; reaches toward and misses objects; waves at toy
Sitting:	Head lag partially compensated when pulled to sitting position; early head control with bobbing motion; back rounded
Reflex:	Typical Moro response has not persisted; makes defensive movements or selective withdrawal reactions
Social:	Sustained social contact; listens to music; says “aah, ngah”
AT 4 MO	
Prone:	Lifts head and chest, with head in approximately vertical axis; legs extended
Supine:	Symmetric posture predominates, hands in midline; reaches and grasps objects and brings them to mouth
Sitting:	No head lag when pulled to sitting position; head steady, tipped forward; enjoys sitting with full truncal support
Standing:	When held erect, pushes with feet
Adaptive:	Sees pellet, but makes no move to reach for it
Social:	Laughs out loud; may show displeasure if social contact is broken; excited at sight of food

AT 7 MO	
Prone:	Rolls over; pivots; crawls or creep-crawls (Knobloch)
Supine:	Lifts head; rolls over; squirms
Sitting:	Sits briefly, with support of pelvis; leans forward on hands; back rounded
Standing:	May support most of weight; bounces actively
Adaptive:	Reaches out for and grasps large object; transfers objects from hand to hand; grasp uses radial palm; rakes at pellet
Language:	Forms polysyllabic vowel sounds
Social:	Prefers mother; babbles;enjoys mirror; responds to changes in emotional content of social contact
AT 10 MO	
Sitting:	Sits up alone and indefinitely without support, with back straight
Standing:	Pulls to standing position;“cruises” or walks holding on to furniture
Motor:	Creeps or crawls
Adaptive:	Grasps objects with thumb and forefinger; pokes at things with forefinger; picks up pellet with assisted pincer movement; unCovers hidden toy; attempts to retrieve dropped object; releases object grasped by other person
Language:	Repetitive consonant sounds (“mama,” “dada”)
Social:	Responds to sound of name; plays peek-a-boo or pat-a-cake;waves bye-bye
AT 1 YR	
Motor:	Walks with one hand held (48 wk); rises independently, takes several steps (Knobloch)
Adaptive:	Picks up pellet with unassisted pincer movement of forefinger and thumb; releases object to other person on request or gesture
Language:	Says a few words besides “mama,” “dada”
Social:	Plays simple ball game; makes postural adjustment to dressing

* Data are derived from those of Gesell (as revised by Knobloch), Shirley, Provence, Wolf, Bailey, and others. Knobloch H, Stevens F, Malone AF: *Manual of Developmental Diagnosis.* Hagerstown, MD, Harper + Row, 1980.

Assessment of development *(Means examination as well as the history)

(Examine according to the child's age and the information that you get from the developmental history)

Gross motor

- **Put the child in prone position :** look for creeping, crawling, raising of his head and chest
- **Put the child in Supine:** rolling, looking, movement of extremities
- **Pull him to sit and see the head lag**
- **Standing**
- **Do axillary suspension**
- **Do ventral suspension**

Fine motor

- Hold a toy in front of him and see whether he follow it
- Put the toy in front of him see whether reach to it or not
- Or give him the toy
- Examine for pincer grip : put a small thing in front of the child
- Give him a cup and see what he will do
- Give him a pen and paper

Speech and hearing:

- See whether the child obey commands
- Hearing assessment: do distraction test (according to child's age)

Social :

- Type of playing
- Respond to his name or not
- Others : wave bye-bye

Assess the vision of the child

For more details see table 4 (Pages 16-17)

Newborn *for more accurate details see table 2 (Pages 14-15)

Gross motor

1- limbs flexed
2- symmetrical postures
3- Marked head lag on pulling up

Fine motor & vision

Follows face in midline

Speech language & learning

Straddles to laud noises

Social & emotional & behavioral

Eye contact with the mother
Responds to parents

1-3 months

Gross motor

1- Holds head up to 45^{o} , holds head steady while sitting (2 months)
2- Push up on arms to sit (3monthes)
3- No head lag (3 months)
4- Bring hand together in midline (3 months)

Fine motor & vision

1- Follows moving object or face by turning the head

Speech language & learning

1- Hearing loud noises
2- Different small sounds

Social & emotional & behavioral

Smile responsively

4-6 months

Gross motor

1- Sits with support
   Round back on sitting
2- Hold head up
3- extend & roll

Fine motor & vision

1- Reaches out for toys and catch
2- Transfer toys from one hand to another

Speech language & learning

1- Vocalizes alone or when spoken to
2- Coos

Social & emotional & behavioral

laughs

7-8 months

Gross motor

1- sits without support with straight back
2- crawling

Fine motor & vision

1- arm face to each
2- grasp pick

Speech language & learning

1- turn to soft sound
2- out of sight used indiscriminately

Social & emotional & behavioral

1- Put food in mouth
2- Fear from stranger

9-11 months

Gross motor

1- Pull to stand
2- Walks around the furniture

Fine motor & vision

1- Mature pincer grip

Speech language & learning

1-Use sound discriminately to parents

Social & emotional & behavioral

1- Wave bye-bye
2- Play peek a poo

One year

Gross motor

1- Independent standing
2- Walking unsteadily with broad gait hand apart

Fine motor & vision

1- Pincer grip
2- catch a cup

Speech language & learning

2 to 3 wards other than dada mama

Social & emotional & behavioral

Drink from a cup

2 years

Gross motor

1- Walks alone steadily
2- Two feet step
3- Climbs stairs

Fine motor & vision

1- Scribbles with a pencil (may be able since 13th month)
2- Builds tower of 3 or 6

Speech language & learning

1- 10 words
2- Obey commands
3- Identifying different parts of the body(nose, ear, eye, moths)
4- Use 3 or more words to make simple phrases

Social & emotional & behavioral

1- Holds food by spoon and get safely to mouth
2- Symbolic play
3- Dry by day
4- Pulls off some clothing

3 years

Gross motor

1- One foot step
2- Playing

Fine motor & vision

Draw a circle without seeing how to do

Speech language & learning

Talk constantly in 3-4 ward sentences more clear

Social & emotional & behavioral

1- Inter active playing
2- Know colors

4 years

Gross motor:

Jump

Fine motor & vision

1- Able to draw across(4 yrs.) or square (4.5 yrs.)
2- Build tower of 8
3- Trains with 4 bricks
4- Bridge and steps
5- Catches ball

Speech language & learning

Tall long story

Social & emotional & behavioral

Play with other children

Older children

1- Relation with family
2- Activity and hobbies
3- School performance (Stage , missing days, attendance, grades, relation with friends & teacher)

Family history

1- Father : name ,age, occupation
2- Mother : name ,age, occupation
3- Consanguinity: relative or not degree of consanguinity
4- Brothers & sisters(age ,sex, illnesses)
5- Order of the child in the familly
6- Same symptoms in the family
7- History of death in the family :cause ,date
8- Diseases affect more than one member of the family
9- Chronic diseases in the family

Social history

1-Parents smoking
2- Living conditions

- Own or rented house
- Water and electrical supply
- Number of rooms
- Sanitary condition
- Safety measures

3- Animal relationship & Pet rearing
4-Hobbies
5-Traveling or contact with patient with same symptoms
6-Worris or stresses

Drug history:

1- Chronic drug use: steroid and others
2- Allergy to drug & food and previous significant drug side effect
3- Over the counter medicines and herbal preparations
4- Hx of specific drug use according to the condition like
Warfarin or Heparin in bleeding tendency
5-others : radiotherapy , psychotherapy
6- If there is a chronic disease controlled by special drug ask about:

- ❖ Name of the drug that the patient use
- ❖ Dose of the drug
- ❖ Duration of thereby
- ❖ Form of the drug
- ❖ Freq. of administration
- ❖ Rout of administration
- ❖ Who responsible for administration of the drug
- ❖ Any side effect
- ❖ Any new adjustment to the dose or type of the drug
- ❖ Storage of the drug
- ❖ Is the disease well controlled by this drug ?

History of common symptoms

1- Convulsion

Name, Age, sex

1) Onset

2) Timing(day , night)

3) Duration

4) Frequency

Whether the mother notice the attack

5) Pre ictal

1. **What precede the attack:**
   a. Nervousness
   b. Excessive crying
   c. Shortness of breath
   d. abdominal pain
2. **What was the child do at time of the attack**

6) ictal description

1. **facial changes**
   a. eye (flickering, blinking , rolling, upward movement, staring)
   b. oropharyngeal : excessive salivation , lip smacking
   c. twitching of the face
2. **limb changes :** jerky limb movement (which limb involved , unilateral or bilateral , coming regularly or not)
3. **sphincter control**
4. **associated symptoms**
   a. loss of consciousness
   b. circumoral pallor
   c. cyanosis
   d. tongue biting
5. **Resolve spontaneously or by medication**

7) post ictal phase

1. pass in deep sleeping
2. limb weakness
3. period between the attack (if frequent) is the child well

8) precipitating conditions

1. Fever, skin rash
2. vomiting and diarrhea (bloody or watery)
3. symptoms of UTI
4. chest infection (cough , SOB)
5. Headache with vomiting (Brain tumor)
6. Drug intake
7. Withdrawal from antiepileptic drug
8. Stressful condition
9. Recent vaccination

9)family history of convulsion

10) family action, investigation & medication that the pt. received & pt. condition now

Past Hx of epileptic patient

1) Prenatal
   a. Any drug intake during pregnancy
   b. Fever , rubella infection
   c. DM , hypertension , ANC
2) Natal:
   a. Term or not
   b. Mode of delivery, Instrumental delivery
   c. Prolong labor , any other complication during labor
   d. Birth trauma
3) Post natal

   Develop jaundice, asphyxia , admitted to NCU

If there were recurrent attacks:

1. Age of first attack
2. Initial manifestations
3. Initial investigations
4. Initial hospitalization (cause, duration, name of hospital , progression of the condition)
5. Freq. of hospitalization (severity)
6. Reason for each hospitalization
7. Patient condition between the attacks
8. Is the patient on antiepileptic drug? When he start?
9. Antiepileptic therapy:
   - ❖ Name of the drug that the patient use
   - ❖ Form of the drug
   - ❖ Dose of the drug
   - ❖ Freq. of administration
   - ❖ Rout of administration
   - ❖ Who responsible for administration of the drug
   - ❖ Any side effect
   - ❖ Any new adjustment to the drug dose or type
   - ❖ Storage of the drug
   - ❖ Is the disease well control on this drug ?
10. Last attack (details)
11. Progression of the condition
12. Freq. of child follow up & EEG

4) Other points in past medical and surgical history (blood transfusion, chronic diseases, childhood diseases (mumps , measles))

Examination of a patient with seizure

Physical Examination General Appearance: Post-ictal lethargy. Note whether the patient looks well or ill. Observe the patient performing tasks (tying shoes, walking).

Vital Signs: Growth percentiles, BP (hypertension), pulse, respiratory rate, temperature (hyperpyrexia).

Skin: Café-au-lait spots, neurofibromas (Von Recklinghausen's disease). Unilateral port-wine facial nevus (Sturge-Weber syndrome); facial angiofibromas (adenoma sebaceum), hypopigmented ash leaf spots (tuberous sclerosis).

HEENT: Head trauma, pupil reactivity and equality, extraocular movements; papilledema, gum hyperplasia (phenytoin); tongue or buccal lacerations; neck rigidity.

Chest: Rhonchi, wheeze (aspiration).

Heart: Rhythm, murmurs.

Extremities: Cyanosis, fractures, trauma.

Perianal: Incontinence of urine or feces.

Neuro: Dysarthria, visual field deficits, cranial nerve palsies, sensory deficits, focal weakness (Todd's paralysis), Babinski's sign, developmental delay.

2- Diabetes Mellitus & DKA

ID:

Name, age, sex

CC:

1. Hyperglycemia, DKA: vomiting , abdominal pain
2. Hypoglycemia : drowsiness ,sweating, loss of consciousness , convulsion)
3. Infection : UTI, Chest infection, diarrhea, vomiting and fever)
4. Classical symptoms of DM (Polyuria, polyphagia polydipsia , nocturnal enuresis, weight loss).

HPI

1. analysis of presented symptom
2. review of the system involved
3. ask about other symptoms of DM (as above)
4. ask about the precipitating factors for DKA:
   1) fever and skin rash
   2) stress : trauma , surgery, psychological stress, exercise
   3) take insulin , usual dose or less
5. other symptoms of DKA if the family notice :
   a. acetonic smell
   b. change in pattern and depth of breathing
   c. decrease urine output (dehydration)
   d. convulsion
8. family action
9. hospitalization (investigations and medications in details and whether the patient improved in the emergency department or not?)

Past Hx of DKA Patient

1) Prenatal
   a. Any drug intake during pregnancy
   b. Fever , rubella infection
   c. DM , hypertension , ANC
2) Natal:
   a. Term or not
   b. Mode of delivery, Instrumental delivery
   c. Prolong labor , any other complication during labor
   d. Birth weight
   e. Birth trauma
   f. Birth asphyxia

3) Post natal like the other diseases.
4) If there were recurrent attacks:
    1. Age of diagnosis of DM
    2. Initial manifestations
    3. Initial investigations
    4. Initial hospitalization (when, cause, duration, name of hospital , progression of the condition)
    5. Freq. of hospitalization (severity)
    6. Reason for each hospitalization
    7. Patient condition between the attacks
    8. Insulin therapy:
        1) When he start to take insulin
        2) Type of insulin
        3) Dose of the insulin
        4) Freq. of administration
        5) Rout and sites of administration
        6) Who responsible for administration of the insulin
        7) Any local or systemic side effect
        8) adjustment to dose or type of insulin
        9) Storage of the insulin
        10) Is the disease well control on this regimen
    9. Last attack (details)
    10. Progression of the condition
    11. Whether the family has glucometer at home
    12. Freq. of follow up
5) Other points in the past medical and surgical history (blood transfusion, chronic diseases (celiac disease, Vitiligo, autoimmune thyroiditis) childhood diseases (mumps, measles)

Family Hx.

1. **DM**
2. **Auto immune diseases :**
    a. **Autoimmune thyroiditis**
    b. **Celiac disease**
    c. **Addison disease**
    d. **Vitiligo**
    e. **Other autoimmune diseases**
3. **Other points in family history like any dz.**

Dietary Hx.:

Number of meals & Snacks
Type of food ,and preferred food
Forbidden from any food or restricted food e.g food contain sugar

Social Hx.:

Living conditions
Income of family

Drug Hx.:

Details of insulin therapy
Any recent drug ingestion chronic drug use

Examination of a child with DKA

1- General look:

1. Age
2. Look ill, or well
3. Built
4. Conscious level
5. Pattern of breathing
6. Dyspneic or not
7. Acetonic smell (musty, apple odor),
8. Capillary refilling
9. Clubbing of finger (celiac dz. may associated with DM)

2- Vital signs

3- Hydration status

4- Growth measures

5- Chest : rales, rhonchi

6- Examination of the skin:

1. Sites of insulin injection
2. Hypo/hyper pigmentation (signs of other autoimmune diseases)
3. Examination of tips of the fingers for pin prick (site of blood investigation)
4. Any skin changes (ulceration , thickening(autoimmune thyroiditis))
5. Skin infection

3- Diarrhea (Frequent bowel motion) and vomiting

ID: name, age , and other information

HPI

1- onset
2- duration
3- frequency per day
4- related to eating or not?
5- Amount, color, odor , consistency : watery , semisolid
6- Associated with mucus or blood (fresh blood, streak , mixed with the stool)
7- Associated with :
   1) Pain or crying on defecation (tenesmus)
   2) Protrusion of a lump (rectal prolapse)
   3) Napkin rash, skin rash
   4) Fever
   5) Vomiting : onset, which start first vomiting or diarrhea , freq. relation to feeding , vomiting of everything, projectile or effortless, amount , color, consistency, aggravating or reliving factors, contain blood or not)
   6) Abdominal distension
   7) Urine output, irritability, disturbed conscious level, sunken eyes
   8) convulsion
8- Effect on feeding, sleeping, activity, weight gain

Past Hx: Previous same attack, chronic diseases, celiac dz. , IBD, Abdominal surgery, recurrent chest infection

Feeding Hx: type of feeding breast or bottle feeding, sterilization, No. of bottle that the mother has , source of water, Any weaning food

Family Hx. Of IBD, celiac dz., same condition other family members affected or not

Drug Hx. Antibiotics

4- Jaundice:

ID

1) **name**
2) **Age**

HPI

1- **Duration**
2- **Onset**
3- **Progressive or fluctuant**
4- **Associated with:**
    1) **Abdominal pain**
    2) **Itching**
5- **Color of urine**
6- **Color of the stool**
7- **Bleeding from any where**
8- **Review of GIT**
    1- Anorexia
    2- Nausea & vomiting
    3- Flatulence
    4- Altered bowel motion (diarrhea or constipation)
    5- Poor wt, gain
    6- Haematemesis
    7- Melaena
    8- Bleeding per rectum
9- **Constitutional symptoms**
    Fever & rigor
    Malaise

Precipitating factors : food , stress, hunger

1- **Past Hx**
    Blood transfusion
    Previous jaundice (neonatal)
    Haematemesis and malena
    Previous biliary surgery
    SCA, G6PD, thalassemia, chronic liver dz
2- **Social Hx**
    Contact with jaundice pt.
    Hx of traveling
3- **Family Hx:**
    Hemolytic dz
    Liver dz, History of perinatal infant death (metabolic disorders).
    Other member of family Affected
4- **Developmental Hx.**
5- **Vaccination history : hepatitis B vaccine**
6- **Feeding Hx breast feeding or bottle feeding ,serialization**
7- **Drug Hx**
    Acetaminophen, isoniazid, phenytoin.

5- Neonatal Jaundice:

❖ **ID**

1) **Name**
2) **Age**

❖ **HPI**

1- Age of onset (in days)

2- Duration

3- Progression of jaundice

4- Color of urine

5- Color of the stool

6- Bleeding from any where

7- Ask about these symptoms

- ❖ Fever
- ❖ Skin rash
- ❖ Convulsion
- ❖ Sleepiness, decrease activity
- ❖ Poor feeding
- ❖ Vomiting

8- Ask about blood group of the child and the parents

❖ **Past history**

Perinatal history:

- Any complication during the pregnancy, whether the mother developed jaundice
- Term or preterm ?
- Birth trauma, cephalhematoma
- Birth weight
- Previous child with neonatal jaundice

❖ **Family Hx:**

- ❖ Whether the parents relatives
- ❖ Hemolytic dz
- ❖ Liver dz

❖ **Vaccination history : hepatitis B vaccine**

❖ **Feeding Hx. breast feeding or bottle feeding ,serialization**

❖ **Drug Hx**

Icterogenic drugs

Any addition , Thank you

6-Bleeding tendency

ID: Name, age , and other information

HPI

1- onset
2- duration
3- site the bleeding (if rash ask about distribution)
4- bleeding from other sites (Haematuria ,malena , epistaxis, haematemesis)
5- spontaneous or there are precipitating factors (like trauma , ask about degree of trauma and after how long after trauma) (factor XIII delayed)
6- frequency of the bleeding ,color of the bleeding , amount , contain clot
7- if there is bruising ask about color of bruising and how long stays before fading
8- joint pain , joint swelling , menorrhagia (in older female child)
9- any skin other lesions?
10- Preceded by (respiratory tract infection , Diarrhea)
11- associated symptoms:
    - ❖ pallor
    - ❖ fever
    - ❖ syncope
    - ❖ decrease activity
    - ❖ palpitation (in older child)
    - ❖ jaundice
    - ❖ dyspnea (bleeding in the soft tissue of the neck)
    - ❖ abdominal pain (iliopsoas bleeding), distention, diarrhea
    - ❖ headache , convulsion , vomiting, change in the mood
12- how the bleeding stopped (spontaneously or not)
13- general condition of the child (feeding , sleeping , weight gain)
14- family action
15- management received
16- the pt. condition now

Past history

- ❖ **any similar attack of bleeding**
- ❖ **age of onset of first attack**
- ❖ **Hx of hepatitis**
- ❖ **Hx of previous blood transfusion**
- ❖ **Chronic dz. Chronic liver dz. , chronic renal failure**
- ❖ **Hematoma at site of vaccine or injection**
- ❖ **Hx of bleeding after cutting of umbilical cord or after or minor operation like tooth extraction , circumcision or after tonsillectomy**

Family Hx

Any similar condition in the family

Drug Hx

Aspirin
NSAID's
Heparin
Warfarin

Other parts of the history

Examination of a child with bruising or skin rash

Goals:

1- to exclude dangerous site of bleeding (CNS, Neck, iliopsoas muscle)
2- to exclude other DDX

General look

Ask about the name and take a permission

1- age of the pt. (e.g ITP in toddlers)
2- sex
3- conscious level
4- look well or ill
5- dyspneic
6- pallor
7- jaundice

local examination

inspection

1- site of the bruise, affect which part of the body, on flexors or extensors
2- bilateral or unilateral
3- symmetrical OR asymmetrical distribution
4- color
5- size in mm
6- shape
7- numbers
8- type of bruising (Petechiae, purpura, ecchymosis)

palpation

1- palpable or not
2- blenching or not (Differ from rash, bruise is not fade by blenching)
3- tender or not

other sites to be examined

1- bleeding from mouth mucous membrane
2- epistaxis
3- neck muscle for swelling (hematoma)
4- joint swelling
5- reticuloendothelial system (spleen , LN)
6- abdominal examination for hepatosplenomegaly
7- signs of chronic liver dz.

7-Red color urine (Haematuria)

ID: name ,age , and other related information

1- **duration**
2- **onset**
3- **Timing(terminal, whole stream, only beginning of micturition)**
4- **pattern (intermittent , continuous)**
5- **severity**
    1) **Associated with clot**
    2) **Amount**
    3) **palpitation , Dyspnea, headache, decrease urine output, fainting attack**
6- **Bleeding between voiding**
7- **Bleeding from other sites**
8- **Has :**
    1) **Hx of passing stone**
    2) **Hx of trauma or Exercise**
    3) **Hx of foley catheter insertion**
    4) **Hx of URTI**
9- **Abdominal mass**
10- **Review of GUT**
    1) **Dysurea**
    2) **Frequency**
    3) **Nacturia**
    4) **Urgency**
    5) **Urge incontinence**
    6) **Polyuria**
    7) **Hesitancy**
    8) **Intermittency**
    9) **Loin pain**
    10) **Poor stream**
    11) **Post micturition dribbling & Terminal dribbling**
11- **Other symptoms**
    1) **Poor weight gain**
    2) **Poor feeding**
    3) **Fever**
    4) **skin rash**
    5) **convulsion**
    6) **bloody diarrhea, vomiting (HUS)**
    7) **hemoptysis (good pasture syndrome)**
    8) **joint pain (SLE)**

12-family history of deafness(Alport syndrome), congenital kidney anomalies (polycystic kidney)

13- Menstrual Hx (in older female)
14- Hx of drug ingestion (like rifampicin)
15- Food ingestion (beet root)
16- Ask about child Abuse

8-Skin rash

ID: name, age , and other information

HPI

1- onset
2- duration
3- site of start
4- distribution
5- Any other sites of rash
6- color of the rash
7- itchy?, tender?
8- Unilateral or bilateral
9- occurs spontaneous or there are precipitating factors (like trauma , ask about degree of trauma and how long after trauma it appeared) (factor XIII delayed)
10- progression
11- whether it disappear or not, after how long
12- type of rash (popular, maculopapular, macular, vesicular)
13- bleeding from any site (Haematuria ,malena, epistaxis)
14- joint pain , joint swelling , menorrhagia (in older female child)
15- Preceded by (Respiratory tract infection , Diarrhea, Tonsillitis)
16- associated symptoms:
    - ❖ pallor
    - ❖ fever
    - ❖ sore throat
    - ❖ syncope
    - ❖ decrease activity, irritability
    - ❖ palpitation (in older child)
    - ❖ jaundice
    - ❖ dyspnea (bleeding in the soft tissue of the neck muscles)
    - ❖ abdominal pain, distention, diarrhea
    - ❖ Haematuria and other urinary complains
    - ❖ headache , convulsion , vomiting, change in the mood
17- general condition of the child (feeding , sleeping , weight gain)
18- family action
19- management received
20- the pt. condition now

Past history

any similar attack of rash or bleeding
age of onset of first attack
Hx of hepatitis
Hx of previous blood transfusion
Chronic dz. Chronic liver dz. , chronic renal failure
Hematoma at site of vaccine or injection
Hx of bleeding after cutting of umbilical cord or after or minor operation like tooth extraction , circumcision or after tonsillectomy

Family Hx

Any similar condition in the family

Drug Hx

Aspirin. Penicillin , NSAID's , Heparin, Warfarin

Other parts of the history

9-Poor weight gain

ID: Name ,age , and other related information

1- onset
2- duration
3- was the condition started since birth or newly developed
4- is the child has any medical condition
5- Review of GIT
    1) appetite
    2) frequent bowel motion, frequent vomiting
6- symptoms of hyperthyroidism
7- history of head trauma
8- Review urinary system
9- Review respiratory systems , chronic chest infection (CF)
10- fever , leg swelling, diarrhea, colic, vomiting, irritability, fatigue or chronic cough

❖ **Past Hx**

1) Prenatal

IUGR

congenital infection and prenatal problems

2) Natal

a. Birth asphyxia
b. Birth trauma
c. Low birth weight

3) Post natal: prematurity , jaundice

4) Past medical

Hx of meningitis, any chronic illnesses , may jeopardize growth potential. Recurrent or chronic illness may affect growth, congenital heart diseases

❖ **Feeding history:** Take a dietary history (a food diary can be helpful). Ask about feeding difficulties: did they start at birth, weaning or as a toddler? Consider whether they are a result or cause of FTT

❖ **Developmental Hx :** Are there neurodevelopmental problems? Has FTT affected the baby's developmental progress?

❖ **Family Hx:** history of same condition in the family Is there a family history of FTT or genetic problems? Are there psychosocial problems?

❖ **Social Hx :**concentrate on social class and income , parents education

❖ **Drug Hx :** steroid use

Family reaction

Ix which was done and the medication that the child received

10-Cough

ID: Name ,age , sex and other related information

1- Duration

2- Onset

3- Time of occurrence (night , morning)

4- Frequency

5- Short or Paroxysmal

6- Character : barking , whooping

7- Dry or productive : if there is sputum : color , amount , with blood , smell

8- Description of the attacks and what the child was doing at that time

9- Aggravating factors relieving factors

10- Associated symptoms(fever, dyspnea, vomiting , convulsion, cyanosis , noisy breathing, hoarse voice, sore throat, preceded by choking)

11- Effect on feeding , sleeping , activity

12- Past history

1- Prenatal: mother fever , rubella
2- Natal : premature , post term difficult labor, birth asphyxia , Meconium aspiration
3- Cyanosis at birth
4- Admission to NCU the cause
5- any similar attack in the past
6- age of onset of first attack
7- allergy , eczema

13- Feeding Hx .

type of feeding

14-Family Hx

1- Any Hx of asthma or allergy in the family
2- Dermatitis , atopy , sinusitis , cystic fibrosis
3- Immune deficiency , child death, hx of congenital heart diseases , heart failure , cardiomyopathy , any chronic respiratory problems

15- Social Hx :

1- Occupation of mother and father
2- Smoking
3- Pet owner
4- overcrowded

16- Developmental Hx:

Effect on development

17- Vaccination Hx: DTP, BCG

18- Drug Hx

1- Aspirin
2- ACE inhibitors
3- Allergy to food or drug

11-dyspnea

ID: Name ,age , and other related information

HPI

1- **Onset (sudden or gradual)**
2- **Duration**
3- **Timing (at night or day time)**
4- **precipitating factors: exercise , perfume , dust, dandruff**
5- **what the child was doing when the attack occurred**
6- **preceded symptoms : fever , cough , chocking**
7- **Ass. symptoms : cyanosis, runny nose, noisy breathing, chest pain , sore throat , sputum , hemoptysis**
8- **aggravating factors & relieving factors:** certain position
9- **frequency of the attacks**
10- **wt. gain , sleeping pattern , interfere with the activity**
11- **associated with eczema , allergy**
12- **associated with:**
    1) pallor
    2) syncope
    3) leg edema
    4) convulsion , vomiting of every thing
    5) abdominal distention
    6) diarrhea (cystic fibrosis)
13- **family action**
14- **management received**
15- **the pt. condition now**

Past history

- Prenatal: mother fever , rubella
- Natal : premature , post term difficult labor birth asphyxia , Meconium aspiration Cyanosis at birth
- Admission to NCU the cause
- any similar attack in the past if the condition recurrent take a history of chronic diseases
- age of onset of first attack…
- history of eczema, allergy
- history of chocking

Feeding Hx .

type of feeding, method of sterilization

Family Hx

- Any Hx of asthma or allergy in the family
- Dermatitis , atopy , sinusitis , cystic fibrosis
- Immune deficiency , child death, hx of congenital heart diseases , heart failure , cardiomyopathy , any chronic respiratory problems

Social Hx :

- Occupation of mother and father, Smoking
- Pet in the house
- overcrowded

Developmental Hx:

Effect on development

Drug Hx

Aspirin ,NSAID's, Allergy to food or drug

12-Stridor

ID: Name ,age , and other related information

HPI

1- **Onset** (sudden or gradual)
2- **Duration**
3- **Timing** (at night or day time)
4- **Is the stridor exertional, biphasic, continuous**
5- **what the child was do when the attack occurred**
6- **preceded symptoms :** fever , cough , chocking, runny nose, sore throat
7- **relieving & aggravating factors** (exertion**,** certain position**)**
8- **associated symptoms:**
    1) high grade fever
    2) Dysphagia, drooling
    3) dyspnea and respiratory distress
    4) cyanosis
    5) any change in the voice
    6) convulsion , vomiting, chest pain , sputum , hemoptysis
9- **whether the child take special posture**
10- **wt. gain , sleeping pattern , interfere with child's activity**
11- **family action**
12- **management received**
13- **pt. condition now**

Past history

- Premature , post term difficult labor, birth asphyxia , Meconium aspiration
- Cyanosis at birth
- History of choking
- any similar attack in the past
- age of onset of first attack

Feeding Hx .

- type of feeding…

Family Hx

- Same condition in the family
- chronic respiratory problems

Drug Hx

History of drug exposure

13-Pallor:

ID: Name, age, sex

HPI

1- **onset**
2- **duration**
3- **external bleeding (hx: of trauma)**
4- **color of stool , urine**
5- **associated with :**
   - ❖ **jaundice**
   - ❖ **bleeding from any where**
   - ❖ **fever**
   - ❖ **skin rash**
   - ❖ **bone pain**
   - ❖ **abdominal pain**
   - ❖ **diarrhea (bloody, offensive , difficult to Wash "malabsorption")**
   - ❖ **headache fatigue , dizziness , poor concentration, convulsion**
   - ❖ **syncope**
   - ❖ **pica**
   - ❖ **child activity , sleeping pattern, weight gain**
   - ❖ **menorrhagia (in older female)**

6- Past Hx:

- ❖ **Hemoglobinopathies,G6PD**
- ❖ **Neonatal jaundice**
- ❖ **Previous attacks of pallor or jaundice**
- ❖ **Hx of blood transfusion**

7- Family Hx:

- ❖ **Of hemolytic anemia : Hemoglobinopathies , G6PD , spherocytosis**

8- Feeding Hx:

- ❖ **Type of feeding**
- ❖ **No. and content of meals**
- ❖ **Beans and other foods that cause hemolysis in G6PD**

9- drug Hx:

- ❖ **Trimethoprim**
- ❖ **Ciprofloxacin … and other drugs that cause hemolysis in G6PD**

Examination of a patient with pallor

1) General look

1- **Conscious level**
2- **Dysmorphic features (e.g thalassemic face)**
3- **Café au lait (fancony anemia)**
4- **Erythematous rash, Butterfly rash**
5- **Microcephaly , microphthalmia or bony abnormalities (fancony anemia)**

2) examination for anemia

i. **Lower Conjunctiva for pallor**
ii. **Mouth signs :mucus membrane, loss of tongue papillae , angular stomatitis**
iii. **hand signs: palmar creases (compare with the other hand) , capillary refilling, Clubbing of fingers, koilonychia, white nail bed**

3) Other important signs

1- **Jaundice**
2- **LAP**
3- **Petechiae or bleeding from any site**
4- **Features of malabsorption**
5- **Cleft lip, Lip pigmentations**
6- **Also examine for organomegaly**

14-Fever

- ID: Name , age ,sex
- HPI:
  1- Duration
  2- Onset
  3- Height
  4- When increase (night or day)
  5- Pattern of fever (intermittent , remittent , sustaining , relapsing….)
  6- How does the fever assessed by (touch, thermometer)
  7- low grade or high grade (associated with sweating, rigor , chill , shivering)
  8- aggravating and relieving factors (medication , cold sponges)
  9- how quickly the fever responds to antipyretics drugs
  10- Hx of recent vaccination
  11- associated with:
    a) red eyes
    b) nasal discharge
    c) recurrent pharyngitis with ulceration
    d) abnormal body movement
    e) headache in older children
    f) skin rash
    g) limbs or bones pain, joint swelling
    h) ear pain
  12- Review of:
    - Respiratory (cough , SOB ,runny nose, sore throat)
    - GIT: (diarrhea , abdominal pain , vomiting, poor appetite)
    - GUT: (dysurea or cry during micturition , loin pain
  13- If it affects feeding , sleeping , activity of the child
  14- Whether there is weight loss, night sweating
  15- Family action, investigation which was done for the child
  16- Consumption of unpasteurized milk (brucellosis)
- Past hx.
  - Previous same illness, recent surgery (abdominal…)
  - Previous infectious dz. (measles, mumps , chicken box , whooping cough)
  - History of congenital heart disease
- Vaccination
  Complete or not, BCG, Recent vaccination
- Family Hx.
  Any similar condition in the family
- Social Hx.
  - Sanitation & water supply,
  - Hx. Of exposure to wild or domestic animals, tick bite or
  - travel to tick- or parasite-infested areas
  - Contact with infected or ill person
- Feeding history :
  - Hx. of pica (is a particularly important clue to infection with *Toxocara)*
  - Bottle feeding , sterilization , type of water
- Developmental Hx
- Drug Hx
  Iodides , atropine

Examination of a child with Fever

WIPE
Ask about name ,age , sex

1.General Appearance: Lethargy, toxic appearance. Note whether the patient looks "ill" or well. Dysmorphic features
2.Vital Signs: Temperature (fever curve), respiratory rate (tachypnea), pulse (tachycardia). Hypotension (sepsis), hypertension (neuroblastoma, pheochromocytoma). Growth and weight percentiles.
3.Skin: Rashes, nodules, skin breaks, bruises, pallor. Icterus, splinter hemorrhages; delayed capillary refill, petechia (septic emboli, meningococcemia), ecthyma gangrenosum (purpuric plaque of Pseudomonas). Pustules,cellulitis, furuncles, abscesses.
4.Lymph Nodes: Cervical, supraclavicular, axillary, inguinal adenopathy.
5.**Eyes:** Conjunctival erythema, retinal hemorrhages, papilledema.
6.Ears: Tympanic membrane inflammation, decreased mobility.
7.Mouth: Periodontitis, sinus tenderness; pharyngeal erythema, exudate.
8.**Neck:** Lymphadenopathy, neck rigidity.
9.Breast: Tenderness, masses, discharge.
10.Chest: Dullness to percussion, rhonchi, crackles.
11.Heart: Murmurs (rheumatic fever, endocarditis, myocarditis).
12.Abdomen: Masses, liver tenderness, hepatomegaly, splenomegaly; right lower quadrant tenderness (appendicitis). Costovertebral angle tenderness, suprapubic tenderness (urinary tract infection).
13.Extremities: Wounds; IV catheter tenderness (phlebitis) joint or bone tenderness (septic arthritis). Osler's nodes, Janeway's lesions (endocarditis). Clubbing, vertebral tenderness.
14.Rectal: Perianal skin tags, fissures, anal ulcers (Crohn disease), rectal flocculence, fissures, masses, occult blood.
15.Pelvic/Genitourinary: Cervical discharge, cervical motion tenderness, adnexal tenderness, adnexal masses, genital herpes lesions.

15-Joint pain

ID: Name , age , sex

HPI:

1- **Onset**
2- **Duration**
3- **Increased at (night or day)**
4- **Number of involved joints (poly / oligoarthritis)**
5- **Pattern of distribution**
6- **progression**
7- **aggravating and relieving factors (medication , certain position)**
8- **effect of the pain on joint movement… and walking (limping)**
9- **is there joint swelling, early morning stiffness?**
10- **associated with:**
    - **a) fever**
    - b) **skin rash**(on the trunk "erythema marginatum", on the extensors)
    - **c) abnormal limb movements (chorea)**
    - **d) pallor**
    - **e) diarrhea, Melaena, Haematuria**
    - **f) bleeding from any site**
    - **g) development of nodules over bony prominences**
11- **Preceded by tonsillitis , sore throat**
12- **History of trauma**
13- **Hx of recent vaccination**
14- **If it affect feeding , sleeping , activity of the child**
15- **If there is weight loss, night sweating**
16- **Family action**
17- **Pt. condition now**

Past hx.

- **Birth trauma, instrumental delevery**
- **Previous same illness , Previous trauma, rheumatic fever, joint diseases**
- **Sickle cell anemia, tonsillitis, hemophilia**

Vaccination : MMR

Family Hx.

- **Of SCA, hemophilia**
- **Any similar condition in the family**

Developmental Hx

Drug Hx

16- Oedema (body swelling)

❖ **ID: Name, age, sex**

❖ **HPI**

1- Duration
2- Onset
3- Timing (night, daytime)
4- Generalize or localize
5- Distribution, Periorbital ,ankle swelling
6- Bilateral, unilateral
7- Progression of edema
8- Intermittent or persistent
9- Pain , redness
10- Hx of trauma, insect bite (if localize)
11- Associated symptoms:

1) SOB, Orthopnea, Cough
2) Abdominal distention, Chronic diarrhea, steatorrhoea and abdominal pain, uremic symptoms such as nausea, vomiting
3) Jaundice
4) Haematuria ,Anuria ,oliguria ,Polyuria, , frothy urine
5) Skin rash
6) Convulsion
7) pallor
8) Poor feeding
9) Fatigue

12- Weight gain and physical activity
13- Past Hx:

❖ Nephrotic syndrome
❖ Liver dz. Heart dz.
❖ Chronic Gastrointestinal dz.
❖ Hx of renal biopsy
❖ Previous surgery

14- Feeding Hx. Type of feeding , protein diet
15- Family History: Lupus erythematosus, cystic fibrosis, renal disease, cardiac problem Alport syndrome, hereditary angioedema, deafness.
16- Drug Hx.
Steroid, diuretics, allergies to food, animal dander

Symptoms you need to read about its History

1- Chronic constipation

2- Acute paralysis

3- Abdominal pain

4- Loss of consciousness

5-Hadache

Note:

Not all previously mentioned questions Are needed in OSCE examination and on the other hand may be there are some missed points but that is what I can collect it so you should keep that in your mind and please excuse me.

Examination

(Note: Most of these information are taken from the booklet of the pediatrics department)

In most OSCE stations

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**
- **The hand must be Washed before and after the examination**
- **Warm smile, warm hand and a warm stethoscope all help**
- **Undressing better to do by the child himself or his parent**

General examination

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**

1- WIPE

1) Wash your hand
2) Introduce your self
3) Take permission, put the pt. in the suitable position
4) Expose the patient and examine from right side

2-General observations:

1) Dysmorphic feature: like face of down syndrome (Mongolian face), Buffy face , moon face
2) Look for the child: well , ill, in pain, irritable
3) Hygiene : good, poor
4) Child activity
5) Behavior
6) Child parents interaction

7) Age: infant , toddler, preschool, school, adolescent
8) Built:
   - ❖ thin (built , average built , obese built if >5yrs
   - ❖ well nourished or mal nourished for <5 yrs (see below)
9) Conscious level: full conscious, lethargic, unconscious
10) Position: lying ,sitting in his mother lab , standing
11) Posture : flexed ,extended
12) Dyspneic or signs of distress
13) Crying
14) Surroundings (O_2 bottle , nebulizer, iv fluid)

3- Look for general signs

- ❖ Jaundice
- ❖ Anemia
- ❖ Cyanosis
- ❖ Clubbing
- ❖ Oedema
- ❖ LAP (lymph adenopathy)
- ❖ Skin rash

4- Assessment hydration status:

Note: this assessment is not according to the new CDD (see page 114 for CDD program)

- General state:
  - ❖ Well , alert
  - ❖ restless or irritable
  - ❖ lethargic or unconscious
- Eyes: not sunken, Sunken, very Sunken
- Tear: present , absent , absent
- Tongue: moist , dry , very dry
- Thirst: drink normally, thirsty drink eagerly, drink poorly
- Skin turgor : goes back immediately, goes back slowly, goes back very slowly >2 sec.
- Pulse: normal ,fast, very fast
- Fontanels (infant) : normal sunken ,very sunken

Decide : no dehydration , some dehydration , severe dehydration

4-Nutritional status assessment

1) WIPE
2) Ask about name and age of the child
3) General look:
    1. facial appearance : old man face , miserable , puffy face
    2. hair (discolored , brittle)
    3. photophobia
    4. avoid eye contact or not
4) examination:
    1) for wasting (loose skin and creasing):
        1. axillae
        2. abdomen
        3. thighs (medial aspects)

    Other regions
        4. gluteal region : flat buttocks
        5. intercostal muscles
        6. prominent vertebrae

    2) palpate for peripheral edema
        - >5 years

        10 cm above the medial malleolus on the shin of tibia for 1 min

        Also don't forget to examine for sacral edema , periorbital , pulmonary edema and for ascites
        - Infant :At the dorsum of the foot for 30 seconds

    3) Eye signs of malnutrition : ulceration , bitot spots, conjunctivitis

    4) Skin (smooth, shiny ,blistered, burned, pigmentation, cracked)

    5) Mouth for angular stomatitis , smooth tongue , dentition status
5) Check for growth measures : height , weight, OFC, and plot them on growth chart and Z score ,also measure mid upper arm circumference (MUAC) if >6 months
6) Decide : well nourished , malnourished (mild, moderate, severe, malnutrition)

6-Vital signs * for normal values according to the age see table 14 (page 148)

a. Pulse: Rate (beat/minute), rhythm, volume, character, radio-radial or radio-femoral delay
b. Temperature: normal core temperature is 36.5-37.5
   Can be measured (sublingual, rectal, axillae, tympanic)
c. Respiratory rate: calculate it in full minute while your hand on the radial pulse to draw patient attention (cycle/minute), depth , pattern of respiration
d. Blood pressure (see page 120)

7- Growth measures: *see appendices (pages 135-145) for more details

➢ Weight :

- ❖ Scales must be calibrated accurately
- ❖ Weigh the child naked
- ❖ Weigh the older children with light clothes or only underwear

➢ Length or Height :

Length:

- ❖ Use a measuring frame or mat
- ❖ Measure the child lying down until 2 years old
- ❖ Ask the helper to hold baby head against the head board
- ❖ Make sure the legs are straight and the feet at 90 degrees before reading of the length

Height :

- ❖ For children > 2yrs
- ❖ Use a properly calibrated standing frame.
- ❖ Check the feet are bare, against the wall and flat on the floor with knee straight
- ❖ Gently extend the neck and ensure the eyes are level with the external auditory meatus

➢ Head circumference :

- ❖ Use flexible non stretchable tape measure
- ❖ Measure the occipito-frontal circumference three times and take the largest diameter.

Cardiovascular system examination

Ask about patient's name, age and sex

Explain what you are going to do

1- WIPE

1) Wash your hand
2) Introduce your self
3) Take permission, put the pt. in the suitable position
4) Expose the pt. and examine from right side

2- General observations:

1) Pallor
2) Cyanosis
3) Respiratory distress
4) Ankle edema
5) Finger clubbing
6) Capillary refilling
7) Pulse: radial, brachial, carotid, femoral describe:
   - ❖ Rate
   - ❖ Rhythm: regular or irregular
   - ❖ Character: collapsing, slow raising
   - ❖ Volume

3- Inspection of precordium:

- ❖ For any thoracotomy scar may be hidden under the arm or in the back

others

- ❖ visible apex beat

4- Palpation:

1- Parasternal heave in lower half of the sternum heave indicate right ventricular hypertrophy

2- Thrill : palpable murmur over the four valve areas and in suprasternal notch
3- Apex beat normally in 5th intercostal space or 4th in children less than 5 years in mid clavicular line
4- Liver : palpate and percuss over the liver, hepatomegaly suggest heart failure

5- Auscultation:

1- Auscultate carefully use both bell and diaphragm of stethoscope

2- listen over the four valve areas and over the back

3- look for:

- First and second heart sounds
- Murmurs: if you heard murmur describe:
  - Systolic or diastolic
  - Character (blowing or harsh)
  - Grade (I-VI)
  - Site of maximum intensity
  - Radiation
  - And recognize whether it's innocent or pathological
  - Note : diastolic murmurs always pathological
- Added sound such as gallop rhythm in heart failure and ejection click in aortic stenosis

6- Measure the blood pressure:

7- Measure growth parameters and plot on percentile charts poor growth suggest congenital heart diseases

- ✓ Cover the patient
- ✓ Wash your hand
- ✓ Thank the child and the mother

Respiratory system examination:

Ask about patient's name, age and sex

Explain what you are going to do

1- WIPE

1) Wash your hand
2) Introduce your self
3) Take permission, put the pt. in the suitable position
4) Expose the pt. and examine from right side

2- General observation

1- Restlessness, drowsiness
2- any audible sound: stridor , wheezes, grunting
3- signs of respiratory distress
    1. flaring of alae nasi
    2. indrowing of the chest ,recession
    3. use of accessory muscles
4- count respiratory rate (tachypnea)
5- cyanosis
6- pallor
7- finger clubbing

others

notice cough character

notice the surrounding

3-examination of the chest

1) **exposure**
2) **inspection**
    1. signs of respiratory distress
    2. shape of the chest

    others
    3. any scar
    4. movement with respiration
    5. depth of respiration
    6. mode of respiration

3) palpation

1. tracheal deviation (position of trachea)
2. localize the apex beat
3. chest expansion (it is normally 1 cm in a 5 years child)
4. tactile vocal fremitus: ask the child to say (44 in Arabic) while you palpate the chest it will increase over an area of consolidation

   others
5. palpate the chest wall for any:
   a. tenderness
   b. mass
6. palpate the liver (palpable in bronchiolitis)

4) Percussion:

In systematic way including the clavicles and axillae

- From anterior compare side to side
- From mid axillary line
- From back

5)Auscultation:

- Ask the pt. to breath in & out though the mouth
- ask the child to Cough
- Auscultate from anterior & from posterior and compare side to side
- **During the auscultation notice :**
  - **breathing sound :**vesicular or bronchial breathing
  - **additional sounds :** crepitation, rhonchi
  - using diaphragm of the stethoscope start at the top of the chest and compare side to side
  - describe your findings according to their location in the chest
    - infraclavicular area, mammary area, inframammary area
    - axillary area, infra-axillary area
    - suprascapular area, interscapular area, infrascapular area
- vocal resonance : ask the child to say (44 in Arabic) it will increase over an area of consolidation

✓ Cover the patient
✓ Wash your hand
✓ Thank the child and the mother

Abdominal examination

Ask about patient's name, age and sex

Explain what you are going to do

1- WIPE

1) Wash your hand
2) Introduce your self
3) Take permission, put the pt. in the suitable position
4) Expose the pt. and examine from right side

2- General look:

1) General appearance does the child look : ill, well
2) Jaundice
3) Pallor
4) Mouth: check for state of teeth and abnormal smell
5) Skin lesions: spider nevi
6) Palmar erythema
7) Finger clubbing
8) Wasted buttocks suggest recent weight loss
9) Edema

4- Inspection of the abdomen :

1-From the foot of the bed

- Symmetry
- Shape
- **Distension (generalize or localize)**

2- kneeling from side of the bed

Movements

Movement with respiration
Visible pulsation
Visible Peristalsis

Others

3- from the side of the bed look for :

1) Skin
   - ❖ Dilated veins
   - ❖ Scars (site, describe it)
   - ❖ Any discoloration , pigmentation
   - ❖ Signs of liver diseases
   - ❖ stria
2) Umbilicus: position, shape ,discharge (amount, color, type)
3) **Ask the pt. to cough to examine hernial orifice**

4- Palpation:

- ❖ Before palpation warm your hand and ask the child if there is tenderness
- ❖ Get down the child's level and watch his face
- ❖ **Do superficial and deep palpation** for tenderness or masses
- ➢ use two or more fingers depending on child's size
- ➢ All four quadrants should be palpated in turn
- ❖ **palpation for organomegaly**

➢ **liver:**

- o normally palpable 1-2 cm below right costal margin in children under 2 years
- o Palpate from right iliac fossa using tip of the fingers
- o You can confirm liver size by percussing upper and lower borders

➢ **Spleen**:

- o ask the patient to take deep breath and palpate from right iliac fossa
- o you can turn the child to toward you

➢ **kidneys :** examine the kidneys by bimanual palpation

➢ **Other masses:** also check for constipation in the left iliac fossa

❖ (for any organomegaly look for span, edge , surface , consistency)

5- Percussion:

- ❖ Percuss the entire abdomen
- ❖ Ascites is suspected if you found dullness in the flanks and a resonant note in the mid line
- ❖ Confirm that by shifting dullness and fluid thrill

6- Auscultation:

Bowel sound , renal artery bruit on renal angle

7- Rectal examination:

- ❖ Not routinely performed
- ❖ If needed left it until last
- ❖ Use your little finger in infant

- ✓ Cover the child
- ✓ Wash your hand
- ✓ Thank the child and the mother

Reticuloendothelial system examination

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**

1- WIPE

2- General look:

1) jaundice
2) pallor

3- Examine the neck:

1) examine the lymph node in anterior and posterior triangles
2) stand in front of the child and feel the pre and post auricular ,occipital nodes and those along the anterior cervical chain
3) stand behind the child and feel the submental ,submandibular , posterior cervical nodes
4) examine the throat if you find cervical LAP

4- Examine the axillae:

1) While the child sitting facing you
2) Support the flexed arm at the elbow with your left hand holding the left arm
3) Place your right hand in the left axilla
4) Feel for the enlarge nodes against the chest wall.
5) Reverse the process for the other side
6) If there is LAP check the hands and arms for a focus of infection

5- Examine the Groin:

1) Lie the child down and gently palpate the groin for enlarge nodes
2) If there is LAP check the feet and legs for a focus of infection

If you find a large node describe it in term of:

- Size
- Position
- Texture: hard, rubbery
- Mobility

6- Examine for hepatosplenomegaly

Examination of male genitalia

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**

1- WIPE

2-inspection :

1) Under developed scrotum
2) Enlarge scrotum
3) Groin swelling
4) Hypospadias

3-palpation :

1) Warm your hand
2) If can't feel the testis may be retracted or undescended
3) Milk it down from the groin
4) If you failed, examine the child in squatting or sitting cross-legged position

If you find a swelling in the groin it may be enlarge lymph node, hernia or gonad

Do transillumination test to distinguish a hydrocele from hernia

- ✓ Cover the child
- ✓ Wash your hand
- ✓ Thank the child and the mother

Neurological examination of the child

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**

1) WIPE

2) General look

1) conscious level
2) dysmorphic features
3) observe the child's posture and look for evidence of contractures
4) abnormal movements
5) observe the child gait
6) Gower's sign
7) Muscle bulk

3) Motor examination

1) Tone

   Tone is assessed by the resistance to passive movement of the limbs. In infants, tone and strength may be judged by observing the posture. Predominantly flexor tone is normal, whereas a frog-leg position suggests hypotonia.

   - Spasticity

2) Power:
   - Upper limbs
   - Lower limbs
3) Reflexes:
   - Tendon reflexes:

     The symmetry and magnitude of muscle stretch reflexes are evaluated. The joint under consideration should be at approximately 90 degrees and fully relaxed. It is often helpful for the examiner to cradle the joint in his or her own arm to support it. The end of the hammer should be held with the other hand and the head of the hammer

allowed to drop like a pendulum so that it strikes the tendon. Reflexes usually tested are:

Biceps: C5
Triceps : C6
Supinator: C5
Knee: L3,4 S1
Ankle: L5

- ❖ Planter reflex

4) Clonus
5) Coordination (see Cerebellar signs)

4) Sensory examination

1. light touch: using cotton wool
2. pain: with blunt needle
3. temperature
4. proprioception (position sense)

5) Cerebellar signs and coordination (very important)

1. Speech
2. tremor
3. nystagmus
4. nose finger test
5. dysdiadokokinesis
6. heel-shin test
7. Gait
   - ❖ A wide-based, unsteady gait is characteristic of cerebellar dysfunction.
   - ❖ Circumduction and toe-dragging often occur with spasticity.
   - ❖ A high-stepping, slapping gait often is seen with peripheral neuromuscular disease.
   - ❖ A waddling gait occurs with pelvic girdle weakness (eg, myopathies and muscular dystrophies).
   - ❖ Asymmetries of gait, or decreased arm swing or abnormal arm posturing are often present in hemiparesis
8. Romberg's sign (read about it)

6) Cranial nerves:

I: Olfactory nerve : Ask the child if he has a sense of smell and test with a familiar non irritant substance.

II. Optic nerve: examine fundi , and vision

III. Occulomotor, IV.Trochlear &VI. Abducent nerves : Examine eye movements

V. Trigeminal nerve: the motor component of the fifth nerve supplies the jaw muscles. Ask the child to

open his mouth and bite hard . palpate the masseter muscle . the 5^{th} nerve also provides sensation to much of the face and is divided into the ophthalmic, maxillary and mandibular divisions test sensation to light touch in each of these areas , the corneal reflex is not routinely examined in children.

VII. Facial nerve : Ask the child to screw up his eyes as tightly as possible and show his teeth . in ability to bury the eyelashes on one side or close the eye , and drooping of the corner of the mouth may indicate facial nerve pulsy.

VIII. Auditory nerve: Ask about hearing . if there is any doubt, or speech delay you should obtain a hearing test.

IX. Glossopharyngeal nerve, X . vagus nerve, XII. Hypoglossal nerves: ask the child to stick out his tongue, look for tongue and uvula deviation. The gag reflex is not routinely examined in children.

XI. Accessory nerve : Ask the child to turn his head to the sides against the resistance of your hand, and to shrug his shoulderd

- ✓ Cover the child
- ✓ Wash your hand
- ✓ Thank the child and the mother

Neurological examination of the infant

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**

1. WIPE

2. General look :

1) Irritability
2) Position at rest
3) Spontaneous movement
4) Look for base of the spine for any tuft of hair

3. Regional examination :

1) Fontanelle
2) Head circumference
3) Tone
   - Prone position
   - Supine position
   - Pull to sit to see head lag
   - Axillary suspension
   - Ventral suspension
   - Passive movement
4) Reflexes
   - Deep tendon reflexes
   - Primitive reflexes:
     - **Moro reflex :**disappears by three months of age
     - **Grasp reflexes (palmar and plantar):** disappear by three months of age
     - **Sucking and rooting reflexes**
     - **Extensor plantar response :**variably present in normal newborns; disappears by 8 to 12 months of age
     - **Stepping reflex:** disappears by one to two months of age
     - **Asymmetrical tonic neck reflex:** variably present in normal newborns; disappears by six months of age
     - **Parchute reflex:** develops from 9 months and persist
5) Vision : check that the baby can fix and follow a silent moving object
6) Hearing consider doing distraction test

Musculoskeletal system examination

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**

1) WIPE

2) Look :

- Look for gait of the child for limp and rhythm and symmetry of movements
- Look for any gross abnormalities of the muscles, bones and joint

1. Redness
2. Swelling
3. Deformity
4. Wasting
5. Function: gait, hold a pencil, do up buttons

3) Feel

for:

1. Tenderness
2. Temperature
3. Effusion : for the knee joint
   look for bulge sign by milking fluid in the medial aspect of the knee in the lateral side
   then firmly stroke the lateral aspect of the knee downwards to push the fluid back in to the medial compartment , you will see a "bulge" of fluid.
4. Limb length and muscle bulk
   - Leg length is measured from anterior superior iliac spine to the medial malleolus
   - Muscle bulk is measured at a fixed distance from the tibial tuberosity
   - You should compare side to side

4) Move

- Range of movement
- Check for active movement by asking the child to mimic your movement
- Check passive movement and notice any limitation or contractures
- Observe child's face for any signs of pain
- Compare the limbs on each side

Examine for scoliosis

Ask the child to stand erect with feet together and examine the child from behind

1. look for asymmetry of the shoulders
2. then ask the child to bend forward at the waist and straightening up slowly
3. examine the spine and thorax for symmetry and prominence of the scapulae

Examine the following:

- **Thoraco-lumbar spine:**
  - **flexion**
  - **extension**
  - **rotation**
  - **lateral flexion**

- **Cervical spine:**
  - flexion
  - extension
  - rotation
  - lateral flexion
- **Shoulder joint:**
  - abduction
  - adduction
  - flexion
  - extension
  - rotation
- **Elbow and wrist joints:**
  - flexion
  - extension
  - pronation
  - supination
  - rotation of the wrist

- **Hand:**
  - fingers movement
  - open and closing the fist

- **Hip joint:**
  - flexion
  - extension internal and external rotation
  - abduction
  - adduction

- **Knee joint:**
  - flexion
  - extension
- **Ankle joint:**
  - flexion
  - extension
  - rotation
- **Feet:**
  - inspect the arches
  - flexion and extension of the toes

✓ Cover the child
✓ Wash your hand
✓ Thank the child and the mother

Note:

Examination of knee joint is frequently coming in OSCE

Head, ear, eye, nose, throat examination

- **Ask about patient's name, age and sex**
- **Explain what you are going to do**
- **WIPE**

Head

1) Inspection:

1) Shape of the head
2) dysmorphic features
3) Size of the head (measure OFC)
4) Fontanelle**:** bulged , depressed

2) palpation:

1) Anterior Fontanelle: closed, measure its diameter
2) posterior fontanelle
3) suture lines
4) skull bones for any swelling , craniotabes
5) palpate the scalp, hair (texture, pattern)

Ear

1. inspection:

- site : low seated ?
- size
- discharge: color of the discharge
- swelling
- patency

2. Palpation

for tenderness
ear cartilage
swelling

3. Examine the ear by auriscope

4.Do distraction hearing test

Eye examination

1. **inspection:**
   - ❖ shape
   - ❖ orientation: slanted or not
   - ❖ size
   - ❖ distance between the eyes : telecanthus
   - ❖ epicanthal fold
   - ❖ look for any obvious abnormality like squint
   - ❖ examine the cornea (hazy) , conjunctiva, iris
   - ❖ eye lid: ptosis
2. **Examine for visual acuity**
3. **Examine for eye movements**
4. **Visual field: "wiggy finger test"**
5. **Reflexes**
   - ❖ corneal reflex
   - ❖ red reflex
6. **Fundoscopy**
7. **Cover test**

Examination for squint:

1.corneal light reflex
2.occular movement
3.visual acuity
4.Cover test
5.fundoscopy

Nose examination:

- ❖ sit the child
- ❖ examine the nostrils for inflammation , obstruction, polyp
- ❖ look for any abnormality
- ❖ look for nasal discharge

Throat examination:

- ❖ sit the child
- ❖ examine the mucosa of the mouth , teeth, tongue, palate, tonsils using tongue depressor
- ❖ look for any abnormality
- ❖ examine for cervical LAP

Newborn examination

- **Ask about patient's name, age and sex**
- **Explain to mother what you are going to do**

1) WIPE

2) General appearance:

1. Posture
2. Dysmorphic features
3. Activity
4. Lethargy
5. Irritability
6. Quality of crying
7. Describe any abnormality: phocomelia, spina bifida

3) Gestational age

1. Skin color, gelatinous , sticky, cracking
2. Lanugo hair, none , abundant
3. Planter surface for creases
4. Breast: subcutaneous tissue
5. Eye, ear : lids of eyes and cartilage of the ears
6. Genitals (male): scrotum rugae , testes presence
7. Genitals (female): labia and clitoris

4) Examine the skin

1) Color: jaundice, pale , plethoric
2) Texture: dry ,wrinkled, vernix – Covered
3) Look for : milia , erythema toxicum, hemangiomas (capillary, strawberry), mongolian blue spots, fat necrosis

5) Examine the head

1) Shape e.g rounded in premature baby
2) Measure OFC usually 35 cm
3) Fontanels: size, bulging , depressed
4) Suture lines
5) Feel skull bones for craniotabes, moulding , cuput succedaneum Cephalhematoma

6)Examine the eyes

Look for :

1) Discharge
2) Cataract
3) Increase size and haziness of cornea suggest congenital glaucoma
4) Look for presence of red reflex

7) Examine the ears

For shape, patency

8) Examine the mouth

For:

Thrush on the tongue or buccal mucosa

Movement of oropharynx and epithelial pearls

Hard palate (high, normal , flat) , cleft palate , ranula

For systemic examination of newborn see the booklet of pediatric department

Management

The following pages contain information about management of about 24 Cases but of course that's not enough and further reading is required, so at least you need to read about the following subjects which are frequently coming in OSCE like:

1- Management of spherocytosis

2-Mangemant of hemorrhagic disease of newborn

3- Tb and it's Management

4- Management of Iron deficiency anaemia

5-Management of Thalassemia

6- Management of pyelonephritis

7-Management of Nephrotic syndrome

8-Managemnt of Haemophilia and Haemarthrosis

Also there are some stations of data interpretation like chest X-ray, complete blood count and ECG you must know something about them

Management of special cases

1. *Status epilepticus:* mortality 4-5%

1) ABC
2) Put the patient in left lateral position
3) Control fit and stabilize the patient
4) ECG , Respiratory function should be monitored
5) Put i.v. cannula
6) At the same time take short history and do brief examination and check the temperature and blood pressure
7) Draw blood sample and do important diagnostic Investigations:
   - ❖ Blood sugar
   - ❖ S. electrolyte(sodium , calcium, phosphate, magnesium)
   - ❖ Lumbar puncture, anticonvulsant drug level , urine study for toxicology screen and arterial blood gases if indicated
   - ❖ EEG if indicated
8) Start glucose-containing IV fluid
9) Give 50% glucose if serum glucose low (1–2 mL/kg)
10) Diazepam 0.3mg/kg i.v to control convulsion
11) If I.v line is not available give 0.5mg/kg of Diazepam rectally
12) Buccal and nasal midazolam is another option
13) If you find correctable cause treat it.(like hypoglycemia <3mmol treat it with 5ml /kg of 10% dextrose by rapid infusion
14) Reassess the patient for response within 5-10 min
15) Other Pharmacological therapy:
    1. If no response use Fosphynitoin 15-20 mg /kg as second line treatment
    2. I.v Phenobarbital at loading dose of 15-20 mg /kg is third line drug if seizure persist intravenous sodium valproate can be use
    3. If no response use one of the following:
       1) Diazepam infusion
       2) Constant infusion of medazolam or propofol
       3) Barbiturate coma use thiopental in an ICU use ventilator and continuous EEG monitoring
       4) Paraldehyde i.v or rectal
       5) General anesthesia use halothane or isoflurane
16) correct the precipitated factors

2. Status Asthmaticus:

1) ABC
2) Close monitoring of clinical status, O_2 saturation
3) O_2 by a mask or nasal prongs
4) Weigh the child rapidly
5) place i.v. cannula
6) At the same time take a short history and do a brief examination and check the temperature and respiratory rate and look for signs of respiratory distress and auscultate the chest rapidly
7) Draw blood sample and do important Investigations
8) Inhaled short acting B- agonist like salbutamol every 20 min for one hour
9) Systemic glucocorticoid (methylprednisolone 1mg/kg 6hourly or hydrocortisone i.v or orally)
10) nenulized ipratopium may added to B- agonist
11) Reassess the patient (calculate respiratory rate , look for signs of respiratory distress and auscultate the chest for wheeze and air entry)
12) If improved discharge him on inhaled B-agonist and oral steroid (like prednisolone for 5 days)
13) Admit the child to the hospital if:
    1. No improvement after 1-2 hrs of initial treatment
    2. No improvement in peak expiratory flow (PEF) (less than 70%)
    3. O_2 saturation less than 92%
    4. Prolong symptoms before emergency visit
14) **Hospital management :**
    1. O_2
    2. Inhaled short acting B- agonist and Systemic glucocorticoid iv or orally
    3. Iv fluid

If no response give:

4. Iv theophylline 5-10mg/kg i.v over 1 hr followed by infusion 1.1 mg /kg per hr (age 1-9 yrs) or 0.7 mg/kg per hr (10 yrs to adult)
5. Inhaled heliox: 70% hhelium- 30% O_2 improvement within 20 min
6. Iv. magnesium sulfate 25-40 mg /kg over 30 min (monitor B. pr every 15 min. during infusion)
7. Mechanical ventilation if impending respiratory failure
8. Halothane inhalation during mechanical ventilation
9. Reassess the patient for response

3. Acute bronchiolitis:

1) Give cool humidified O_2 by head box or O_2 tent
2) elevates head and chest put the child in 30 degree with neck extended
3) assess the child condition (respiratory rate, signs of respiratory distress, pulse oximetry for O_2 saturation) may need for admission
4) May need to NG tube to avoid aspiration
5) Keep the child nil by mouth
6) Maintain with iv fluid give 75% of maintenance
7) Endotracheal intubation if there is risk of further respiratory decompensation
8) Adjuvant treatment :
    1. Bronchodilators: short acting β-agonist
    2. Nebulized epinephrine has same effect of short acting β-agonist
    3. Corticosteroids : methylprednisolone 1mg/kg
    4. Ribavirin: for CHD or Chronic lung dz.
    5. Antibiotics if there is secondary bacterial pneumonia

11) Avoid sedative it may depress respiratory derive

Prevention :

1. **I.V immunoglobulin (RSV-IVIG, RespiGam)**
2. **Palivizumab monoclonal Antibody for:**

    Child <2 yrs with:

    - **Chronic lung dz.**
    - **Prematurity**

3. **Hand Washing**

4. Pneumonia :

Note: this management is not according to the ARI program (see page 113)

1- **Send chest X-ray to confirm the diagnosis and detect complications**

2- **Put iv line and Draw blood sample and do important Investigations(WBC, blood culture, cold agglutination, isolation of the Bacteria or the virus.**

3- **Treatment of suspected bacterial pneumonia is based on the presumptive cause and the clinical appearance of the child. For mildly ill children who do not require hospitalization, amoxicillin is recommended. In communities with a high percentage of penicillin-resistant pneumococci, high doses of amoxicillin (80–90 mg/kg/24 hr) should be prescribed. Therapeutic alternatives include cefuroxime axetil or amoxicillin/clavulanate. For school-aged children and in those in whom infection with *M. pneumoniae* or *C. pneumoniae* (atypical pneumonias) is suggested, a macrolide antibiotic such as azithromycin is an appropriate choice. In adolescents, a respiratory fluoroquinolone (levofloxacin, gatifloxacin, moxifloxacin, gemifloxacin) may be considered for atypical pneumonias.**

4- **The empirical treatment of suspected bacterial pneumonia in a hospitalized child requires an approach based on the clinical manifestations at the time of presentation. Parenteral cefuroxime (150 mg/kg/24 hr), cefotaxime, or ceftriaxone is the mainstay of therapy when bacterial pneumonia is suggested. If clinical features suggest staphylococcal pneumonia (pneumatoceles, empyema), initial antimicrobial therapy should also include vancomycin or clindamycin.**

5- **If viral pneumonia is suspected, it is reasonable to withhold antibiotic therapy, especially for those patients who are mildly ill, have clinical evidence suggesting viral infection, and are in no respiratory distress. Up to 30% of patients with known viral infection may have coexisting bacterial pathogens. Therefore, if the decision is made to withhold antibiotic therapy based on presumptive diagnosis of a viral infection, deterioration in clinical status should signal the possibility of superimposed bacterial infection and antibiotic therapy should be initiated.**

6- **Admit the child if:**

- **Age < 6 months**
- **Sickle cell anemia with acute chest syndrome**
- **Multiple lobe involvement**
- **Immunocompromised state**
- **Toxic appearance**
- **Severe respiratory distress**
- **Requirement for supplemental oxygen**
- **Dehydration**
- **Vomiting**
- **No response to appropriate oral antibiotic therapy**
- **Noncompliant parents**

Supportive care

- **O_2 if needed**
- **If the child has fever (≥39 °C or ≥102.2 °F) which appears to be causing distress, give paracetamol.**
- **Encourage the child to eat and drink. oral zinc (20 mg/day) helps accelerate recovery from severe pneumonia**
- **IV fluid if needed, Avoid frequent examinations or disturbing the child unnecessarily**
- **If there is difficulty in swallowing, nasogastric feeding is required.**

5. Croup :

1) Ask about patient's name ,age
2) You should know the weight of the child
3) Use cool mist by tent or face mask
4) Nebulized epinephrine or Racemic epinephrine decrease laryngeal and mucosal edema
   - ❖ Indications are:
     1- Moderate to severe stridor at rest
     2- The need for intubation
     3- Respiratory distress and hypoxia
     4- No response to cool mist
5) Corticosteroid decrease edema use Iv or I.m dexamethasone 0.6 mg/kg or single dose of prednisolone 1mg/kg
6) Heliox have same effect of neubulized epinephrine
7) May need for endotracheal intubation
8) There is no indication for antibiotics and sedative
9) Ensure adequate fluid intake

Indication for hospitalization

1- Progressive stridor
2- Sever stridor at rest
3- Respiratory distress, hypoxia, cyanosis
4- Depress mental status

6. Acute epiglottitis, :

Is a medical emergency and warrants immediate treatment

1- Keep the child in a sitting position
2- Give cool humidified O_2 by mask
3- Summon immediate help from anaesthetist or intensivist
4- Don't examine the larynx unless an anesthetist is present and able to intubate
5- Endotracheal intubation must be performed immediately for all patients
6- If intubation is difficult ventilate the child with bag-valve-mask
7- If ventilation is impossible perform cricothyrotomy or tracheostomy
8- Blood culture and epiglottis swab should be obtained
9- Start with appropriate intravenous antibiotics to cover *H influenzae* and *Streptococcus* species (parenteral ceftriaxone sodium initial dose 100 mg /kg with a second dose 50mg/kg after 24 hrs)
10- Intravenous antibiotics should be continued for 2–3 days, followed by oral antibiotics to complete a 10-day course.
11-I.v fluid 60% of the maintenance
12-Extubation can usually be accomplished in 2–3 days
13-Corticosteroid and neubulized epinephrine are in effective

7. Bacterial meningitis :

**** for CSF finding see table 12 (page 147)***

1- Control seizure if present use phenytoin
2- Confirm the diagnosis by LP and CSF Analysis and culture
3- Dexamethasone 0.6 mg/kg/day (0.15 mg/kg/dose given every 6 hr) for 2 days give it before the antibiotics by 1-2 hrs . corticosteroid recipients have a shorter duration of fever, lower CSF protein and lactate levels, and a reduction in sensorineural hearing loss.
4- Antibiotics therapy: *For more details see table 13 (page 148)

- ❖ Vancomycin 60 mg /kg/24hr given every 6 hrs

In combination with

- ❖ Cefotaxime 200 mg /kg/24hr given every 6 hrs

or

- ❖ Ceftriaxone 100 mg /kg/24hr once per day or in divided doses

If the pt. is allergic to β-lactam use:

- ❖ Chloramphenicol 100 mg /kg/24hr given every 6 hrs

5- Duration of therapy is 7 days for meningococcal infections, 10 days for *Haemophilus influenza* or pneumococcal infection, and 14–21 days for other organisms.

Supportive care :

- ❖ Treat shock if present
- ❖ Treat DIC if present
- ❖ Treat anemia if present
- ❖ Give antipyretics for fever
- ❖ Treat dehydration with I.v fluid 50% of the maintenance
- ❖ Treat raise intracranial pressure if present

6- All patient required hearing assessment 6-8 wks after discharge

For viral meningitis :

Use supportive treatment with 30 mg/kg /day of acyclovir for 14 days if HSV infection

8. Heart failure:

1- Ask about patient's name ,age, sex

2- You should know the weight of the child

3- Support the child in a semi-seated position with head and shoulders elevated and lower limbs dependent.

4- Give cool humidified O_2 by nasal prongs or mask if the child has a respiratory rate of >70cycle/min, shows signs of respiratory distress, or has central cyanosis.

5- Do important investigations: Chest X-ray ,ECG, Echocardiography

6- Reduction of preload

diuretics : furosemide 1mg/kg/dose PO or I.V up to qid

Add hydrochlorthiazide 2mg/kg/day bid

7- Inotropic drugs:

- Digoxin : rapid digitization 0.04 mg/kg

  Maintenance(slow digitization 0.01 mg/kg /day)

  Give half dose in preterm baby or patient with myocarditis

  75% of this dose if given I.V

- Dopamine or dobutamine 5-28 mcg/kg /min

8- After load reduction

ACE inhibitors

Captopril 0.1 mg /kg/d PO q8h

Enalapril 0.1 mg/kg/d PO bid

9- Sedative like chloral hydrate 20mg/kg/dose

10- Morphine 0.1mg/kg/dose

11- Sodium bicarbonate may use to correct sever acidosis

12- Antibiotics if there is chest infection

13- Packed blood cell are given in severe anemia

14- Improve nutrition

Supportive care

- Avoid the use of IV fluids, where possible.
- Relieve any fever with paracetamol to reduce the cardiac workload.

Monitoring

The child should be checked by nurses every 6 hours (3-hourly whilst on oxygen therapy) and by doctors once a day. Monitor both respiratory and pulse rates, liver size, and body weight to assess the response to treatment. Continue treatment until the respiratory and pulse rates are normal and the liver is no longer enlarged.

9. SVT

1) **Vagal stimulation by submersion of the face in iced saline (in older children) or by placing an ice bag over the face (in infants) may abort the attack. To abolish the paroxysm, older children may be taught vagotonic maneuvers such as the Valsalva maneuver, straining, breath holding, drinking ice water, or adopting a particular posture.**
2) **When these measures fail, several pharmacologic alternatives are available:**

   - **In stable patients, adenosine (0.1mg/kg diluted by normal saline)by rapid intravenous push is the treatment of choice because of its rapid onset of action and minimal effects on cardiac contractility. The dose may need to be repeated rapidly (given at 2 min. intervals, increase the dose by 0.05 mg /kg up to 0.3 mg/kg (max 18 mg).**
   - **Other drugs that have been used for initial treatment of SVT include infusions of phenylephrine (Neo-Synephrine) or edrophonium (Tensilon), which increase vagal tone through the baroreflex, as well as the antiarrhythmic agents quinidine, procainamide, and propranolol. Calcium channel blockers such as verapamil have also been used in the initial treatment of SVT in older children. Verapamil may reduce cardiac output and produce hypotension and cardiac arrest in infants younger than 1 yr; it is therefore contraindicated in this age group.**

3) **In urgent situations when symptoms of severe heart failure have already occurred, synchronized DC cardioversion 0.5–2 W-sec/kg (average 1J/kg) is recommended as the initial management .**
4) **Once the patient has been converted to sinus rhythm, a longer acting agent is selected for maintenance therapy. In patients without an antegrade accessory pathway, digoxin or propranolol is the mainstay of therapy. In children with evidence of pre-excitation (WPW syndrome), digoxin or calcium channel blockers may increase the rate of anterograde conduction of impulses through the bypass tract and should be avoided. These patients are usually managed in the long term with propranolol. In patients with resistant tachycardias, procainamide, quinidine, flecainide, propafenone, sotalol, and amiodarone have all been used. It should be recognized that most antiarrhythmic agents could have proarrhythmic and negative inotropic effects. Flecainide in particular should be limited to use in patients with otherwise normal hearts. If cardiac failure occurs because of prolonged tachycardia in an infant with a normal heart, cardiac function usually returns to normal after sinus rhythm is reinstituted, although it may take days to weeks.**
5) **Twenty-four hour electrocardiographic (Holter) recordings are useful in monitoring the course of therapy and in detecting brief runs of asymptomatic tachycardia. A brief assessment of arrhythmia control can be made at the bedside with transesophageal pacing. More detailed electrophysiologic studies performed in the cardiac catheterization laboratory are often indicated in patients with refractory SVTs.These studies are necessary prerequisites to radiofrequency ablation.**
6) **Radiofrequency ablation of an accessory pathway is another treatment option commonly used in patients with re-entrant rhythms. It is often used electively in children and teenagers, as well as in patients who require multiple agents or find drug side effects intolerable or for whom arrhythmia control is poor.**

10. Hypercyanotic (tet) spells

1- You should know the weight of the child
2- Put an I.v cannula and draw blood for important investigation (Hb%, PCV, Blood sugar, blood gas analysis, U&E)
3- Place the child on his back or over the mother's shoulder in knee-chest position
4- Give O_2 by mask or nasal prongs
5- Give morphine 0.2 mg/kg i.m
6- Na-bicarbonate in sever acidosis
7- β- blockers like propranolol 0.2-0.5 mg/kg/12hr
8- in extreme cases child may need i.v fluid replacement , intubation and positive pressure ventilation
9- phenylephrine may be of benefit in extreme cases
10- Stabilize general condition of the patient correct hypoglycemia, Acidosis, electrolyte changes
11- Monitor child's condition
12- definitive treatment is surgical correction by total correction (usually performed in the first 2 yrs of life)
or palliative surgery (Blalock-Taussing operation)

11. Shock

Hemorrhagic shock

1) Control external bleeding
2) O_2 by mask
3) Insert 2large bore cannulae
4) With draw blood for blood group and cross match
5) Rapidly infuse 20 ml/kg of crystalloid or colloid solution
6) Infuse blood if available
7) Insert foley catheter
8) Monitor blood pressure, heart rate , oxygenation, urine out put
9) Calcium and fresh frozen plasma are needed if 1-2 blood volumes have been transfused

Septicaemic shock

1) O_2 by mask
2) Insert 2large bore cannulae
3) With draw blood for blood group and cross match
4) Collect blood for culture
5) Rapidly infuse 20 ml/kg of crystalloid or colloid solution
6) Give empirical antibiotics I.v like cefotaxime 50mg/kg 4 hourly max 2g
7) Dopamine 5-20 mcg /kg may be needed
8) Monitor blood gases
9) Mechanical ventilation may required
10) Defer Lumpar puncture till the child has been stabilized

12. Dehydration

No dehydration:

Plan A

➢Treat the child as an outpatient.

➢Counsel the mother on the 4 rules of home treatment:

1) give extra fluid
2) give zinc supplements
3) continue feeding
4) give advice on when to return.

1) Give extra fluid, as follows:

— If the child is being breastfed, advise the mother to breastfeed frequently and for longer at each feed. If the child is exclusively breastfed, give ORS solution or clean water in addition to breast milk. After the diarrhea stops, exclusive breastfeeding should be resumed, if appropriate to the child's age.

— In non-exclusively breastfed children, give one or more of the following:

• ORS solution

• food-based fluids (such as soup, rice water and yoghurt drinks)

• clean water. To prevent dehydration from developing, advise the mother to give extra fluids—as much as the child will take:

• for children <2 years, about 50–100 ml after each loose stool

• for children 2 years or over, about 100–200 ml after each loose stool.

Tell the mother to give small sips from a cup. If the child vomits, wait 10 minutes and then give more slowly. She should continue giving extra fluid until the diarrhoea stops. Teach the mother how to mix and give ORS solution and give her two packets of ORS to take home.

2)Give zinc supplements

— Tell the mother how much zinc to give:

Up to 6 months 1/2 tablet (10 mg) per day 6 months and more 1 tablet (20 mg) per day for 10–14 days

— Show the mother how to give the zinc supplements:

• Infants, dissolve the tablet in a small amount of clean water, expressed milk or ORS.

• Older children, tablet can be chewed or dissolved

— Remind the mother to give the zinc supplements for the full 10–14 days.

3)Continue feeding

4)Advise the mother on when to return

Follow-up

➢Advise the mother to return immediately to the clinic if the child becomes more sick, or is unable to drink or breastfeed, or drinks poorly, or develops a fever, or shows blood in the stool. If the child shows none of these signs but is still not improving, advise the mother to return for follow-up at 5 days.

Diarrhoea Treatment Plan A: Treat diarrhoea at home

COUNSEL THE MOTHER ON THE 4 RULES OF HOME TREATMENT: GIVE EXTRA FLUID, CONTINUE FEEDING, WHEN TO RETURN

- **1. GIVE EXTRA FLUID (AS MUCH AS THE CHILD WILL TAKE)**
  - **TELL THE MOTHER:**
    - — Breastfeed frequently and for longer at each feed.
    - — If the child is exclusively breastfed, give ORS or clean water in addition to breastmilk.
    - — If the child is not exclusively breastfed, give one or more of the following: ORS solution, food-based fluids (such as soup, rice water, and yoghurt drinks), or clean water.

    It is especially important to give ORS at home when:
    - — the child has been treated with Plan B or Plan C during this visit.
    - — the child cannot return to a clinic if the diarrhoea gets worse.
  - **TEACH THE MOTHER HOW TO MIX AND GIVE ORS. GIVE THE MOTHER 2 PACKETS OF ORS TO USE AT HOME.**
  - **SHOW THE MOTHER HOW MUCH FLUID TO GIVE IN ADDITION TO THE USUAL FLUID INTAKE:**

Up to 2 years	50 to 100 ml after each loose stool
2 years or more	100 to 200 ml after each loose stool

    Tell the mother to:
    - — Give frequent small sips from a cup.
    - — If the child vomits, wait 10 minutes. Then continue, but more slowly.
    - — *Continue giving extra fluid until the diarrhoea stops.*
- **2. GIVE ZINC SUPPLEMENTS**
  - **TELL THE MOTHER HOW MUCH ZINC TO GIVE:**

    Up to 6 months ½ tablet (10 mg) per day for 10–14 days

    6 months and more 1 tablet (20 mg) per day for 10–14 days
  - **SHOW THE MOTHER HOW TO GIVE THE ZINC SUPPLEMENTS:**
    - — Infants, dissolve the tablet in a small amount of clean water, expressed milk or ORS in a small cup or spoon.
    - — Older children, tablet can be chewed or dissolved in a small amount of clean water in a cup or spoon.
  - **REMIND THE MOTHER TO GIVE THE ZINC SUPPLEMENTS FOR THE FULL 10–14 DAYS.**
- **3. CONTINUE FEEDING**
- **4. WHEN TO RETURN**

Some dehydration:

Plan B

➢In the first 4 hours, give the child the following approximate amounts of ORS solution, according to the child's weight (or age if the weight is not known) However, if the child wants more to drink, give more.

➢Show the mother how to give the child ORS solution, a teaspoonful every 1–2 minutes if the child is under 2 years; frequent sips from a cup for an older child.

➢Check regularly to see if there are problems.

• If the child vomits, wait 10 minutes; then, resume giving ORS solution more slowly (e.g. a spoonful every 2–3 minutes).

• If the child's eyelids become puffy, stop ORS solution and give plain water or breast milk.

➢Advise breastfeeding mothers to continue to breastfeed whenever the child wants.

➢If the mother cannot stay for 4 hours, show her how to prepare ORS solution and give her enough ORS packets to complete the rehydration at home plus enough for 2 more days.

➢**Reassess the child after 4 hours**, checking for signs of dehydration (Note: Reassess the child before 4 hours if the child is not taking the ORS solution or seems to be getting worse.)

❖ If there is no dehydration, teach the mother the four rules of home treatment:

(i) give extra fluid

(ii) give zinc supplements for 10–14 days

(iii) continue feeding

(iv) return if the child develops any of the following signs:

1) drinking poorly or unable to drink or breastfeed
2) becomes more sick
3) develops a fever
4) has blood in the stool.

❖ If the child still has some dehydration, repeat treatment for another 4 hours with ORS solution, as above, and start to offer food, milk or juice and breastfeed frequently.

❖ If signs of severe dehydration have developed for treatment.

Give zinc supplements

➢Tell the mother how much zinc to give Up to 6 months 1/2 tablet (10 mg) per day 6 months and more 1 tablet (20 mg) per day for 10–14 days

Diarrhoea Treatment Plan B: Treat some dehydration with ORS

GIVE RECOMMENDED AMOUNT OF ORS IN CLINIC OVER 4-HOUR PERIOD

➤ **Determine amount of ORS to give during first 4 hours.**

AGE*	Up to 4 months	4 months up to 12 months	12 months up to 2 years	2 years up to 5 years
WEIGHT	<6 kg	6–<10 kg	10–<12 kg	12–19 kg
In ml	200–400	400–700	700–900	900–1400

* *Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in kg) by 75.*

— If the child wants more ORS than shown, give more.

➤ **Show the mother how to give ORS solution.**

— Give frequent small sips from a cup.

— If the child vomits, wait 10 minutes. Then continue, but more slowly.

— Continue breastfeeding whenever the child wants.

■ **After 4 hours:**

— Reassess the child and classify the child for dehydration.

— Select the appropriate plan to continue treatment.

— Begin feeding the child in clinic.

➤ **If the mother must leave before completing treatment:**

— Show her how to prepare ORS solution at home.

— Show her how much ORS to give to finish 4-hour treatment at home.

— Give her enough ORS packets to complete rehydration. Also give her 2 packets as recommended in Plan A.

— Explain the 4 Rules of Home Treatment:

1. Give extra fluid
2. Give zinc supplements
3. Continue feeding
3. When to return

Severe dehydration:

Plan C

Children with severe dehydration should be given rapid IV rehydration followed by oral rehydration therapy.

➢Start IV fluids immediately. While the drip is being set up, give ORS solution if the child can drink. Note: The best IV fluid solution is Ringer's lactate Solution (also called Hartmann's Solution for Injection). If Ringer's lactate is not available, normal saline solution (0.9% NaCl) can be used. 5% glucose (dextrose) solution on its own is **not** effective and should not be used.

➢Give 100 ml/kg of the chosen solution divided

	First, give 30 ml/kg in:	**Then, give 70 ml/kg in:**
<12 months old	1 hour	5 hours
≥12 months old	30 minute	2and half hours

Repeat again if the radial pulse is still very weak or not detectable.

Monitoring

Reassess the child every 15–30 minutes until a strong radial pulse is present. If hydration is not improving, give the IV solution more rapidly. Thereafter, reassess the child by checking skin pinch, level of consciousness, and ability to drink, at least every hour, in order to confirm that hydration is improving. Sunken eyes recover more slowly than other signs and are less useful for monitoring. When the full amount of IV fluid has been given, reassess the child's hydration status fully

• If signs of severe dehydration are still present, repeat the IV fluid infusion as outlined earlier. Persistent severe dehydration after IV rehydration is unusual; it usually occurs only in children who pass large watery stools frequently during the rehydration period.

• If the child is improving but still shows signs of some dehydration, discontinue IV treatment and give ORS solution for 4 hours

If the child is normally breastfed, encourage the mother to continue breastfeeding frequently. Where appropriate, encourage the mother to continue breastfeeding frequently. Observe the child for at least 6 hours before discharge, to confirm that the mother is able to maintain the child's hydration by giving ORS solution. All children should start to receive some ORS solution (about 5ml/kg/hour) by cup when they can drink without difficulty (usually within 3–4 hours for infants, or 1–2 hours for older children). This provides additional base and potassium, which may not be adequately supplied by the IV fluid. When severe dehydration is corrected, prescribe zinc

Diarrhoea Treatment Plan C: Treat severe dehydration quickly

➥ Follow the arrows. If answer is YES go across. If NO go down.

START HERE

Can you give intravenous (IV) fluid immediately?

YES → ➤ Start IV fluid immediately. If the child can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's lactate solution (or, if not available, normal saline), divided as follows:

AGE	First give 30 ml/kg in:	Then give 70 ml/kg in:
Infants (under 12 months)	1 hour*	5 hours
Children (12 months up to 5 years)	30 minutes*	2 1/2 hours

* Repeat once if radial pulse is still very weak or not detectable.

■ Reassess the child every 15–30 minutes. If hydration status is not improving, give the IV drip more rapidly.

➤ Also give ORS (about 5 ml/kg/hour) as soon as the child can drink: usually after 3–4 hours (infants) or 1–2 hours (children).

NO ↓

Is IV treatment available nearby (within 30 minutes)?

YES → ➤ Refer URGENTLY to hospital for IV treatment.

■ Reassess an infant after 6 hours and a child after 3 hours. Classify dehydration. Then choose the appropriate plan (A, B, or C) to continue treatment.

NO ↓

Are you trained to use a nasogastric (NG) tube for rehydration?

YES → ➤ Start rehydration by tube (or mouth) with ORS solution: give 20 ml/kg/hour for 6 hours (total of 120 ml/kg).

NO ↓

Can the child drink?

YES → ➤ If the child can drink, provide the mother with ORS solution and show her how to give frequent sips during the trip.

■ Reassess the child every 1–2 hours:

— If there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.

— If hydration status is not improving after 3 hours, send the child for IV therapy.

NO ↓

Refer URGENTLY to hospital for IV or NG treatment

■ After 6 hours, reassess the child. Classify dehydration. Then choose the appropriate plan (A, B, or C) to continue treatment.

Note: If possible, observe the child for at least 6 hours after rehydration to be sure the mother can maintain hydration giving the child ORS solution by mouth.

13. Poisoning

Initial medical care

A- Prevention of Absorption

1. Emesis:

use syrup of ipcac 15-30 ml followed by liquid such as water .
its contraindicated in comatose patient, ingestion strong acid or base

2. Lavage:

should be done within one hour

3. Charcoal:

most effective and safe procedure give as s water slurry with a minimum dose of 15-30 g , 2-6 hrs**.**

The dose of charcoal is 1–2 g/kg (maximum, 100 g) per dose. Repeating the dose of activated charcoal may be useful for those agents that slow passage through the gastrointestinal (GI) tract. When multiple doses of activated charcoal are given, Charcoal dosing is repeated every 2–6 hours until charcoal is passed through the rectum.

4. Cathartics

Like sorbet (max 1g/kg) magnesium sulfate, sod citrate. despite their widespread use, cathartics do not improve outcome. The use of cathartics should therefore be avoided.

5. Whole Gut Lavage

Whole bowel lavage uses an orally administered, non absorbable hypertonic solution such as CoLyte. The use of this procedure in poisoned patients remains controversial. Preliminary recommendations for use of whole bowel irrigation include poisoning with sustained-release preparations, mechanical movement of items through the bowel (eg, cocaine packets, iron tablets), and poisoning with substances that are poorly absorbed by charcoal (eg, lithium, iron). Underlying bowel pathology and intestinal obstruction are relative contraindications to its use. Consultation with a certified regional poison center is recommended.

Enhancement of Excretion

1. Forced diuresis: helpful in salicylate ingestion

2. Dialysis

Hemodialysis (or peritoneal dialysis if hemodialysis is unavailable) is useful in the poisonings listed below and in the general management of a critically ill patient. dialysis is useful for thiophylline, Digoxin and refractory salicylate intoxication.

3. Hemoperfusion over activated charcoal or resin helpful in:

thiophylline , salicylate intoxication
contraindicated in Digoxin, acetaminopgin

Aspirin and other salicylates poisoning

This can be very serious in young children because they rapidly become acidotic and are consequently more likely to suffer the severe CNS effects of toxicity. Salicylate overdose can be complex to manage.
■ These cause acidotic-like breathing, vomiting and tinnitus.

1) Give activated charcoal if available 1-2 g/kg.
Note: that salicylate tablets tend to form a concretion in the stomach leading to delayed absorption, so it is worthwhile giving several doses of charcoal. If charcoal is not available and a severely toxic dose has been given, then perform gastric lavage or induce vomiting.

2) Give IV sodium bicarbonate 1 mmol/kg over 4 hours to correct acidosis and to raise the pH of the urine to above 7.5 so that salicylate excretion is increased.

3) Give supplemental potassium (20-40 ml/L)even the serum K^+ is normal

4) Monitor urine and plasma PH hourly.

5) do important other investigations like:
S. K^+, PT, S.GPT, S.GOT, TSB, Measure level of Salicylate

6) Give IV fluids at maintenance requirements unless child shows signs of dehydration in which case give adequate rehydration.

7) Monitor blood glucose every 6 hours and correct as necessary

8) Give vitamin K 10mg IM or IV.

9) Refractory salicylate intoxication may benefit from dialysis.

10) Charcoal hemoperfusion

Paracetamol poisoning

Table 5 -- Classic Stages in the Clinical Course of Acetaminophen Toxicity

STAGE	TIME AFTER INGESTION	CHARACTERISTICS
I	0.5–24 hr	Anorexia, nausea, vomiting, malaise, pallor, diaphoresis
II	24–48 hr	Resolution of earlier symptoms; right upper quadrant abdominal pain and tenderness; elevated bilirubin, prothrombin time, hepatic enzymes; oliguria
III	72–96 hr	Peak liver function abnormalities; anorexia, nausea, vomiting, and malaise may reappear
IV	4 days–2 wk	Resolution of hepatic dysfunction or complete liver failure

1)If within 1 hour of ingestion give activated charcoal, if available, or induce vomiting UNLESS an oral antidote may be required.

2)Decide if antidote is required to prevent liver damage: ingestions of 150 mg/kg or more, or toxic 4 hour paracetamol level where this is available. Antidote is more often required for older children who deliberately ingest paracetamol or when parents overdose children by mistake.

3) If within 8 hours of ingestion give oral methionine or IV acetylcysteine. Methionine can be used if the child is conscious and not vomiting (<6 years: 1 gram every 4 hours for 4 doses; 6 years or older: 2.5 grams every 4 hours for 4 doses).

4) If more than 8 hours after ingestion, or the child cannot take oral treatment, give IV acetylcysteine.

Petroleum compounds poisoning

Examples: kerosene, turpentine substitutes, petrol

1)Do not induce vomiting or give activated charcoal as inhalation can cause respiratory distress with hypoxaemia due to pulmonary oedema and lipoid pneumonia. Ingestion can cause encephalopathy.

2) chest x-ray may show infiltrates by 2-3hr after ingestion, and after 2-3wk may show pneumatocele

3)Specific treatment includes:

- oxygen therapy if respiratory distress
- put the patient in left lateral position
- observation

Organo-phosphorus and carbamate compounds poisoning

Examples: organophosphorus – malathion, parathion, TEPP, mevinphos (Phosdrin); and carbamates – methiocarb, carbaryl

These can be absorbed through the skin, ingested or inhaled.
The child may complain of vomiting, diarrhoea, blurred vision or weakness. Signs are those of excess parasympathetic activation: salivation, sweating, lacrimation, slow pulse, small pupils, convulsions, muscle weakness/twitching, then paralysis and loss of bladder control, pulmonary oedema, respiratory depression.

Treatment involves:

1)Remove poison by irrigating eye or Washing skin (if in eye or on skin).

2)Give activated charcoal if ingested and within 1 hour of the ingestion.

3)Do not induce vomiting because most pesticides are in petrol-based solvents.

4)In a serious ingestion where activated charcoal cannot be given, consider careful aspiration of stomach contents by NG tube (the airway should be protected).

5)If the child has signs of excess parasympathetic activation, then give atropine 15–50 micrograms/kg IM (i.e. 0.015–0.05mg/kg) or by intravenous infusion over 15 minutes. The main aim is to reduce bronchial secretions whilst avoiding atropine toxicity. Auscultate the chest for signs of respiratory secretions and monitor respiratory rate, heart rate and coma score (if appropriate). Repeat atropine dose every 15 minutes until no chest signs of secretions, and pulse and respiratory rate returns to normal.

6)Check for hypoxaemia with pulse oximetry, if possible, if giving atropine as it can cause heart irregularities (ventricular arrythmias) in hypoxic children.

7)Give oxygen if oxygen saturation is less that 90%.

8)If muscle weakness, give pralidoxime (cholinesterase reactivator) 25–50mg/ kg diluted with 15 ml water by IV infusion over 30 minutes repeated once or twice, or followed by an intravenous infusion of 10 to 20 mg/kg/hour, as necessary.

Iron poisoning **(you need to read more than this)**

Check for clinical features of iron poisoning: nausea, vomiting, abdominal pain and diarrhoea. The vomit and stools are often grey or black. In severe poisoning there may be gastrointestinal hemorrhage, hypotension, drowsiness, convulsions and metabolic acidosis. Gastrointestinal features usually appear in the first 6 hours and a child who has remained asymptomatic for this time probably does not require antidote treatment.

1)Activated charcoal does not bind to iron salts, therefore consider giving a gastric lavage if potentially toxic amounts of iron were taken.

2)Decide whether to give antidote treatment. Since this can have side-effects it should only be used if there is clinical evidence of poisoning.

3)If you decide to give antidote treatment, give deferoxamine (50 mg/kg IM up to a maximum of 1 g) by deep IM injection repeated every 12 hours;

4) if very ill, give IV infusion 15 mg/kg/hour to a maximum of 80 mg/kg in 24 hours.

14.Snake bite

First aid

1)Splint the limb to reduce movement and absorption of venom. If the bite was likely to have come from a snake with a neurotoxic venom

2)Apply proximal tourniquet loose enough to insert 2 fingers and allow arterial blood flow.

3)Clean the wound.

4) Transport to hospital which has antivenom as soon as possible. If snake has already been killed, take this with child to hospital.

5)Avoid cutting the wound or applying ice to bite site.

Hospital care

1)Insert large iv cannula and draw blood for investigations :
CBC, PT, PTT, Blood group, fibrinogen and FDP, RFT

2) Give tetanus toxoid

3) Treat shock, if present.

4)Paralysis of respiratory muscles can last for days and requires intubation and mechanical ventilation or manual ventilation (with a mask or endotracheal tube and bag) by relays of staff and/or relatives until respiratory function returns. Attention to careful securing of endotracheal tube is important. An alternative is to perform an elective tracheostomy.

5)Antivenom

■ If there are systemic signs or severe local signs (swelling of more than half of the limb or severe necrosis), give antivenom, if available

➢ Give monovalent antivenom if the species of snake is known. Give polyvalent antivenom if the species is not known. Follow the directions given on the antivenom preparation. The dose for children is the same as for adults.

Deliver it with in 4 hrs (5 vials and repeated every 2 hrs) Give it more slowly initially and monitor closely for anaphylaxis or other serious adverse reactions.

Prepare IM epinephrine and chlorpheniramine and be ready if allergic reaction occurs.

15. Acute renal failure:

1- Ask about patient's name ,age
2- You should know the weight of the child
3- treat dehydration or shock by i.v crystalloid 20 ml/kg or by blood if there is blood loss pt. should void with in 2hrs if fail indicate intrinsic or post renal ARF
4- diuretics therapy considered after adequacy of circulation established
   - ❖ use furosemide 1-4 mg /kg /dose as single dose
   - ❖ if urine output isn't improved use continuous infusion of furosemide
5- to increase renal blood flow use dopamine 3 ug/kg/min
6- if no response diuretics is should stopped and fluid restriction consider as the following 400ml/m^2/day + urine output

Treatment of complication of ARF

Hyperkalemia (very important)

S.K^+ > 6 mEq/L

1- eliminate exogenous source of K^+

2- continuous ECG monitoring (wide QRS ,Tall T wave)

3- sodium bicarbonate 1mmol/kg I.v over 30 min

4- Na-polystyrene resine 1g/kg given orally or rectal may repeated every 2 hrs

5- Ca-gluconate 0.5-1 ml/kg I.v over 5-10 min
6- Regular insulin 0.1 U/kg with 50% glucose 1g/kg over 1hr
7- Persistent Hyperkalemia should managed by dialysis

Metabolic acidosis

If severe give Na-bicarbonate I.V then orally

Hypocalcaemia

1- Low phosphate diet
2- Oral phosphate binder (Ca-carbonate , Ca-acetate)

Hyponatremia

1- Fluid restriction
2- Hypertonic saline 3% for
- ❖ Symptomatic hyponatremia (seizure ,lethargy)
- ❖ S.Na < 120 mEq/L

Hypertension

1- Salt and water restriction
2- diuretics
3- antihypertensive agents
- ❖ β- blockers like propranolol 0.5 mg/kg/12hr
- ❖ menoxidil 0.5 mg/kg/12hr
- ❖ nifedipine 0.5 mg/kg/dose bid

Anemia

if Hb% <7 g/dl use packed RBC slowly over 4-6 hrs

Indication of dialysis:

1- Volume overload with HT or pulmonary edema refractory to diuretics therapy
2- Persistent Hyperkalemia
3- Sever metabolic acidosis unresponsive to treatment
4- Neurological symptoms (seizure, altered mental status)
5- B . urea > 100-150 mg/dl
6- Calcium/phosphorus imbalance with hypocalcemic tetany

16. Diabetes Mellitus:

If pt. firstly present with hyperglycemia

1) **Admission of the pt. to the ward for DM control**
2) **Apply sliding scale:**

Date	time	RBS	Urine sugar	Insulin U	note

Measure RBS every 6 hrs and see the reading if:

<90 mg/dl no need for insulin
90-180 mg/dl give 0.1 U/kg of insulin
180-270 mg/dl give 0.2 U/kg
270-360 mg/dl give 0.3 U/kg
>360 mg/dl give 0.4 U/kg

Notes:

1- **The insulin used in this scale is soluble Insulin only**
2- **Night dose is 0.1 U/kg**
3- **The pt. must stay on this scale for 3 days**
4- **After 3 days count the total amount of insulin used and divided it on 3 to calculate the maintenance dose of insulin that the pt. will need after discharge**
5- **Use mixtard insulin after discharge**
6- **Give the dose half hr. before the meal**
7- **Give the pt 2/3 of this dose at morning and 1/3 at night**
3- **Educate the family about DM , complication , Insulin, diet.**

patient may be firstly presented with DKA:

(See next page)

20% of diabetic pt. firstly present with DKA

Dx:

Clinical features(vomiting , abdominal pain,...)
RBS > 300
Ketonaemia, ketonuria
Low bicarbonate
Low PH

17. Diabetic Ketoacidosis (DKA)

1- Ask about patient's name ,age, weight

2- You must arrange a observation chart

3- Confirm the diagnosis by RBS & urine for ketone bodies and sugar

4- Admission to ICU

5- Initial treatment

Successful therapy consistently includes the following:

- ❖ Stabilization of the airway, respiration, restoration of circulatory volume
- ❖ Institution of insulin therapy to correct hyperglycemia and clear ketoacidosis
- ❖ Correction of fluid and metabolic abnormalities
- ❖ Determination of the cause of diabetic ketoacidosis; rule out infection
- ❖ Avoidance of complications of therapy, including cerebral edema, hypokalemia, and hypoglycemia

6- Rehydration is the main step of treatment The initial goal of fluid resuscitation is to restore circulation, usually with a 10-20mL/kg bolus of isotonic saline solution or Ringer lactate over 30 to 60 minutes then slow rehydration from the 2nd hour until reduce the risk of cerebral edema using 0.45% NaCl the amount of which is calculated according to the following formula: IV rate = 85ml/kg + maintenance - bolus divided by 23 hours to replace the deficit

Maintenance (24 hr) = 100 ml/kg (for the 1st 10 kg) + 50 ml/kg (for the 2nd 10 kg) + 25 mL/kg (for all remaining kg)

7- Insulin therapy

We begin with by infusion of 0.1 U/kg until blood sugar is less than 250 mg/dL (14 mmol/L) then we give 5% glucose water

8- Potassium therapy

During therapy for diabetic ketoacidosis, serum level of potassium can decrease as insulin therapy facilitates intracellular glucose uptake and with potassium shift back into the intracellular compartment as acidosis resolves. In anticipation of these shifts, one must begin potassium replacement early in the course of therapy for diabetic ketoacidosis.

a-If the patient is urinating

b- potassium level is 5 mEq/L or less, potassium replacement is initiated with up to 40 mEq/L added to the maintenance fluids. The goal is to provide 2 to 5 mEq/kg/d. Patients with more marked deficits may need potassium replacement at up to 0.5 mEq/kg/h. Potassium replacement should be given as 50% potassium chloride and 50% potassium phosphate

9- Bicarbonate therapy should be avoided unless severe acidosis (pH <7.0) results in hemodynamic instability, or symptomatic hyperkalemia is present

10- Subsequent treatment

when diabetic ketoacidosis has been successfully controlled that's to say pH is greater than 7.3, bicarbonate level is greater than 15 mEq/L, glucose less than 300 mg/dl, and the patient is ready to resume enteral intake The insulin infusion can be discontinued this transition ideally occurs during the day and before a meal. The insulin infusion must be continued for 30 to 60 minutes after the first subcutaneous dose is administered to allow for delayed onset of action of the injected insulin. Calculation of an appropriate subcutaneous dose is based on sliding scale in which insulin dose is divided into 4 daily doses continued for 2-3 days as follows

Blood glucose level	Dose of insulin(soluble)
More than 360mg/dl	0.4u/kg
270-360mg/dl	0.3u/kg
180-270mg/dl	0.2u/kg
90-180mg/dl	0.1u/kg
90mg/dl	Not give insulin

11- After that the patient should be shifted Outpatient Management The dose should be divided into two daily injections, with two thirds of the total daily dose given in the morning, 30 minutes before breakfast if using regular insulin or at breakfast if using lispro or aspart, and one third given in the evening, likewise 30 minutes before dinner if using regular or at dinner if using lispro or aspart The ratio of insulin in the morning dose should be two-thirds intermediate-acting insulin (NPH or Lente), and one-third short-acting or fast-acting insulin, In the evening, one half of the evening insulin dose should be given as intermediate-acting insulin (NPH or Lente), and one half should be given as short-acting or fast-acting insulin

18. Painful crisis of SCA

Specific therapies for pain vary, but generally include the use of acetaminophen or a nonsteroidal agent early in the course of pain, followed by acetaminophen with codeine and short- or long-acting oral opioids, or hospitalization with IV administration of morphine or morphine derivatives . The incremental increase and decrease in the use of medication to relieve pain roughly parallels the 8 phases associated with a chronology of pain and comfort In phase 1 (baseline), the patient is free of pain. Phase 2 involves no pain, but the child may show prodromal signs and symptoms of painful episodes, such as scleral icterus or fatigue. During this phase, comfort measures can be used. Phases 3–7 involve increasing and then decreasing levels of pain, including the pain start point, phase 3, when acetaminophen with codeine or nonsteroidal inflammatory agents may be used. Pain acceleration, phase 4, is often associated with administering short- or long-acting morphine derivatives. Peak pain experience, phase 5, is the point at which IV morphine may be started and the patient is often admitted to the hospital. The average hospital stay for children admitted for pain is 3–5 days. The pain starts to decrease during phases 6 and 7, and the pain medication is slowly decreased. In general, decreasing the opioid medication by 20% of the starting dose should occur during the early morning hours, when the caretaker, physician, or house staff is available to assess the effect of the change in dose. Decreasing opioid administration in the afternoon or late at night is not advisable because pain is often worse at night and the primary health care provider is often not available to assess the effect of the change in dose administration. In phase 8, pain resolution, the pain decreases to a manageable level so that the child can be discharged from the hospital.

Several myths exist about the treatment of pain in sickle cell anemia. The concept that painful episodes in children should be managed without opioids is without foundation and results in unwarranted suffering on the part of the patient. There is no evidence that blood transfusion therapy during an existing painful episode decreases the intensity or duration of the episode. Blood transfusion should be reserved for patients who have a decrease in hemoglobin, resulting in hemodynamic compromise, and for patients with respiratory distress or a dropping hemoglobin concentration with no expectation that a safe nadir will be reached.

IV hydration does not relieve or prevent pain and is appropriate when the patient is dehydrated or is unable to drink as a result of severe pain. Concern about opioid dependency in children with sickle cell anemia must never be used as a reason not to treat a child in pain. Patients with multiple painful episodes requiring hospitalization within 1 yr or those whose pain episodes require hospital stays of longer than 7 days should be evaluated for comorbidities and psychosocial stressors that may contribute to the frequency or duration of pain.

Hydroxyurea, a myelosuppressive agent, is the only effective drug proven to reduce the frequency of painful episodes. Hydroxyurea raises the level of Hb F and the hemoglobin level. Hydroxyurea usually decreases the rate of painful episodes by 50%; it also decreases the rate of ACS episodes and blood transfusions by approximately 50% in adults. In children with sickle cell anemia, only a safety and feasibility trial of hydroxyurea has been conducted. This study demonstrated that hydroxyurea was safe and well tolerated in children older than 5 yr of age. No clinical adverse events were identified. The primary laboratory toxicities were limited to myelosuppression, which was reversed on cessation of the drug. Given the short-term safety profile of hydroxyurea in children and its established efficacy in adults, hydroxyurea is commonly used in children with multiple painful episodes. Hydroxyurea treatment begun in infancy may preserve splenic function, improve growth, and reduce the incidence of ACS. The long-term toxicity associated with hydroxyurea in children has not been established, and there are theoretical concerns about the potential risk of leukemia and unknown complications. The typical starting dose of hydroxyurea is 15–20 mg/kg daily, with an increase in dose every 8 wk of 2.5–5.0 mg/kg, if no toxicities occur, up to a maximum dose of 35 mg/kg. The therapeutic effect of hydroxyurea may require several mo of treatment. Monitoring children who are receiving hydroxyurea is labor-intensive, with initial visits every 2 wk and then monthly, after a therapeutic dose has been identified. Close monitoring of the patient requires a commitment by the parents and the patient as well as diligence by a physician to monitor toxicity.

19. Management of transfusion reactions

If a transfusion reaction occurs, first check the blood pack labels and patient's identity. If there is any discrepancy, stop the transfusion immediately and notify the blood bank.

Mild reactions (due to mild hypersensitivity)

Signs and symptoms:

■ itchy rash

Management:

➢slow the transfusion
➢give chlorphenamine 0.1 mg/kg IM, if available
➢continue the transfusion at the normal rate if there is no progression of symptoms after 30 minutes
➢if symptoms persist, treat as moderate reaction .

Moderately severe reactions

(due to moderate hypersensitivity, nonhaemolytic reactions, pyrogens or bacterial contamination
Signs and symptoms:
■ severe itchy rash (urticaria)
■ flushing
■ fever >38 °C or >100.4 °F (Note: fever may have been present before the transfusion)
■ rigors
■ restlessness
■ raised heart rate.

Management:

➢stop the transfusion, but keep the IV line open with normal saline
➢give IV 200 mg hydrocortisone, or chlorphenamine 0.25 mg/kg IM, if available
➢give a bronchodilator, if wheezing

➢send the following to the Blood Bank: the blood-giving set that was used, blood sample from another site, and urine samples collected over 24 hours.

➢if there is improvement, restart the transfusion slowly with new blood and observe carefully

➢if no improvement in 15 minutes, treat as life-threatening reaction, and report to doctor in charge and to the Blood Bank.

Life-threatening reactions

(due to hemolysis, bacterial contamination and septic shock, fluid overload or anaphylaxis)

Signs and symptoms:

■ fever >38 °C or >100.4 °F (note: fever may have been present before the transfusion)

■ rigors, restlessness

■ raised heart rate, fast breathing

■ black or dark red urine (haemoglobinuria)

■ unexplained bleeding, pallor, jaundice

■ confusion

■ collapse.

Note that in an unconscious child, uncontrolled bleeding or shock may be the only signs of a life-threatening reaction.

Management:

➢stop the transfusion, but keep the IV line open with normal saline

➢maintain airway and give oxygen

➢give epinephrine (adrenaline) 0.01 mg/kg body weight (equal to 0.1 ml of 1 in 10 000 solution

➢treat shock

➢give IV 200 mg hydrocortisone, or chlorpheniramine 0.1 mg/kg IM, if available

➢give a bronchodilator, if wheezing

➢report to doctor in charge and to blood laboratory as soon as possible

➢maintain renal blood flow with IV furosemide 1 mg/kg

➢give antibiotic as for septicaemia.

20.Management infant of diabetic mother

Treatment of infants of diabetic mothers should be initiated before birth by frequent prenatal evaluation of all pregnant women with overt or gestational diabetes, by evaluation of fetal maturity, by biophysical profile, by Doppler velocimetry, and by planning the delivery of these infants in hospitals where expert obstetric and pediatric care is continuously available. Periconception glucose control reduces the risk of anomalies and other adverse outcomes, and glucose control during labor reduces the incidence of neonatal hypoglycemia. Women with Type 1 diabetes who have tight glucose control during pregnancy (average daily glucose levels <95 mg/dL) deliver infants with birthweights and anthropomorphic features that are similar to those of infants of nondiabetic mothers. Treatment of gestational diabetes also reduces complications; dietary advice, glucose monitoring, and insulin therapy as needed decrease the rate of serious perinatal outcomes (death, shoulder dystocia, bone fracture, or nerve palsy). Women with gestational diabetes may also be treated successfully with glyburide, which may not cross the placenta. In these mothers, the incidence of macrosomia and neonatal hypo glycemia is similar to that in mothers with insulin-treated gestational diabetes. Regardless of size, all infants of diabetic mothers should initially receive intensive observation and care.

- Asymptomatic infants should have a blood glucose determination within 1 hr of birth and then every hour for the next 6–8 hr
- if clinically well and normoglycemic, oral or gavage feeding with breast milk or formula should be started as soon as possible and continued at 3 hr intervals.
- If any question arises about an infant's ability to tolerate oral feeding, the feeding should be discontinued and glucose given by peripheral intravenous infusion at a rate of 4–8 mg/kg/min.
- Hypoglycemia should be treated, even in asymptomatic infants, by frequent feeding and/or intravenous infusion of glucose.

Bolus injections of hypertonic glucose should be avoided because they may cause further hyperinsulinemia and potentially produce rebound hypoglycemia.

Managing

- Hypoglycemia
- Hypomagnesemia
- respiratory distress syndrome
- polycythemia

21. Management infant with hypoglycemia

1) **When symptoms other than seizures are present, an intravenous bolus of 200 mg/kg (2 mL/kg) of 10% glucose is effective in elevating the blood glucose concentration.**
2) **In the presence of convulsions, 4 mL/kg of 10% glucose as a bolus injection is indicated.**
3) **After initial therapy, a glucose infusion should be given at 8 mg/kg/min.**
4) **If hypoglycemia recurs, the infusion rate and concentration should be increased until 15–20% glucose is used.**
5) **If intravenous infusions of 20% glucose are inadequate to eliminate symptoms and maintain constant normal serum glucose concentrations, hyperinsulinemia is probably present and diazoxide should be administered.**
6) **If the diazoxide is unsuccessful, octreotide may be useful**
7) **infants with severe persistent hyperinsulinemic hypoglycemia may eventually need to undergo subtotal pancreatectomy .**
8) **The serum glucose level should be measured every 2 hr after initiating therapy until several determinations are above 40 mg/dL.**
9) **Subsequently, levels should be measured every 4–6 hr**
10) **the treatment gradually reduced and finally discontinued when**

- **the serum glucose value has been in the normal range**
- **the baby asymptomatic for 24–48 hr.**

11) **Treatment is usually necessary for a few days to a week, rarely for several weeks.**

12) **Infants at increased risk for hypoglycemia should have their serum glucose measured within 1 hr of birth, every 1–2 hr for the 1st 6–8 hr, and then every 4–6 hr until 24 hr of life.**

13) **Normoglycemic high-risk infants should receive oral or gavage feeding with human milk or formula started at 1–3 hr of age and continued at 2–3 hr intervals for 24–48 hr.**

14) **An intravenous infusion of glucose at 4 mg/kg/min should be provided if oral feedings are poorly tolerated or if asymptomatic transient neonatal hypoglycemia develops.**

22.Management of ITP

platelet transfusion in ITP is usually contraindicated unless life-threatening bleeding is present. Initial approaches to the management of ITP include the following:

1. **No therapy other than education and counseling of the family and patient for patients with minimal, mild, and moderate symptoms, as defined earlier. This approach emphasizes the usually benign nature of ITP and avoids the therapeutic roller coaster that ensues once interventional therapy is begun. This approach is far less costly, and side effects are minimal.**
2. **Intravenous immunoglobulin (IVIG). IVIG at a dose of 0.8–1.0 g/kg/day for 1–2 days induces a rapid rise in platelet count (usually>20× 10^9/L) in 95% of patients within 48 hr. IVIG appears to induce a response by downregulating Fc-mediated phagocytosis of antibody-coated platelets. IVIG therapy is both expensive and time-consuming to administer. Additionally, after infusion, there is a high frequency of headaches and vomiting, suggestive of IVIG-induced aseptic meningitis.**
3. **Intravenous anti-D therapy. For Rh positive patients, IV anti-D at a dose of 50–75µg/kg causes a rise in platelet count to>20× 10^9/L in 80–90% of patients within 48–72 hr. When given to Rh positive individuals, IV anti-D induces mild hemolytic anemia. RBC-antibody complexes bind to macrophage Fc receptors and interfere with platelet destruction, thereby causing a rise in platelet count. IV anti-D is ineffective in Rh negative patients.**
4. **Prednisone. Corticosteroid therapy has been used for many years to treat acute and chronic ITP in adults and children. Doses of prednisone of 1–4 mg/kg/24 hr appear to induce a more rapid rise in platelet count than in untreated patients with ITP. Whether bone marrow examination should be performed to rule out other causes of thrombocytopenia, especially acute lymphoblastic leukemia, before institution of prednisone therapy in acute ITP is controversial. Corticosteroid therapy is usually continued for 2–3 wk or until a rise in platelet count to>20× 10^9/L has been achieved, with a rapid taper to avoid the long-term side effects of corticosteroid therapy, especially growth failure, diabetes mellitus, and osteoporosis.**

Each of these medications may be used to treat exacerbations of ITP, which commonly occur several wk after an initial course of therapy.

In the special case of intracranial hemorrhage, multiple modalities should be used, including platelet transfusion, IVIG, high-dose corticosteroids, and prompt surgical consultation, with plans for emergency splenectomy.
patients who are bleeding significantly should be treated, and these may represent only 5% of children with ITP. Intracranial hemorrhage remains rare, and there are no data showing that treatment actually reduces its incidence.

The role of splenectomy in ITP should be reserved for 1 of 2 circumstances. The older child (> 4 yr) with severe ITP that has lasted >1 yr (chronic ITP) and whose symptoms are not easily controlled with therapy is a candidate for splenectomy. Splenectomy must also be considered when life-threatening hemorrhage (intracranial hemorrhage) complicates acute ITP, if the platelet count cannot be corrected rapidly with transfusion of platelets and administration of IVIG and corticosteroids. Splenectomy is associated with a lifelong risk of overwhelming postsplenectomy infection caused by encapsulated organisms.

23.Management of severe malnutrition

Treat the following conditions

1) Hypoglycaemia

➢**Give the first feed of F-75 if it is quickly available and then continue with 2–3 hourly feeds.**

➢**If the first feed is not quickly available give 50 ml of 10% glucose or sucrose solution (1 rounded teaspoon of sugar in 31/2 tablespoons of water) orally or by nasogastric tube, followed by the first feed as soon as possible.**

➢**Give 2–3-hourly feeds, day and night, at least for the first day.**

➢**Give appropriate antibiotics.**

➢**If the child is unconscious, treat with IV 10% glucose 5 ml/kg or, if unavailable, 10% glucose or sucrose solution by nasogastric tube**

Monitoring

If the initial blood glucose was low, repeat the measurement (using fingerprick or heelprick blood and dextrostix, where available) after 30 minutes.

• If blood glucose falls <3 mmol/1 (<54 mg/dl), repeat the 10% glucose or sugar solution.

• If the rectal temperature falls <35.5 °C or if there is deterioration in the level of consciousness, repeat the dextrostix measurement and treat accordingly.

Prevention

➢**Feed 2 hourly, starting immediately or, if necessary, rehydrate first. Continue feeding throughout the night.**

2) Hypothermia

➢**Feed the child immediately (if necessary, rehydrate first).**

➢**Make sure the child is clothed (including the head), Cover with a warmed blanket and place a heater (not pointing directly at the child) or lamp nearby, or put the child on the mother's bare chest or abdomen (skin-to-skin) and Cover them with a warmed blanket and/or warm clothing.**

Position for kangaroo mother care of young infant. Note: after wrapping the child, the head needs to be covered with a cap or bonnet to prevent heat loss.

➢**Give appropriate antibiotics.**

Monitoring

• Take the child's rectal temperature 2-hourly until it rises to more than 36.5 °C. Take it half-hourly if a heater is being used.

• Ensure that the child is Covered at all times, especially at night. Keep the head Covered, preferably with a warm bonnet to reduce heat loss.

• Check for hypoglycaemia whenever hypothermia is found.

Prevention

➢**Feed the child 2-hourly, starting immediately**

➢**Always give feeds through the night.**

➢**Place the bed in a warm, draught-free part of the ward and keep the child Covered.**

➢**Change wet nappies, clothes and bedding to keep the child and the bed dry.**

➢**Avoid exposing the child to cold (e.g. after bathing, or during medical examinations).**

➢**Let the child sleep with the mother for warmth in the night.**

3) Dehydration:

Treatment

Do not use the IV route for rehydration except in cases of shock .
Standard WHO-ORS solution for general use has a high sodium and low potassium content, which is not suitable for severely malnourished children. Instead, give special rehydration solution for malnutrition, ReSoMal (see recipe below, or use commercially available ReSoMal).

➢Give the ReSoMal rehydration fluid, orally or by nasogastric tube, much more slowly than you would when rehydrating a well-nourished child:
— give 5 ml/kg every 30 minutes for the first 2 hours
— then give 5–10 ml/kg/hour for the next 4–10 hours.
The exact amount depends on how much the child wants, volume of stool loss, and whether the child is vomiting.

➢If rehydration is still occurring at 6 hours and 10 hours, give starter F-75 instead of ReSoMal at these times. Use the same volume of starter F-75 as for ReSoMal.

Monitoring

During rehydration, respiration and pulse rate should fall and urine start to be passed. The return of tears, a moist mouth, less sunken eyes and fontanelle, and improved skin turgor are also signs that rehydration is proceeding, but many severely malnourished children will not show these changes even when fully rehydrated. Monitor weight gain.
Monitor the progress of rehydration half-hourly for 2 hours, then hourly for the next 4–10 hours. Be alert for signs of overhydration, which is very dangerous and may lead to heart failure. Check:

- respiratory rate
- pulse rate
- urine frequency
- frequency of stools and vomit.

If you find signs of overhydration (increasing respiratory rate by 5/min and pulse rate by 15/min), stop ReSoMal immediately and reassess after 1 hour.

Prevention

Measures to prevent dehydration from continuing watery diarrhoea are similar to those for well-nourished children, except that ReSoMal fluid is used instead of standard ORS.

➢If the child is breastfed, continue breastfeeding.
➢Initiate refeeding with starter F-75.
➢Give ReSoMal between feeds to replace stool losses. As a guide, give 50–100 ml after each watery stool.

4) Electrolytes
5) Infection
6) Micronutrients
7) Initiate feeding
8) Catch-up growth
9) Sensory stimulation
10) Prepare for follow-up

For further information see the lecture (Management of severe malnutrition)

24. Rickets :

Children with nutritional vitamin D deficiency should receive vitamin D and adequate nutritional intake of calcium and phosphorus.

There are 2 strategies for administration of vitamin D. With stoss therapy, 300,000–600,000 IU of vitamin D are administered orally or intramuscularly as 2–4 doses over 1 day. Because the doses are observed, stoss therapy is ideal in situations where adherence to therapy is questionable.

The alternative is daily, high-dose vitamin D, with doses ranging from 2,000–5,000 IU/day over 4–6 wk. Either strategy should be followed by daily vitamin D intake of 400 IU/day, typically given as a multivitamin.

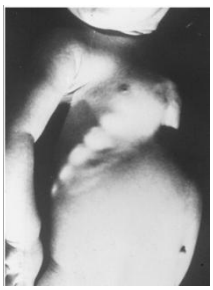
It is important to ensure that children receive adequate dietary calcium and phosphorus; this is usually provided by milk, formula, and other dairy products.

Children who have symptomatic hypocalcemia may need intravenous calcium acutely, followed by oral calcium supplements, which typically can be tapered over 2–6 wk in children who receive adequate dietary calcium. Transient use of intravenous or oral 1,25-D (calcitriol) is often helpful in reversing hypocalcemia in the acute phase by providing active vitamin D during the delay as supplemental vitamin D is converted to active vitamin D. Calcitriol doses are typically 0.05 μmg/kg/day.

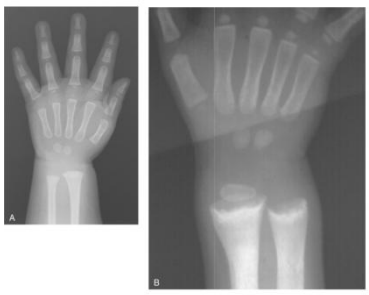
Intravenous calcium is initially given as an acute bolus for symptomatic hypocalcemia (20 mg/kg of calcium chloride or 100 mg/kg of calcium gluconate).

Some patients require a continuous intravenous calcium drip, titrated to maintain the desired serum calcium level. These patients should transition to enteral calcium, with most infants requiring approximately 1,000 mg of elemental calcium.

Rachitic rosary in a young infant



Wrist x-rays in a normal child *(A)* and a child with rickets *(B)*. The child with rickets has metaphyseal fraying and cupping of the distal radius and ulna.



Primary health care

ARI Program

1- **WIPE**
2- **Ask about :**
    1- **Name, age, sex of the patient**
    2- **Ask about danger signs : convulsion, vomiting of everything , inability to drink or breastfeed**
    3- **Does the child have cough or difficult breathing?**
    4- **Duration (For how long)?**

3-look and listen

1. **Count the breaths in one minute fast if:**
    i. **>2mon <1yr = 50 breath /min or more**
    ii. **>12mon <5 yr= 40 breath /min or more**
2. **Look for chest in drawing**
3. **Listen for stridor**
4. **Listen for wheeze**
5. **Look for danger signs**
    i. **Lethargic or unconscious**
    ii. **Is the child convulsing now**

The child must be calm

Classify cough or difficult breathing:

1.Sever pneumonia or Very sever disease

1- **any general danger signs**
   or
2- **stridor in calm child**
   or
3- **chest indrawing**

(If also wheeze go to treat wheeze and reassess)

Treatment of Sever pneumonia or Very sever disease:

1- Give first dose of an appropriate antibiotic
2- Treat wheeze if present
3- Prevent low blood sugar
4- Refer urgently to hospital

2.Pneumonia (fast breathing If also wheeze go to treat wheeze and reassess)

Treatment of pneumonia

1- Give an appropriate antibiotic for 5 days
2- Treat wheeze if present
3- Soothe the throat and relieve the cough with a safe remedy
4- Follow up in 2 days
5- Advice the mother when to return immediately

3.No pneumonia (cough or cold)

(no signs of pneumonia or very sever disease, if also wheeze go to treat wheeze and reassess)

Treatment of cough or cold

1- Treat wheeze if present
2- If coughing more than 30 days refer for assessment
3- Soothe the throat and relieve the cough with a safe remedy
4- Advice the mother when to return immediately
5- Follow up in 2 days
6- Follow up in 5 days if not improving

Assessment hydration status according to CDD program:

1) **WIPE**
2) **Ask about name , age**
3) **Ask about danger signs, convulsion, vomiting of everything, poor feeding**
4) **Ask whether the child has diarrhea, duration, whether bloody , fever**
5) **General look:**
   - **General condition:**
     - *** Well , alert**
     - **# restless or irritable**
     - **$ lethargic or unconscious**
   - **Thirst: *drink normally, #thirsty drink eagerly , $ unable to drink**
   - **Eyes: *not Sunken, #sunken, $very sunken**
   - **Skin turgor : *return immediately, #slow return, $delay return >2 sec.**
6) **See whether the child lethargic, has abnormal movement (Danger signs) , has fever**

7) **Decide : Patient with diarrhea can be classified as :**

   - **No dehydration = * * => Management plan A**
   - **Some dehydration = # # => Management plan B**
   - **Severe dehydration = $ $ => Management plan C**

(for management of these cases see pages 85 - 90)

Vaccinations

Table 6: Vaccination Schedule In Iraq

Birth	2 mon.	4 mon.	6 mon.	9 mon.	15 mon.	18 mon.	4-6 yrs
OPV 0D	OPV 1st D	OPV 2nd D	OPV 3rd D	Measles V.	MMR	OPV 1st BD	OPV 2nd BD
BCG	DPT 1st D	DPT 2nd D	DPT 3rd D	Vitamin A 100 U		DPT Hi b (اللقاح الرباعي) 1st BD	DPT 2nd BD
Hep. B 1st D	Hep. B 2nd D	Hi b (اللقاح الرباعي) 1st D	Hep. B 3rd D				MMR Booster
	Hi b (اللقاح الخماسي) 1st D		Hi b (اللقاح الخماسي) 2nd D			Vitamin A 200 U	
	Rota virus 1st D	Rota virus 2nd D	Rota virus 3rd D				

Notes:

- OPV = Oral polio vaccine
- BCG = Bacillus Calmette-Guerin
  - لا يعطى هذا اللقاح للطفل بعد إكماله السنة الأولى من العمر حتى في حالة عدم استلامه لجرعة سابقة
  - يعاد التلقيح بلقاح الـ BCG مرة ثانية في حالة عدم ظهور الندبة بعد مضي شهرين على التلقيح
- Hep. B = Hepatitis B
- DPT = Diphtheria , Pertussis, Tetanus= اللقاح الثلاثي
- Rota virus:(الدوار) اللقاح الفايروسي العجلي
  - لا يعطى اللقاح العجلي للطفل اذا تجاوز عمره ثلاثة اشهر ولم يباشر بالتلقيح
  - كذلك لا يعطى اللقاح للطفل اذا تجاوز عمره ثمانية اشهر حتى وان لم يكمل الجرع المقررة
- MMR = Mump, Measles, Rubella= لقاح الحصبة المختلطة
- Hi b = H. Influenza type B = لقاح المستدمية النزلية
- DPT +Hi b = اللقاح الرباعي
- DPT +Hi b+ Hep. B = اللقاح الخماسي
- D = Dose
- BD= Booster dose
  - لا يعتبر التلقيح في أيام الحملات الوطنية بديلا عن التلقيحات الروتينية

Clinical Skills

Basic life support (Management of a child with sudden collapse):

1- Ensure safety of the environment

2- Check for response: by gentile stimulation or by loud verbal stimuli

3- If no response shout for help

4- Open the air way by head tilt and chin lift or jaw thrust

- ❖ Look for chest movement
- ❖ Listen for abnormal sound
- ❖ Feel for respiration by putting your cheek near the patient's mouth

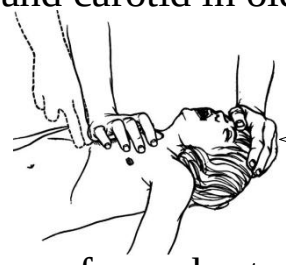
5- If no response deliver 5 rescue breathings:

- ➢ In infant : no neck extension, breathing from mouth and nose
- ➢ In older children : do neck extension and close the nose

6- Check pulse for response (brachial in infant and carotid in older children) in ten second multiply x 6

7- If bradycardia or no response start CPR

8- CPR 15:2



Locating the hand position for chest compression in a child

- ❖ in infant : by two methods
  1) Two thumb-encircling hands used to perform chest compression in an infant (2 rescuers). (See below)
  2) By two fingers above the lower third of the sternum about 1 finger above xiphisternum and press up to one third of AP diameter of the chest wall (see the figure) ⇨

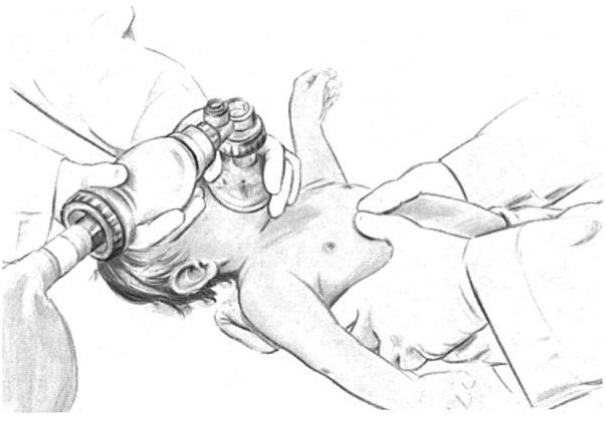
The infant is supine on the palm of the rescuer's hand.

- ❖ for older child use heel of your hand

9- If there is response put the child in recovery position (left lateral position)

10- Stop CPR If:

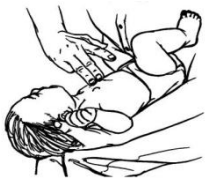
- ➢ Response
- ➢ No improvement for > 20 min.
- ➢ Exhaustion of rescuer
- ➢ Availability of ALS and help

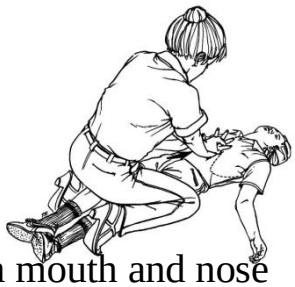


Two thumb-encircling hands used to perform chest compression in an infant (2 rescuers).

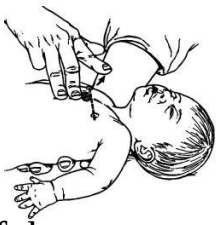
Chocking:

1- Ensure safety of the environment
2- Check for response: by gentile stimulation or by loud verbal stimuli
3- If no response shout for help
4- Open the air way by head tilt and chin lift or jaw thrust
5- Check for response :
   - ❖ Look for chest movement
   - ❖ Listen for abnormal sound
   - ❖ Feel for respiration by putting your cheek near the patient's mouth
6- Hold the infant in prone position over your hand and deliver five back blows between the scapulae (Use the upright position in older children)
7- If no response place the infant in a supine position. Give up to five thrusts to the sternum by two fingers vertically about one finger above the xiphisternum (In children over one year deliver up to five abdominal thrusts).
8- If no response also hold the infant in prone position over your hand and deliver 5 back blows between the scapulae (Use the upright position in older children)



11- If no response deliver 5 rescue breathings :
   - ➢ In infant : no neck extension breathing from mouth and nose
   - ➢ In older children : do neck extension and close the nose
12- Check pulse for response (brachial in infant and carotid in older children) for 10 second multiply x 6
13- If bradycardia or no response do CPR
14- CPR 15:2
   - ❖ In infant : by two methods
     1) By two thumbs above lower third of the sternum about 1 finger and press up to one third of AP diameter of chest wall
     2) By two fingers above lower third of the sternum about 1 finger and press up to one third of AP diameter of chest wall
   - ❖ for children use heel of your hand




15- If there is response put the child in recovery position (left later position)

Intraosseous Access:

Features of IO infusion:

- ❖ used when intravascular access cannot be obtained
- ❖ Rapidly and easily inserted
- ❖ Low complication rate
- ❖ Roughly has the same absorption rate as iv access
- ❖ Safe with resuscitation medications
- ❖ Not for long term use (usually 24-48 hrs)
- ❖ Require less skill and practice than central and umbilical line placement
- ❖ Recommended in <6 yrs but can be used in all age groups

Procedure:

1- Prepare the necessary equipment, i.e.:
— bone marrow aspiration or intraosseous needles (15–18 gauge or, if not available, 21 gauge). If these are not available, large-bore hypodermic or butterfly needles can be used in young children
— antiseptic solution and sterile gauze to clean the site
— a sterile 5-ml syringe filled with normal saline
— a second sterile 5-ml syringe
— IV infusion equipment
— sterile gloves.

2- Place padding under the child's knee so that it is bent 30° from the straight (180°) position, with the heel resting on the table.

3- Locate the correct position (described above and shown in the illustration).

4- Wash the hands and put on sterile gloves.

5- Clean the skin over and surrounding the site with an antiseptic solution.

6- Stabilize the proximal tibia with the left hand (this hand is now not sterile) by grasping the thigh and knee above and lateral to the cannulation site, with the fingers and thumb wrapped around the knee but not directly behind the insertion site.

7- Palpate the landmarks again with the sterile glove (right hand).

8- Insert the needle at a 90° angle with the bevel pointing towards the foot.
Advance the needle slowly using a gentle but firm, twisting or drilling motion.

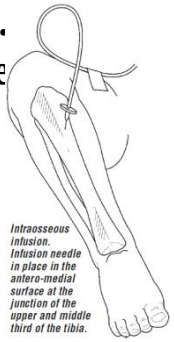
9- Stop advancing the needle when you feel a sudden decrease in resistance
or when you can aspirate blood. The needle should now be fixed in the bone.

10- Remove the stylet.

11- Aspirate 1 ml of the marrow contents (looks like blood), using the 5-ml syringe, to confirm that the needle is in the marrow cavity.

12- Attach the second 5-ml syringe filled with normal saline.

13- Stabilize the needle in place in the antero-medial surface at the junction of the upper and middle third of the tibia.
and slowly inject 3 ml while palpating the area for any leakage under the skin. If no infiltration is seen, start the infusion.


Intraosseous infusion. Infusion needle in place in the antero-medial surface at the junction of the upper and middle third of the tibia.

14- Apply dressings and secure the needle in its place.
Note: Failure to aspirate marrow contents does not mean that the needle is not correctly placed.

15- Monitor the infusion by the ease with which the fluid flows and by the clinical response of the patient.

16- Check that the calf does not swell during the infusion.
Stop the intraosseous infusion as soon as venous access is available. In any case, it should not continue for more than 8 hours.

Complications:

1- Incomplete penetration of the bony cortex
Signs: The needle is not well fixed; infiltration occurs under the skin.

2- Penetration of the posterior bone cortex (more common)
Signs: Infiltration occurs, calf becomes tense.

3- Infection Cellulites at the site of the infusion, osteomyelitis

4- Compartmental syndrome

5- Hematoma

6- Fracture

Note: you need to read about Contrindication of intraosseoss infusion

Measurement of blood pressure:

WIPE

Ask about patient's name , age and sex

1- Inform the child and the mother that you will measure the blood pressure
2- The child must be relaxed in sitting position if can sit
3- Choose a suitable cuff by:
   - ❖ Measuring the length of the arm from acromion to olecranon
   - ❖ Calculate two thirds of this length
   - ❖ Measure the width of the cuff and connect it with the sphygmomanometer
4- Apply the cuff to the arm, ensuring that it fits securely.
5- Localize the brachial artery at about 2 cm above the cubital fossa.
6- The level of the arm (cubital fossa) must be at the level of the heart
7- Palpate brachial pulse and Inflate the cuff till the pulse disappears
8- Inflate the cuff to 20-30 mmHg more than that point. You can estimate the systolic blood pressure by palpating the brachial or radial artery pulse and inflating the cuff until you can no longer feel it.
9- Place the stethoscope over the brachial artery pulse, ensuring that it does not touch the cuff. and start to deflate the cuff slowly 2-3mm/sec.
10- Record the points when the sound appears and disappears as systolic and diastolic blood pressure
11- Measure the height of the patient and plot it on the centile chart
12- plot your reading on special chart for blood pressure
13- You also should mention that you need to measure blood pressure in other hand and in standing position.

After the procedure

14- Ensure that the patient is comfortable.
15- Tell the child or the mother about the blood pressure and explain its significance. Hypertension can only be confirmed through several blood pressure measurements taken over time.
16- Thank the patient.

Procedures:

Phototherapy

WIPE

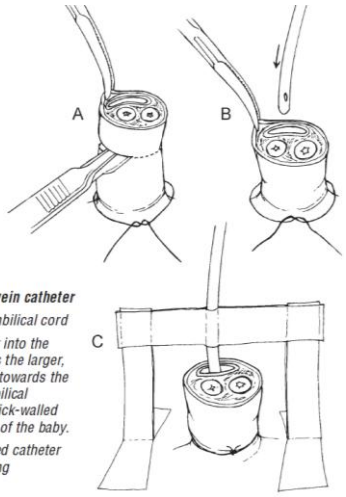
Ask about name and age

1. **Confirm the indication**
   - ❖ **Jaundice on day 1**
   - ❖ **Deep jaundice involving palms and soles of the feet**
   - ❖ **Prematurity and jaundice**
   - ❖ **Jaundice due to haemolysis**
2. **Admission**
3. **The child must be naked**
4. **The eyes are Covered**
5. **Place the child under the phototherapy (wave length 450 nm)**
6. **The distance is 50 cm**
7. **Operate the device**
8. **Advice the mother to change the position of the baby**
9. **Encourage breast feeding every 2 hrs**
10. **Measures TSB every 6 hrs**
11. **Seek for complications like**
    - ❖ **Skin rash**
    - ❖ **Dehydration: so the child need more fluid than" the usual maintenance volumes"**
    - ❖ **Hyperthermia**
    - ❖ **Hypothermia**
    - ❖ **Diarrhea**
12. **Continue phototherapy until serum bilirubin level is lower than threshold range or until baby is well and there is no jaundice of palms and soles. If the bilirubin level is very elevated and you can safely do exchange transfusion, consider doing so.**

Exchange transfusion:

Ask about name, age

1- **See if there is indication for exchange**
2- **Prepare the instrument and calcium and warm fresh compatible blood**
3- **Call for an assistant**
4- **At room temperature 25 C**
5- **Under aseptic technique**
6- **Wash your hands and wear gloves**
7- **Catheterize umbilical vein (As in figure below)**
8- **Draw 20 ml of blood in term and 10 ml in preterm baby and replace it with the donar blood then repeat the process**
9- **The total volume that must be exchanged is 80-85 ml/kg x 2**
10- **Inject calcium 1cc after each 100 ml of blood**
11- **Look for any allergy or complication**



Inserting an umbilical vein catheter
A. Preparation of the umbilical cord
B. Inserting the catheter into the umbilical vein. This is the larger, thin walled structure towards the head. Note the 2 umbilical arteries, which are thick-walled and towards the legs of the baby.
C. Fixation of the inserted catheter which prevents kinking

- **Acute complication (5-10 %)**
  1) **transient bradycardia**
  2) **Apnea**
  3) **Cyanosis**
  4) **Transient vasospasm**

- **Late**
  1) **Infection (CMV, HIV,Hepatitis)**
  2) **Anemia**
  3) **Cholestasis**
  4) **Mild graft versus host reaction, diarrhea, Rash, hepatitis, eosinophlia**
  5) **Inspissated syndrome**
  6) **Portal vein thrombosis**

12- **After finishing the process remove the transfusion set but not the catheter because you may need it for further transfusion.**

Ventolin nebulizer:

1) **Place the air compressor on a sturdy surface that will support its weight plug the cord from the compressor into properly grounded (three prong) electrical outlet.**
2) **Wash your hands with soap and water and dry completely with a clean towel.**
3) **Carefully measure the medicine exactly as you have been instructed. use a separate syringe for each medicine**
4) **see the expire date of the drug**
5) **the average dose for a single treatment is (0.25 to 2.5 mg of salbutamol) diluted in 2-5 ml of sterile normal saline**
6) **remove the top part of the nebulizer cup.**
7) **Place the medicine in the bottom of the nebulizer cup.**
8) **Attach the top portion of the nebulizer cup and connect the mouthpiece or face mask to the cup**
9) **Connect the tubing to both the aerosol compressor and nebulizer cup.**
10) **Turn on the compressor with the on/off switch. Once you turn on the compressor you should see a light , mist coming from the back of the tube opposite the mouthpiece**
11) **Let the pt. sit up straight on a comfortable chair**
12) **If you are using a mask , position it comfortably and securely on the face**
13) **If you are using a mouth piece place it between the pt. teeth and lips around it.**
14) **Take slow , deep breaths through the mouth , if possible , hold each breath for two to three second before breathing out, this allow the medication to settle into the airways**
15) **Continue the treatment for 7-10 minutes**
16) **Turn the compressor off**
17) **Ask the pt. to take several deep breath and cough**
18) **Wash your hands with warm water and soap and dry them with dry towel.**

Care for nebulizer

1. after each treatment rise the nebulizer cup with warm water ,shake off excess water and let it air dry

2.at the end of each day , the nebulizer cup , mask or mouth piece should be washed in warm , soapy water

3.no need to clean the tube that connect the nebulizer to the air compressor

4. every third day , after washing your equipment disinfect the equipment using a vinegar/water solution or other disinfectant solution

Blood transfusion

1- Name , Age of the patient
2- weight of the patient
3- Confirm the indication of transfusion
4- type of transfusion
5- See the blood is the correct group and the patient's name and number are on both the label and the form calculate the volume you need
6- see the blood transfusion bag for any leaks
7- the blood pack has not been out of the refrigerator for more than 2 hours, the plasma is not pink , and the red cells do not look purple or black
8- any signs of heart failure. If present, give 1mg/kg of furosemide IV at the start of the transfusion in children whose circulating blood volume is normal. Do not inject into the blood pack.

During transfusion:

1- record the time of start of transfusion
2- if available, use an infusion device to control the rate of the transfusion
3- check that the blood is flowing at the correct speed
4- look for signs of a transfusion reaction particularly carefully in the first 15 minutes of the transfusion
5- Observe and record the child's general appearance, temperature, pulse and respiratory rate, urine output, urine color , skin rash every 30 minutes

After transfusion:

- record the time the transfusion was started and ended, the volume of blood transfused, and the presence of any reactions.
- Reassess the child. If more blood is needed, a similar quantity should be transfused and the dose of furosemide (if given) repeated.

Note: Desferal pump and its use is very important subject so Please read about it.

Family counseling:

Note : the following information are taken from the portfolios of previous years with slight modifications.

Febrile convulsion:

- **Inform parents that these dramatic events do not indicate future neurologic dysfunction or disease& There is no evidence that they cause death, brain damage, epilepsy, mental retardation, a decrease in IQ, or learning difficulties**
- **also inform them Febrile seizures are age dependent & rarely occur after 6 year old.**
- **Educate the parents what to do during seizure :**

- **leave the child on the floor.**
- **slide a blanket under the child if the floor is hard.**
- **Move him only if he is in a dangerous location.**
- **Remove objects that may injure him.**
- **Loosen any tight clothing, especially around the neck. If possible, open or remove clothes from the waist up.**
- **If he vomits, or if saliva and mucus build up in the mouth, turn him on his side or stomach. This is also important if it looks like the tongue is getting in the way of breathing.**
- **Don't try to force anything into his mouth to prevent him from biting the tongue, as this increases the risk of injury.**
- **Don't try to restrain their child or try to stop the seizure movements.**
- **If possible try to time the seizure using watch or a clock. Because they're so alarming, seizures often seem to last longer than they really do**
- **Also try to note which part of child's body begins to shake first, and look for other signs of illness.**
- **Focus their attention on bringing the fever down:**

    - **Insert an acetaminophen suppository (if have some) into the child's rectum.**
    - **DO NOT try to give anything by mouth.**
    - **Apply cool Washcloths to the forehead and neck. Sponge the rest of the body with lukewarm (not cold) water. Cold water may make the fever worse.**

- **After the seizure is over and child is awake, give the normal dose of ibuprofen or acetaminophen.**

❖ **When to Contact a Medical Professional:**

- **If the seizure is lasting several minutes bring the child to the hospital.**
- **if repeated seizures occur during the same illness, or if this looks like a new type of seizure for your child.**
- **if other symptoms occur before or after the seizure, such as:**

1) **Abnormal movements**
2) **Agitation**
3) **Confusion**
4) **Drowsiness**
5) **Nausea**
6) **Problems with coordination**
7) **Rash**
8) **Sedation**
9) **Tremors**

❖ **Possible Complications**

- **Biting oneself**
- **Breathing fluid into the lungs, pneumonia**
- **Complications if a serious infection, such as meningitis, caused the fever**
- **Injury from falling down or bumping into objects**
- **Injury from long or complicated seizures**
- **Seizures not caused by fever**
- **Side effects of medications used to treat and prevent seizures (if prescribed)**

❖ **prognosis: Febrile seizures are not associated with reduction in later intellectual performance, and most children with febrile seizures have only a slightly greater risk of later epilepsy than the general population. Factors that are associated with a substantially greater risk of later epilepsy include the presence of complex features during the seizure or postictal period, a positive family history of epilepsy, an initial febrile seizure before 12 mo of age, delayed developmental milestones, or a pre-existing neurologic disorder. The risk of epilepsy is much higher than in the general population in children with one or more complex febrile seizures, especially if the seizures are focal in children with an underlying neurologic disorder. The incidence of epilepsy is >9% when several risk factors are present, compared with an incidence of 1% in children who have febrile convulsions and no risk factors.**

Diabetic ketoacidosis (DKA):

- The child's family must understand clearly that diabetes is a life long illness and their child must be kept on insulin for the rest of his life.
- one should emphasize that insulin is not harmful and must not discontinued by the family also education about herbal medicine and traditional medicine which causes a significant proportion of poor compliance to treatment
- The parent must also have an idea about the Long-term complications of DM1 which include retinopathy, nephropathy, neuropathy, and macrovascular disease.
- Before hospital discharge, the family and child must show competence in glucose monitoring
- insulin administration including how to calculate the dose of insulin ,how to give subcutaneous injections ,the site of injection(thigh, abdomen ,arms ….etc)
- this site should be periodically ;
- various aspects of nutrition, especially related to carbohydrate intake instruction must be given so that the family understand that no diet apart from refined sugar is restricted (refined sugar is allowed once or twice monthly or if the child is participating for example in a birthday party provided that the insulin dose is increased)
- the ideal diet consist of carbohydrates 50% to 65% of the total calories; protein, 12% to 20%; and fat, less than 30%. Saturated fat should contribute less than 10% of the total caloric intake, and cholesterol intake should be less than 300 mg/24 hours.
- High fiber content is recommended because it improve glycemic control
- recognition and management of hypoglycemia(Symptoms of hypoglycemia include headache, visual changes, confusion, irritability, or

seizures tremors, tachycardia, diaphoresis, or anxiety) and hyperglycemia; when and how to check for urinary ketones; and what to do during intercurrent illnesses .

- ❖ The child must be given close follow-up care in the outpatient clinic and by telephone and be given 24-hour access to a physician in the event of an emergency.
- ❖ Families need clear guidelines on when and how to call for help. In the early stages, many families need daily telephone calls for reassurance, to assess glucose control, and to adjust the insulin regimen.
- ❖ A visiting home health nurse can help assess the family's management skills and facilitate the transition to outpatient therapy.
- ❖ Also they must be told that exercise in controlled D.M reduce insulin requirement by 10%
- ❖ After the initial period the child must be followed every 3-4 month with screening for possible complication of diabetes.

❖ Prognosis

T1DM is a serious, chronic disease. It has been estimated that the average life span of individuals with diabetes is about 10 yr shorter than that of the non diabetic population. Although diabetic children eventually attain a height within the normal adult range, puberty may be delayed, and the final height may be less than the genetic potential

Note: counseling to family about insulin injection and storage it's so important and frequently Coming in OSCE so please read about it.

Nephrotic syndrome

You should tell the family these facts and advices:

- Nephrotic syndrome is not infectious. May be hereditary.
- High percentage of patient will not achieve complete remission
- The child should be bring to the medical attention if he develops abdominal pain, fever, or look ill.
- Diet:
  - Should provide adequate energy & protein.
  - Sodium restriction participates in reduction of edema.
  - Fluid restriction per se is not required.

- Micronutrient supplement: - According to the condition of the patient may need supplement with iron , vitamin D ,Ca

- Activity: There are no activity restrictions for patients with nephrotic syndrome. Ongoing activity, rather than bed rest, will reduce the risk of blood clots.
- Vaccinations should be taken: -

  - Yearly influenza vaccination is recommended to prevent serious illness in the immunocompromised patient, as well as to prevent this possible trigger of relapse.
  - Pneumococcal vaccination should be administered to all patients with INS upon presentation. Vaccination should be repeated every 5 years while the patient continues to have relapses.
  - Routine childhood vaccines with live virus strains are contraindicated during steroid therapy and for a minimum of 1 month afterward. Care must be taken in administering live viral vaccines to children in remission from FRNS, who might need to restart steroid therapy shortly after vaccination.
  - Because of the high risk of varicella infection in the immunocompromised patient, post exposure prophylaxis with varicella-zoster immune globulin is recommended in the non immune patient. Patient with varicella-zoster infection should be treated with acyclovir and carefully monitored. Varicella immunization is safe and effective in patients with INS who are in remission and off steroid treatment (with the usual precautions for administering live viral vaccines to patients who have received steroids).
  - Routine non live viral vaccines should be administered according to their recommended schedules. Despite the former belief that routine

immunization can trigger relapse of nephrotic syndrome, no solid evidence supports this, and the risk of these preventable childhood illnesses exceeds the theoretical, unproven risk for triggering relapses.

- Explain to the parents about the possible complications of the disease and the side effects of the treatment .

- **Long-term monitoring**

  - Ambulatory monitoring of the child's condition and response to treatment is a very important aspect of the overall management of nephrotic syndrome.
  - Home monitoring of urine protein and fluid status is an important aspect of management.
  - Parents and/or caregivers should be trained to monitor first morning urine proteins at home with urine dipstick.
  - Weight should be checked every morning as well and a home logbook should be kept recording the patient's daily weight, urine protein, and steroid dose if the child is receiving steroids.

- Families and patients are instructed to call for any edema, weight gain, or urine testing 2+ or more for protein for more than 2 days. Rapid detection of relapse of proteinuria by home testing of urine can allow early initiation of steroid treatment before edema and other complications develop. Urine testing at home is also useful in monitoring response (or non response) to steroid treatment.

Bronchial asthma

- Asthma is not an infectious disease
- Lifestyle and home remedies:

Taking steps to reduce your child's exposure to his or her asthma triggers will lessen the possibility of asthma attacks. Steps to help avoid triggers vary depending on what triggers your child's asthma. Here are some things that may help:

- Maintain low humidity at home.
- Keep indoor air clean.
- Reduce pet dander. If your child is allergic to dander, it's best to avoid pets with fur or feathers. Regularly bathing or grooming your pets also may reduce the amount of dander in your surroundings.
- Use your air conditioner. Air conditioning helps reduce the amount of airborne pollen and lowers indoor humidity and can reduce your child's exposure to dust mites. If you don't have air conditioning, try to keep your windows closed during pollen season.
- Make your home more asthma friendly. Minimize dust that may aggravate nighttime symptoms by replacing certain items in your bedroom. For example, encase pillows, mattresses and box springs in dust-proof Covers. Consider removing carpeting and installing hard flooring, particularly in your child's bedroom. Use Washable curtains and blinds.
- Clean regularly. Clean your home at least once a week to remove dust and allergens.
- Reduce your child's exposure to cold air. If your child's asthma is worsened by cold, dry air, wearing a face mask outside can help.

- Make treatment a regular part of life. If your child has to take daily medication, don't make a big deal out of it , it should be as routine as eating breakfast or brushing teeth.
- Make sure your child gets exercise. Don't let asthma sideline your child. Regular exercise reduces symptoms and is important for your child's overall health. With

asthma under control, there should be no limit to your child's physical activity level.

- Help your child to maintain a healthy weight. Being overweight can worsen asthma symptoms, and it puts your child at risk of other health problems.

- Regular clinic visit 2-4 per year to maintain good control to check up
- Treatment of co-morbid condition (sinusitis, rhinitis ,Gastroesophageal reflux).
- Prognosis

  The prognosis for asthma is good, especially for children with mild disease. Of asthma diagnosed during childhood, 54% of cases will no longer carry the diagnosis after a decade. The extent of permanent lung damage in people with asthma is unclear. Airway remodeling is observed, but it is unknown whether these represent harmful or beneficial changes. Although conclusions from studies are mixed, most studies show that early treatment with glucocorticoids prevents or ameliorates decline in lung function as measured by several parameters. For those who continue to suffer from mild symptoms, corticosteroids can help most to live their lives with few disabilities. It is more likely to consider immediate medication of inhaled corticosteroids as soon as asthma attacks occur. According to studies conducted, patients with relatively mild asthma who have received inhaled corticosteroids within 12 months of their first asthma symptoms achieved good functional control of asthma after 10 years of individualized therapy as compared to patients who received this medication after 2 years (or more) from their first attacks. Though they (delayed) also had good functional control of asthma, they were observed to exhibited slightly less optimal disease control and more signs of airway inflammation. Asthma mortality has decreased over the last few decades due to better recognition and improvement in care.

Breast feeding

1. الرضاعة الطبيعية مفيدة للرضيع وللأم
2. يجب ان تبدأ الرضاعة في أول ساعة بعد الولادة
3. وتستمر بالرضاعة كلما بكى الطفل وعلى الأقل 8 مرات في اليوم الواحد
4. لا تنسى الرضاعة أثناء الليل
5. يجب ان تغسل الأم يديها قبل وبعد الرضاعة ولا حاجة لغسل الثدي فقط الاعتماد على الحمام اليومي
6. الرضاعة يجب ان تكون فقط من الصدر دون الحاجة الى الماء حتى لمدة 6 اشهر
7. طريقة الرضاعة:

- يجب ان تجلس الأم على كرسي مع وضع شيء لرفع قدميها وتضع إحدى يديها لإسناد الطفل والأخرى تمسك بالثدي
- وان تضع الطفل في حضنها بحيث يصل الى الثدي بسهولة
- جسم الطفل يجب ان يكون بخط مستقيم مع رأسه
- ان تدخل كل حلمة الثدي وما يحيط بها في فم الطفل
- ان يقوم الطفل بالرضاعة من احد الثديين لمدة كافية قبل الانتقال الى الثدي الأخر
- مراقبة الطفل أثناء الرضاعة للانتباه لأي مضاعفات أو اختناق

❖ عند الشعور بأي مشاكل في الثدي يجب مراجعة اقرب طبيب

- عند الإنتهاء من الرضاعة تضع الطفل في حضنها أو على كتفها وتربّت على ظهره
- عدم استخدام الملهية أو قنينة الرضاعة
- ملاحظة نوم الطفل اكتسابه للوزن وإدراره وخروجه
- بعد ستة اشهر تبدأ الأم بإعطاء أغذية تكميلية أخرى الى الطفل
  - تبدأ بالأغذية شبه السائلة كماء الرز وحبوبهِ المدعّمة بالحديد.
  - بعد ذلك تبدأ بإضافة الخضروات ، الفواكه، وأخيرا البيض واللحوم
  - هذه الأغذية يجب أن تعطى في وقت غير وقت الرضاعة
  - البداية تكون بملعقة كوب ومن ثم ملعقة طعام أو أكثر بالتناسب مع عمر الطفل
  - يجب البدء أولا بنوع واحد من الطعام ومن ثم إعطاء غذاء أخر كل 3-4 أيام لمراقبة أي حساسية أو ما شابه
- تستمر الرضاعة الطبيعية لمدة سنتين

Note: you need to read something about the difference between bottle and breast feeding

Appendices

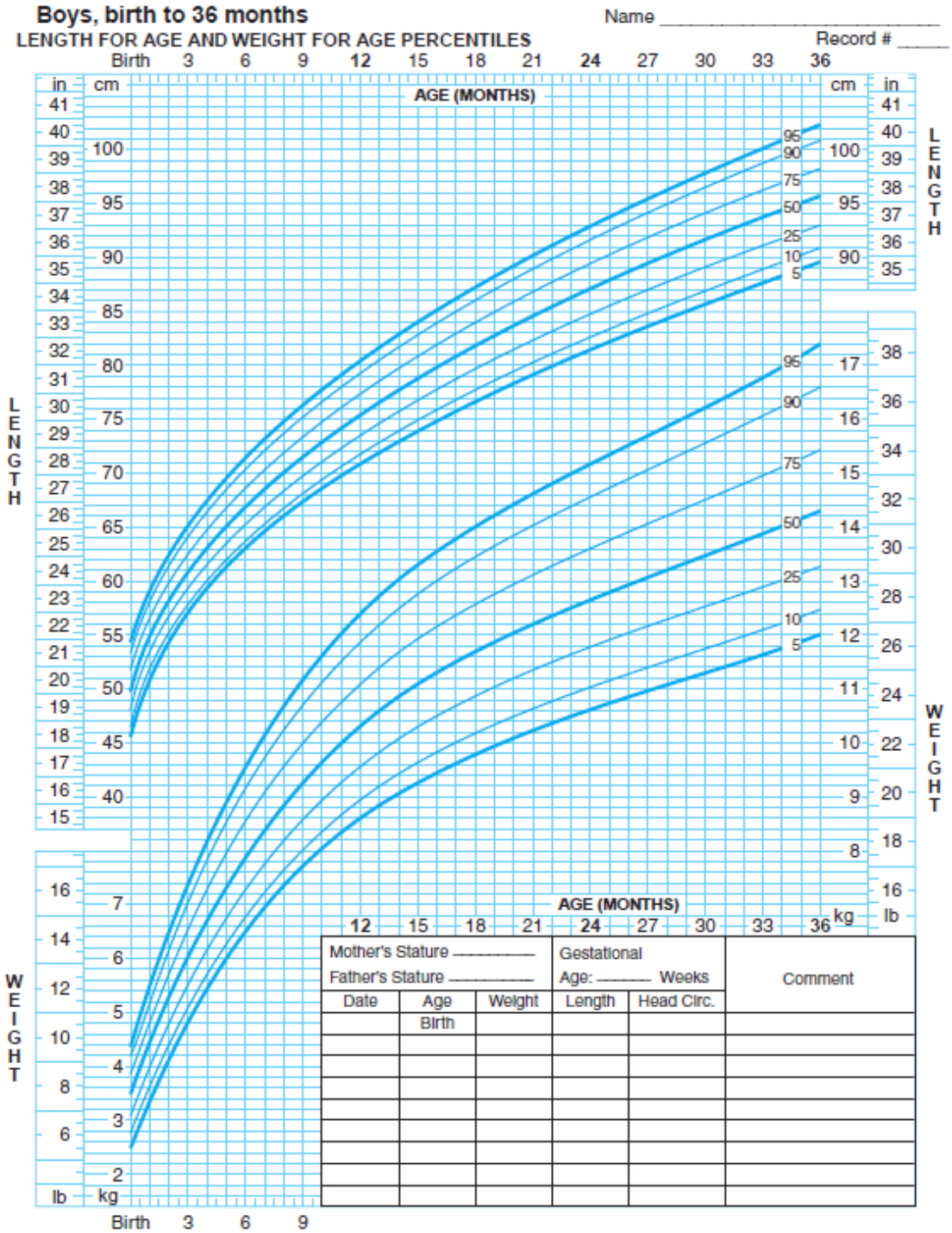


Chart 1 : Percentile standards for length for age and weight for age in boys, birth to age 36 months. (Centers for Disease Control and Prevention.)

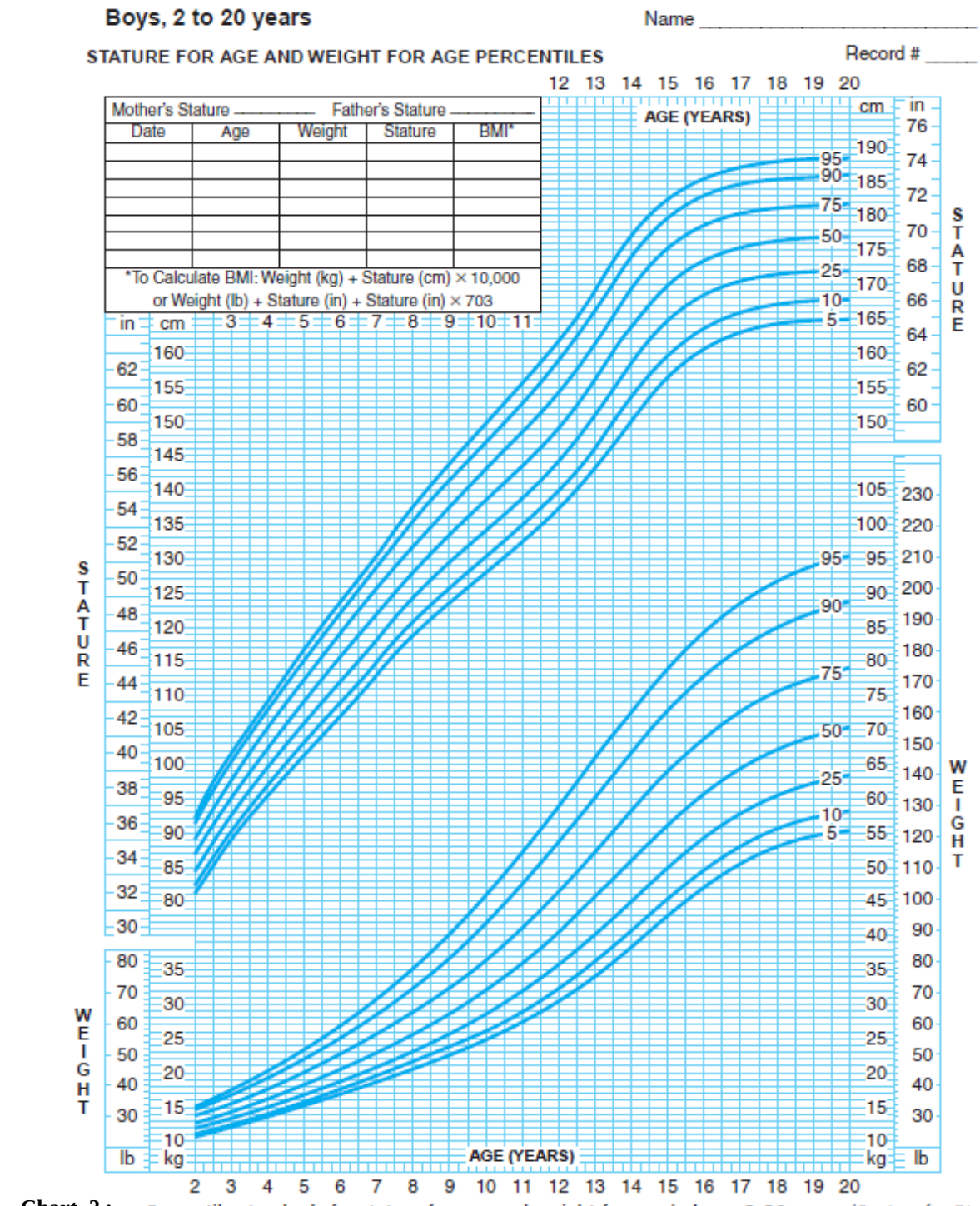


Chart 2 : Percentile standards for stature for age and weight for age in boys, 2–20 years. (Centers for Disease Control and Prevention.)

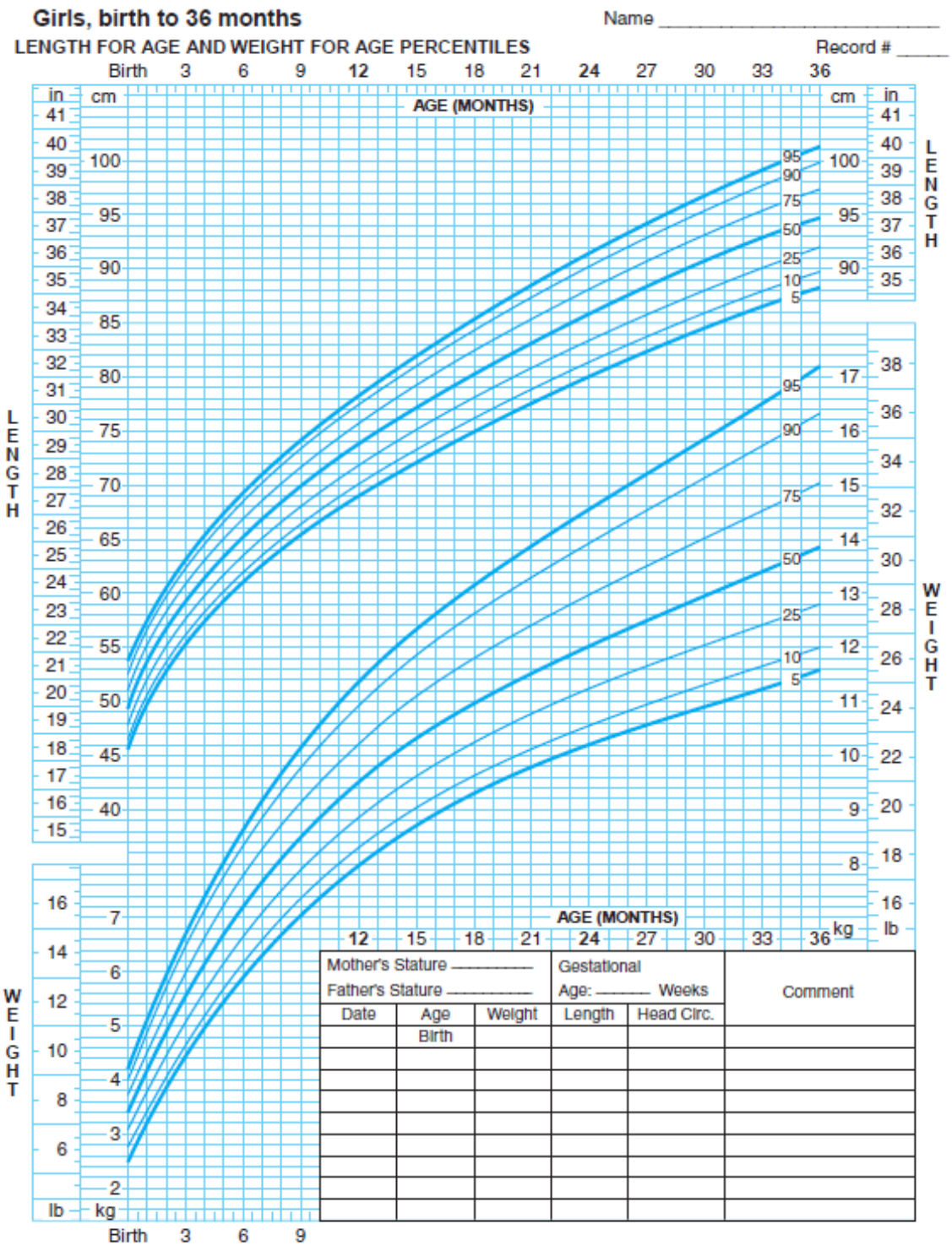


Chart 3 : Percentile standards for length for age and weight for age in girls, birth to age 36 months. (Centers for Disease Control and Prevention.)

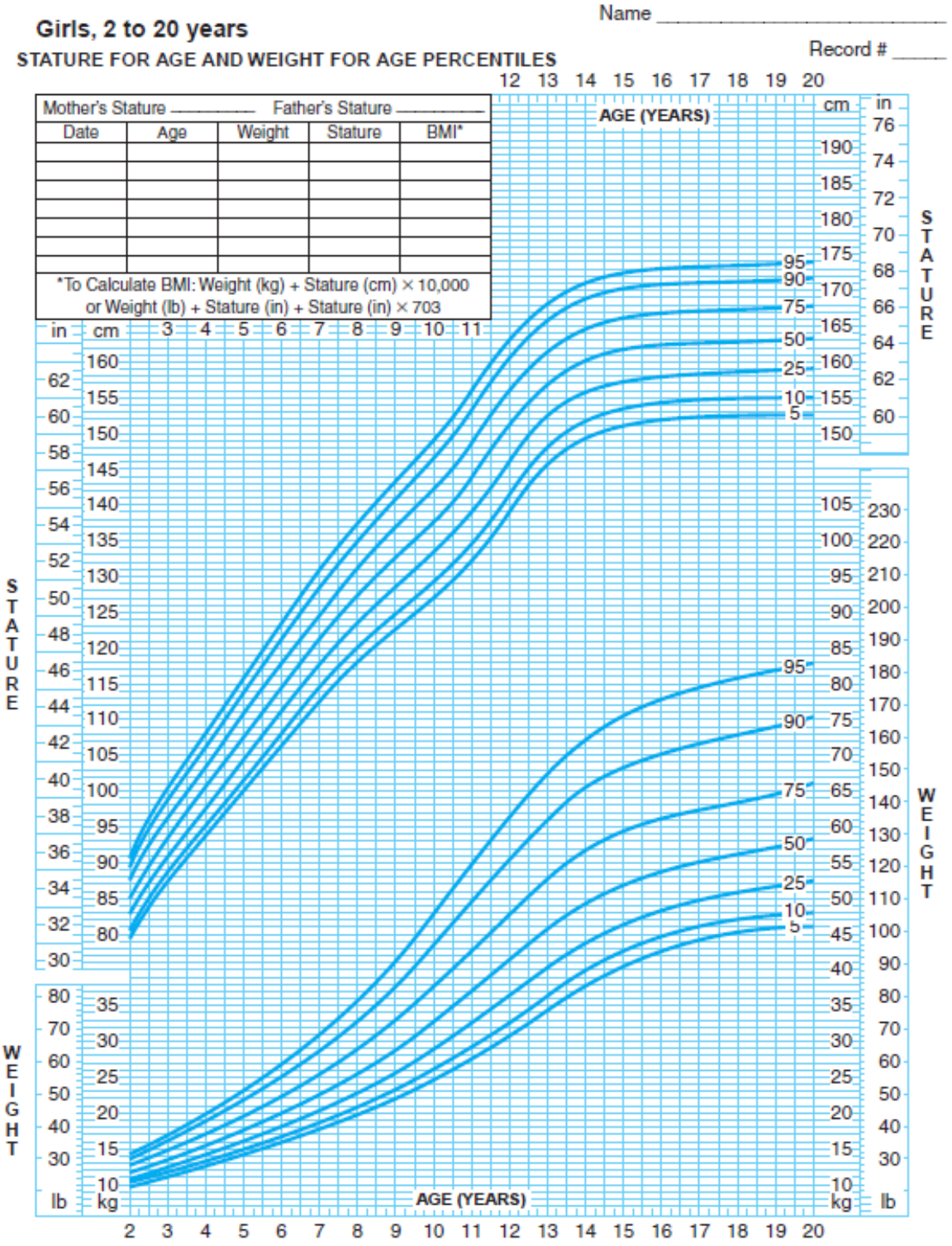


Chart 4 : Percentile standards for stature for age and weight for age in girls, 2–20 years. (Centers for Disease Control and Prevention.)

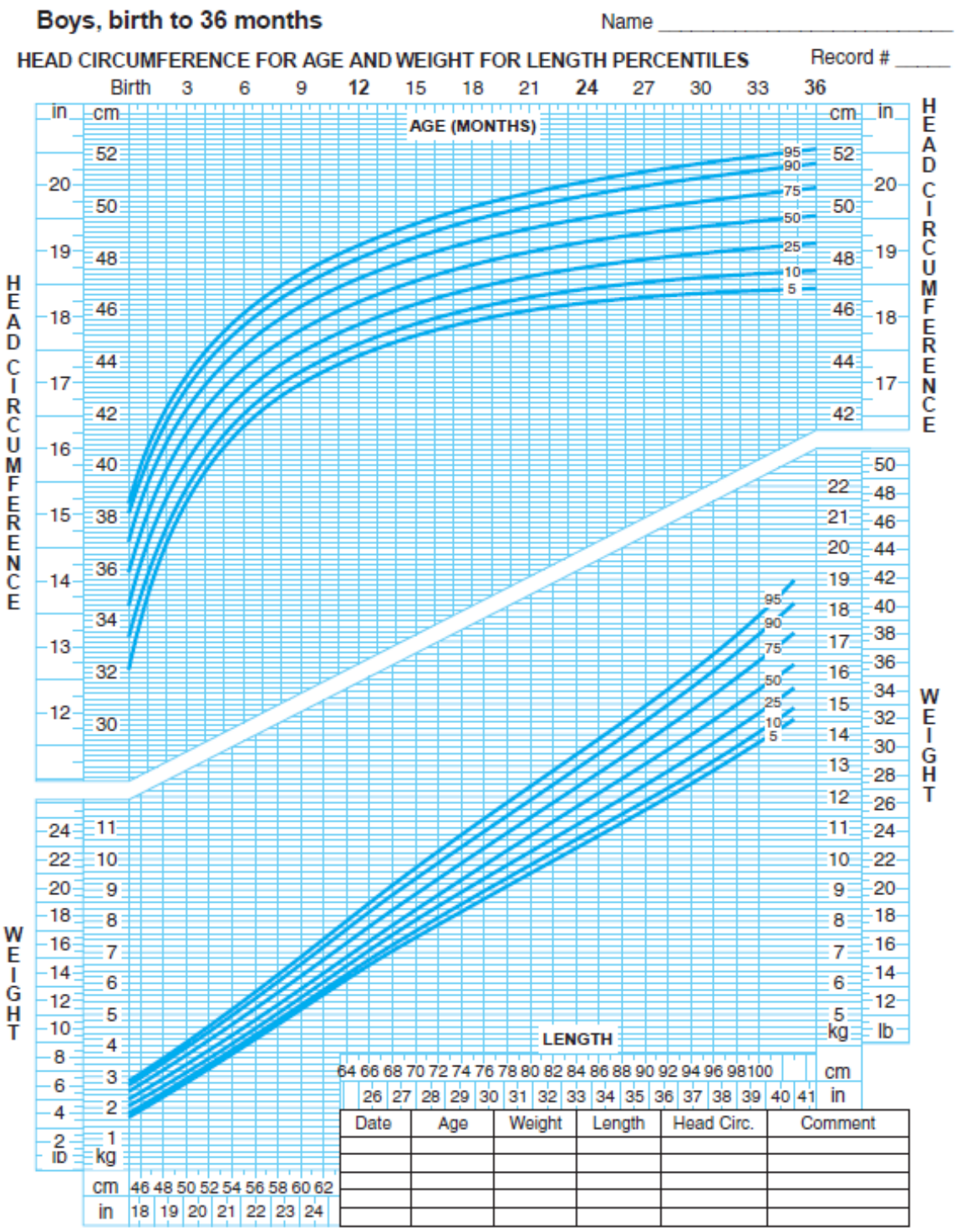


Chart 5 : Percentile standards for head circumference for age and weight for length in boys, birth to age 36 months. (Centers for Disease Control and Prevention.)

Assessing nutritional status

Calculating the child's weight-for-age

- Locate the row containing the child's age in the central column of Table 7 .
- Look to the left in that row for boys, and to the right for girls.
- Note where the child's weight lies with respect to the weights recorded in this row.
- Look up the adjacent column to read the weight-for-age of the child.

Example 1: Boy: age 5 months, weight 5.3 kg; He is between -2 and -3 SD

Example 2: Girl: age 27 months, weight 6.5 kg; She is less than -4 SD.

Table 7 *Weight-for-age*

Boys' weight (kg)					Age	Girls' weight (kg)				
-4SD	-3SD	-2SD	-1SD	Median	(months)	Median	-1SD	-2SD	-3SD	-4SD
1.63	2.04	2.45	2.86	3.27	**0**	3.23	2.74	2.24	1.75	1.26
1.55	2.24	2.92	3.61	4.29	**1**	3.98	3.39	2.79	2.19	1.59
1.76	2.62	3.47	4.33	5.19	**2**	4.71	4.03	3.35	2.67	1.99
2.18	3.13	4.08	5.03	5.98	**3**	5.40	4.65	3.91	3.16	2.42
2.73	3.72	4.70	5.69	6.68	**4**	6.05	5.25	4.46	3.66	2.87
3.34	4.33	5.32	6.31	7.30	**5**	6.65	5.82	4.98	4.15	3.31
3.94	4.92	5.89	6.87	7.85	**6**	7.21	6.34	5.47	4.60	3.73
4.47	5.44	6.41	7.37	8.34	**7**	7.71	6.80	5.90	5.00	4.09
4.92	5.89	6.85	7.82	8.78	**8**	8.16	7.22	6.29	5.35	4.42
5.30	6.27	7.24	8.21	9.18	**9**	8.56	7.59	6.63	5.66	4.70
5.62	6.60	7.58	8.56	9.54	**10**	8.92	7.92	6.93	5.93	4.94
5.88	6.88	7.87	8.87	9.86	**11**	9.24	8.22	7.20	6.17	5.15

CALCULATING THE CHILD'S WEIGHT-FOR-AGE

Boys' weight (kg)					Age	Girls' weight (kg)				
-4SD	-3SD	-2SD	-1SD	Median	(months)	Median	-1SD	-2SD	-3SD	-4SD
6.09	7.11	8.12	9.14	10.15	**12**	9.53	8.48	7.43	6.39	5.34
6.26	7.30	8.34	9.38	10.41	**13**	9.79	8.72	7.65	6.57	5.50
6.40	7.46	8.53	9.59	10.65	**14**	10.03	8.93	7.84	6.74	5.64
6.51	7.60	8.69	9.78	10.87	**15**	10.25	9.13	8.01	6.89	5.78
6.60	7.72	8.84	9.96	11.08	**16**	10.45	9.31	8.17	7.04	5.90
6.68	7.83	8.98	10.13	11.28	**17**	10.64	9.49	8.33	7.18	6.02
6.76	7.93	9.11	10.29	11.47	**18**	10.83	9.65	8.48	7.31	6.14
6.83	8.04	9.25	10.45	11.66	**19**	11.01	9.82	8.64	7.46	6.27
6.91	8.15	9.38	10.61	11.85	**20**	11.19	9.99	8.80	7.60	6.41
7.00	8.26	9.52	10.78	12.04	**21**	11.37	10.16	8.96	7.75	6.54
7.08	8.37	9.65	10.94	12.22	**22**	11.55	10.33	9.12	7.90	6.68
7.17	8.48	9.79	11.10	12.41	**23**	11.73	10.50	9.28	8.05	6.82
7.84	8.97	10.09	11.22	12.34	**24**	11.80	10.62	9.45	8.28	7.10
7.85	9.03	10.20	11.37	12.54	**25**	12.01	10.81	9.61	8.40	7.20
7.87	9.09	10.30	11.52	12.74	**26**	12.23	10.99	9.76	8.53	7.29
7.89	9.15	10.41	11.68	12.94	**27**	12.43	11.17	9.91	8.65	7.39
7.91	9.22	10.52	11.83	13.13	**28**	12.63	11.35	10.06	8.77	7.48
7.94	9.28	10.63	11.98	13.33	**29**	12.83	11.52	10.21	8.89	7.58
7.97	9.36	10.74	12.13	13.52	**30**	13.03	11.69	10.35	9.01	7.67
8.00	9.43	10.85	12.28	13.71	**31**	13.22	11.85	10.49	9.13	7.76
8.04	9.51	10.97	12.43	13.89	**32**	13.40	12.01	10.63	9.24	7.85
8.09	9.58	11.08	12.58	14.08	**33**	13.58	12.17	10.76	9.35	7.94
8.13	9.66	11.20	12.73	14.26	**34**	13.76	12.33	10.90	9.46	8.03
8.18	9.75	11.31	12.88	14.44	**35**	13.93	12.48	11.03	9.57	8.12
8.24	9.83	11.43	13.03	14.62	**36**	14.10	12.63	11.15	9.68	8.21
8.29	9.92	11.55	13.18	14.80	**37**	14.27	12.78	11.28	9.79	8.29
8.35	10.01	11.67	13.32	14.98	**38**	14.44	12.92	11.41	9.89	8.38
8.42	10.10	11.79	13.47	15.16	**39**	14.60	13.06	11.53	9.99	8.46
8.48	10.19	11.91	13.62	15.33	**40**	14.76	13.20	11.65	10.10	8.54
8.55	10.29	12.03	13.77	15.51	**41**	14.91	13.34	11.77	10.20	8.62
8.62	10.39	12.15	13.91	15.68	**42**	15.07	13.48	11.89	10.29	8.70
8.70	10.48	12.27	14.06	15.85	**43**	15.22	13.61	12.00	10.39	8.78
8.77	10.58	12.40	14.21	16.02	**44**	15.37	13.74	12.12	10.49	8.86
8.85	10.68	12.52	14.35	16.19	**45**	15.52	13.88	12.23	10.58	8.94
8.93	10.79	12.64	14.50	16.36	**46**	15.67	14.00	12.34	10.68	9.01
9.01	10.89	12.77	14.65	16.53	**47**	15.81	14.13	12.45	10.77	9.09

CALCULATING THE CHILD'S WEIGHT-FOR-AGE

Boys' weight (kg)					Age	Girls' weight (kg)				
-4SD	-3SD	-2SD	-1SD	Median	(months)	Median	-1SD	-2SD	-3SD	-4SD
9.10	11.00	12.90	14.79	16.69	**48**	15.96	14.26	12.56	10.86	9.16
9.18	11.10	13.02	14.94	16.86	**49**	16.10	14.39	12.67	10.95	9.23
9.27	11.21	13.15	15.09	17.03	**50**	16.25	14.51	12.77	11.04	9.30
9.36	11.32	13.28	15.23	17.19	**51**	16.39	14.63	12.88	11.13	9.37
9.45	11.43	13.40	15.38	17.36	**52**	16.53	14.76	12.98	11.21	9.44
9.54	11.54	13.53	15.53	17.52	**53**	16.67	14.88	13.09	11.30	9.51
9.64	11.65	13.66	15.67	17.69	**54**	16.81	15.00	13.19	11.38	9.57
9.73	11.76	13.79	15.82	17.85	**55**	16.95	15.12	13.29	11.46	9.64
9.82	11.87	13.92	15.97	18.02	**56**	17.09	15.25	13.40	11.55	9.70
9.92	11.99	14.05	16.12	18.18	**57**	17.24	15.37	13.50	11.63	9.76
10.02	12.10	14.18	16.26	18.34	**58**	17.38	15.49	13.60	11.71	9.82
10.11	12.21	14.31	16.41	18.51	**59**	17.52	15.61	13.70	11.79	9.88
10.21	12.33	14.44	16.56	18.67	**60**	17.66	15.73	13.80	11.87	9.94
10.31	12.44	14.57	16.71	18.84	**61**	17.81	15.85	13.90	11.95	9.99
10.41	12.56	14.70	16.85	19.00	**62**	17.96	15.98	14.00	12.02	10.04
10.50	12.67	14.84	17.00	19.17	**63**	18.10	16.10	14.10	12.10	10.10
10.60	12.78	14.97	17.15	19.33	**64**	18.25	16.23	14.20	12.17	10.15
10.70	12.90	15.10	17.30	19.50	**65**	18.40	16.35	14.30	12.25	10.20
10.79	13.01	15.23	17.45	19.67	**66**	18.56	16.48	14.40	12.32	10.25
10.89	13.13	15.36	17.60	19.84	**67**	18.71	16.61	14.50	12.40	10.29
10.99	13.24	15.49	17.75	20.00	**68**	18.87	16.74	14.60	12.47	10.34
11.08	13.35	15.63	17.90	20.17	**69**	19.03	16.87	14.70	12.54	10.38
11.18	13.47	15.76	18.05	20.34	**70**	19.19	17.00	14.81	12.62	10.42
11.27	13.58	15.89	18.20	20.51	**71**	19.36	17.13	14.91	12.69	10.46
11.36	13.69	16.02	18.35	20.69	**72**	19.52	17.27	15.01	12.76	10.50
11.45	13.80	16.15	18.51	20.86	**73**	19.70	17.41	15.12	12.83	10.54
11.54	13.91	16.29	18.66	21.03	**74**	19.87	17.55	15.22	12.90	10.57
11.63	14.02	16.42	18.81	21.21	**75**	20.05	17.69	15.33	12.97	10.61
11.71	14.13	16.55	18.97	21.38	**76**	20.23	17.83	15.43	13.04	10.64
11.80	14.24	16.68	19.12	21.56	**77**	20.42	17.98	15.54	13.11	10.67
11.88	14.35	16.81	19.28	21.74	**78**	20.61	18.13	15.65	13.18	10.70
11.96	14.45	16.94	19.43	21.92	**79**	20.80	18.28	15.76	13.24	10.72
12.04	14.56	17.07	19.59	22.10	**80**	21.00	18.44	15.87	13.31	10.75
12.12	14.66	17.20	19.75	22.29	**81**	21.20	18.59	15.99	13.38	10.77
12.19	14.76	17.33	19.90	22.47	**82**	21.41	18.76	16.10	13.45	10.79
12.26	14.86	17.46	20.06	22.66	**83**	21.62	18.92	16.22	13.52	10.81

CALCULATING THE CHILD'S WEIGHT-FOR-AGE

Boys' weight (kg)					Age	Girls' weight (kg)				
-4SD	-3SD	-2SD	-1SD	Median	(months)	Median	-1SD	-2SD	-3SD	-4SD
12.33	14.96	17.59	20.22	22.85	**84**	21.84	19.09	16.34	13.58	10.83
12.39	15.06	17.72	20.38	23.04	**85**	22.06	19.26	16.46	13.65	10.85
12.46	15.15	17.85	20.54	23.24	**86**	22.29	19.43	16.58	13.72	10.86
12.52	15.25	17.97	20.70	23.43	**87**	22.53	19.61	16.70	13.79	10.87
12.57	15.34	18.10	20.87	23.63	**88**	22.76	19.79	16.82	13.85	10.88
12.63	15.43	18.23	21.03	23.83	**89**	23.01	19.98	16.95	13.92	10.89
12.68	15.52	18.35	21.19	24.03	**90**	23.26	20.17	17.08	13.99	10.90
12.72	15.60	18.48	21.36	24.24	**91**	23.51	20.36	17.21	14.06	10.91
12.77	15.69	18.61	21.52	24.44	**92**	23.77	20.55	17.34	14.13	10.92
12.81	15.77	18.73	21.69	24.65	**93**	24.03	20.75	17.48	14.20	10.92
12.84	15.85	18.85	21.86	24.86	**94**	24.30	20.95	17.61	14.27	10.93
12.87	15.92	18.98	22.03	25.08	**95**	24.57	21.16	17.75	14.34	10.93
12.90	16.00	19.10	22.20	25.30	**96**	24.84	21.37	17.89	14.41	10.94
12.92	16.07	19.22	22.37	25.52	**97**	25.12	21.58	18.03	14.49	10.94
12.94	16.14	19.34	22.54	25.74	**98**	25.41	21.79	18.18	14.56	10.94
12.96	16.21	19.46	22.71	25.97	**99**	25.70	22.01	18.32	14.63	10.95
12.97	16.28	19.58	22.89	26.19	**100**	25.99	22.23	18.47	14.71	10.95
12.98	16.34	19.70	23.06	26.43	**101**	26.29	22.45	18.62	14.79	10.96
12.98	16.40	19.82	23.24	26.66	**102**	26.59	22.68	18.77	14.87	10.96
12.99	16.46	19.94	23.42	26.90	**103**	26.89	22.91	18.93	14.95	10.97
12.99	16.52	20.06	23.60	27.14	**104**	27.20	23.14	19.08	15.03	10.97
12.98	16.58	20.18	23.78	27.38	**105**	27.51	23.38	19.24	15.11	10.98
12.98	16.64	20.30	23.97	27.63	**106**	27.82	23.61	19.40	15.20	10.99
12.97	16.70	20.43	24.15	27.88	**107**	28.14	23.85	19.57	15.28	11.00
12.97	16.76	20.55	24.34	28.13	**108**	28.46	24.10	19.73	15.37	11.01
12.96	16.82	20.67	24.53	28.39	**109**	28.79	24.34	19.90	15.46	11.02
12.95	16.87	20.80	24.72	28.65	**110**	29.11	24.59	20.07	15.55	11.03
12.94	16.93	20.93	24.92	28.91	**111**	29.44	24.84	20.24	15.65	11.05
12.93	16.99	21.05	25.12	29.18	**112**	29.78	25.10	20.42	15.74	11.06
12.91	17.05	21.18	25.32	29.45	**113**	30.12	25.36	20.60	15.84	11.08
12.90	17.11	21.31	25.52	29.72	**114**	30.45	25.62	20.78	15.94	11.10
12.89	17.17	21.45	25.72	30.00	**115**	30.80	25.88	20.96	16.04	11.12
12.88	17.23	21.58	25.93	30.28	**116**	31.14	26.14	21.15	16.15	11.15
12.87	17.30	21.72	26.14	30.57	**117**	31.49	26.41	21.33	16.25	11.18
12.86	17.36	21.86	26.36	30.86	**118**	31.84	26.68	21.52	16.36	11.21
12.86	17.43	22.00	26.57	31.15	**119**	32.19	26.95	21.72	16.48	11.24

Table 8 : ***WHO/NCHS normalized reference weight-for-length (49–84 cm) and weight-for-height (85–110 cm), by sex***

Boys' weight (kg)						Girls' weight (kg)				
-4SD 60%	-3SD 70%	-2SD 80%	-1SD 90%	Median	Length (cm)	Median	-1SD 90%	-2SD 80%	-3SD 70%	-4SD 60%
1.8	2.1	2.5	2.8	3.1	**49**	3.3	2.9	2.6	2.2	1.8
1.8	2.2	2.5	2.9	3.3	**50**	3.4	3	2.6	2.3	1.9
1.8	2.2	2.6	3.1	3.5	**51**	3.5	3.1	2.7	2.3	1.9
1.9	2.3	2.8	3.2	3.7	**52**	3.7	3.3	2.8	2.4	2
1.9	2.4	2.9	3.4	3.9	**53**	3.9	3.4	3	2.5	2.1
2	2.6	3.1	3.6	4.1	**54**	4.1	3.6	3.1	2.7	2.2
2.2	2.7	3.3	3.8	4.3	**55**	4.3	3.8	3.3	2.8	2.3
2.3	2.9	3.5	4	4.6	**56**	4.5	4	3.5	3	2.4
2.5	3.1	3.7	4.3	4.8	**57**	4.8	4.2	3.7	3.1	2.6
2.7	3.3	3.9	4.5	5.1	**58**	5	4.4	3.9	3.3	2.7
2.9	3.5	4.1	4.8	5.4	**59**	5.3	4.7	4.1	3.5	2.9
3.1	3.7	4.4	5	5.7	**60**	5.5	4.9	4.3	3.7	3.1
3.3	4	4.6	5.3	5.9	**61**	5.8	5.2	4.6	3.9	3.3
3.5	4.2	4.9	5.6	6.2	**62**	6.1	5.4	4.8	4.1	3.5
3.8	4.5	5.2	5.8	6.5	**63**	6.4	5.7	5	4.4	3.7
4	4.7	5.4	6.1	6.8	**64**	6.7	6	5.3	4.6	3.9
4.3	5	5.7	6.4	7.1	**65**	7	6.3	5.5	4.8	4.1
4.5	5.3	6	6.7	7.4	**66**	7.3	6.5	5.8	5.1	4.3
4.8	5.5	6.2	7	7.7	**67**	7.5	6.8	6	5.3	4.5
5.1	5.8	6.5	7.3	8	**68**	7.8	7.1	6.3	5.5	4.8
5.3	6	6.8	7.5	8.3	**69**	8.1	7.3	6.5	5.8	5
5.5	6.3	7	7.8	8.5	**70**	8.4	7.6	6.8	6	5.2
5.8	6.5	7.3	8.1	8.8	**71**	8.6	7.8	7	6.2	5.4
6	6.8	7.5	8.3	9.1	**72**	8.9	8.1	7.2	6.4	5.6
6.2	7	7.8	8.6	9.3	**73**	9.1	8.3	7.5	6.6	5.8
6.4	7.2	8	8.8	9.6	**74**	9.4	8.5	7.7	6.8	6
6.6	7.4	8.2	9	9.8	**75**	9.6	8.7	7.9	7	6.2
6.8	7.6	8.4	9.2	10	**76**	9.8	8.9	8.1	7.2	6.4
7	7.8	8.6	9.4	10.3	**77**	10	9.1	8.3	7.4	6.6
7.1	8	8.8	9.7	10.5	**78**	10.2	9.3	8.5	7.6	6.7
7.3	8.2	9	9.9	10.7	**79**	10.4	9.5	8.7	7.8	6.9
7.5	8.3	9.2	10.1	10.9	**80**	10.6	9.7	8.8	8	7.1

CALCULATING THE CHILD'S WEIGHT-FOR-LENGTH

Boys' weight (kg)					Length (cm)	Girls' weight (kg)				
-4SD 60%	-3SD 70%	-2SD 80%	-1SD 90%	Median		Median	-1SD 90%	-2SD 80%	-3SD 70%	-4SD 60%
7.6	8.5	9.4	10.2	11.1	**81**	10.8	9.9	9	8.1	7.2
7.8	8.7	9.6	10.4	11.3	**82**	11	10.1	9.2	8.3	7.4
7.9	8.8	9.7	10.6	11.5	**83**	11.2	10.3	9.4	8.5	7.6
8.1	9	9.9	10.8	11.7	**84**	11.4	10.5	9.6	8.7	7.7
7.8	8.9	9.9	11	12.1	**85**	11.8	10.8	9.7	8.6	7.6
7.9	9	10.1	11.2	12.3	**86**	12	11	9.9	8.8	7.7
8.1	9.2	10.3	11.5	12.6	**87**	12.3	11.2	10.1	9	7.9
8.3	9.4	10.5	11.7	12.8	**88**	12.5	11.4	10.3	9.2	8.1
8.4	9.6	10.7	11.9	13	**89**	12.7	11.6	10.5	9.3	8.2
8.6	9.8	10.9	12.1	13.3	**90**	12.9	11.8	10.7	9.5	8.4
8.8	9.9	11.1	12..3	13.5	**91**	13.2	12	10.8	9.7	8.5
8.9	10.1	11.3	12.5	13.7	**92**	13.4	12.2	11	9.9	8.7
9.1	10.3	11.5	12.8	14	**93**	13.6	12.4	11.2	10	8.8
9.2	10.5	11.7	13	14.2	**94**	13.9	12.6	11.4	10.2	9
9.4	10.7	11.9	13.2	14.5	**95**	14.1	12.9	11.6	10.4	9.1
9.6	10.9	12.1	13.4	14.7	**96**	14.3	13.1	11.8	10.6	9.3
9.7	11	12.4	13.7	15	**97**	14.6	13.3	12	10.7	9.5
9.9	11.2	12.6	13.9	15.2	**98**	14.9	13.5	12.2	10.9	9.6
10.1	11.4	12.8	14.1	15.5	**99**	15.1	13.8	12.4	11.1	9.8
10.3	11.6	13	14.4	15.7	**100**	15.4	14	12.7	11.3	9.9
10.4	11.8	13.2	14.6	16	**101**	15.6	14.3	12.9	11.5	10.1
10.6	12	13.4	14.9	16.3	**102**	15.9	14.5	13.1	11.7	10.3
10.8	12.2	13.7	15.1	16.6	**103**	16.2	14.7	13.3	11.9	10.5
11	12.4	13.9	15.4	16.9	**104**	16.5	15	13.5	12.1	10.6
11.2	12.7	14.2	15.6	17.1	**105**	16.7	15.3	13.8	12.3	10.8
11.4	12.9	14.4	15.9	17.4	**106**	17	15.5	14	12.5	11
11.6	13.1	14.7	16.2	17.7	**107**	17.3	15.8	14.3	12.7	11.2
11.8	13.4	14.9	16.5	18	**108**	17.6	16.1	14.5	13	11.4
12	13.6	15.2	16.8	18.3	**109**	17.9	16.4	14.8	13.2	11.6
12.2	13.8	15.4	17.1	18.7	**110**	18.2	16.6	15	13.4	11.9

SD = standard deviation score or Z-score; although the interpretation of a fixed percent-of-median value varies across age and height, and generally the two scales cannot be compared; the approximate percent-of-the median values for -1 and -2SD are 90% and 80% of median respectively (*Bulletin of the World Health Organization*, 1994, 72: 273–283).

Length is measured below 85 cm; height is measured 85 cm and above. Recumbent length is on average 0.5 cm greater than standing height, although the difference is of no importance to the individual child. A correction may be made by deducting 0.5 cm from all lengths above 84.9 cm if standing height cannot be measured.

Table 9 Antihypertensive drugs for emergent treatment.

Drug	Oral Dose	Major Side Effects[a]
Nifedipine	0.25–0.5 mg/kg SL	Flushing, tachycardia
Labetalol	1–3 mg/kg/h IV	Secondary to β-blocking activity
Sodium nitroprusside	0.5–10 mg/kg/min IV drip	Cyanide toxicity, sodium and water retention
Furosemide	1–5 mg/kg IV	Secondary to severe volume contraction, hypokalemia
Diazoxide	2–10 mg/kg IV bolus	Hyperglycemia, hyperuricemia, sodium and water retention
Hydralazine	0.1–0.2 mg/kg IV	Sodium and water retention, tachycardia, flushing

[a]Many more side effects than those listed have been reported.
IV, intravenous; SL, sublingual.

Table 10 Antihypertensive drugs for ambulatory treatment.

Drug	Oral Dose	Major Side Effects[a]
Hydrochlorothiazide	2–4 mg/kg/24 h as single dose or in 2 individual doses	Potassium depletion, hyperuricemia
Furosemide	1–5 mg/kg per dose, 2–3 doses per day	Potassium and volume depletion
Hydralazine	0.75 mg/kg/24 h in 4–6 divided doses	Lupus erythematosus, tachycardia, headache
Amlodipine	0.2–0.5 mg/kg/d in 2 divided doses	Fatigue, headache, facial flushing
Propranolol	0.2–5 mg/kg per dose, 2–3 doses per day	Syncope, cardiac failure, hypoglycemia
Minoxidil	0.15 mg/kg per dose, 2–3 doses per day	Tachycardia, angina, fluid retention, hirsutism
Captopril	0.3–2 mg/kg per dose, 2–3 doses per day	Rash, hyperkalemia, glomerulopathy
Enalapril	0.2–0.5 mg/kg/d in 2 divided doses	Proteinuria, cough, hyperkalemia
Nifedipine	0.5–1 mg/kg/d, 3 doses per day	Flushing, tachycardia
Verapamil	3–7 mg/kg/d in 2 or 3 divided doses	AV conduction disturbance

Table 11 -- Growth and Caloric Requirements

AGE	APPROXIMATE DAILY WEIGHT GAIN (g)	APPROXIMATE MONTHLY WEIGHT GAIN	GROWTH IN LENGTH (cm/mo)	GROWTH IN HEAD CIRCUMFERENCE (cm/mo)	RECOMMENDED DAILY ALLOWANCE (Kcal/kg/day)
0–3 mo	30	2 lb	3.5	2.00	115
3–6 mo	20	1.25 lb	2.0	1.00	110
6–9 mo	15	1 lb	1.5	0.50	100
9–12 mo	12	13 oz	1.2	0.50	100
1–3 yr	8	8 oz	1.0	0.25	100
4–6 yr	6	6 oz	3 cm/yr	1 cm/yr	90–100

Adapted from National Research Council, Food and Nutrition Board: Recommended Daily Allowances. Washington, DC, National Academy of Sciences, 1989; Frank D, Silva M, Needlman R: Failure to thrive: Myth and method. Contemp Pediatr 1993;10:114.

Table 12 : Cerebrospinal Fluid Findings in Central Nervous System Disorders

CONDITION	PRESSURE (MM H_2O)	LEUKOCYTES (MM^3)	PROTEIN (MG/DL)	GLUCOSE (MG/DL)	COMMENTS
Normal	**50–80**	**<5, ≥75% lymphocytes**	**20–45**	**>50 (or 75% serum glucose)**	
COMMON FORMS OF MENINGITIS					
Acute bacterial meningitis	Usually elevated (100–300)	100–10,000 or more; usually 300–2,000; PMNs predominate	Usually 100–500	Decreased, usually <40 (or <50% serum glucose)	Organisms usually seen on Gram stain and recovered by culture.
Partially treated bacterial meningitis	Normal or elevated	5–10,000; PMNs usual but mononuclear cells may predominate if pretreated for extended period of time	Usually 100–500	Normal or decreased	Organisms may be seen on Gram stain. Pretreatment may render CSF sterile. Antigen may be detected by agglutination test
Viral meningitis or meningoencephalitis	Normal or slightly elevated (80–150)	Rarely >1,000 cells. Eastern equine encephalitis and lymphocytic choriomeningitis (LCM) may have cell counts of several thousand. PMNs early but mononuclear cells predominate through most of the course	Usually 50–200	Generally normal; may be decreased to <40 in some viral diseases, particularly mumps (15–20% of cases)	HSV encephalitis is suggested by focal seizures or by focal findings on CT or MRI scans or EEG. Enteroviruses and HSV infrequently recovered from CSF. HSV and enteroviruses may be detected by PCR of CSF
UNCOMMON FORMS OF MENINGITIS					
Tuberculous meningitis	Usually elevated	10–500; PMNs early, but lymphocytes predominate through most of the course	100–3,000;may be higher in presence of block	<50 in most cases; decreases with time if treatment is not provided	Acid-fast organisms almost never seen on smear. Organisms may be recovered in culture of large volumes of CSF. *Mycobacterium tuberculosis* may be detected by PCR of CSF
Fungal meningitis	Usually elevated	5–500; PMNs early but mononuclear cells predominate through most of the course. Cryptococcal meningitis may have no cellular inflammatory response	25–500	<50;decreases with time if treatment is not provided	Budding yeast may be seen. Organisms may be recovered in culture. Cryptococcal antigen (CSF and serum) may be positive in cryptococcal infection
Syphilis (acute) and leptospirosis	Usually elevated	50–500;lymphocytes predominate	50–200	Usually normal	Positive CSF serology. Spirochetes not demonstrable by usual techniques of smear or culture; darkfield examination may be positive
Amebic *(Naegleria)*	Elevated	1,000–10,000 or more; PMNs predominate	50–500	Normal or slightly decreased	Mobile amebae may be seen by hanging-drop examination of CSF at room temperature

Table 13 -- Antibiotics Used for the Treatment of Bacterial meningitis

	NEONATES		
DRUG	**0–7 Days**	**8–28 Days**	**INFANTS AND CHILDREN**
Amikacin[†][‡]	15–20 divided q12h	20–30 divided q8h	20–30 divided q8h
Ampicillin	200–300 divided q8h	300 divided q4h or q6h	300 divided q4–6h
Cefotaxime	100 divided q12h	150–200 divided q8h or q6h	200–300 divided q8h or q6h
Ceftriaxone[§]	—	—	100 divided q12h or q24h
Ceftazidime	150 divided q12h	150 divided q8h	150 divided q8h
Gentamicin[†][‡]	5 divided q12h	7.5 divided q8h	7.5 divided q8h
Meropenem	—	—	120 divided q8h
Nafcillin	100–150 divided q8h or q12h	150–200 divided q8h or q6h	150–200 divided q4h or q6h
Penicillin G	250,000–450,000 divided q8h	450,000 divided q6h	450,000 divided q4h or q6h
Rifampin	—	—	20 divided q12h
Tobramycin[†][‡]	5 divided q12h	7.5 divided q8h	7.5 divided q8h
Vancomycin[†][‡]	30 divided q12h	30–45 divided q8h	60 divided q6h

Modified from Klein JO:Antimicrobial treatment and prevention of meningitis. Pediatr Ann 1994;23:76;and from Kliegman RM, Greenbaum LA, Lye PS: Practical Strategies in Pediatric Diagnosis and Therapy, 2nd ed. Philadelphia, Elsevier, 2004, p 963.

Table 14 : Age-specific Vital Signs and Laboratory Variables (Lower Values for Heart Rate, Leukocyte Count, and Systolic Blood Pressure are for the 5th and Upper Values for Heart Rate, Respiration Rate, or Leukocyte Count for the 95th Percentile)

	HEART RATE (BEATS/MIN)		RESPIRATORY RATE (BREATHS/MIN)	LEUKOCYTE COUNT (LEUKOCYTES × 10^3/MM)	SYSTOLIC BLOOD PRESSURE (MM HG)
AGE GROUP	**TACHYCARDIA**	**BRADYCARDIA**			
0 day–1 wk	>180	<100	>50	>34	<65
1 wk–1 mo	>180	<100	>40	>19.5 or <5	<75
1 mo–1 yr	>180	<90	>34	>17.5 or <5	<100
2–5 yr	>140	NA	>22	>15.5 or <6	<94
6–12 yr	>130	NA	>18	>13.5 or <4.5	<105
13–18 yr	>110	NA	>14	>11 or <4.5	<117

From Goldstein B, Giroir B, Randolph A, et al

Table 15 : Normal values of blood tests

ANALYTE OR PROCEDURE	SPECIMEN	REFERENCE VALUES (USA)	CONVERSION FACTOR	REFERENCE VALUES (SI)	COMMENTS	
Complete Blood Count						
Hematocrit (HCT, Hct) Calculated from mean corpuscular volume (MCV) and RBC count (electronic displacement or laser)	W(E)		% of packed red cells (V red cells/V whole blood cells × 100		Volume fraction (V red cells/V whole blood)	
		1 day (cap)	48–69%	× 0.01	0.48–0.69	
		2 days	48–75%		0.48–0.75	
		3 days	44–72%		0.44–0.72	
		2 mo	28–42%		0.28–0.42	
		6–12 yr	35–45%		0.35–0.45	
		12–18 yr M	37–49%		0.37–0.49	
		F	36–46%		0.36–0.46	
		18–49 yr M	41–53%		0.41–0.53	
		F	36–46%		0.36–0.46	
Hemoglobin (Hb)	W(E)		g/dL		mmol/L	
		1–3 days (cap)	14.5–22.5	× 0.155	2.25–3.49	MW Hb = 64,500
		2 mo	9.0–14.0		1.40–2.17	
		6–12 yr	11.5–15.5		1.78–2.40	
		12–18 yr M	13.0–16.0		2.02–2.48	
		F	12.0–16.0		1.86–2.48	
		18–49 yr M	13.5–17.5		2.09–2.27	
		F	12.0–16.0		1.86–2.48	
	P(H)	See *Chemical Elements*				
Erythrocyte indices (RBC indices)						
Mean corpuscular hemoglobin (MCH)	W(E)		pg/cell		fmol/cell	
		Birth	31–37	× 0.0155	0.48–0.57	
		1–3 days (cap)	31–37		0.48–0.57	
		1 wk–1 mo	28–40		0.43–0.62	
		2 mo	26–34		0.40–0.53	
		3–6 mo	25–35		0.39–0.54	
		0.5–2 yr	23–31		0.36–0.48	
		2–6 yr	24–30		0.37–0.47	
		6–12 yr	25–33		0.39–0.51	
		12–18 yr	25–35		0.39–0.54	
		18–49 yr	26–34		0.40–0.53	
Mean corpuscular hemoglobin concentration (MCHC)	W(E)		% Hb/cell or g Hb/dL RBC		mmol Hb/L RBC	
		Birth	30–36	× 0.155	4.65–5.58	
		1–3 days (cap)	29–37		4.50–5.74	

ANALYTE OR PROCEDURE	SPECIMEN	REFERENCE VALUES (USA)	CONVERSION FACTOR	REFERENCE VALUES (SI)	COMMENTS	
		1–2 wk	28–38		4.34–5.89	
		1–2 mo	29–37		4.50–5.74	
		3 mo–2 yr	30–36		4.65–5.58	
		2–18 yr	31–37		4.81–5.74	
		>18 yr	31–37		4.81–5.74	
Mean corpuscular volume (MCV)	W(E)		μm^3		fL	
		1–3 days (cap)	95–121	× 1	95–121	
		0.5–2 yr	70–86		70–86	
		6–12 yr	77–95		77–95	
		12–18 yr M	78–98		78–98	
		F	78–102		78–102	
		18–49 yr M	80–100		80–100	
		F	80–100		80–100	
Leukocyte count (WBC count)	W(E)	× 1,000 cells/mm^3 (μ L)			× 10^9 cells/L	
		Birth	9.0–30.0	× 1	9.0–30.0	
		24 hr	9.4–34.0		9.4–34.0	
		1 mo	5.0–19.5		5.0–19.5	
		1–3 yr	6.0–17.5		6.0–17.5	
		4–7 yr	5.5–15.5		5.5–15.5	
		8–13 yr	4.5–13.5		4.5–13.5	
		Adult	4.5–11.0		4.5–11.0	
Leukocyte differential	W(E)	%			Number fraction	
Myelocytes		0%		× 0.01	0	
Neutrophils (“bands”)		3–5%			0.03–0.05	
Neutrophils (“segs”)		54–62%			0.54–0.62	
Lymphocytes		25–33%			0.25–0.33	
Monocytes		3–7%			0.03–0.07	
Eosinophils		1–3%			0.01–0.03	
Basophils		0–0.75%			0–0.0075	
		Cells/mm^3 (μ L)			× 10^6 cells/L	
Myelocytes		0		× 1	0	
Neutrophils (“bands”)		150–400			150–400	
Neutrophils (“segs”)		3,000–5,800			3,000–5,800	
Lymphocytes		1,500–3,000			1,500–3,000	
Monocytes		285–500			285–500	
Eosinophils		50–250			50–250	
Basophils		15–50			15–50	
Platelet count (thrombocyte count)	W(E)	× 10^3/mm^3 (μ L)			× 10^9/L	
		Newborn 84–478 (after 1 wk, same as adult)		× 10^6	84–478	(Buck, 1996)
		Adult 150–400			150–400	

ANALYTE OR PROCEDURE	SPECIMEN	REFERENCE VALUES (USA)	CONVERSION FACTOR	REFERENCE VALUES (SI)	COMMENTS	
Reticulocyte count	W(E, H, O)	Adults 0.5–1.5% of erythrocytes or 25,000–75,000/mm^3 (μ L)		× 0.01	0.005–0.015 (number fraction) or 25,000–75,000 × 10^6/L	
				× 10^6		
			%		Number fraction	
	W(cap)	1 day	0.4–6.0%	× 0.01	0.004–0.060	
		7 days	<0.1–1.3%		<0.001–0.013	
		1–4 wk	<1.0–1.2%		<0.001–0.012	
		5–6 wk	<0.1–2.4%		<0.001–0.024	
		7–8 wk	0.1–2.9%		0.001–0.029	
		9–10 wk	<0.1–2.6%		<0.001–0.026	
		11–12 wk	0.1–0.3%		0.001–0.013	
Alanine aminotransferase (ALT, SGPT)	S	0–5 days	6–50 U/L	× 1	6–50 U/L	37°bw
		1–19 yr	5–45		5–45	(Lockitch, Halstead, and Albersheim, 1988)

Table 16: IV fluid composition

IV fluid	Composition						
	Na^+ mmol/l	K^+ mmol/l	Cl^- mmol/l	Ca^{++} mmol/l	Lactate mmol/l	Glucose g/l	Calories /l
Ringer's lactate (Hartmann's)	130	5.4	112	1.8	27	–	–
Normal saline (0.9% NaCl)	154	–	154	–	–	–	–
5% Glucose	–	–	–	–	–	50	200
10% Glucose	–	–	–	–	–	100	400
0.45 NaCl / 5% glucose	77	–	77	–	–	50	200
0.18% NaCl / 4% glucose	31	–	31	–	–	40	160
Darrow's solution	121	35	103	–	53	–	–
Half-strength Darrow's with 5% glucose*	61	17	52	–	27	50	200
Half-strength Ringer's lactate with 5% glucose	65	2.7	56	1	14	50	200

Table 17 : The Thalassemias

THALASSEMIA	GLOBIN GENOTYPE	FEATURES	EXPRESSION	HEMOGLOBIN ELECTROPHORESIS
α-THALASSEMIA				
1 gene deletion	-,α/α,α	Normal	Normal	Newborn: Bart 1–2%
2 gene deletion trait	-,α/-,α-,-/ α,α	Microcytosis, mild hypochromasia	Normal, mild anemia	Newborn: Bart 5–10%
3 gene deletion hemoglobin H	-,-/-,α	Microcytosis, hypochromic	Mild anemia, transfusions not required	Newborn: Bart 20–30%
2 gene deletion + Constant Spring	-,-/α,αConstant Spring	Microcytosis, hypochromic	Moderate to severe anemia, transfusion, splenectomy	2–3% Constant Spring, 10–15% hemoglobin H
4 gene deletion	-,-/-,-	Anisocytosis, poikilocytosis	Hydrops fetalis	Newborn: 89–90% Bart with Gower 1 and 2 and Portland
Nondeletional	α,α/α,αvariant	Microcytosis, mild anemia	Normal	1–2% variant hemoglobin
β-THALASSEMIA				
β^0 or β^+ heterozygote:trait	β°/A,β^+/A	Variable microcytosis	Normal	Elevated A_2, variable elevation of F
β°-Thalassemia	β°/β°, β^+/β°, E/β°	Microcytosis, nucleated RBCs	Transfusion-dependent	F 98%, A_2 2%
				E 30–40%
β^+-Thalassemia severe	β^+/β^+	Microcytosis, nucleated RBCs	Transfusion-dependent/thalassemia intermedia	F 70–95%, A_2 2%, trace A
Silent	β^+/A	Microcytosis	Normal with only microcytosis	A_2 3.3–3.5%
	β^+/β^+	Hypochromic, microcytosis	Mild to moderate anemia	A_2 2–5%, F 10–30%
Dominant (rare)	B°/A	Microcytosis, abnormal RBCs	Moderately severe anemia, splenomegaly	Elevated F and A_2
δ-Thalassemia	A/A	Normal	Normal	A_2 absent
(δβ)°-Thalassemia	(δβ)°/A	Hypochromic	Mild anemia	F 5–20%
$(\delta\beta)^+$-Thalassemia Lepore	βLepore/A	Microcytosis	Mild anemia	Lepore 8–20%
Lepore	βLepore/βLepore	Microcytic, hypochromic	Thalassemia intermedia	F 80%, Lepore 20%
γδβ-Thalassemia	(γAγδβ)°/A	Microcytosis, microcytic, hypochromic	Moderate anemia, splenomegaly, homozygote: thalassemia intermedia	Decreased F and A_2 compared with δβ-thalassemia
γ-Thalassemia	(γAγG)°/A	Microcytosis	Insignificant unless homozygote	Decreased F
HEREDITARY PERSISTENCE OF FETAL HEMOGLOBIN				
Deletional	A/A	Microcytic	Mild anemia	F 100% homozygotes
Nondeletional	A/A	Normal	Normal	F 20–40%

In α-thalassemia, there are relatively fewer α-globin chains and an excess of β- and γ-globin chains. These excess chains form **Bart's hemoglobin** (γ_4) in fetal life and Hb H (β_4) after birth. These abnormal tetramers are not as lethal, but lead to extravascular hemolysis. Prenatally, a fetus with α-thalassemia may become symptomatic because Hb F requires sufficient α-globin gene production, whereas postnatally, infants with β-thalassemia become symptomatic because Hb A requires adequate production of β-globin genes

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