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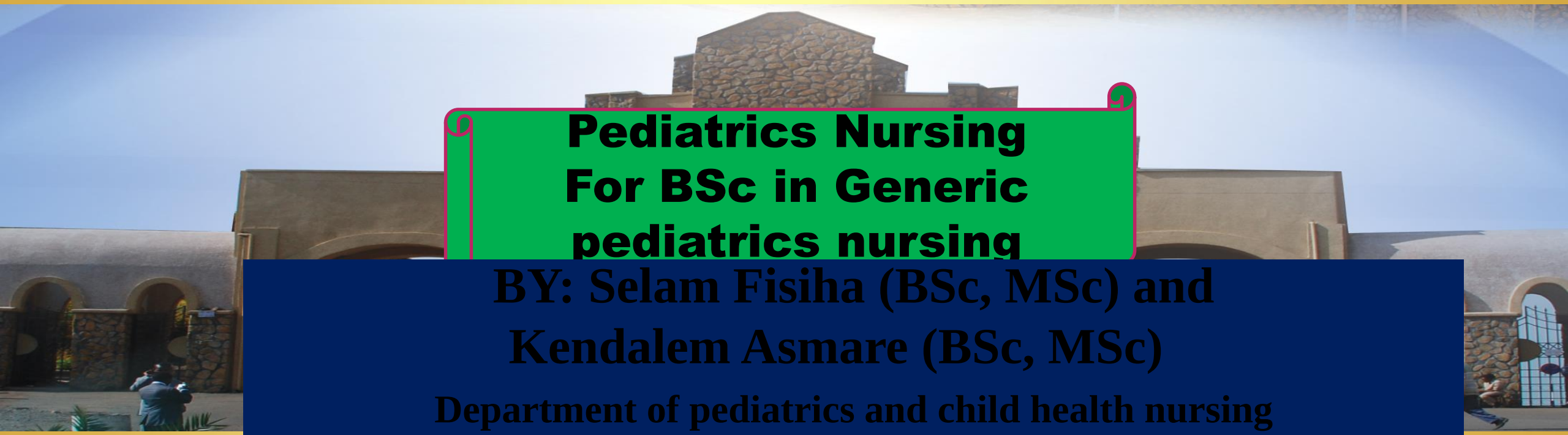

Pediatrics Nursing
For BSc in Generic pediatrics nursing

BY: Selam Fisiha (BSc, MSc) and Kendalem Asmare (BSc, MSc)

Department of pediatrics and child health nursing

School of nursing

College of medicine and health sciences

University of Gondar

Pediatric nursing course syllabus

- **Program**: BSc in Pediatric Nursing(generic)
- **Module Name: Clinical Nursing II**
- **Module Code: Nurs- M2113**
- **Module ECTS: 22**
- **Module Duration: 16 Weeks**
- **Course instructors**: Selam F. Kendalem A.

Course description:

- This course is designed to enable pediatrics Nursing students to be familiar with child health care, manage and prevent common child hood illness, including infectious disease and nutritional disorders.

Course Objectives:

- At the end of the course, the students will be able to assess to nutritional status of children, manage common childhood problems and provide care for the sick and healthy child.

Contents

- Introduction to pediatric nursing
- Child growth and development
- Care of Newborn
- Management of common childhood disease
- Introduction to IMNCI
- Management of systemic child hood disorders
- Expanded program of immunization
- Management of handicapped children
- HIV associated TB in children
- Nutrition in HIV children
- Palliative care

Teaching methods

- Interactive lecture
- Group discussion
- Case study
- Video show
- Reading Assignment

Teaching aids

- LCD projector
- Lecture note and books
- National Pediatrics HIV/AIDS guidelines
- IMNCI chart booklets
- Audio visual
- Hand out

Assessments

- Continuous assessment =50%
- Final exam=50%

Objectives

At the end of this session the students will be able to:

√ Define pediatric nursing

√ Describe the modern concepts of pediatric nursing care

√ Explain the basics of pediatric health assessment

√ Differentiate normal and abnormal V/S values

√ Identify common pediatric nursing procedures

Unit I: Introduction

- What is nursing?
- What is paediatrics nursing?
- Why paediatrics is given as a subject it self?

Definition of nursing

ANA

- "responses to actual or potential health problems"

WHO

- Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings.
- It includes the promotion of health, the prevention of illness, and the care of ill, disabled and dying people.

Pediatrics

- Pediatric nursing - Paediatrics comes from the Greek words
- '**paedia**' ⟹ child,
- '**iatrike**' ⟹ treatment
- **ics** ⟹ branch of science
- Pediatrics means the science of child care and scientific treatment of childhood disease.
- Pediatrics is synonymous with child health.

Pediatrics nursing

- Pediatric nursing is specialty of nursing concerning the care of children during wellness and illness.
- It encompasses neonates, infants, toddlers, children, and their families to promote health throughout development and growth.
- It is the art and science of giving nursing care to children from birth through adolescent with emphasis on the physical growth, mental, emotional and psycho-social development

- Pediatric nursing covers routine immunizations and check-up appointments, as well as any illnesses or minor injuries that occur.
- It involves in giving assistance, care and support to the growing and developing to achieve their individual potential for functioning with fullest capacity.

Goals of pediatrics nursing care

- To provide skillful, intelligent and need based comprehensive care for children
- To interpret the basic needs of children to their parents and families to guide them in child care.
- To promote growth and development
- To prevent disease and alleviate suffering

Quality of pediatrics nurses

- Love for children and become trustworthy
- Patient and pleasant
- Good interpersonal relationship
- Friendly and diligent
- Skill, scientific knowledge and experience.

Principle of pediatrics nursing

- Family centered care
- Case management
- Prevent or minimize child separation from family
- Prevent or minimize bodily injury and pain

Hospital environment for the sick child

❖Pediatric unit consists of the following facilities.

- Few beds in a room
- Sinks & latrine should be child & adult size.
- Playroom and recreation facilities should be provided.
- Children should be placed in the ward according to their age and their disease.
- Small & critically ill children have placed very near to the nurse stations.

- **Why should pediatric nursing be an independent specialty? (think-pair-share)**

Why pediatrics ... ?

1. The health problems of children differ from those adults in many ways
2. Children's response to an illness is influenced by age
3. Managements of childhood illness are significantly different from an adult
4. Children need special care since they are among the most vulnerable groups

Modern concepts of child care

- Previously the emphasis was on the care of the ill child as an individual
- Current emphasis:

√ Prevention of illnesses and accidents

√ Holistic nursing care

√ Interdisciplinary approach

NURSING FUNCTIONS

- **Promoting Health** and Wellness and **Preventing Illness** - engaging in attitudes and behavior that enhance the quality of life and maximize personal potential.

Eg, BF, nutrition, alcohol, exercise, HW

- **Curative activities** and **Restoring Health** - help an ill client return to **health**

Eg. Pain/suffering alleviation, medication administration, assessing a clients surgical incision

Standards of Clinical Nursing Practice: ANA

- **Assessment**: the nurse collects patient health data.
- **Diagnosis**: the nurse analyzes the assessment data in determining diagnoses.
- **Planning**: the nurse develops a plan of care that prescribes interventions to attain expected outcomes.
- **Implementation**: the nurse implements the interventions identified in the plan of care.
- **Evaluation**: the nurse evaluates the patients progress toward attainment of outcomes.

Overview of Pediatric Health Assessment

Contents of Pediatric History

1. Personal details
2. C/C
3. HPI
4. Past medical History

...pediatric history

5. Family history
6. Immunization history
7. Nutritional history
8. Developmental history
9. Review of systems- A check list of symptoms

- It helps to ask questions that are missed during history taking.

Case study for group work

- A 7 months child with fever
- Comes from rural area
- Lives in a single room
- Currently stops feeding per mouth

Discussion questions

- Is this history complete?
- If you say no, suggest any point that you think important

N.B.

- 5 students per group
- 5 minutes for discussion
- A total of 5 minutes for reflections.

Pediatric Physical Examination

- **Be opportunistic in examining a child!**
- **Starts with general appearance**

Differences in Performing A Pediatric Physical Examination Compared to an Adult:

I. General Approach

1. Gather as much data as possible **by observation** first
2. **Position** of child: parent's lap vs. exam table
3. **Order of exam**: least distressing to most distressing
3. **Distraction** is a valuable tool
4. **Examine painful area last-get** general impression of overall attitude
5. **Be honest**. If something is going to hurt, tell them that in a calm fashion. Don't lie or you lose credibility!
6. Understand developmental stages' impact on child's response.

For example, **stranger anxiety**.

V/S: PR, BP, & RR (Normal values)

Age	Heart rate, Beats/min	BP, mmHg	Respiratory rate, breath/minute
Premature	120-170	55-75/35-45	40-70
0-3 months	100-150	65-85/45-55	35-55
3-6 months	90-120	70-90/50-65	30-45
6-12 months	80-120	80-100/55-65	25-40
1-3 years	70-110	90-105/55-70	20-30
3-6 years	65-110	95-110/60-75	20-25
6-12 years	60-95	100-120/60-75	14-22

V/S: Temperature

- Normal body temperature: 36.5°C to 37.5°C (97.7-99.5°F)
- Hyperthermia: >37.5°C
- Hypothermia: <36.5°C

√ Mild hypothermia: 36-36.4°C

√ Moderate hypothermia: 32-35.9°C

√ Severe hypothermia: <32°C

Common pediatric nursing procedures

- Medication administration
- NG-tube insertion and feeding
- Oxygen administration
- Resuscitations
- Catheterizations
- Administering enema
- Tracheostomy care

...pediatric procedures

- Blood transfusion
- Specimen collection
- Iv cannulation , etc ...

Reading Assignment

- Read and take short note about common pediatric nursing procedures by considering the following points when appropriate.

√ Indications

√ Contraindications

√ precautions

√ Steps with its rationale

√ Differences from the adult

Thank you so much!

Pediatrics Nursing For BSc in Generic pediatrics nursing

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GROWTH AND DEVELOPMENT

Objectives

- Define growth and development
- Principles of growth and development
- Mention types of growth and development
- Identify the stages of development based on age
- Growth monitoring

Growth and Development

Growth

- Growth refers to an increase in physical size of the whole body or any of its parts.
- It is simply a quantitative change in the child's body.
- It can be measured in Kg, pounds, meters, inches, ….. Etc

Development

- Development refers to a progressive increase in skill and capacity of function.
- It is a qualitative change in the child's functioning.
- It can be measured through observation.

Developmental Assessment

- Gross motor development
    - Gross muscular activity and neuro-development including posture, independent mobility and progress from head control to running
- Fine motor development (Manipulation)
    - The ability to reach for, grasp and manipulate objects
- Cognition and Social skill
    - Social smile, watching a mirror, waving goodbye, general alertness and curiosity about the surrounding
- Language

STAGES OF GROWTH AND DEVELOPMENT

I. PRENATAL
II. INFANCY
III. EARLY CHILDHOOD
IV. MIDDLE CHILDHOOD
V. LATE CHILDHOOD

Growth Spurt

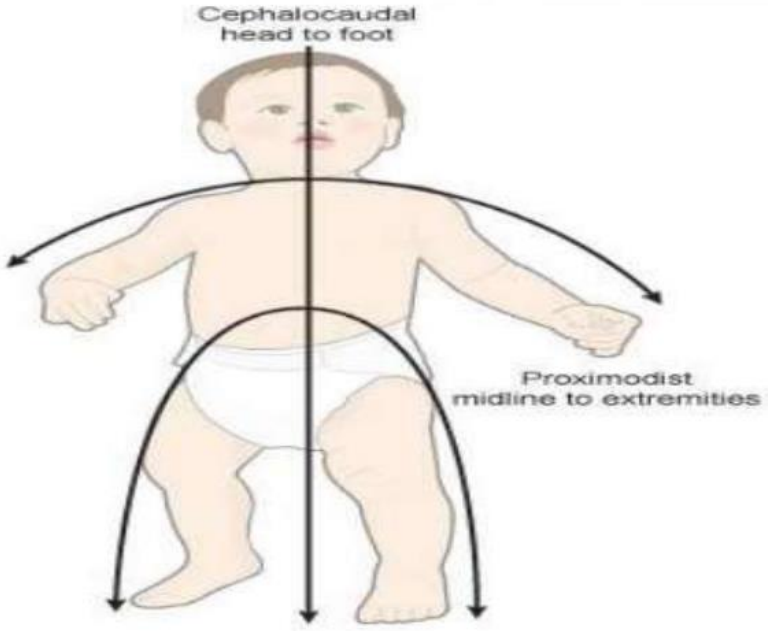
- ❖ Growth does not take place uniformly at all times
- ❖ There seems to be periods when a sudden acceleration of it occurs
- ❖ The timings of the growth spurts differ in boys and girls.
- ❑ Acceleration of growth (growth spurts):
  - ❖First year
  - ❖Adolescence

Developmental principles

- It is a continuous process
- Development is sequential(one skill can not be developed until the previous is achieved)
- Unique individual rates of growth and development but the sequence is same
- Depends on maturation and learning

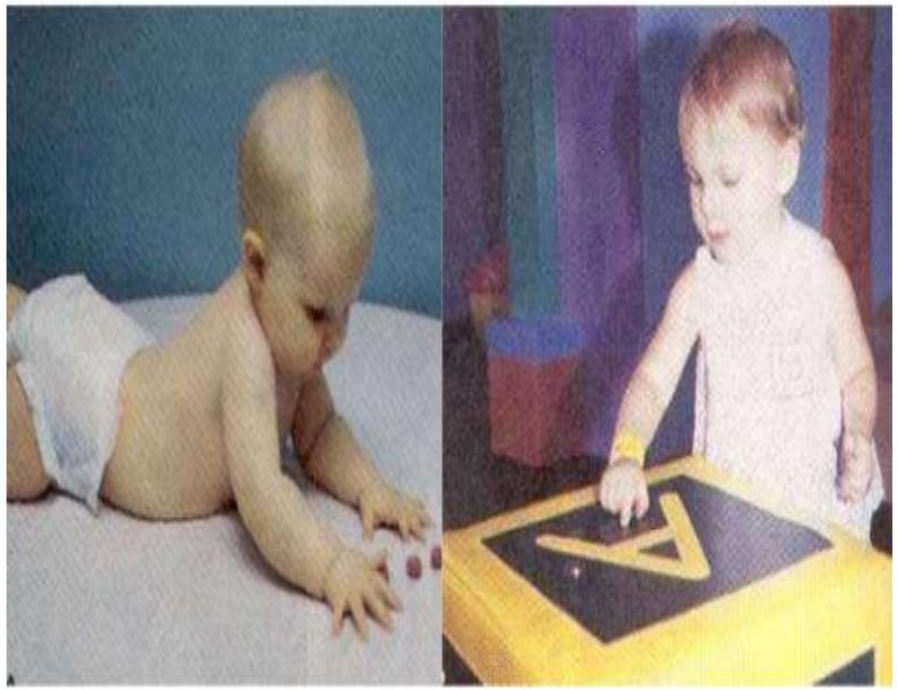
Developmental Principles

- Development proceeds cephalo-caudal and proxy modal fashion



Developmental Principles

- Proceeds from general to specific
- Proceeds from simple to more complex



Factors affecting growth and development

1. **Hereditary/Genetic factors**

- The maximum possible growth and development potential is genetically determined

2. **Environmental factors**

- For full realization of genetic potential, a favourable environment is of paramount importance

Factors affecting growth and development

1. Intrauterine or prenatal factors

- Maternal nutrition
- Infections and Other illnesses during pregnancy
- Drugs & Radiation

2. Birth and natal factors

- Brain injury (physical or anoxia), for example

3. Postnatal factors

a. Adequate nutrition
b. Education and learning opportunity
c. Social and psychological or emotional factors

DEVELOPMENTAL MILESTONES

0-2 months

1. Physical growth
   - Average birth weight = 3.4kg
   - Average length = 50cm , (46-54cm)
   - Average head circumference= 35cm(32-37cm)
   - Weight may initially decrease 10% below birth weight in the 1st wk
   - Infants regain or exceed birth weight by 2 wk of age
   - Wt gain during 1st month is 30gm/d
   - This is the period of fastest postnatal growth

0-2 months

2. Neurodevelopment

Gross motor

- When held in sitting position- back bends
- Prone - momentarily holds chin off couch
- Pull to sit- almost complete head lag
- Ventral suspension- head and hip are flexed & limb hangs downward

Figure 2.1: - Prone. Head turned to side.

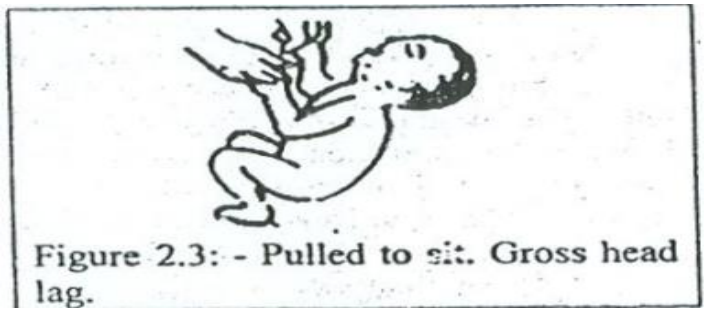


Figure 2.3: - Pulled to sit. Gross head lag.

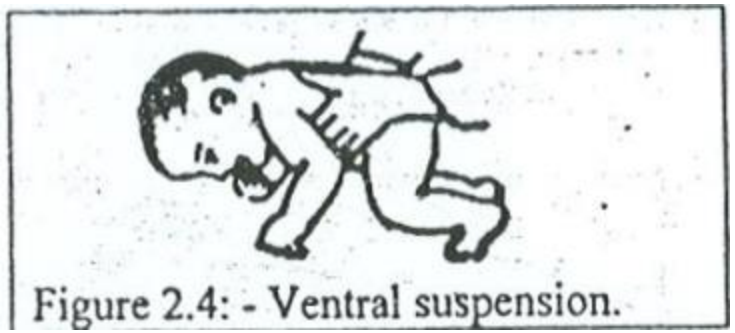


Figure 2.4: - Ventral suspension.

0-2 months

3. Language & social

- Hearing is well developed & prefers **high pitched** sound

- Near sighted with focal length of **20 - 30cm**

- Spontaneous smile

Infancy

1. Physical growth
   - Weight - Birth weight doubles by 5th mn and triples by11-12mn
   - Length - 75 cm at 12mn
   - Head circumference = increase by 12cm in 1st yr
     - increase by 2cm/mn in 1st 3mn
     - increase by 1cm/mn 3-6mn
     - increase by o.5cm/mn 6-12mn
2. Dentition - starts at age 5-6mn
   - then erupts 4 teeth every 4 month till 20 milk teeth

Infancy

3. Motor development

Gross motor

- At 2 months
  - ***Hold head erects*** in mid-position
- At 3 months
  - Prone- *lift head & chest off the table*
  - Hold object put in hand
- 4 months
  - ***Sit with adequate support***
  - ***Roll over*** from front to back
  - Hold head erect and steady while in sitting position
  - Bring hands together in midline and ***plays with fingers***
  - ***Grasp*** objects with both hands

Infancy

- 5 months
  - ***Sit with slight suppor***t
  - Pull feet up to mouth when supine
  - Hold one object while looking at another
- At 6 months
  - ***Sit alone briefly***
  - Turn completely over(abdomen to abdomen)
  - ***Lift chest and upper abdomen*** when prone

Infancy

- 7-8 months
  - Imitate simple acts of others
  - ***Drink*** from cup with assistance
  - ***Eat finger food*** that can be held in one hand
- 9 months
  - *Crawl* (i.e., pull body while in prone position)
  - Hold one bottle with *good hand-mouth coordination*
- 10 months
  - *Creep well* (use hands and legs)
  - *Walk but with help*

Infancy

- 11 months
  - *Walk holding on furniture*
- 12months
  - *Sit down* from standing position alone
  - *Walk in few steps with help or alone*

Fine motor

- **0-4mn –**move arms, bring hands to mouth
- **4-8 mn** –roll over to explore & get object,

-transfers object from one hand to the other

- **8-12 mn** –grasp and put objects in mouth

- Drop & pick up toys
- Wave/bye

Infancy

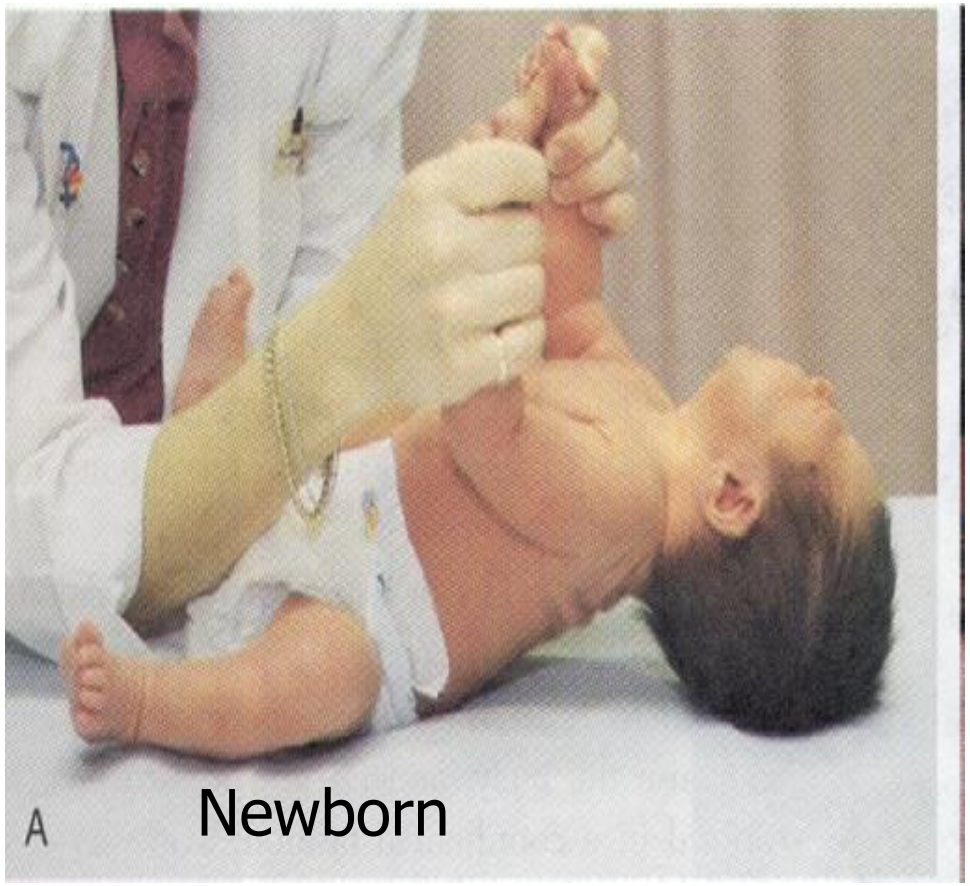
4. Language

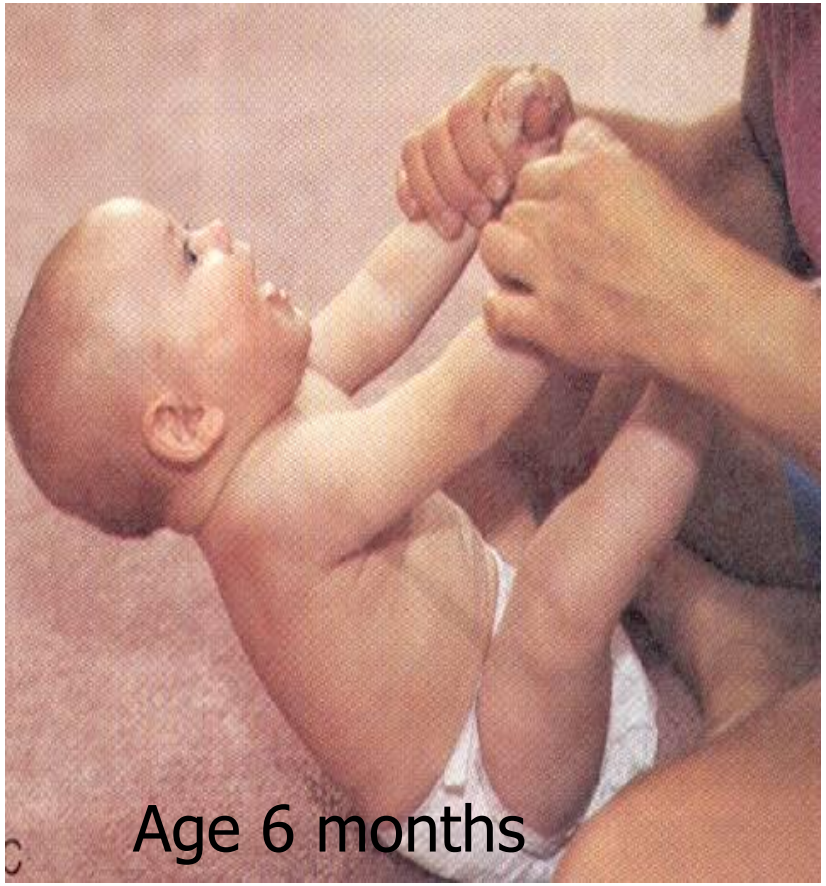
- 0-3 mn: crying, make soft exaggerated vowel sounds
- 3-4mn- start to make consonant sounds.
- 4-5mn- begin to put vowel and consonant sounds together
- 8-9 months: mama/dada *as sounds*
- 10-12 months: "*mama/dada specific*

5. Social development

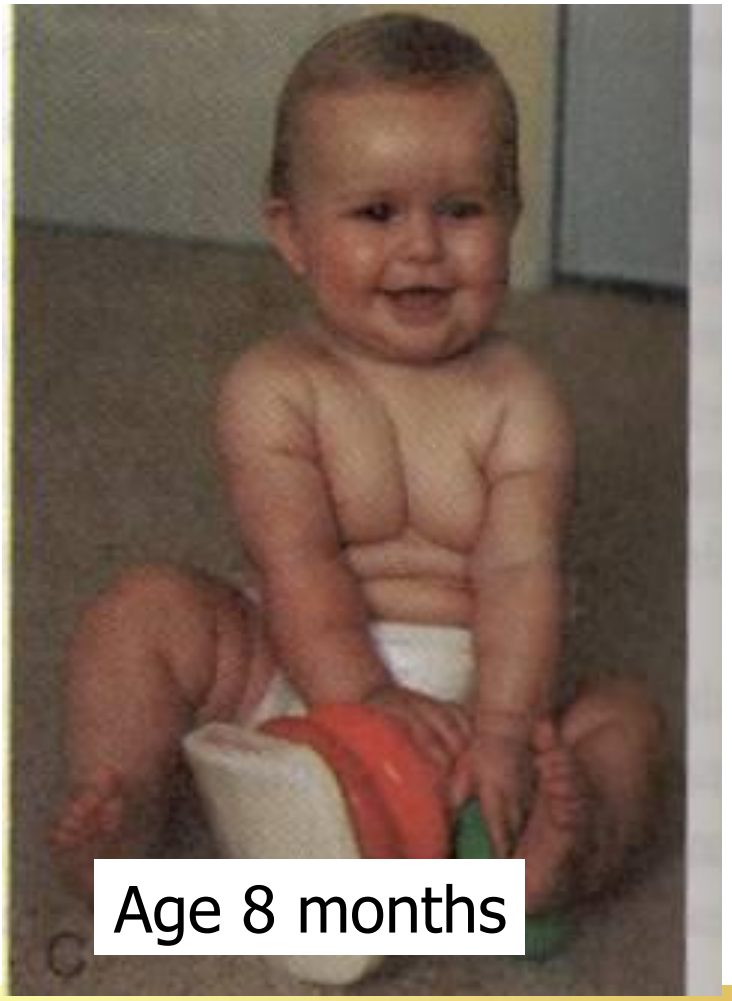
- Learns that *crying brings attention*
- *Smiles* in response to smile of others
- ***7mn*** shows fear of stranger (*stranger anxiety).*
- *Responds* socially to his name

Head Control

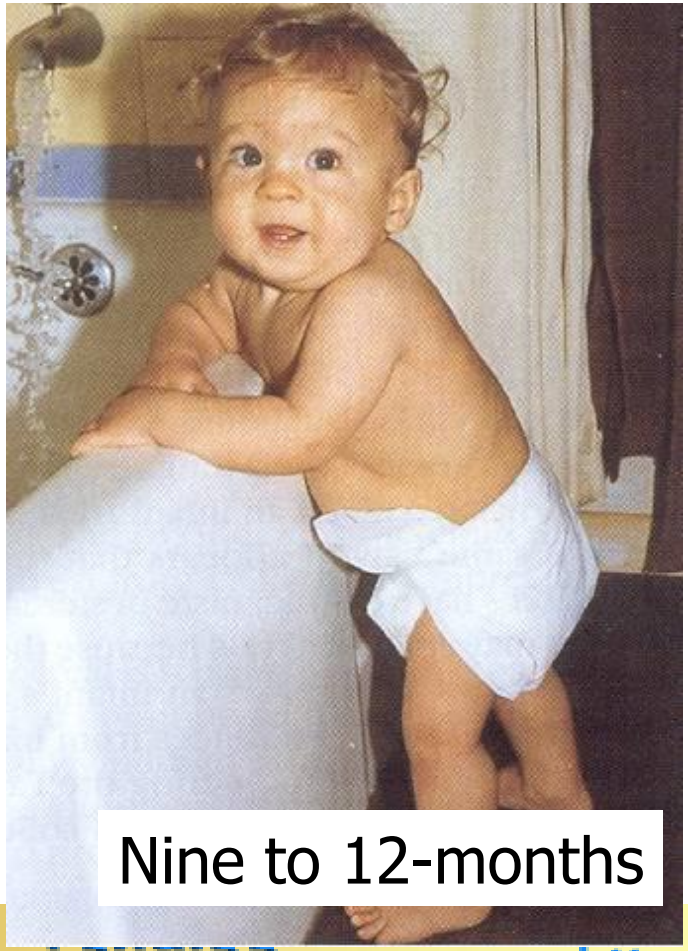




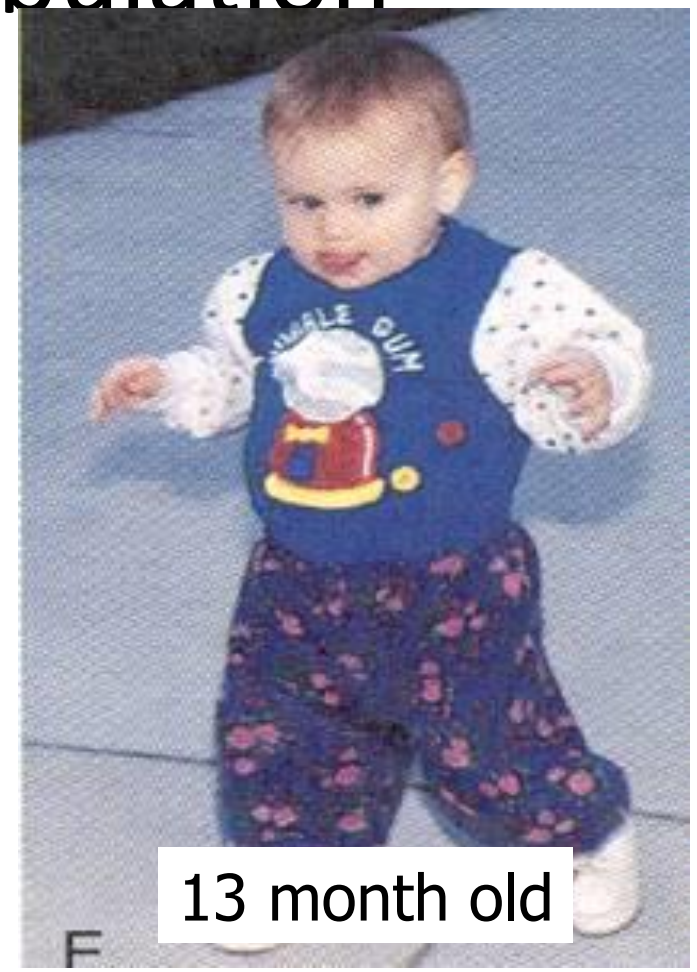
Sitting Up



Ambulation

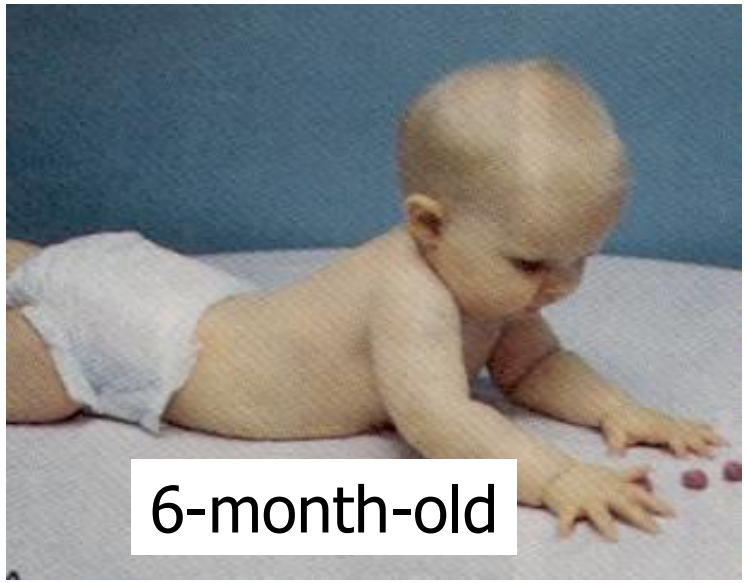


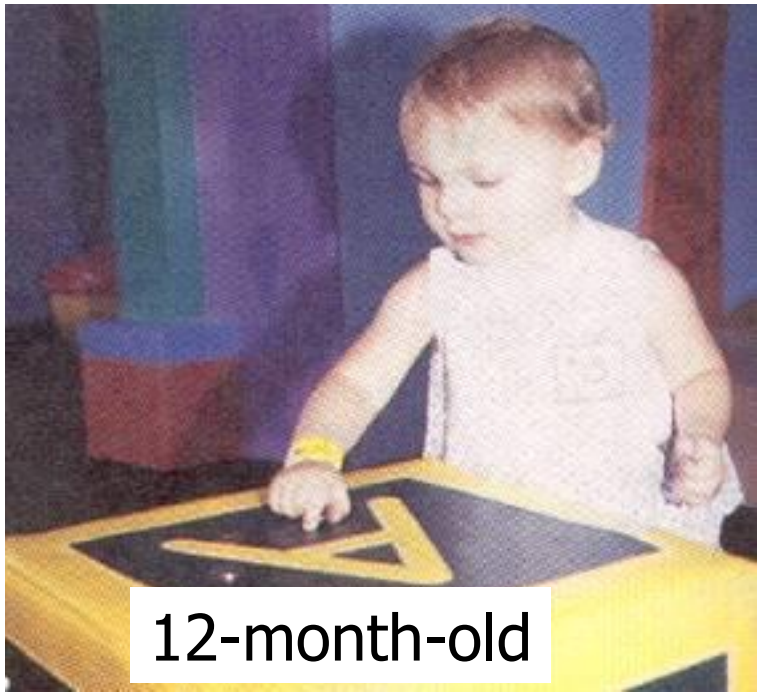
Nine to 12-months



13 month old

Fine Motor Development in infancy





Toddler

1. Physical growth

- During this period, growth slows considerably
- Physical growth
  - Height – increases by 1cm/mn
  - The toddler's average weight gain is 1.8 to 2.7 kg/year.
  - Head circumference increases 10cm from 1yr till adulthood
  - HC increases 2cm from 1^{st} -2^{nd} year

Toddler

Gross motor

15 months

- Walk alone
- Creep upstairs

18 months

- Runs stiffly,
- Walks up stairs with one hand held

24 months

- Runs well,
- Walks up and down stairs one step at a time,
- jumps

Fine motor

15mn

- Hold a cup with all fingers grasped around it

18mn

- Transfer objects hand-to hand at will

24mn

-Turn the page of a book

Toddler

3. Adaptive/cognitive

15 mn - Makes tower of 3 cubes

18mn - Makes tower of 4 cubes,

-imitates scribbles

24mn - Makes tower of 7 cubes,

-scribbles in circular pattern,

- imitates horizontal stroke

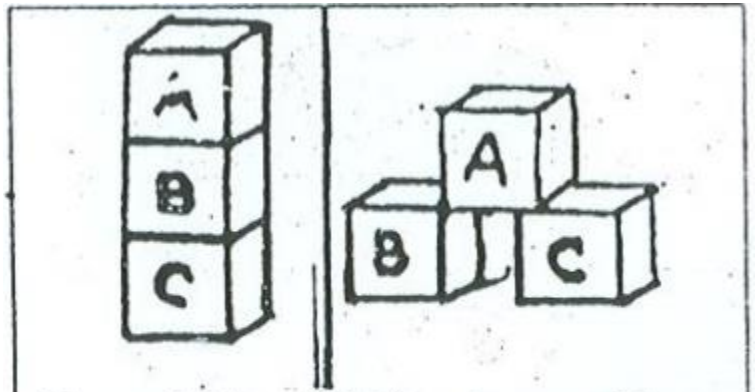


Figure 2.23: - Builds a tower of three cubes.

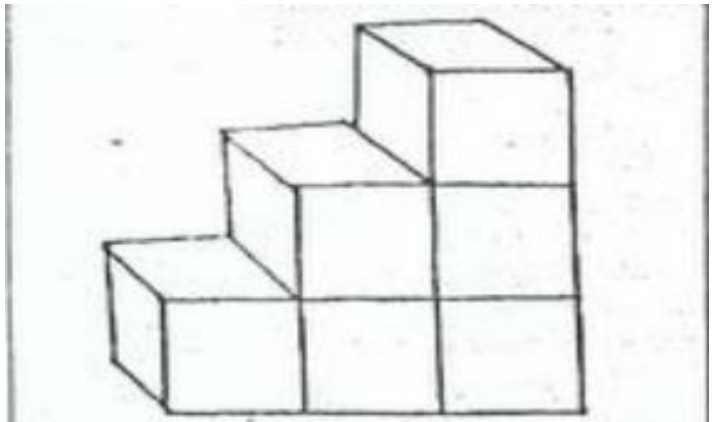


Figure 2.26: - Builds three steps with six cubes.

Toddler

4. Social development
   - 15mn hugs parents
   - 18mn Feeds self
   - 24mn Handles spoon well, helps to undress

5. Language

15 mn - follows simple command,
- responds to name

18mn - 10 words (average),
- names pictures,
- identifies parts of body

24mn - Puts 3 words together (subject, verb, object)

Preschool stage

1. Physical growth
   - Weight: - 2 kg per year,
   - Linear growth: - height ↑ by 6-7 cm per year
   - HC increases by 1-2 cm per year
2. Dental development: - all 20 1^0 tooth erupted by the age 3 yr

2. Neurodevelopment

Gross motor:

30mn -Goes up stairs alternating feet

3 yr - Rides tricycle,

4yr -Throws ball overhand, uses scissors to cut out pictures, climbs well

Fine motor:

- 3rd yr - copies circle
  - rides tricycle
- 4th yr -copies a square

Preschool stage

3. Social/Language

- Language dev't is rapid during the age of 2-3y
- From 100 to 2,000 words
- From 3 word to complex sentences

4. Cognitive/Adaptive

- Build a tower of 10 cubes,
- bowel and bladder control 24-30mn
- Knows sex and age by the age of 3 yr
- Tells story, copies cross and square by 4yr

School age

- Self esteem becomes a central issue
  - Strong motor skill
  - Sexual organs remain physically immature but interest in gender differences & sexual behavior become active & increase progressively until puberty

School age

1. Physical growth
   - Weight gain is 3-3.5Kg/ year
   - Height: -increase by 6cm per year
   - HC ↑ by 2-3 cm throughout this period

Dental development
   - Loss of deciduous teeth starts by 6 year
   - First molar (6year molar) erupts (The 1st permanent teeth)
   - Replacement with & adult teeth occurs at a rate 4 per year for the next 5 years.

School age

2.Neurodevelopment

Gross motor

- ride bicycle, sport

Fine motor

- copies a diamond & draws detail picture
- draw pictures with recognizable features,
- Writing

3. Social/language

- Identify with same sex parents adopting them as *role models*
- Further separation from the family

4. Cognitive

- Engage in activities that *challenge cognitive skills*, such as reading, playing computer and board games.

Adolescent

1. Physical growth

Weight:

- Growth spurt begins earlier in girls (10–14 years, while it is 12–16 in boys)

Height:

- By the age of 13, triples his birth length
- Males gains 10 to 30cm in height.
- Females gains less height than males as they gain 5 to 20cm.
- Growth in height ceases at 16 or 17 years in females and 18 to 20 in males

Secondary sexual characteristics

Male

- Genital changes
- Appearance of pubic, axillary, and facial hair
- Voice change

Female

- Breast changes
- Growth of pubic and axillary hair
- Onset of menarche

Growth Monitoring

Growth monitoring

- Growth monitoring is regular check up the growth of the baby

What is the importance of growth monitoring

- It tells the *nutritional status* of children in a given community
- If it is done right time malnutrition can be *identified before* it affects the brain.

Methods

A. Anthropometry- practical use

B. Tissue growth assessment (SFT)

C. Dental Development

D. Skeletal assessment

What needs to be monitored at community level

- First 2 years
  - ✓ Length/age
  - ✓ Weight/age
  - ✓ Weight /height
  - ✓ Head circumference/age
- 2 –10 years
  - ❖ Height/age
  - ❖ Weight/age
  - ❖ BMI/age
- >10 years
  - ➢ Above in relation to pubertal development

Steps of Growth Monitoring

Step 1: Obtaining accurate measurements

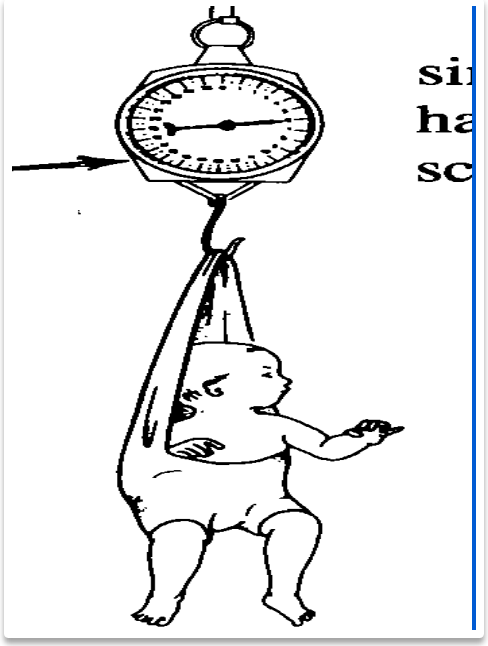
- Begins with measuring and charting weight, length and head circumference

Step 2: Using Growth Charts

Step 3: Interpreting the Finding

1. Weight

- To enhance accuracy of measurements:
  - ✓ Use same scale at each visit
  - ✓ Scale should be zeroed daily and calibrated weekly
  - ✓ Infant scales should be used for children < 20kg



Simple hanging scale

Weighing Infants

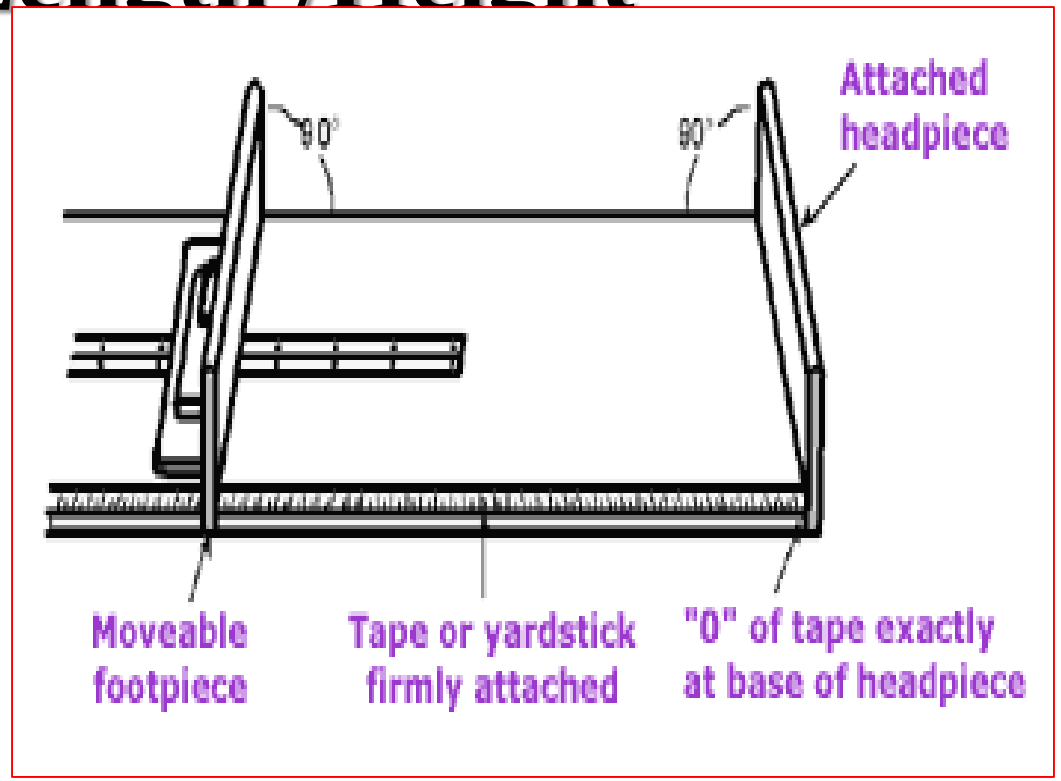
- Remove all clothing
- But you can weigh infant wearing a dry diaper
- Weigh infants supine

Weighing Infants

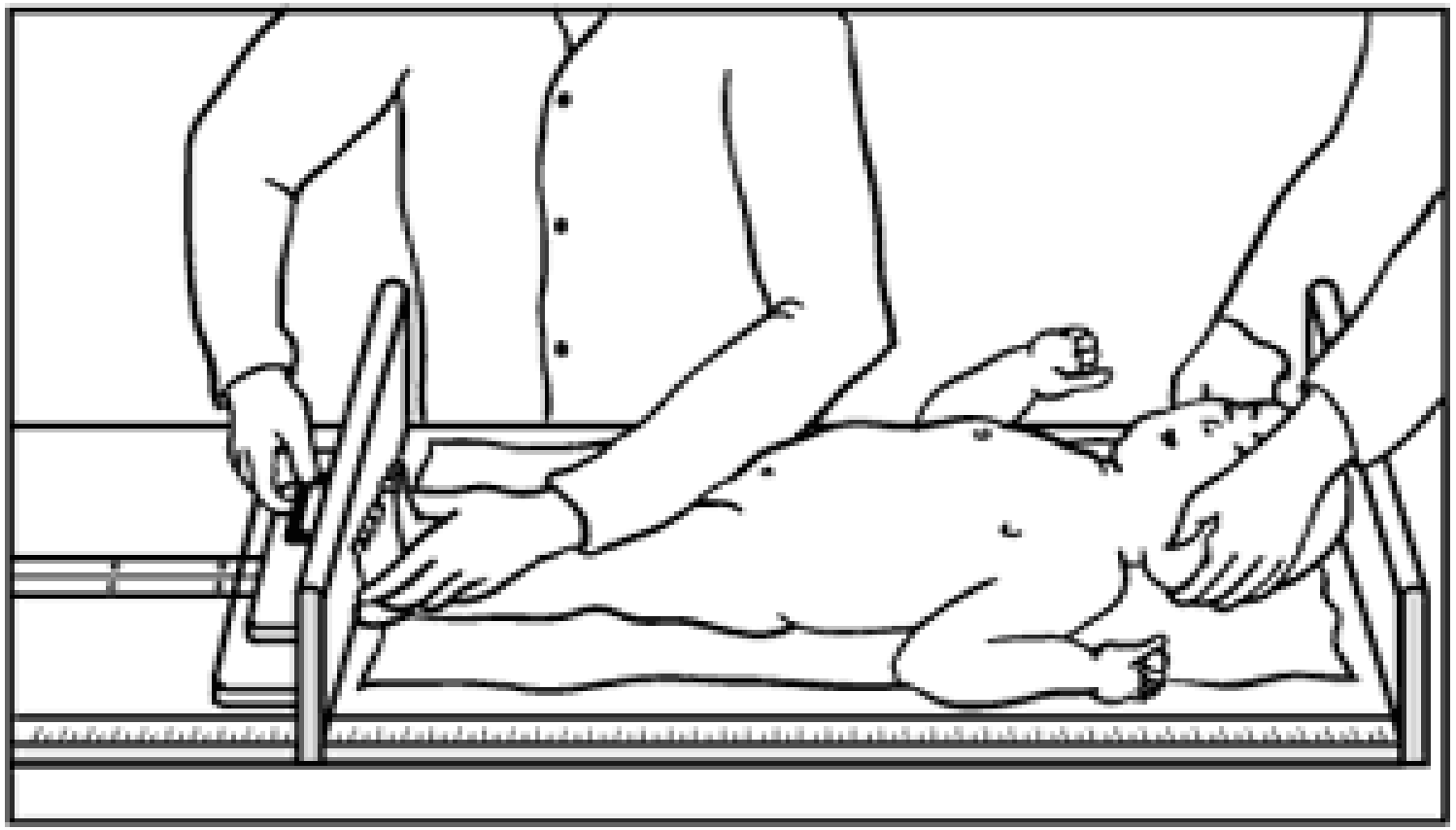
Weighing Older Children

2. Length /Height

- >2 years : (standing) height
- <2 years: (recumbent) length
  - Measure length of children 0-2 years supine
  - Straighten knees and keep ankles in neutral
  - Record measurement to the nearest 0.5cm



How to measure length …cont'd



3. Head circumference

- Measured using non stretchable tape.
- The tape should pass on the supra orbital ridges and on the ***occipital prominence***

Age	Birth	3m	6m	1yr	2yr	3yr	4yr	5yr
OFC	34	40	43	46	48	49	50	51(cm)

4. Head - chest circumference Ratio

- CC is measured at the level just below the nipples.
- At birth head circumference is larger than chest circumference by about 2.5cm
- At 9 to 12 months, both are equal.
- At 1st year, chest circumference tends to be larger by 2.5cm.
- At the age of 5years, it is more 5cm greater in size than the head circumference.

5. Mid-upper arm circumference (MUAC)

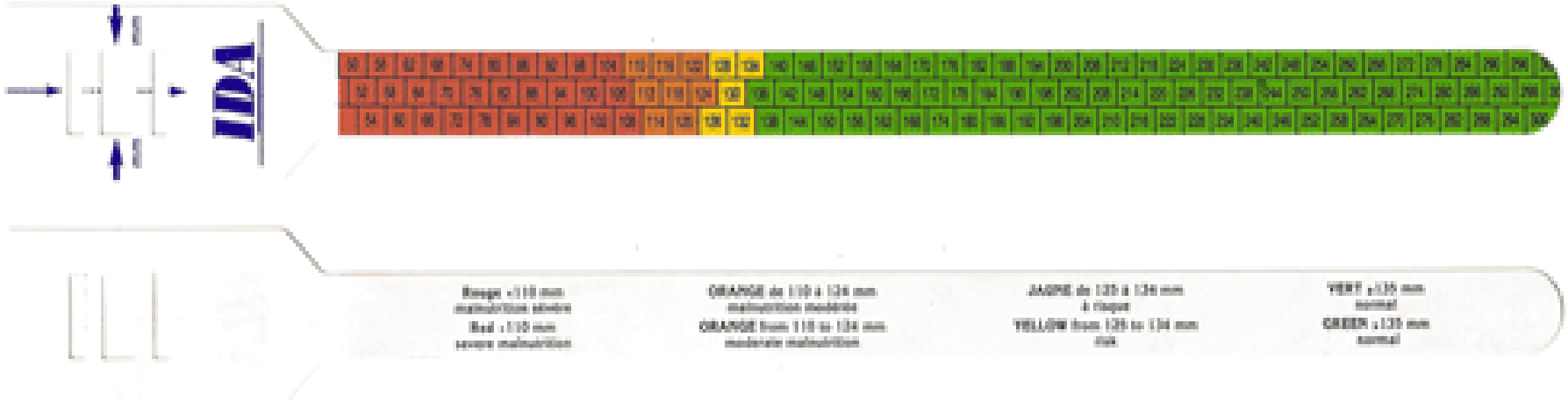
- Use full way to assess a child present nutritional status
- It also used to rapidly screening of all children in the community to sever malnutrition
- Measures mainly the lean body mass
- The candidates are from one year to five years old.
- MUAC below 11.5cm is an indicator of severe malnutrition in children 6-59 months of ages

MUAC…cont'd

RANGES

- Greater than 13.5 cm (**green**)--- Normal
- 12.5-13.5 cm (**yellow**)--- mild malnutrition
- 12.5 -11.5 cm **(Orange)**---moderate malnutrition
- less than 11.5 cm (**red**) ---Sever malnutrition

➔Using shakers tape with color indicators



6. Body mass index (BMI)

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

- Detects whether the weight of the individual is proportional to the height or not.
- BMI remains constant up to the age of 5 years
- For adults and adolescents

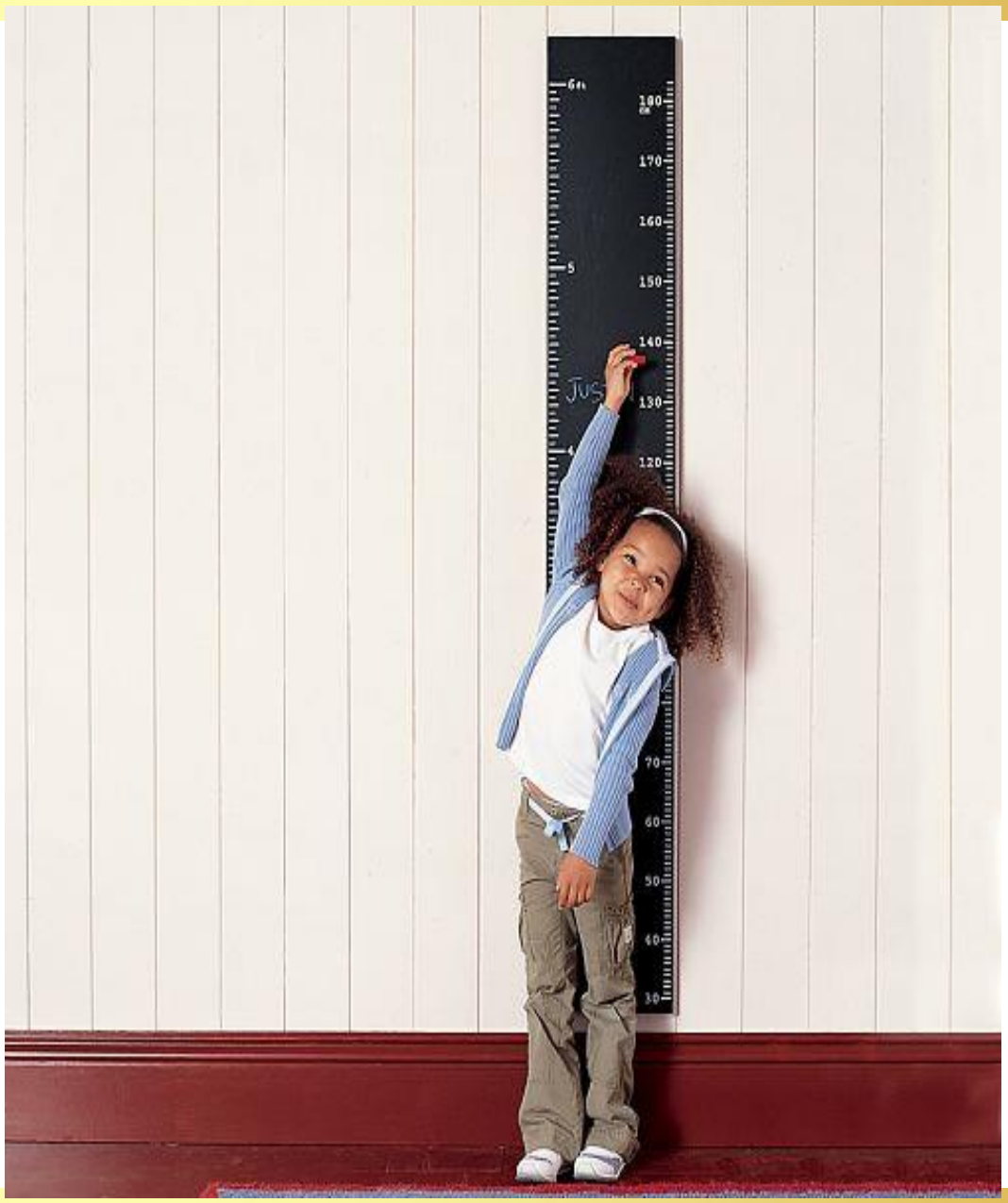
BMI…cont'd

RANGES

BMI :

- Greater than 30 obese
- 26-30 --over weight
- 18.5-25--normal weight
- 17-18.4 --mild PEM
- 16-16.9 --moderate PEM
- Less than 15-- severe PEM

Step 2:
Growth Charts



Growth Monitoring…cont'd

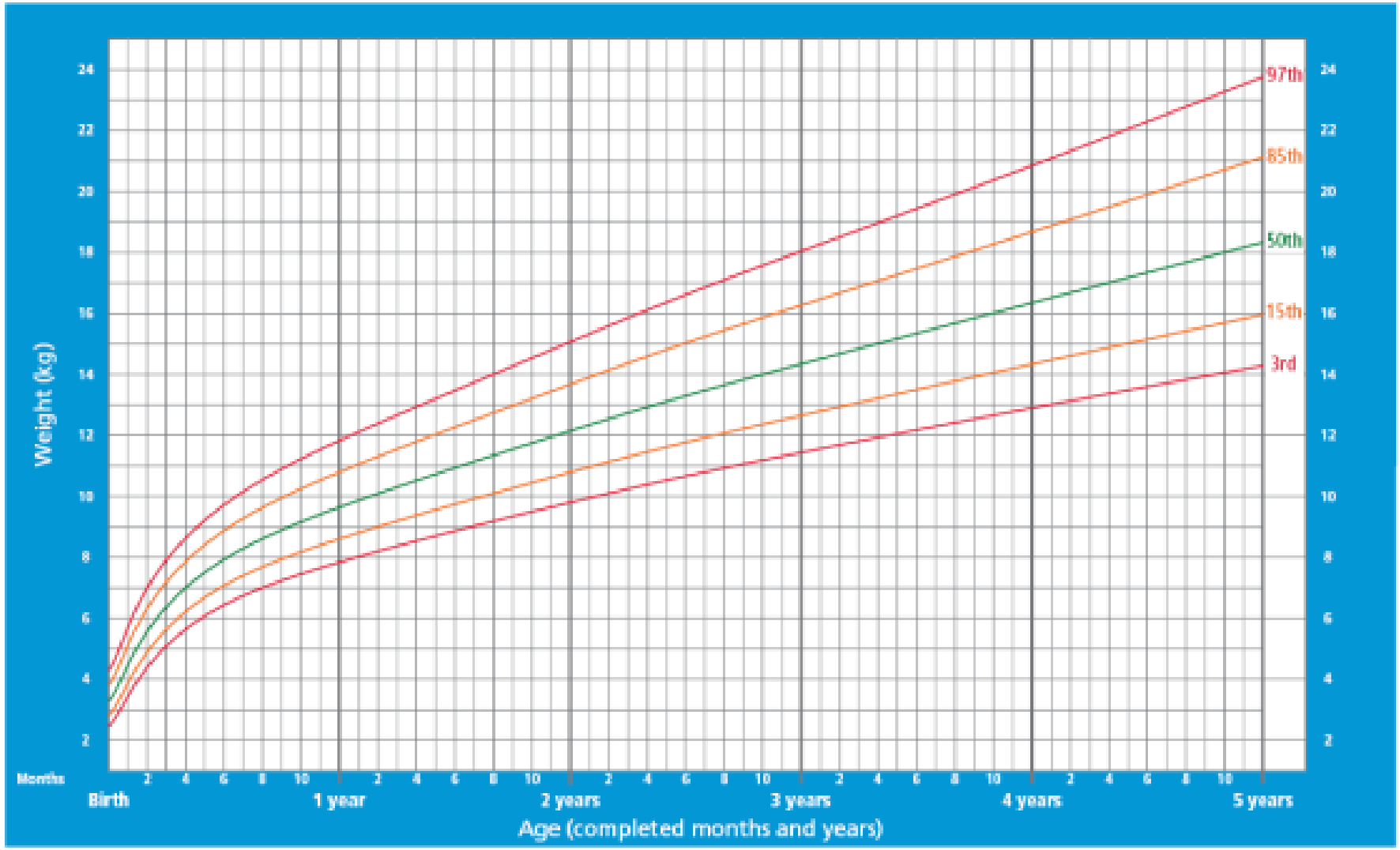
Growth chart

- Is a very important record, used to indicate the child illness and progress and has notes about nutrition.
- Growth chart offers a simple and inexpensive way of monitoring
- *Height and weight* should be plotted for all children, *head circumference* should be monitored for all children under 2 years of age.
- Any deviation from "normal" detected by comparison with **reference curves.**

Weight-for-age BOYS

Birth to 5 years (percentiles)

World Health Organization



WHO Child Growth Standards

Why Use Growth Curves? / Important of growth chart

- ❖ Easy and systematic way to follow changes in growth over time for an individual child
- ❖ Tells direction of growth
- ❖ Reveal significant change in growth pattern
- ❖ Help early detection of growth failure

NB. Height, weight and head circumference should be plotted at regular intervals

- Monthly till 6 months of age
- Quarterly till 18 months of age

Step3- Interpretation growth chart

- ❖ Anthropometric indices including:
- ❑ Weight –for-age –under wt (acute and chronic)
- ❑ Weight-for-height/L-wasting (acute)
- ❑ Height- for-age -stunting(chronic)
- ❑ BMI -wasting (acute)
- ❑ MUAC -wasting (acute)

Interpretation of the finding on growth chart…cont'd

Growth faltering

- If child weight is not increasing or increase more slowly than standard curve for more than **one month** in a baby less than 4 or **2 months** in older children, then the child has growth faltering
- Common in the first 2 years of life & may be the first sign of *inadequate feeding*
- The child may be *less active* than other of the same age
- Sometimes growth faltering is due to illness and when a child is ill weight may be decrease

Interpretation of the finding on growth chart…cont'd

Loss of weight

- ❖ If the child growth falling, the child may be ill with an infection,

  Ex. Tuberculosis or AIDS
- ❑ Acute malnutrition is the most likely cause for weight loss
- ❑ If there is no other complication, the child can manage in the community but if the child has any serious illness or danger sign he/ she has to be referred
- ❑ Close follow up is needed to ensure that the weight gain is achieved within two weeks

Interpretation of the finding on growth chart…cont'd

Rapid rise in the growth curve

- If a child has been ill or undernourished, a rapid raise is expected during the *re-feeding period*, that is experienced as *catch- up growth*
- A sharp increase may indicate inappropriate feeding practice that can lead to ***overweight***
- If a child has gained weight rapidly, it also important to ***look height***
- If only the **weight is increase**, this is a problem
- but if height is increase proportionally, it can be ***catch up growth*** from previous under nutrition and in this situation ***both the weight-for- age &height-for-age curve should be raised***

Intervention after growth monitoring

- ♣ Health education about nutrition
- ♣ Demonstration of mothers about nutrition
- ♣ Manage and treat health problem of child
- ♣ Refer all cases of sever malnutrition

Interpretation	child is growing well	Not gaining wt Find out why?	Losing wt Need care
Intervention	Compliment the mother	Instruct the mother Support her	Care full counseling Refer & admit

FEEDING RECOMMENDATIONS DURING SICKNESS AND HEALTH

Up to 6 Months of Age

- Breastfeed as often as the child wants, day and night, at least 8 times in 24 hours.
- Do not give other foods or fluids.

6 Months up to 12 Months

- Breastfeed as often as the child wants.
- Give adequate servings of:

_____
_____
_____,
_____

  - 3 times per day if breastfed plus snacks
  - 5 times per day if not breastfed.

12 Months up to 2 Years

- Breastfeed as often as the child wants.
- Give adequate servings of:

_____
_____
_____,
_____

or family foods 3 or 4 times per day plus snacks.

2 Years and Older

- Give family foods at 3 meals each day. Also, twice daily, give nutritious food between meals, such as:

_____
_____
_____
_____
_____

What age is each infant?

A- sits without support

B- just started walking

C- crawling

D- can lift chest off the table


QUESTION???

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University of Gondar

New Born Care

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Learning objectives

- **At the end of this unit, student will be able to:**
  - Define newborn
  - Discuss immediate care of newborn
  - Describe steps of neonatal resuscitation
  - Explain types of neonatal reflexes
  - Discuss management of babies with low birth weight
  - Discuss management of common neonatal disorders
  - Describe organization of neonatal unit

Definition

- In medical contexts, newborn or **neonate** (from Latin, neonatus, newborn) refers to an infant in the first 28 days after birth.
- **Classification**

1) **Gestational age**

A. Preterm – born before 37 complete weeks

B. Term baby – 37 -42 weeks

C. Post term – After 42 weeks

2) **Birth weight**

A. Extremely low birth weight infant (less than 1 kg)

B. VLBW <1.5kg

C. Low birth wt < 2.5 k.g (pre term or small for gestational age)

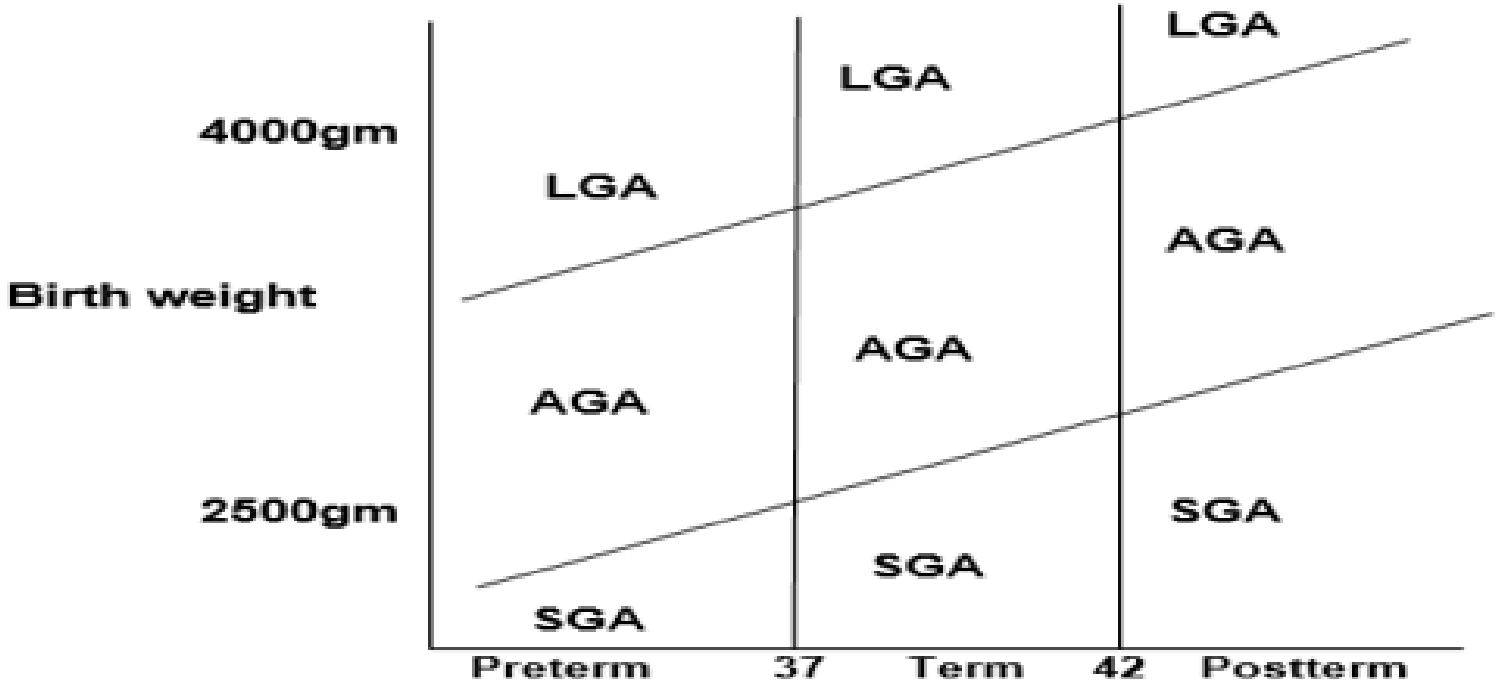
Classification of new born

3) **Weight Percentiles**

A. SGA

B. AGA

C. LGA



Assessment of new born

- Most neonate problem identified and managed based on:
  - ✓Accurate history
  - ✓Physical examination

1. Accurate history

- From the history, investigate about
  - ✓Prenatal hx – ANC follow up, illness & infection, exposure to smoking & alcohol
  - ✓Delivery hx – mode of delivery, duration of labor, home/hospital
  - ✓Postnatal hx - Apgar score and any resuscitation needed, BF, Urine and meconium passed, Any clinical problems, e.g. hypothermia, respiratory distress, hypoglycaemia.

2. Physical assessment

- Done in a warm, well lighted area and maintain body tempe.
- Assessment can performed systematically (from the head- to toe)

1) **Measurements:**
2) **General inspection:**
3) **Regional examination:**

Measurements	Normal	Abnormal
Birth weight	2500 g to 4000 g. Between 10th and 90th centile for gestational age.	Low birth weight (below 2500 g). Underweight (below 10th centile) or overweight (above 90th centile) for gestational age.
Head circumference	Between 10th and 90th centile for gestational age.	Small head (below 10th centile) or large head (above 90th centile for gestational age).
Gestational age	Physical and neurological features of term infants (37–42 weeks).	Immature features in preterm infant (below 37 weeks). Postterm infants (42 weeks and above) have long nails.

2. Physical assessment

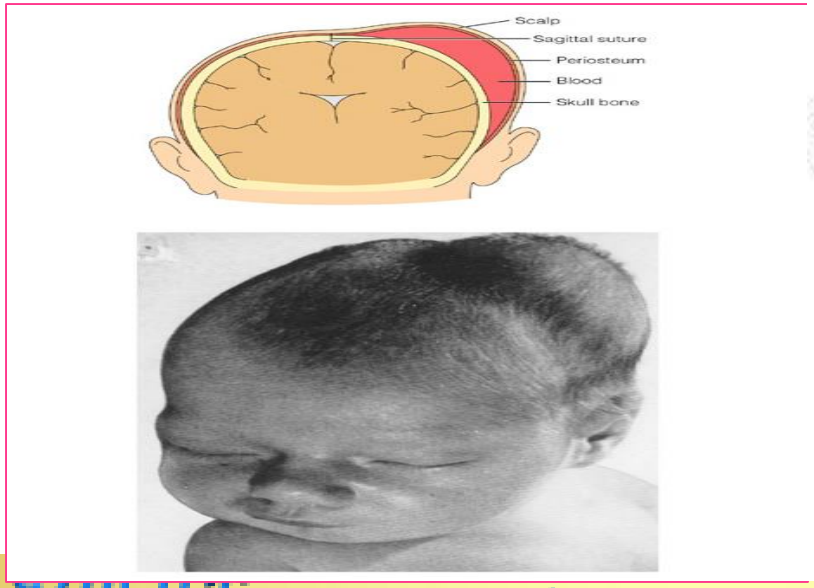
A. Temperature : temper. Will drop with in 10 min. as a result of exposure to cold (room air) and stabilizes 8-12 hrs

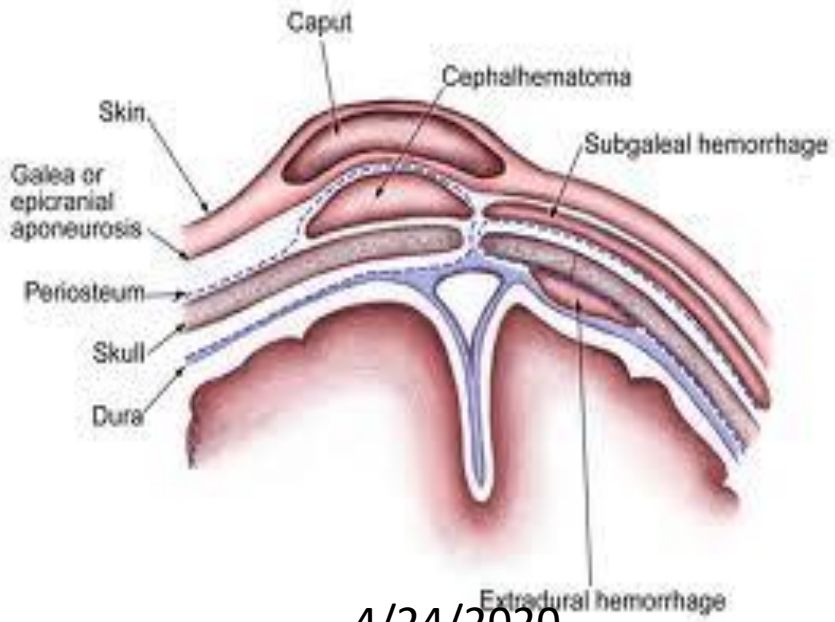
B. Skin characteristics:

- Pink color
- Yellowish
- **Acrocyanosis** may appear for 2-6 hrs due to poor peripheral circulation
- **Forceps mark,**
- **Vernix caseosa**
- **Lanugo:** Slight, downy distribution of fine hair over the body

Head :

- ❖ Moulding- w/h diminished a few days after birth
- ❖ Anterior fontanel and posterior fontanel:
- ❖ **Cephalohematoma** is *collection of blood due to rapture of blood vessels* in cranial bone can be bilateral or unilateral
- ❖ **Caput succedaneum** is *edema or swelling* on infants scalp





Physical assessment…cont'd

Face : normally symmetrical

Eye : the eye should be checked for size, pupil size, reaction to light, blink reflex to light or edema of eye lid,

Neck: for fracture of clavicles and injury to sternocleidomastoid muscle

Lungs

Chest shape	Symmetrical.	Hyperinflated or small chest.
Chest movement	Symmetrical.	Asymmetrical in pneumothorax and diaphragmatic hernia.
Recession	Mild recession in preterm infant.	Severe recession in respiratory distress.
Grunting		Expiratory grunt in respiratory distress.
Stridor		Inspiratory stridor a sign of upper airway obstruction

Heart

Pulses	Brachial and femoral pulses easily palpable. 120–160 beats per minute.	Pulses weak, collapsing, absent, fast or slow or irregular.
Capillary filling time	Less than 4 seconds over chest and peripheries.	Prolonged filling time if infant cold or shocked.
Blood pressure	Systolic 50 to 70 mm at term.	Hypertensive or hypotensive.
Precordium	Mild pulsation felt over heart and epigastrium.	Hyperactive precordium.
Apex beat	Heard maximally to left of sternum.	Heard best in right chest in dextrocardia.

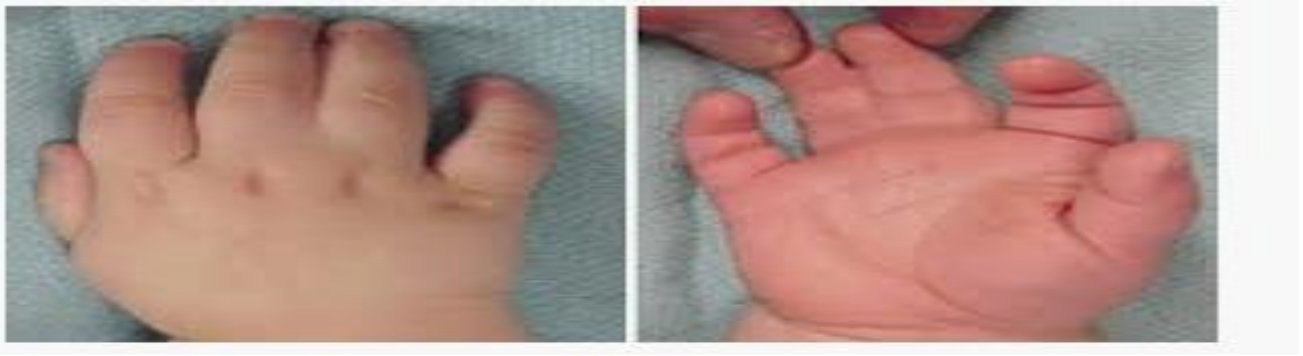
Abdomen : should be cylindrical, protrude slightly and move with respiration. A scaphoid (hallow-shaped)appearance is abnormal.

Genitals:

- In female during the first wk may have vaginal discharge composed whitish mucus and changed with tinged with blood
- Look for any congenital anomalies/malformation. Eg. Hypospadias

Extremities :

- Arm and hand will exam for presence of
  - **Polydactyly -** Extra digits
  - **Syndactyly** - Fusion (webbing) of fingers and
  - Damage of the upper arm due to damage of 5 and 6 cervical nerve (brachial plexus)
- Leg and foot is checked for evidence of turning of foot to in ward



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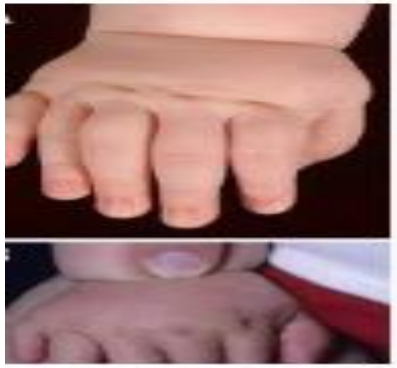


Neonatal reflexes

- Also known as developmental, primary, or primitive reflexes.
- They consist of autonomic behaviors that do not require higher level brain functioning.
- They are often protective and disappear as higher level motor functions emerge.
- They can provide information about the nervous system and muscle tone.

Eg. reflex that is still present after the age when it would normally disappear can be a sign brain or nervous system damage

1. Suck

- ✓ begins when a nipple or finger is placed in the mouth of a newborn.
- ✓ Elicited by the examiner stroking the lips of the infant; the infant's mouth opens and the examiner introduces their gloved finger and sucking starts.
- ✓ Persist through out infancy

2. Rooting

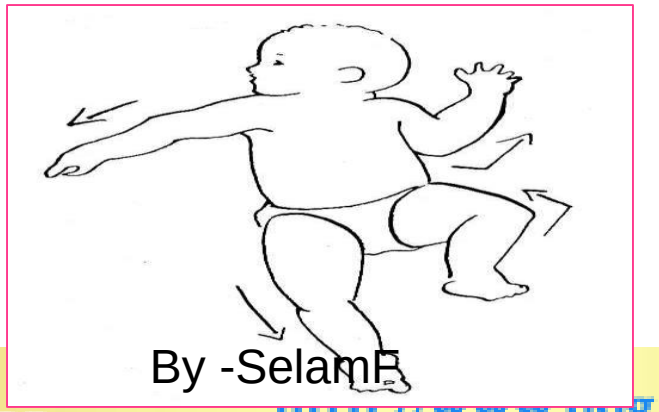
- ❖ Elicited by the examiner stroking the cheek or corner of the infant's mouth.
- ❖ The infant's head turns toward the stimulus and opens its mouth
- ❖ Disappear by 3-4mo but may persist upto 12 mo

3. Palmar grasp

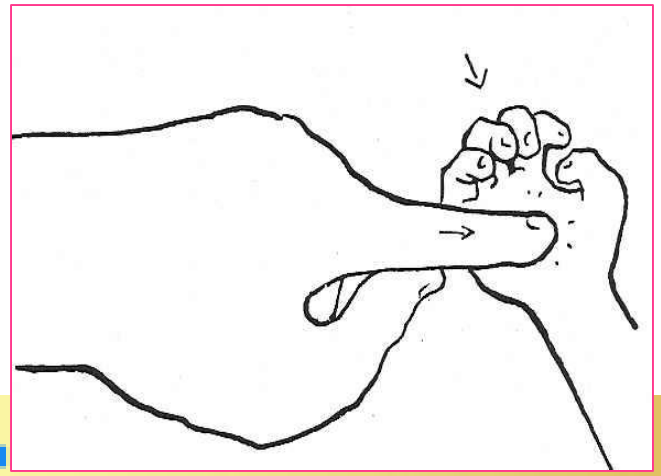
- Elicited by the examiner placing his finger on the palmar surface of the infant's hand and the infant's hand grasps the finger.
- Attempts to remove the finger result in the infant tightening the grasp.
- Lessen after 3mo

4. Tonic neck

- Elicited by rotating the infants head from midline to one side.
- The infant should respond by extending the arm on the side to which the head is turned and flexing the opposite arm.
- The lower extremities respond similarly.



By -SelamF



5. Moro

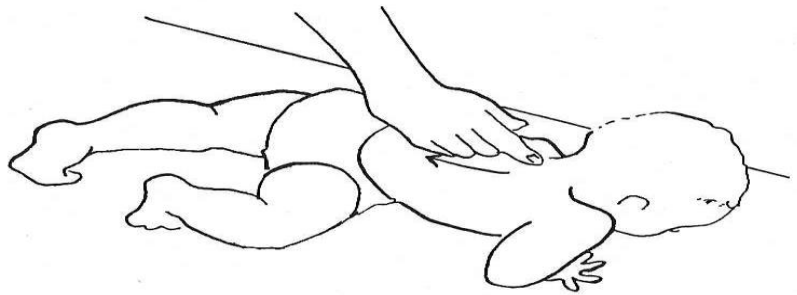
- The examiner holds the infant so that one hand supports the head and the other supports the buttocks.
- The reflex is elicited by the sudden dropping of the head in her hand
- The response is a series of movements: the infant's hands open and there is extension and abduction of the upper extremities.
- This is followed by anterior flexion of the upper extremities and and audible cry.

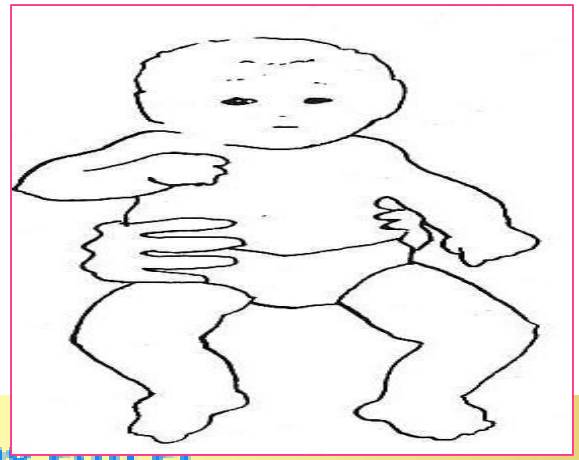
6. Stepping

- ❖ Elicited by touching the top of the infant's foot to the edge of a table while the infant is held upright.
- ❖ The infant makes movements that resemble stepping.

7. Galant

- ✓ The infant is held in ventral suspension with the chest in the palm of the examiner's hand.
- ❖ Firm pressure is applied to the infant's side parallel to the spine in the thoracic area.
- ❖ The response consists of flexion of the pelvis toward the side of the stimulus.





8. Babinski

❖ Elicited by stimulus applied to the outer edge of the sole of the foot.

❖ The infant responds by plantar flexion and either flexion or extension of the toes.

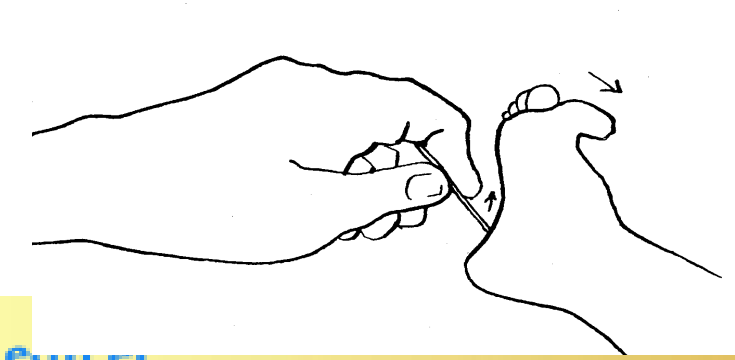
9. Plantar grasp

✓Infant's toes will curl downward when sole of foot is touched.

✓lesson by 8 mo

10. Startle

❖ a loud noise such as a hand clap will elicit the newborn to abduct his arms and flex his elbows.



Significance

- They are often protective and disappear as higher level motor functions emerge.
- They can provide information about the nervous system and muscle tone.
- reflex that is *still present* after the age when it would normally disappear can be a *sign brain or nervous system damage*
- Eg. An absent or inadequate Moro response on one side : **hemiplegia, brachial plexus palsy**, or **a fractured clavicle**
- Persistence beyond 5 months of age is : indicate severe **neurological defects.**

Danger signs

- Not feeding well
- Less active than before
- Fast breathing
- Moderate or severe chest in-drawing
- Grunting
- Convulsions
- Temperature >37.5^{0}C or <35.5^{0}C
- Umbilicus draining pus or
- Umbilical redness extending to skin
- Bleeding from umbilical stump

Immediate care of new born baby

1. Deliver baby on to mothers abdomen
2. Dry the baby with clean towel, keep in warm room & a way from draft
3. Quick check of newborn's breathing and color while drying(to assess the need of resuscitation, APGAR scoring)
4. Offer care of cord
5. Place the baby in skin to skin contact
6. Eye care
7. Provide Vit. K
8. Weight baby and classifying based on BWt and GA

Assigning Apgar score

- Is a commonly-used method to assess the newborn status
- Mainly related to the **Oxygenation status** of newborn after birth
- Therefore help to identify infants requiring resuscitation for hypoxic-acidosis (Asphyxia)
- APGAR
  - A - Appearance
  - P - Pulse rate
  - G- Grimace
  - A - Activity
  - R – Respiration

Assigning Apgar score…cont'd

- **Why APGAR score /Purposes?**
  - Evaluate the conditions of the baby at birth
  - Determine the need for resuscitation
  - Evaluate the effectiveness of resuscitative efforts
  - Identify neonates at risk for morbidity and mortality

- Is usually assigned at 1 and 5-min
- The 1- minute score signals, the need for immediate resuscitation
- The 5-minute score indicates the probability of successfully resuscitating the newborn
- Scores of 0-3 at 20 min predicate high mortality and morbidity

APGAR score

TABLE 33-1 The APGAR Score

Sign	0	1	2	Score	
				1 min	5 min
Appearance (Skin color)	Blue, pale	Body pink, extremities blue	Completely pink		
Pulse Rate (Heart Rate)	Absent	Below 100	Above 100		
Grimace (Irritability)	No response	Grimaces	Cries		
Activity (Muscle Tone)	Limp	Some flexion of extremities	Active motion		
Respiratory (Effort)	Absent	Slow and irregular	Strong cry		
			TOTAL SCORE =		

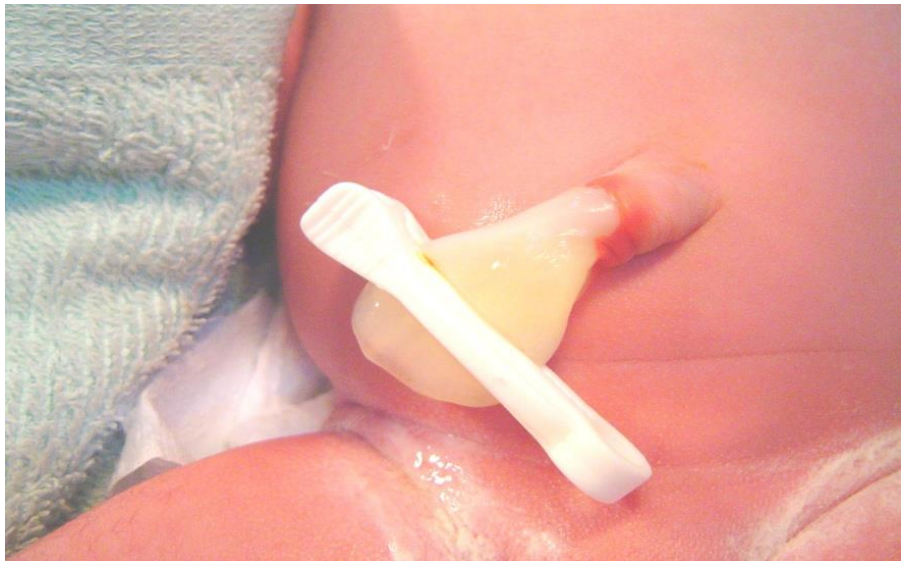
What to do if the Apgar score is:

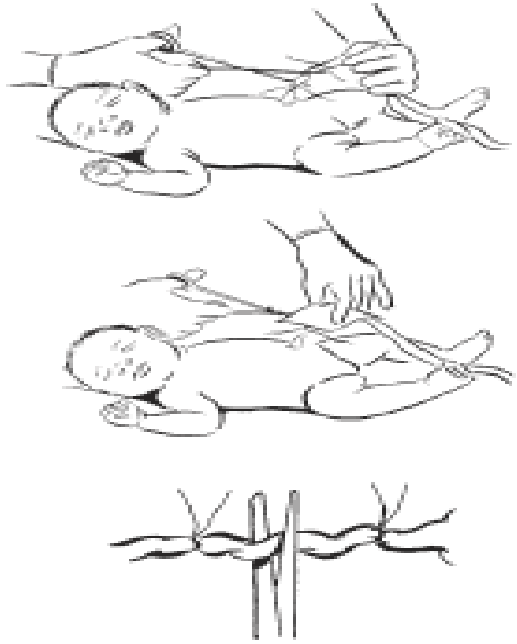
- **Apgar 7-10 (**Normal)
  - Dry the baby and keep warm
  - Using suction is not necessary if the baby cries vigorously
- **Apgar 4-6 (**Moderate Asphyxia)
  - Most of these babies are breathing
  - If so and have HR< 100/minute, quick and gentle clearing of the airway
  - If no improvement, the HR<100/minute
  - Move immediately to vigorous Rx (see Apgar 0-3)
- **Apgar 0-3 (**Sever Asphyxia)

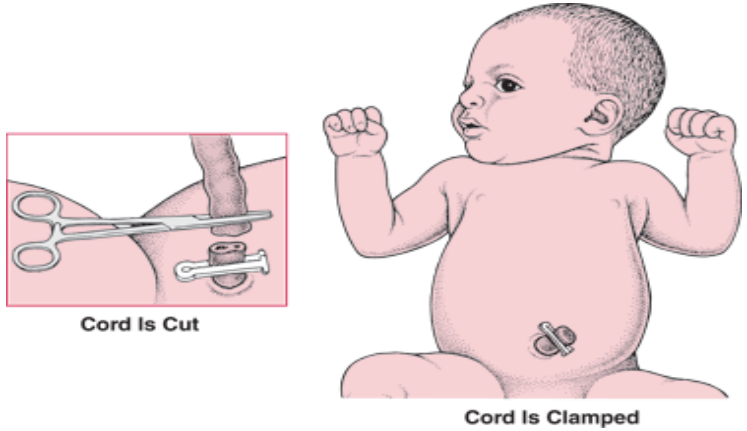
- Proceed in the following order quickly and as carefully as possible:
  - Note the time
  - Dry and cover the baby
  - Resuscitate

3. Cord care/Avoidance of infection

- ❑ Cut cord
- ❑ Observe for oozing blood.
- ❑ Do not apply any substance to the stump
- ❑ Do not bind or bandage the stump
- ❑ Leave the stump uncovered

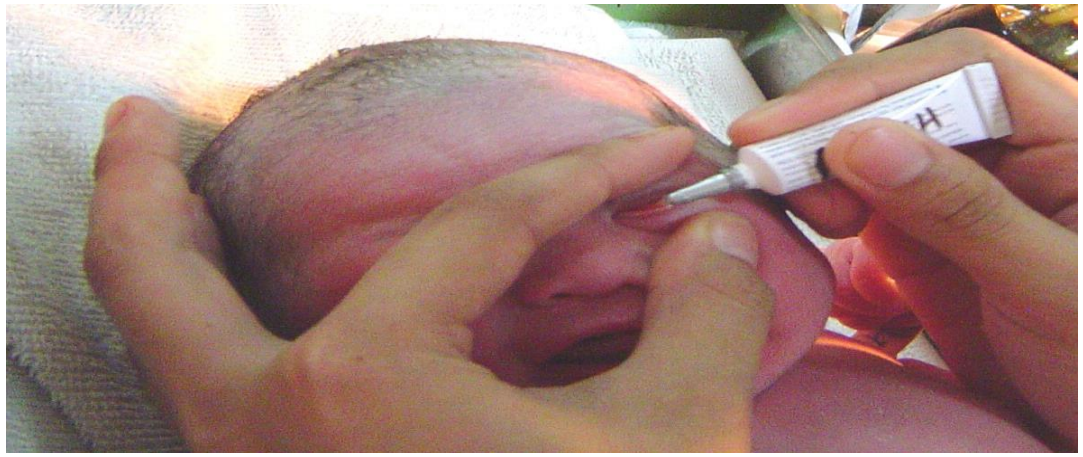






5. Eye care

- Wipe the eyes and instill eye prophylaxis
  - Given within 1 hour after birth
  - Prevent ophthalmia neonatorum and Chlamydia trachomatis conjunctivitis
    - Erythromycin ointment 0.5%
    - Tetracycline ointment 1%
    - Silver nitrate drops 1%
- Do not wash away the eye antimicrobial



6. Provide Vit. K

- It prevents neonatal hemorrhage during first few days of life
- **Recommended route of administration: intramuscular**
- Dose:
  - 1mg being given at birth.
  - Preterm infants may receive 0.5mg.
- **Alternative Route: Oral**

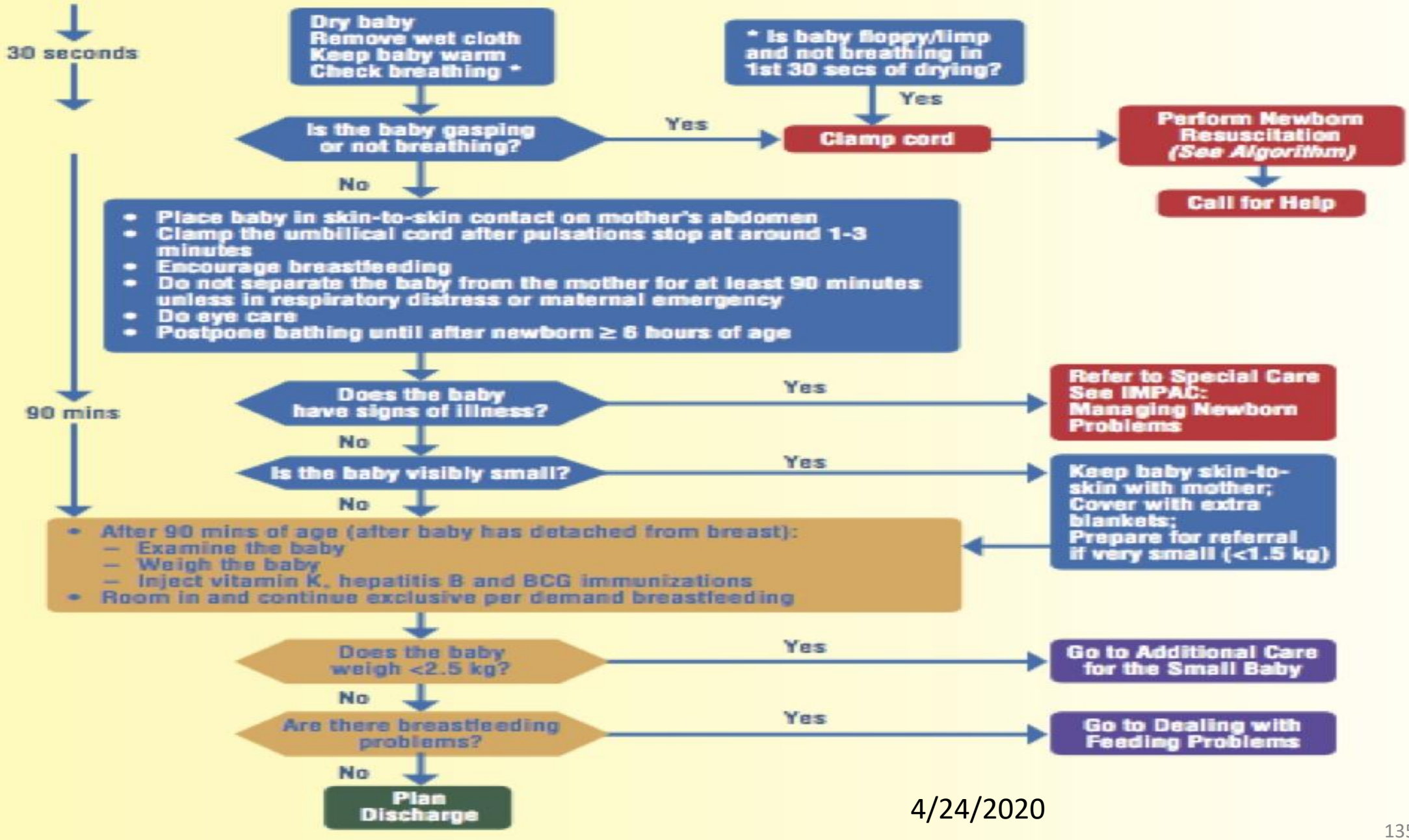
  Dose:
  - 2mg orally at birth;
  - Repeat dose at 3-5 days and at 4-6 weeks of age.
  - Repeat dose if the infant vomits or regurgitates within 1 hour

➢Immunization

- At birth: BCG , OPV and HBV vaccine.

7. Weight baby and classifying based on BWt and GA

❑See the following summary


IMMEDIATE NEWBORN CARE
30 seconds
Dry baby
Remove wet cloth
Keep baby warm
Check breathing *
* Is baby floppy/limp and not breathing in 1st 30 secs of drying?
Yes
Is the baby gasping or not breathing?
Yes
Clamp cord
Perform Newborn Resuscitation (See Algorithm)
Call for Help
No
• Place baby in skin-to-skin contact on mother's abdomen
• Clamp the umbilical cord after pulsations stop at around 1-3 minutes
• Encourage breastfeeding
• Do not separate the baby from the mother for at least 90 minutes unless in respiratory distress or maternal emergency
• Do eye care
• Postpone bathing until after newborn ≥ 6 hours of age
90 mins
Does the baby have signs of illness?
Yes
Refer to Special Care See IMPAC: Managing Newborn Problems
No
Is the baby visibly small?
Yes
Keep baby skin-to-skin with mother; Cover with extra blankets; Prepare for referral if very small (<1.5 kg)
No
• After 90 mins of age (after baby has detached from breast):
– Examine the baby
– Weigh the baby
– Inject vitamin K, hepatitis B and BCG immunizations
• Room in and continue exclusive per demand breastfeeding
Does the baby weigh <2.5 kg?
Yes
Go to Additional Care for the Small Baby
No
Are there breastfeeding problems?
Yes
Go to Dealing with Feeding Problems
No
Plan Discharge

Resuscitation of the newborn baby

Introduction

- Approximately 10% of in hospital delivered newborns require resuscitation assistance to breathe at birth.
- Less than 1% require extensive resuscitation.

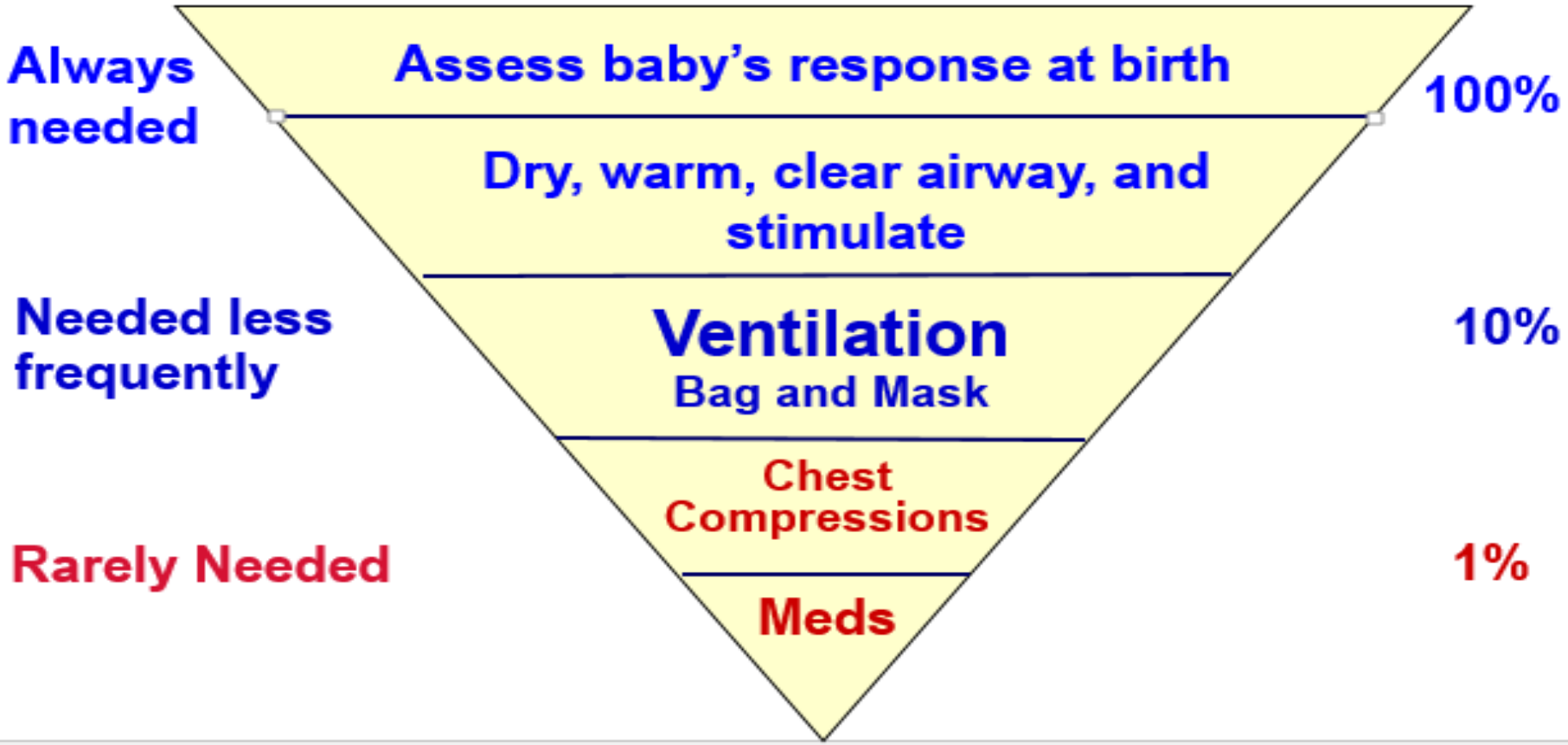
Goal of Resuscitation is to get a baby with:-

- ❑ Sustained regular respirations,
- ❑ Heart rate above100 beats per minute, and
- ❑ Pink color of the lips and central trunk

Baby who may need neonatal resuscitation

- Mother who had history of previous fetal & neonatal death
- Mother with pre-eclampsia
- Multiple pregnancy
- Abnormal presentation
- In prolonged labour or meconium stained liquor
- Instrumental deliveries
- Placental anomalies (eg, placenta previa)

Basic Steps in Resuscitation

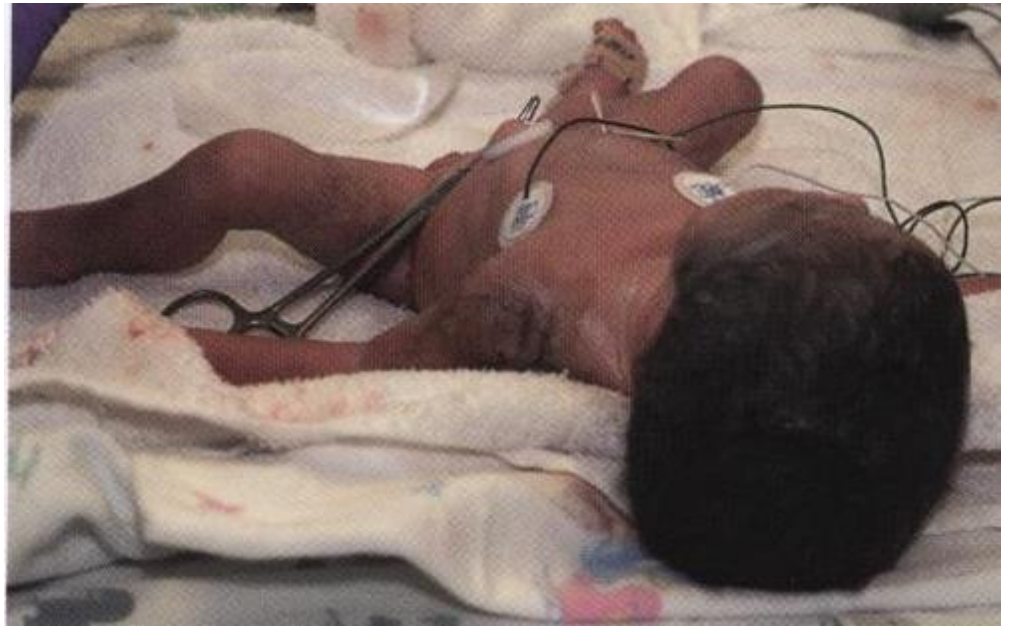


Normal Transition

- No meconium
- Breathing/crying
- Good muscle tone
- Term

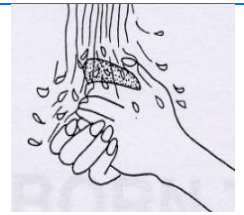
Abnormal Transition

- Gasping, ineffective or no breathing
- Poor muscle tone
- Central cyanosis (blue)
- All need assisted ventilation!



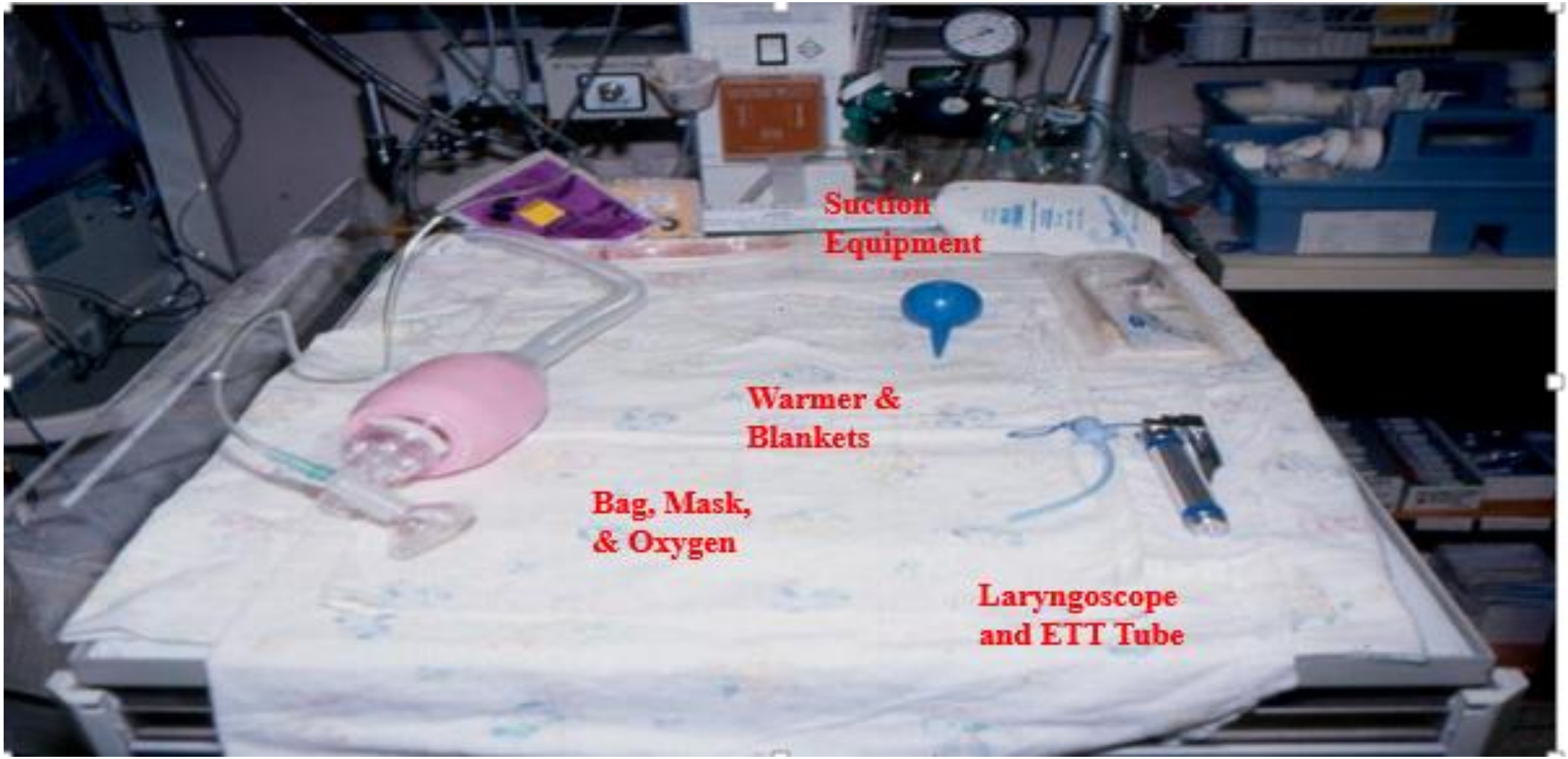
Preparing for birth

❑**Wash your hands**



- Draught free, warm room - temperature $\geq 25^0C$
- Clean, dry and warm delivery surface
- Radiant heater
- Two clean, warm towels/clothes
- Self inflating bag - newborn size
- Infant masks in two sizes - normal and small newborn
- Suction device
- Oxygen (if available)
- Clock

Check if all equipments are in working order


Suction
Equipment
Warmer &
Blankets
Bag, Mask,
& Oxygen
Laryngoscope
and ETT Tube

Clear the mouth and nose

Bulb syringe:

- **Suction mouth first, then nose ("m" before "n")**

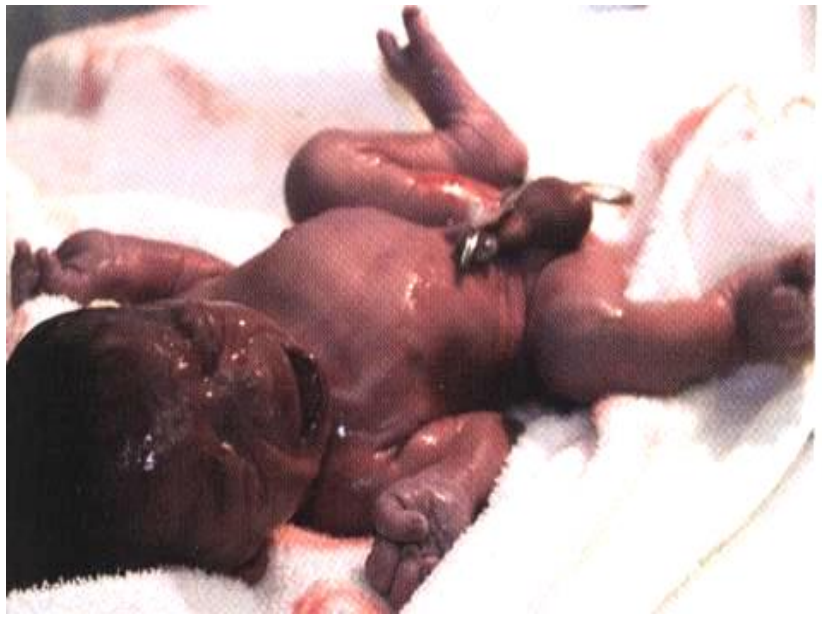
No bulb syringe:

- **Clear secretions with clean, dry cloth**

No deep suctioning with bulb syringe or catheter!

Bradycardia (slowing of the heart rate) can result from deep suctioning

Drying the Infant



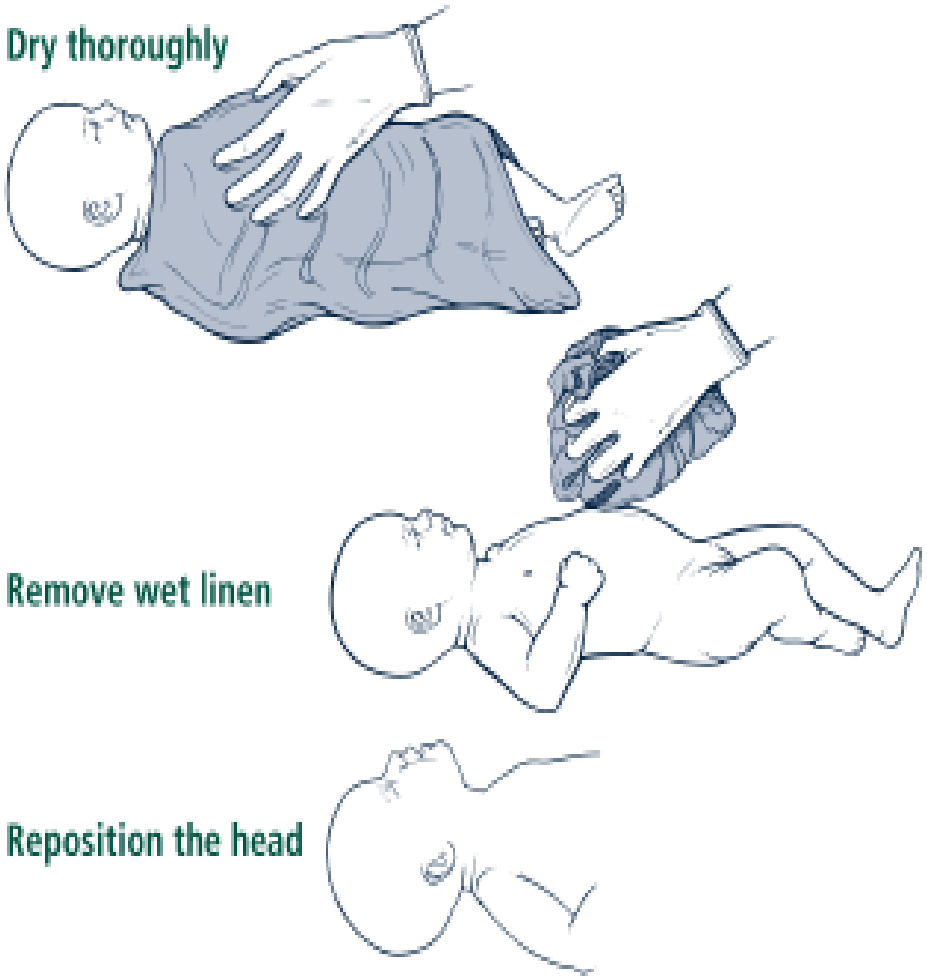


Figure 2.6. Drying and removing wet linen to prevent heat loss and repositioning the head to ensure an open airway

Tactile Stimulation

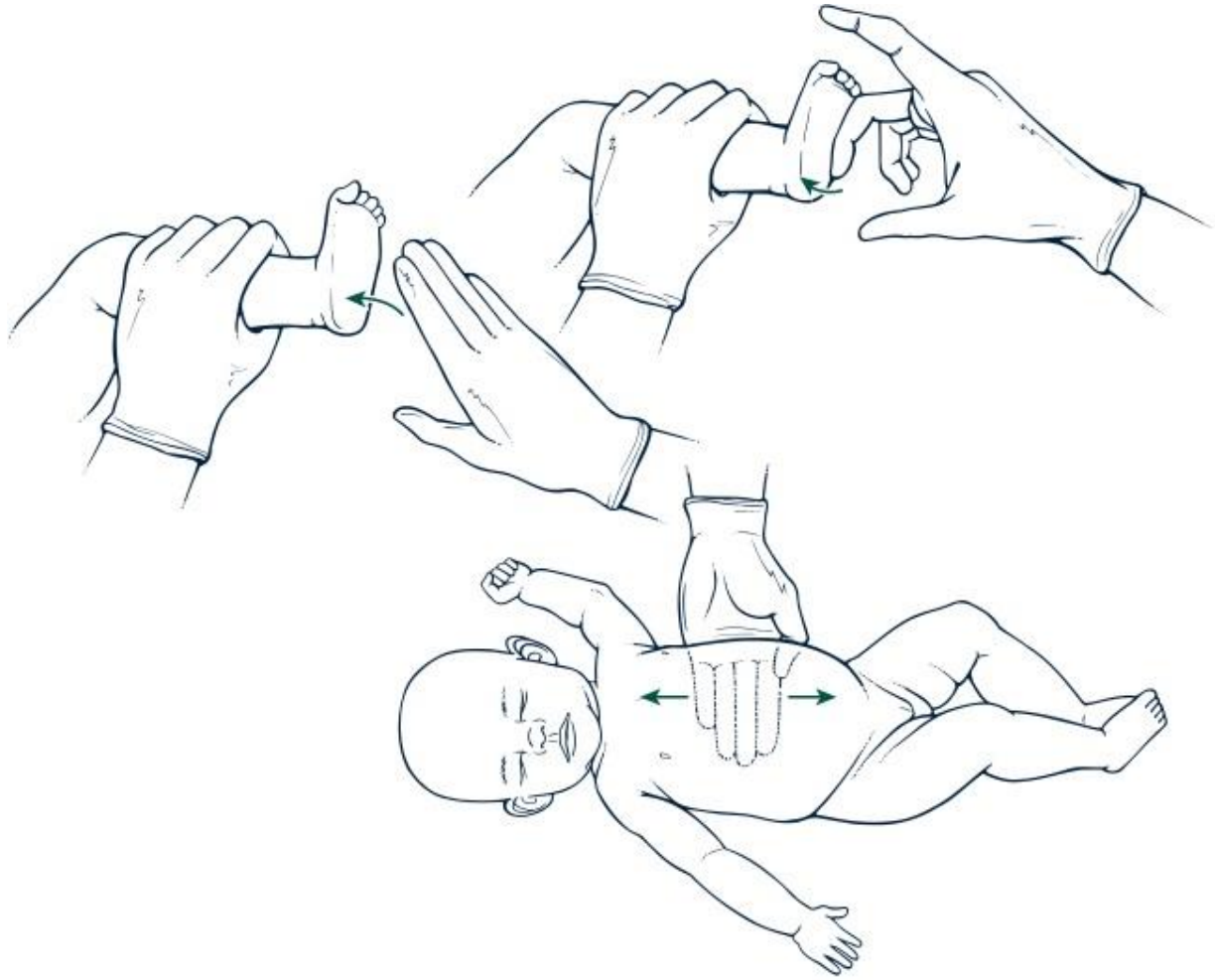
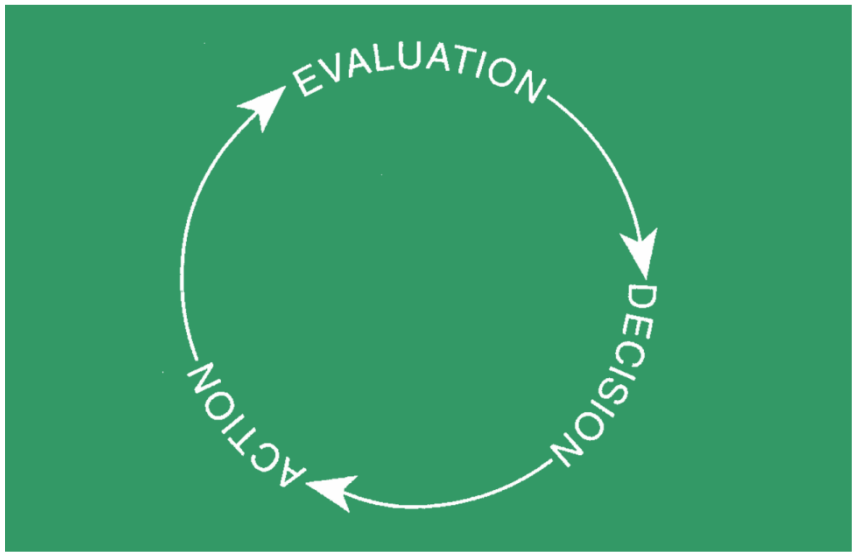


Figure 2.7. Acceptable methods of stimulating a baby to breathe

How to Prioritize Actions

Evaluation is based on:

- **Respirations (breathing/crying)**
- **Heart rate**
- **Color**



Evaluate Respirations

YES

- **Unlabored breathing/crying**
- **Listen with stethoscope**

NO

- **If shallow breathing, gasping, or not breathing at all, give positive-pressure ventilation**

Evaluate Heart Rate

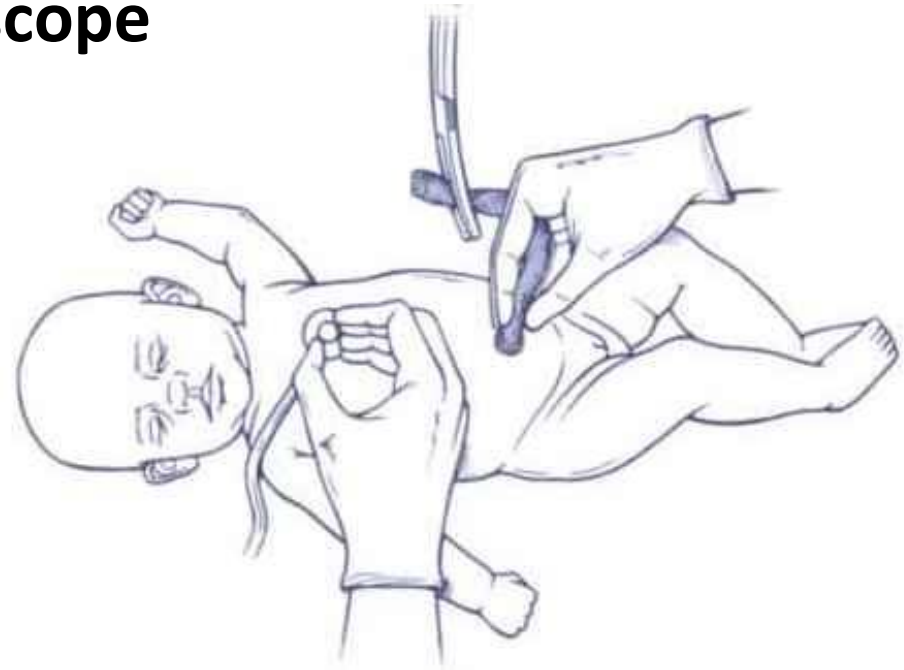
- Feel pulse at base of umbilical cord or listen with stethoscope
- Count for 6 seconds and multiply by 10

  Example:

  If you counted 13 pulsations in 6 seconds the baby's heart rate would be

  13 x 10 = 130

- Heart rate <100 requires positive-pressure ventilation

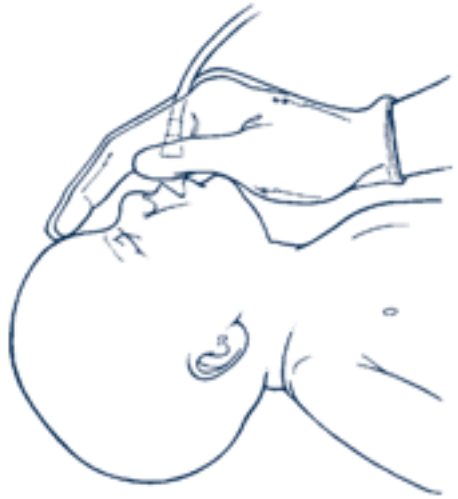


Evaluate Color

- **Peripheral cyanosis (a bluish color):**
  - Bluish color of hands and feet
  - Requires no further action
- **Central cyanosis:**
  - Bluish color of the trunk and limbs
  - Bluish color of lips and gums
  - Use free-flow oxygen, if available, or positive-pressure ventilation

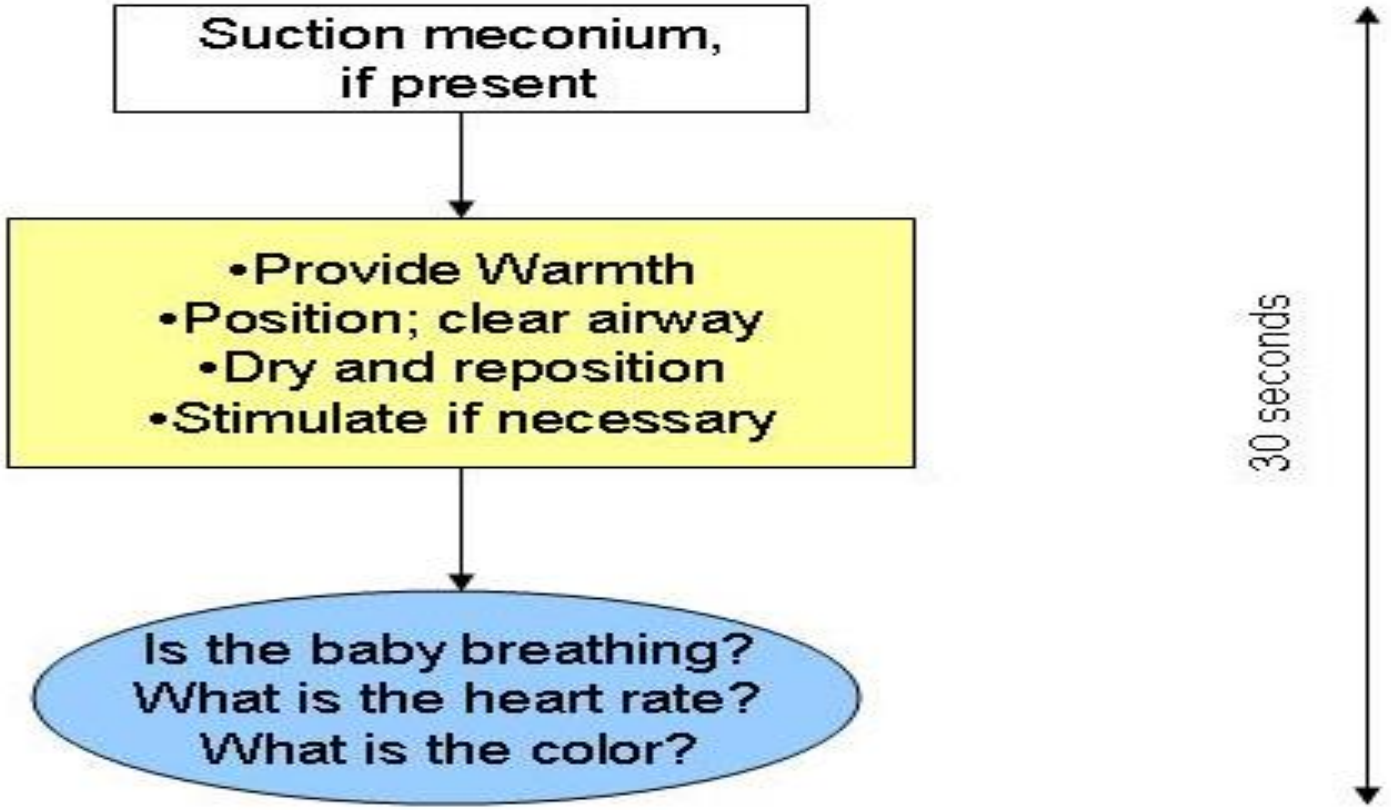
Free-flow Oxygen

- If the infant is breathing but there is persistent central cyanosis, give free-flow oxygen.
- Flow rate at approximately 5-10 L/min
- If not available, use positive-pressure (bag-and-mask) ventilation

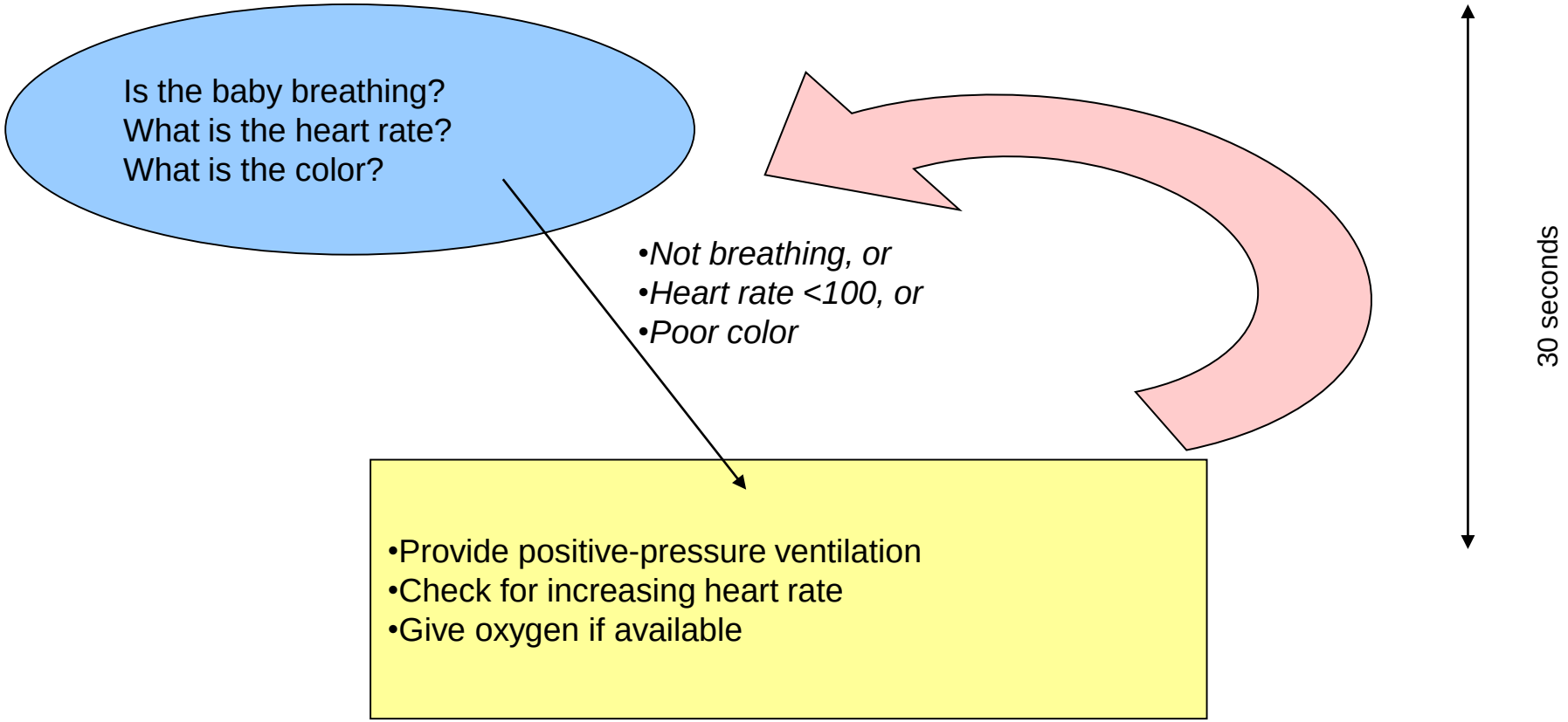


Newborn Resuscitation Flowchart

Initial Steps

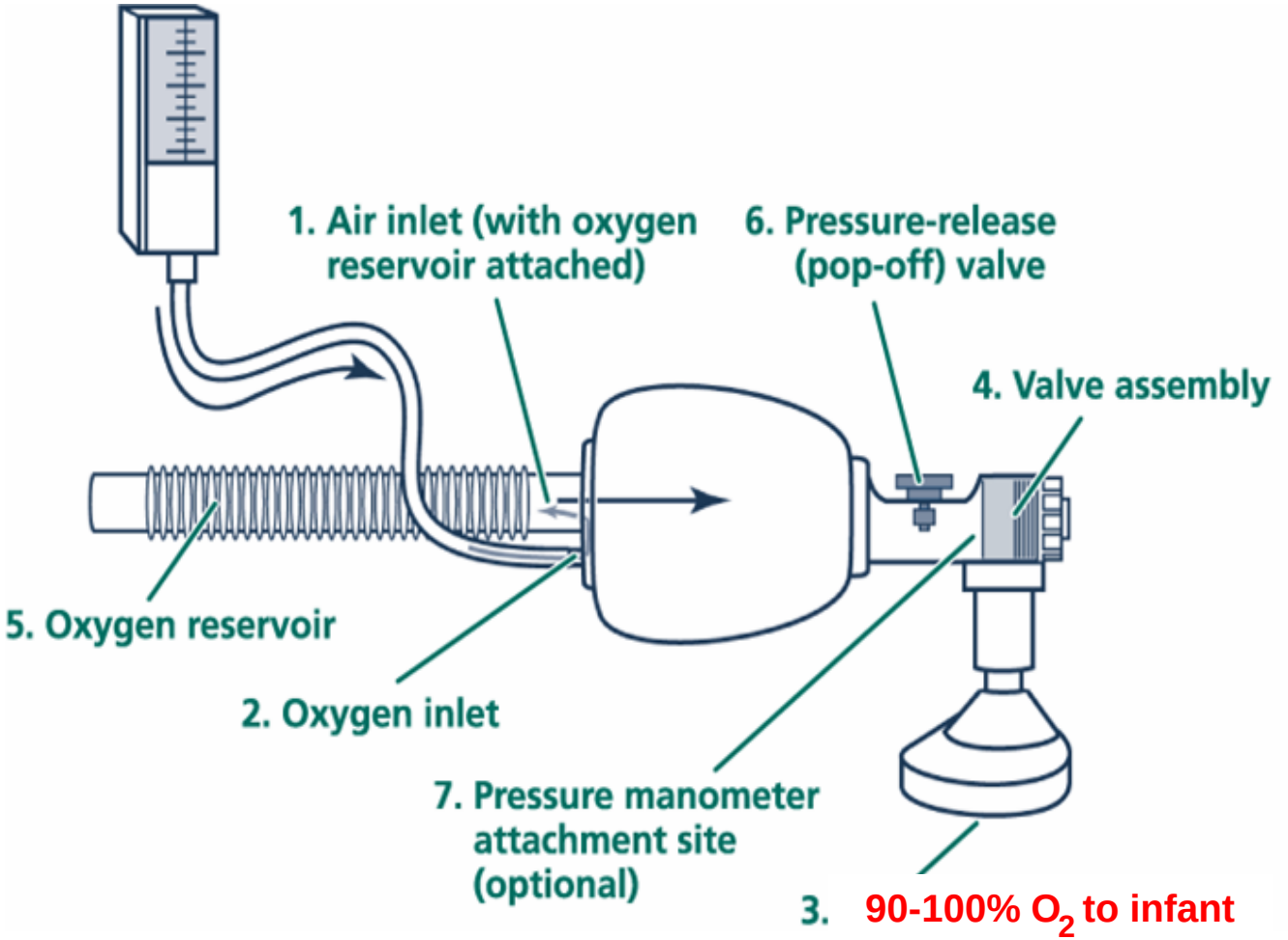


If the evaluation is NOT normal

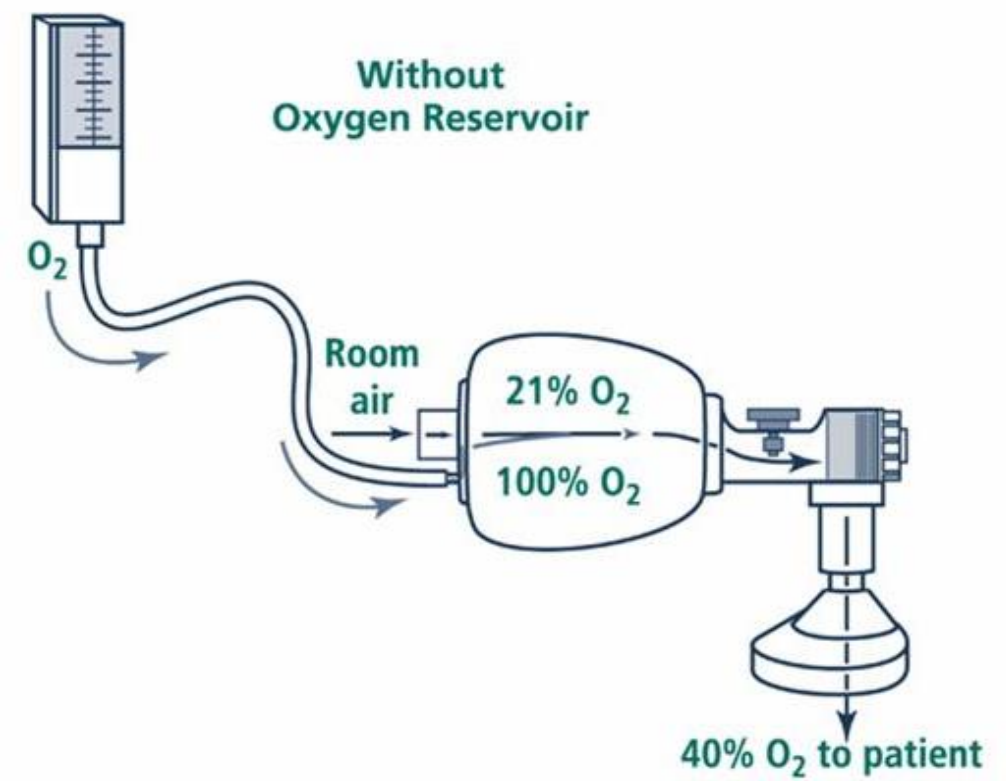


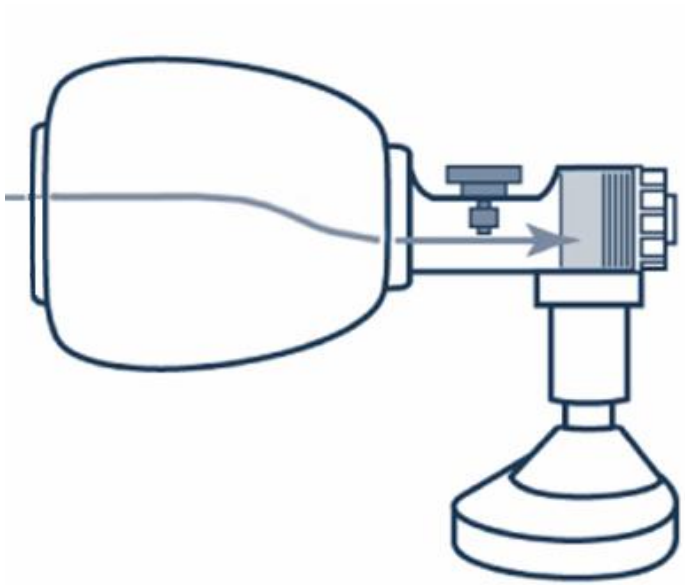
Ventilation of the lungs is the single most important and effective step of resuscitation.

Basic Parts of Bag and Mask



Room air may be used for resuscitation





Room air to infant

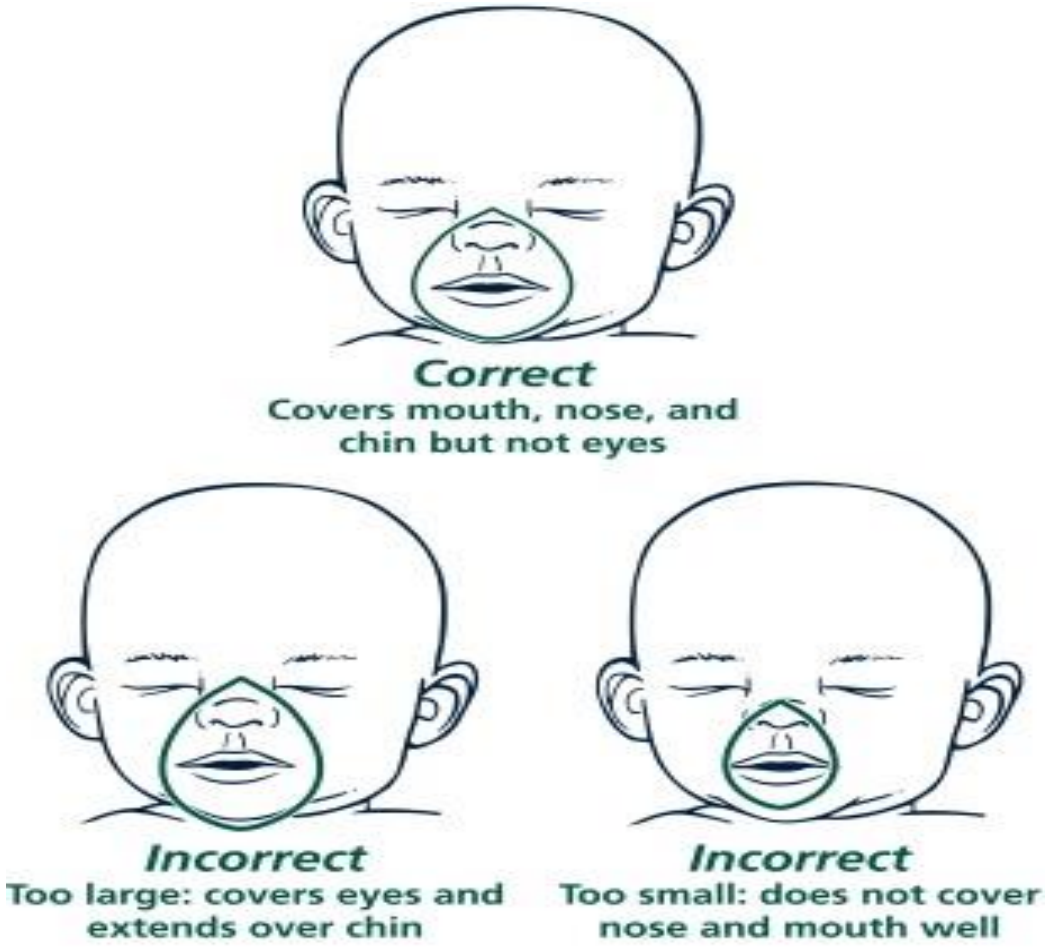
Face Mask Placement

Correct: Covers mouth, nose, and chin

Incorrect:

Too large - covers eyes and extends over chin

Too small - does not cover nose and mouth



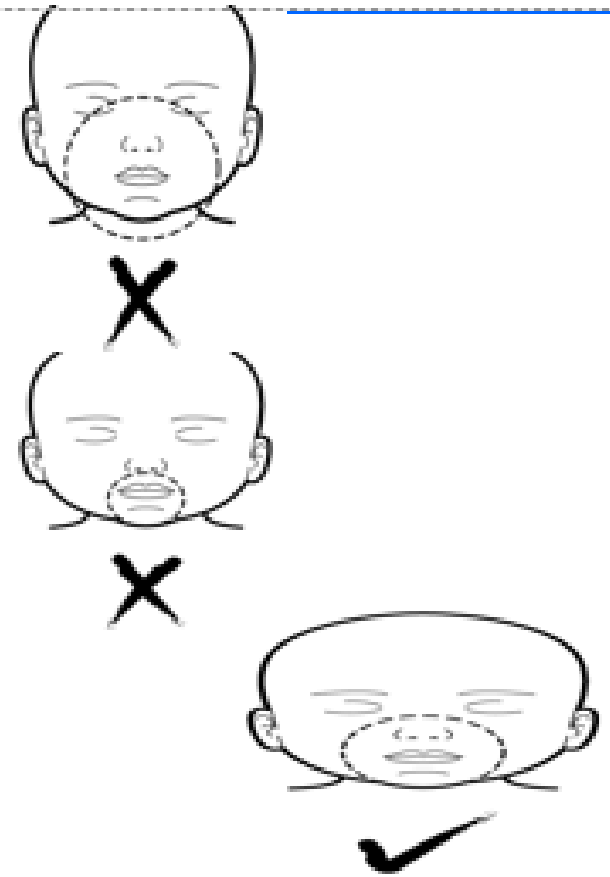
Face Mask Placement

❑Fitting a face mask:

- A face mask that is too LARGE
  - Covers the eyes
  - Extends over the tip of the chin
- A face mask that is too SMALL
  - Does not cover the nose
  - Does not cover the mouth effectively

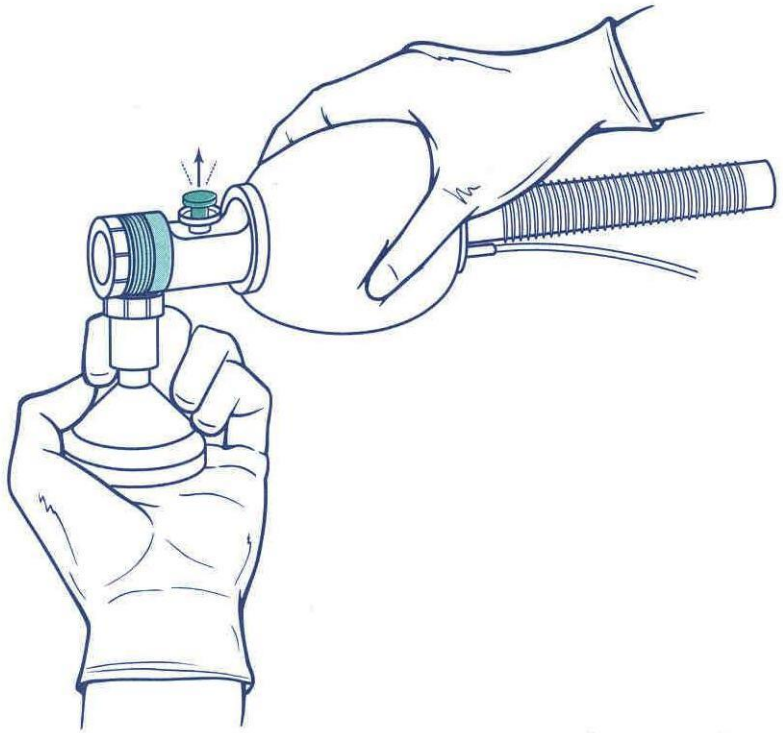
❑ Use the CORRECT size face mask that covers:

- The nose
- The mouth
- The tip of the chin but not the eyes



Testing Bag and Mask

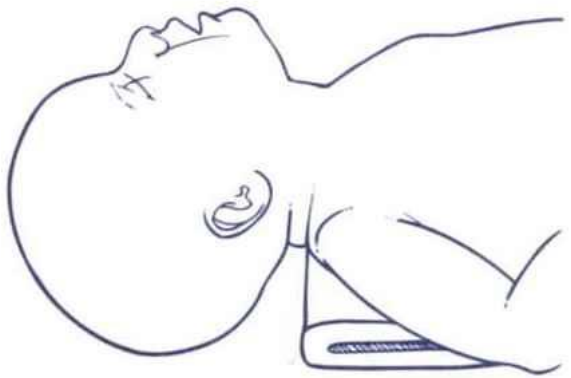
- **Pressure against your hand?**
- **Pressure-release valve opens?**



Face Mask Placement

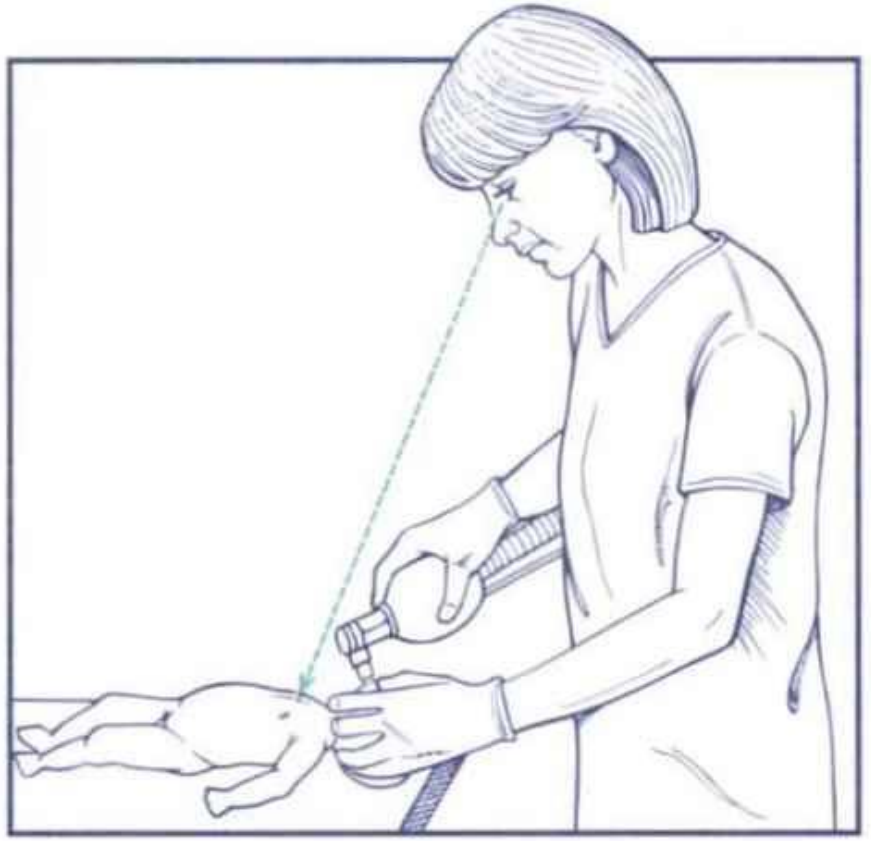
- **Correct Positioning: Cover mouth, nose, and tip of chin, but not the eyes**

- **Correct position for assisted ventilation**



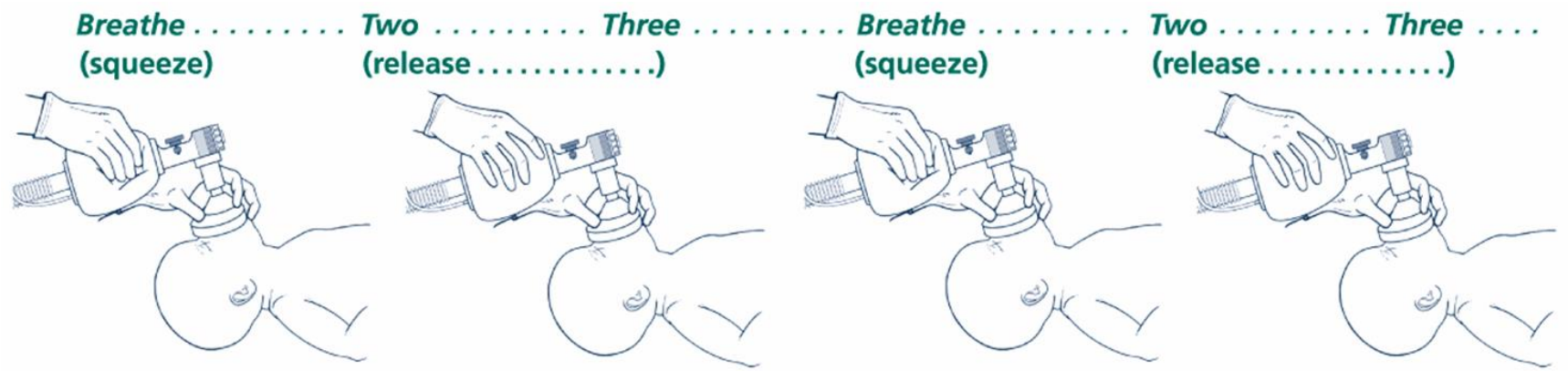
Preparing for Positive Pressure Ventilation

- Select correct-sized mask
- Clear airway
- Position head
- Position yourself at side or head of baby



How often should you squeeze the bag?

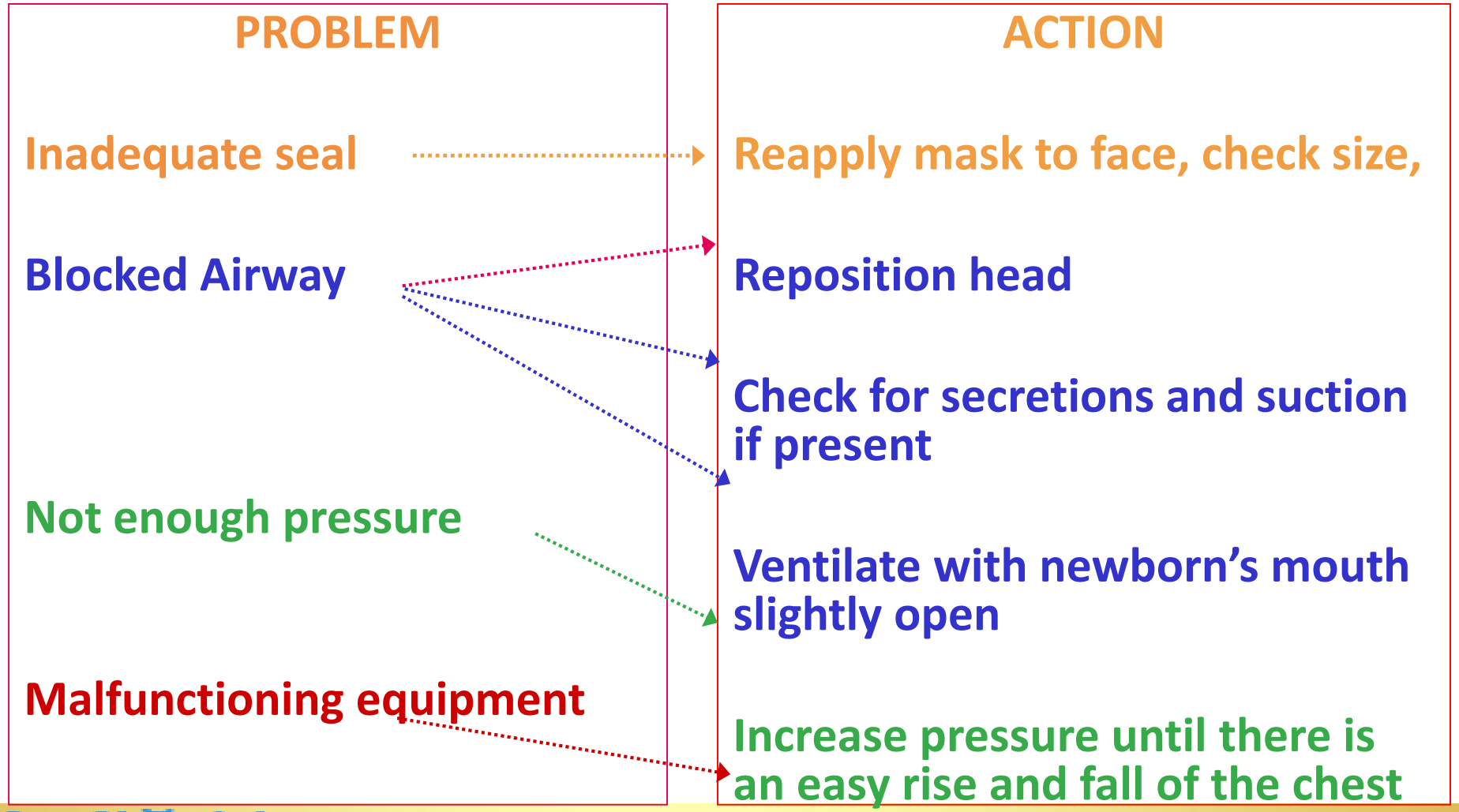
40-60 breaths per minute
Count out loud: “Breathe—two—three”



Signs of Improvement

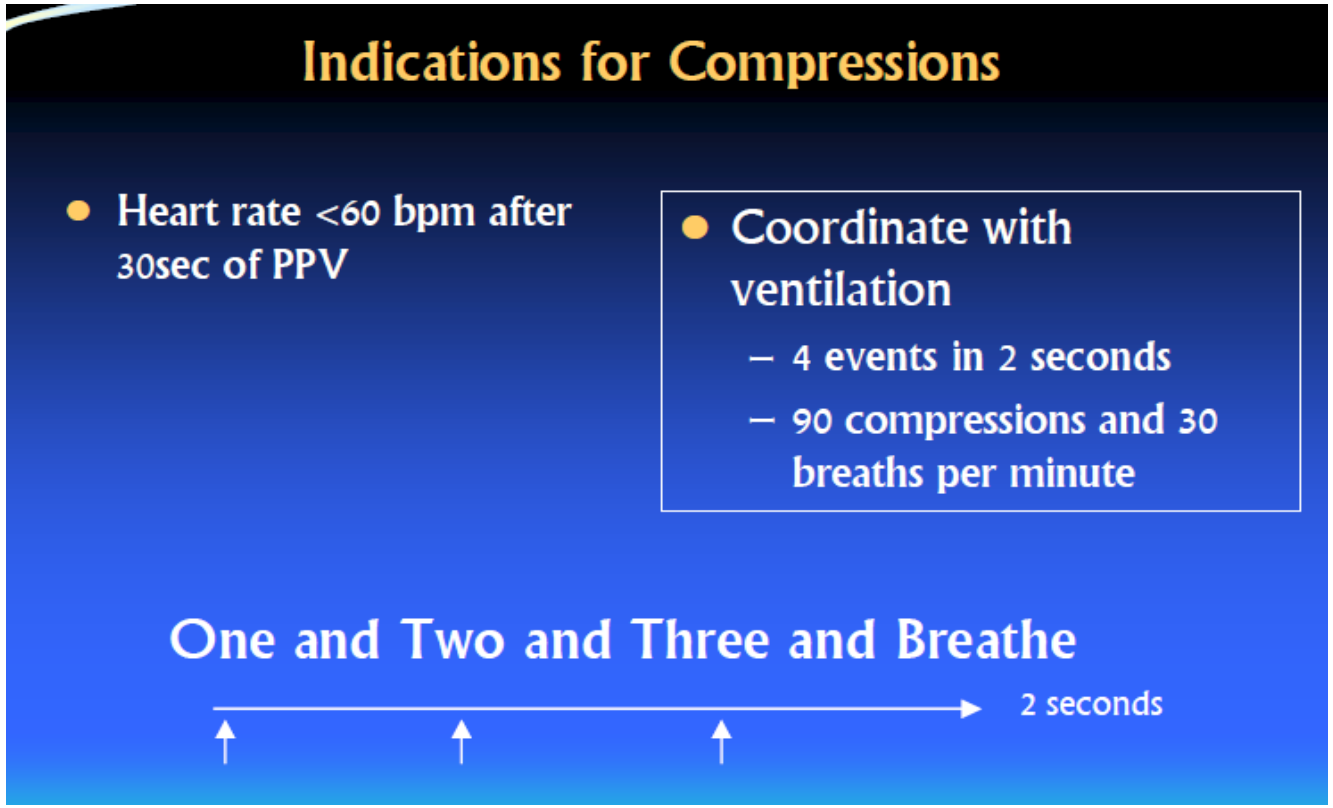
1. Increasing Heart Rate (>100)
2. Improving color
3. Spontaneous breathing or crying
4. Improving muscle tone

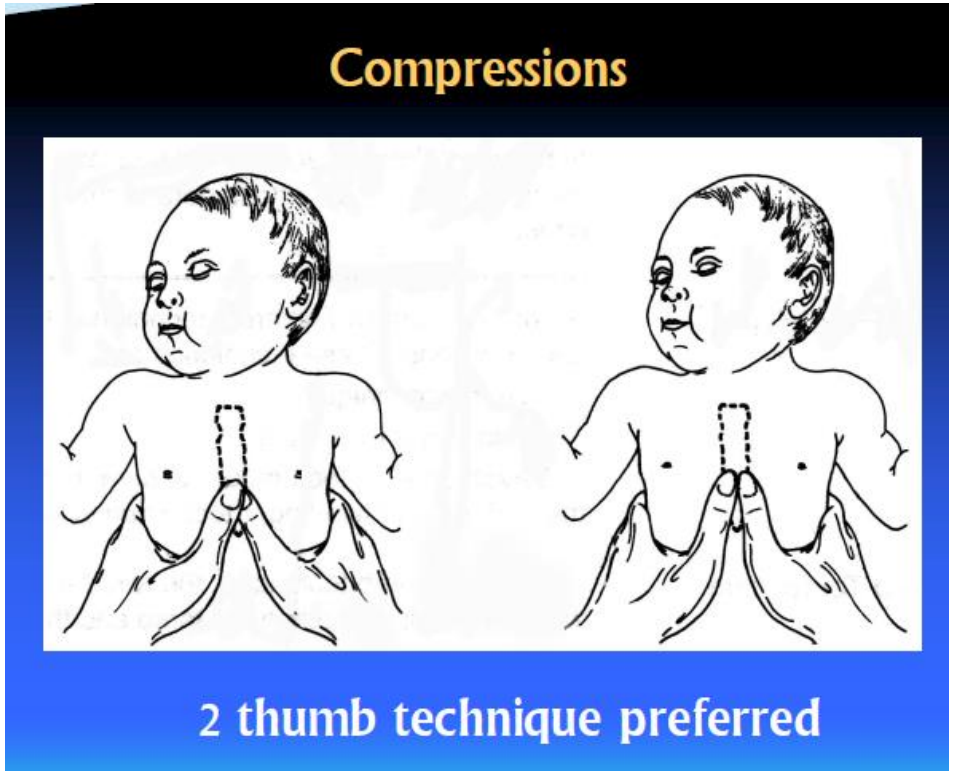
Inadequate Chest Expansion



- Start compression - If heart rate < 60/ min
  - Continue ventilation with bag
  - make sure the chest is moving adequately
  - every 1-2 min stop & see if the pulse or breathing has improved
  - stop compression once the HR >100/ min
  - stop bagging when respiratory rate >30 / min
  - continue oxygen until pink and active

- 90 compression coordinated with 30 breath /min (3 compression 1 breath every 2 second
- place thumbs just below the line connecting the nipples on the sternum
- compress *1/3 the A-P diameter* of the chest





Medications:

Epinephrine

- Indication: Heart rate <60 after 30 sec of *coordinated ventilation and compressions*
- 1:10,000 (0.1mg/ml)
- Route: IV
- 0.1-0.3 ml/kg
  - 1ml →Term
  - 0.5ml →Preterm
  - 0.25ml→ Extreme preterm

When to stop ventilating

When to stop ventilating

- If baby is crying;
- If breathing >30/min, and
- NO chest in-drawing:

❖ If after 20 minutes of resuscitation the baby is not breathing and pulse is absent explain to the mother that the baby has died

Care after resuscitation

- Keep the baby warm
- Monitor every 15 minutes
- Start breastfeeding as soon as possible
- Do not separate the mother and baby unless the baby has difficult breathing


QUESTION???

Thank you so much!

By- SELAM FISIHA(Bsc,Msc)
Lecturer of pediatrics and child health nursing

Newborn care

Common neonatal problems

- Hypothermia
- Hypoglycaemia
- Neonatal sepsis
- Jaundice
- Birth asphyxia
- Low birth weight & prematurity

Thermal protection of the newborn

- **Thermal protection** is the series of measures taken at birth and during the first days of life.
- To ensure that the newborn baby does not become either too *cold (hypothermia) or too hot (hyperthermia)* and maintains a normal body temperature.

Thermal protection ...

- Newborn babies cool down or heat up much quicker than adults because they cannot regulate body temperature as desired
- In general, newborns need a warmer environment than adults
- A naked newborn exposed to a room temperature of 23^{o}C suffers the same heat loss as a naked adult does at 0^{o}C

Thermal protection ...

- The neonate has a large surface area for small body mass, and its heat loss is relatively greater
- At birth, the skin and core temperatures of the baby fall by 0.1 and 0.3^{o}C/minute respectively.
- This is equivalent to loss of 200 Kcal per kilogram body weight per minute

Mechanism of heat loss

1. **Convection**:

- Heat is lost from the skin to moving air

2. Conduction:

- If a body is in contact with another solid body

3. Radiation:

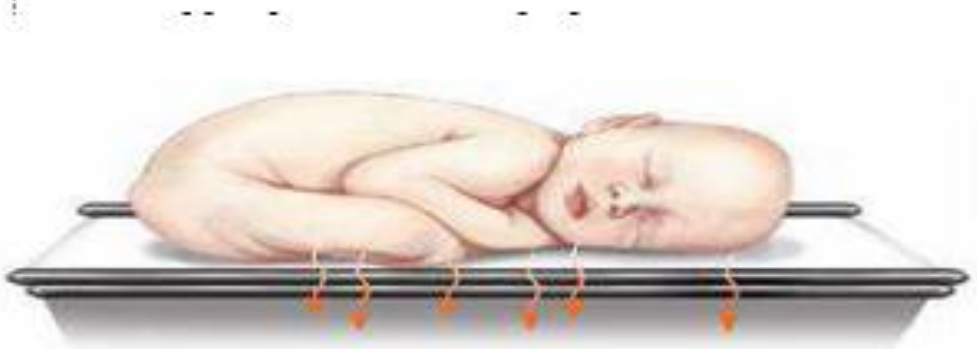
- It is the transfer of heat between objects of higher temperature to the next solid object of lower temperature

Mechanism of ...

4. Evaporation:

- This is a major source of heat loss in a newborn baby immediately after birth and while giving bath
- A baby loses as much heat when water is evaporated from his skin, same as evaporation from boiling water
- Large surface area of contact, greater wind velocity and most important thinner stratum corneum of the baby are associated with higher evaporative heat loss

Mechanism of heat loss and production....



A. Conduction

B. Convection

C. Evaporation

D. Radiation

Mechanism of heat production

1. Muscular activity:

- Increased muscular activity during restlessness & crying
- Conservation of heat by assuming flexed position

2. Metabolic thermogenesis

Brown fat

... heat production

❑ **The role of CNS in metabolic thermogenesis**

- Cold skin → afferent neurons → heat regulating center in the anterior hypothalamic area → neurogenic efferent pathway → brown fat → trigger the local release of noradrenalin so that triglycerides are oxidize to glycerol & fatty acids

➢ The blood level of glycerol rises but fatty acids are locally consumed for the generation of heat

... heat production

- Effective metabolic thermogenesis demands:
  - Integrity of CNS pathways
  - Adequacy of brown fat
  - Availability of glucose & oxygen
  - Normal birth weight & term gestational age

Optimal thermal environment

- Heat loss can be minimized by keeping infants in neutral-thermal environment
- **Thermo-neutral environment**: the narrow range of environmental temperature at which a given baby can maintain normal body temperature
- A fall in the environmental temperature by 2^{o}C below the neutral range can trigger infant's metabolic machinery to generate 25% of additional heat

Thermo-neutral environment

Age	Weight in gram			
	<1,200	1,200-1,500	1,501-2,500	>2,500
1st day	35.0±0.5	34.3±0.5	33.4±1.0	33.0±1.0
2nd day	34.5±0.5	33.7±0.5	32.7±1.0	32.2±1.0
3rd day	34.0±0.5	33.5±0.5	33.0±1.0	32.0±1.0
4th day	33.5±0.5	32.8±0.5	32.2±1.0	31.5±1.0

By- Selam F

Thermo-neutral ...

- The environmental temperature at which the metabolic response becomes necessary is called **critical temperature**
- Hypothermia is caused more by **lack of knowledge** rather than lack of equipment
- Hypothermia can be prevented by strictly following **the warm chain system.**

Warm chain system

- It is a system of keeping a baby in a thermo-neutral environment,
- immediately after delivery,
- in the delivery room, postpartum ward,
- during transportation and
- while nursing the baby at home

Warm chain system ...

- **Components**

1. Immediate drying
2. Warm resuscitation
3. Skin-to-skin contact with the mother
4. Immediate initiation of breast-feeding
5. Bathing & weighting postponed
6. Appropriate clothing & bedding
7. Warm transportation

Hypothermia

- **Hypothermia** in a newborn baby is defined as skin temperature of <36.5^{o}C or core temperature of <35.5^{o}C
- **Classification**

1. Mild hypothermia (cold stress): 36-36.4^{o}C
2. Moderate hypothermia: 32-35.9^{o}C
3. Severe hypothermia (neonatal cold injury): less than 32^{o}C

Causes of hypothermia

- Cold environment
- Wet or naked baby
- During transportation
- Bath too early
- Deficiency of brown fat
- Problems in CNS pathway
- Relatively large surface area,
- Inability to reduce the effective surface area by assuming flexed posture

Core S/S of hypothermia

- Acrocyanosis
- Cold extremities
- Lethargy, Poor feeding, Apnoea & bradycardia
- Hypoglycaemia
- Metabolic acidosis
- Hypoxia
- Tachypnea
- Respiratory distress

Management of hypothermia

- **Warm the baby**:
  - Warming using the Kangaroo Mother Care system (KMC)
  - Warming in an open care
  - Warming in an incubator
- **Treat hypoglycemia & hypoxia**
- **Other symptomatic treatments**

Hypoglycemia

- is defined as blood glucose concentration **< 40mg/dl (**irrespective of gestational age and day of life).

Emergency management of hypoglycemia

- If the child is able to drink-→ give the child therapeutic milk, 50ml glucose 10% glucose, or 50ml of drinking water plus 10g sugar.
- If the child is unconscious or has convulsion-→ 5ml/kg 10% glucose by IV or NGT

Hypoglycemia

- ❖ Continue frequent feeding
- ❖ Treat infection

Prevent Hypoglycemia

- ➢ By initiation of early breast feeding
- ➢ Frequent small feeds (day and night)

Neonatal jaundice

- **Jaundice-** Is yellowish discoloration of the skin, sclera, mucous membranes , nails and body fluids due to hyperbilirubinaemia
- **Hyperbilirubinemia**
  - Is an excessive level of accumulated bilirubin in the blood and is characterized by jaundice

Types of jaundice

1. Physiological jaundice

- Appears after *24 hours* usually b/n 48-72 hours of age usually
- Serum level less than 15 mg / dl
- Clinically not detectable after 14 days
- Does not extend to palms and soles, &
- Disappears without any treatment

Types of jaundice

2. Pathologic jaundice

- ❖ Occurs with in 24hrs of birth and persists beyond 14 days age
- ❖ Serum bilirubin > 15 mg / dl
- ❖ The unconjugated and/or conjugated fractions of bilirubin are ↑sed
- ❖ Extends to palms and soles and
- ❖ Requires urgent attention

Neonatal bilirubin metabolism

Destruction RBCs ---------- ***Non RBC comp.***

Hemoglobin — Cytochrome, Myoglobin, Heme containing Globin

↓

HEME

<----------Heme oxygenase enzymes

↓

biliverdin

<---------- biliverdin reductase

↓

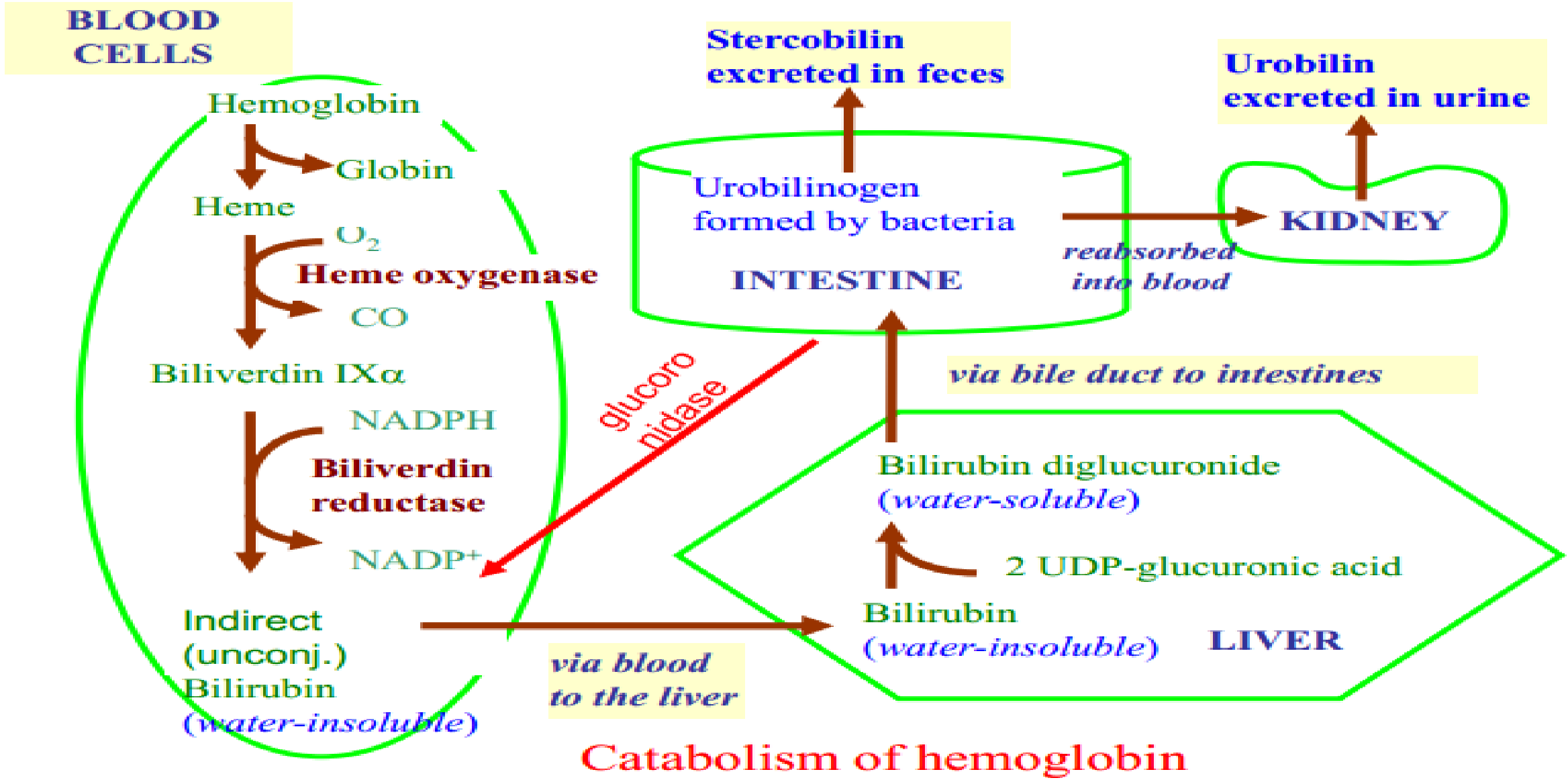
bilirubin (unconjugated or indirect)

↓

Uridine diphosphate glucornyl transferase ---------- INSIDE LIVER

↓

Bilirubin glucuronide (conjugated bilirubin or direct bilirubin)


BLOOD CELLS
Hemoglobin
Globin
Heme
O_2
Heme oxygenase
CO
Biliverdin IXα
NADPH
Biliverdin reductase
$NADP^+$
Indirect (unconj.) Bilirubin
(water-insoluble)
via blood to the liver
Stercobilin excreted in feces
Urobilinogen formed by bacteria
INTESTINE
reabsorbed into blood
KIDNEY
Urobilin excreted in urine
via bile duct to intestines
glucoro nidase
Bilirubin diglucuronide
(water-soluble)
2 UDP-glucuronic acid
Bilirubin
(water-insoluble)
LIVER
Catabolism of hemoglobin

Mechanism of neonatal jaundice

- 1.Increased bilirubin load – due to high hemoglobin concentration
  - ❖The normal newborn infants
  - ❖Hemolysis
  - ❖Cephalohematoma or bruising , polycythemia

2. Problem in bilirubin conjugation
   - ❖Decreased UGT(uridine glucuronyl activity)
   - ❖Deficiency UGT enzyme

3. Defective bilirubin excretion

Types of bilirubin

- I. Unconjugated bilirubin(indirect)

➢ Binds to albumin

➢ Fat soluble

➢ Can cross blood brain barrier

➢ Toxic in high level to brain

- *II. Conjugated bilirubin(Direct)*

➢ Conjugated with glucoronic acid

➢ Water soluble

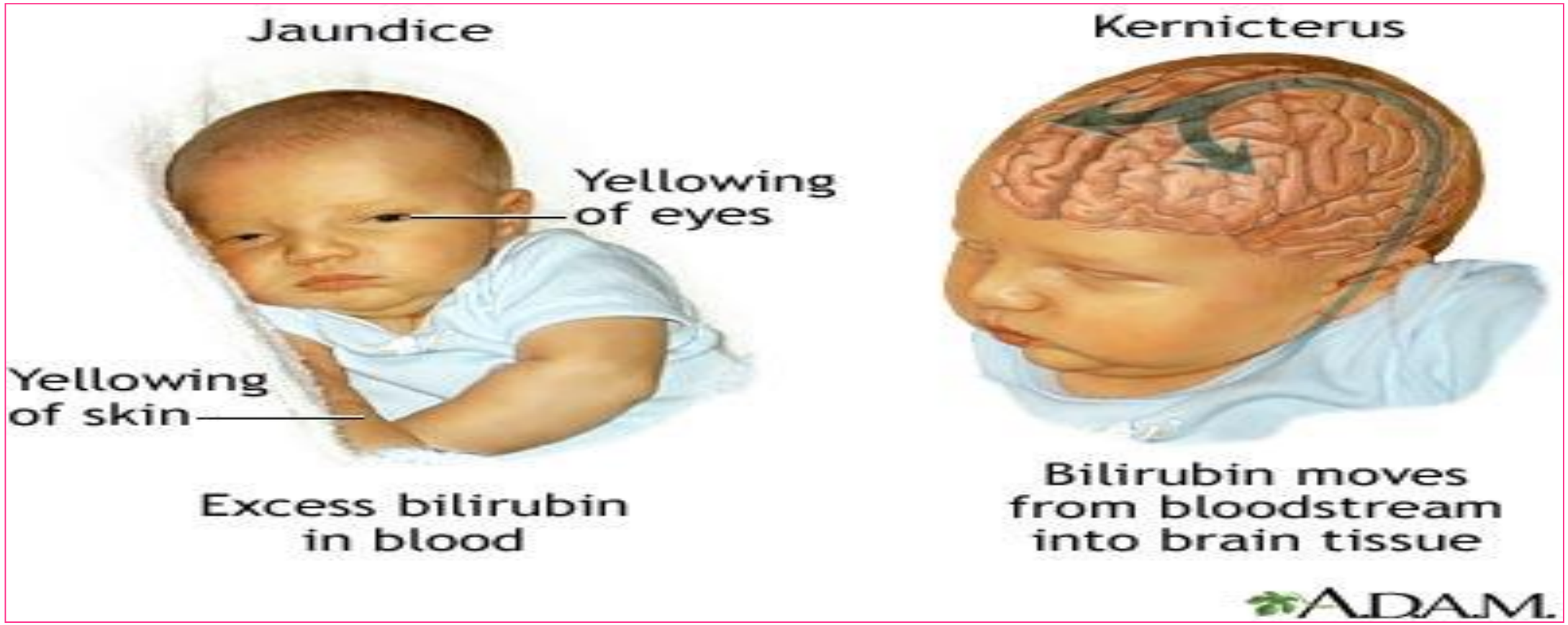
➢ Excreted in urine & stool

➢ Non toxic

Investigations

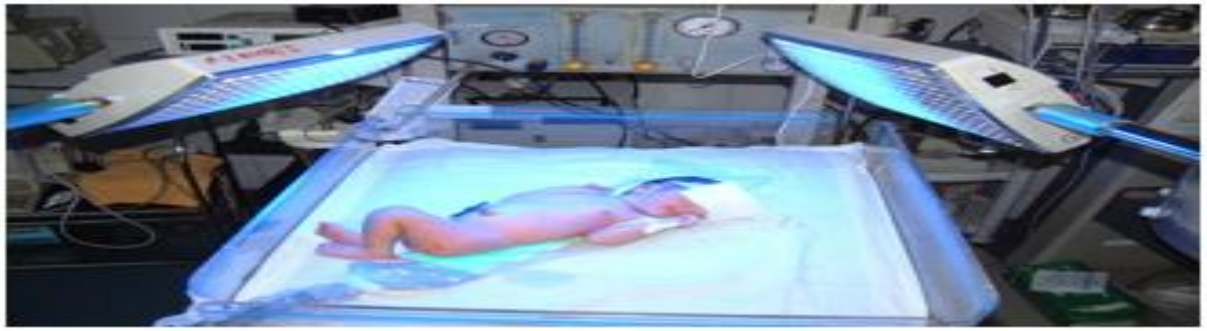
- Bilirubin measurement
- CBC
- Hgb
- Blood group & RH factor

Clinical Manifestation



Treatment

- **Phototherapy**



- **Exchange transfusion**: if the bilirubin level is highly elevated
- **Antibiotics**
- **Anti-malarias**

Neonatal sepsis

- **Sepsis:** any *systemic bacterial infection* in the first 28 days of life documented by a positive culture
- **ETIOLOGY** – Escherchia coli, GBS, Listeria monocytogenes
- Others include s.pneumonia, klebsiella, pseudomonas aeruginosa..

Classification

I. According to the time of onset:

1. Early onset neonatal sepsis (EONS): from birth to 120 hours (5 days)
2. Late onset neonatal sepsis (LONS): after 5 days to 2 months

II. According to culture result:

1. Proved or confirmed sepsis: clinical findings with positive culture
2. Suspected or probable sepsis: sign & symptom of sepsis but negative culture

Classification ...

III. According to the severity of sepsis (staging)

1. Systemic inflammatory response syndrome (SIRS)

- **Characteristics**
  - ✓ Temperature ≥ 37.5ºc or ≤36.5ºc
  - ✓ AHB ≥160 beats/minute
  - ✓ RR ≥60/minute
  - ✓ WBC ≥20x10^3 & Increased ESR

2. Sepsis: SIRS + positive culture

Classification ...

3. Grave sepsis or septicemia:

- Sepsis + serious S/S of sepsis like:
- Metabolic disorder (acidosis, persistent hypoglycemia, etc.)
- Fluid & electrolyte imbalance
- Neurological impairment
- Poor perfusion
- Bleeding disorder (anemia, thrombocytopenia, pancytopenia, DIC, etc

Classification ...

4. Septic shock: grave sepsis (septicemia) + hypotension or shock associated with organ dysfunction (could respond to proper therapy)
5. Overwhelming sepsis: septic shock + multiple organ failure which does not respond to any therapy

Early Onset Neonatal Sepsis (EONS)

- EONS is caused by organisms prevalent in the *maternal genital tract* or in the labor room and maternity operation theatre
- In developing countries most cases are due to E coli, GBS, Klebsiella, group D and other Entrobacter species

EONS-risk factors

- Gestational age: more in *premature* neonates but does not exclude term neonates
- Birth weight: more common in *LBW*, *VLBW*, *ELBW* but does not exclude normal weights or overweights
- Prenatal maternal history: fever, vaginosis, UTI, etc
- Perinatal conditions: lots of manipulation, prolonged labor, etc
- Chrioamnionitis

EONS- sign & symptoms

- Hypothermia or hyperthermia
- Hypoglycemia
- Failure to suck
- Respiratory distress, apnoea, cyanotic episodes
- Unexplained jaundice
- Skin rashes
- Seizure, and in severe cases bleeding disorders

Investigations

- Ward routine: blood group, RH factor, blood glucose, Hct, Hgb
- CBC with differentials (specially absolute neutrophil count)
- Blood culture
- Chest X-ray
- Electrolytes & blood gas

Management

1.General management:

- Maintenance of normal body T^0 (kangaroo mother care).
- Oxygen administration
- Careful regulation of fluids, electrolyte or acid-base imbalance.
- Blood transfusion may be needed to correct anemia, and shock.

Management ...

2. Antibiotics

❑ **Indications**

- Any neonate with risk factors & clinical features of sepsis

❑ **Initially:** 1st line antibiotics (GBS, E. Coli, Listeria)

- Ampicillin 100 to 200mg/kg/dose every 12 hours
- Gentamycin 3 to 7.5mg/kg/d in two divided doses

Antibiotics ...

- **After 24 hours:** review clinical progress & microbiology results
  a. If cultures negative, consider stopping therapy
  b. Continue therapy if cultures positive or sepsis very likely
  c. Add **Metronidazole** if suspicion of anaerobic infection (e.g. Intra-abdominal sepsis, NEC)
  d. Consider **Vancomycin** for Coagulase negative Staphylococcal sepsis, especially if neonate is very sick
  e. Change to **Cefotaxime** if there is neonatal meningitis

Antibiotics ...

Infection type	Duration (days) of therapy
Pneumonia	5-7
Septicemia	7-10
UTI	7-10
Meningitis	14-21
Skin conditions	5-14
Conjunctivitis	5-7
Oral thrush	7-10

Consecutive follow up

- Record daily progress of S/S
- Control temperature
- Control fluid and electrolyte balance
- Monitor input & output, weight, glycaemia
- Control Hct
- Oral feeding

Late Onset Neonatal Sepsis (LONS)

- **Types**

1. Community acquired infections
2. Hospital acquired infections

- **Causes**

- S. aureus ,GBS, gram negatives like E. Coli & Klebsiella, Streptococcus pneumonia, Neisseria meningitides, Listeria, Candida albicans, etc

Common presenting clinical diseases

- Acute gastro enteritis (AGI)
- Pneumonia
- Skin infection
- Meningitis
- UTI

Investigations

- CBC with ESR
- Blood culture
- CSF analysis
- According to the clinical presentation: gram stain of different specimen (urine, stool, CSF, pus or other fluid)
- According to onset or clinical stage: blood gas analysis, BUN and creatinine, LFT , and electrolytes

Management

- General management and follow up are the same as EONS
- Specific management depends on:
  - ✓Culture & sensitivity result
  - ✓Condition of the neonate
- All suspected cases of meningitis should be treated with high dose of proper antibiotics
- If there are skin infections, start *cloxacillin* immediately
- If the neonate looks critical, treat with 2nd line antibiotics

Nursing management of low birth weight and pre-term babies

- The delivery of an anticipated LBW baby should be conducted in a hospital.
- Those under 2 kg-intensive care therapy till weight reaches above 2kg
- Between 2-2.5 –Intensive care therapy for 1 to 2 days

- *Intensive care*

  a) Incubatory care adjustment of temperature ,and oxygen supply

Management

Keeping warm:

- Drying, skin to skin contact, KMC, thermoneutral environment,
- Check blood sugar constantly
- Weight 2 times per day
- Prevention of infection
- Growth monitoring

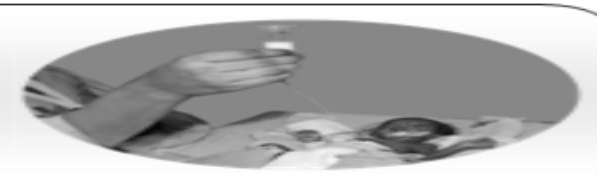
Feeding:

- Breast milk is the only option for babies because breast milk contains growth nutrition for LBW baby
- IV feeding tube might be required

Feeding ability

Gestational age	Maturation of feeding skills	Initial feeding method
< 28 weeks	-No proper sucking efforts -No gut motility	Intravenous fluids
28-31 weeks	-Sucking breast develop -No coordination between suck/swallow and breathing	OG tube feeding with Occasional spoon feeding
32-34 weeks	-Slightly mature sucking pattern -Coordination begins	Feeding by spoon/cup
>34 weeks	-Mature sucking pattern -More coordination between breathing and swallowing	Breastfeeding

Initial feeding method in stable LBW babies

ASSESSMENT		ACTION
Is the baby clinically stable?	No	Manage as per guidelines for sick neonates*
Yes		
Is birth weight more than 1250 g?	No	Start intravenous fluids 
Yes		
Is the baby able to breastfeed effectively? ■ When offered the breast, the baby roots, attaches well and suckles effectively ■ Able to suckle long enough to satisfy needs	Yes	Initiate breast feeding 
No		
Is the baby able to accept feeds by alternative methods? ■ When offered cup or spoon feeds, the baby opens the mouth, takes milk and swallows without coughing/ spluttering ■ Able to take an adequate quantity to satisfy needs	Yes	Give oral feeds by cup/spoon/ *paladai* 
	No	Start intra-gastric tube feeds 

* *Assess daily for clinical stability ; once stable, assess for initial feeding method*

Progression of oral feeds

Baby on IV fluids

Assess for stability

If stable

Introduce small amounts of intra-gastric tube feeds

Baby on intra-Gastric tube feeds

increase the feed volume

Monitor daily for signs of feeding readiness

when signs appear

- Offer small amounts of oral feeds by cup/spoon/*paladai*
- Give remaining volume by intragastric tube
- Put on breast

Continue till the baby is on full oral feeds by cup/spoon/*paladai*

Progressing from initial feeding method

Baby on oral feeds by cup/spoon/*paladai*

Make him suckle at breast

If breastfeeding effectively

Put him on breast more frequently

Baby on breastfeeding

Continue breastfeeding

Prevention

- Follow regular prenatal check ups:
  - Every 4 weeks for the first 28 to 32 weeks
  - Every 2 weeks from 32 to 36 weeks
  - Every week from 36 to 40 weeks
- Controlling infections
- Monitor maternal nutrition
- Ultrasound
- Education about all risk factors is key

ORGANISATION OF NEONATAL INTENSIVE CARE UNIT

Definition

- Is a special department of a hospital that provides intensive-care medicine
- **Intensive Care Unit** (**ICU**), also known as :
  - ❖ Critical Care Unit (CCU)
  - ❖ Intensive Therapy Unit or
  - ❖ Intensive Treatment Unit (ITU)

PHYSICAL FACILITIES OF NICU

- **Space:**
  - ❖ Each infant provide 100 sq.ft.
  - ❖ There should be adequate space to reduce nasocomial infection
- **Location** :
  - ❖ It should closes to labor room and obstetrics unit.
  - ❖ Facilities for transfer sick infant and high risk infants

PHYSICAL FACILITIES OF NICU

- **Lighting :**
  - ❖ It is *well illuminated and painted white* or off white to promote early detection of jaundice and cyanosis
- **Temperature and humidity:**
  - ❖ It must be maintained around *26 to 28 ^0C*
  - ❖ It can be maintained by *radiant warmer*
- **Acoustic characteristic:**
  - ❖ Sound intensity in the NICU should *not exceed 75db*
  - ❖ Effective *sound proofing of ceilings*, walls, doors and floor are made

Equipments

❑ Incubator

- is an apparatus used *to maintain environmental condition*
- *suitable for a neonate*.
- It is used in preterm births or for some ill full-term babies

Possible functions of a neonatal incubator are:

- Oxygenation, through oxygen supplementation by head hood or nasal cannula, or even continuous positive airway pressure (CPAP) or mechanical ventilation

Equipments

- ✓Resuscitation equipments
- ✓ICP monitors
- ✓Laboratory facilities

Neonatal ventilators

Levels of care

Level I:

- It consists of caring for *healthy newborns*.

Level II:

- This level provides *intermediate or special care* for premature or ill newborns.

Level III *:*

- Used to treats newborns who cannot be treated in the other levels and those in *need of high technology to survive*, such as breathing and feeding tubes.

Reading Assignment

Read and take short note about

I. The cause and the characteristics of LBW & preterm babies

II. Why we are concern of premature/preterm & LBW babies

Thank you


common childhood illnesses
By- Selam F(Bsc, Msc PCHN)

Objective

At the end of this lesson the students will be able to

1. Describe the magnitude of ARI in Ethiopia
2. Identify some of ARI
3. Identify risk factor for ARI
4. Describe the management and nursing care Pneumonia.
5. Describe the management and nursing care diarrhea in children.
6. Discuss about under-nutrition
7. Explain SAM management

Upper respiratory tract illnesses

- Acute respiratory infection (ARI) is the leading cause of morbidity and mortality in children under 5years of age.
- ARI accounts for about 28% of under 5 mortality in Ethiopia.
- ARI involves both upper and lower respiratory tract infections
- Nearly 20% of ARI develop acute lower respiratory tract infections, mainly pneumonia.
- ***Risk factor-*** Pollution, lack of breast feeding ,

  Congenital abnormalities heart /Lung/, Malnutrition,

  Young infants, Poor socio-economic status

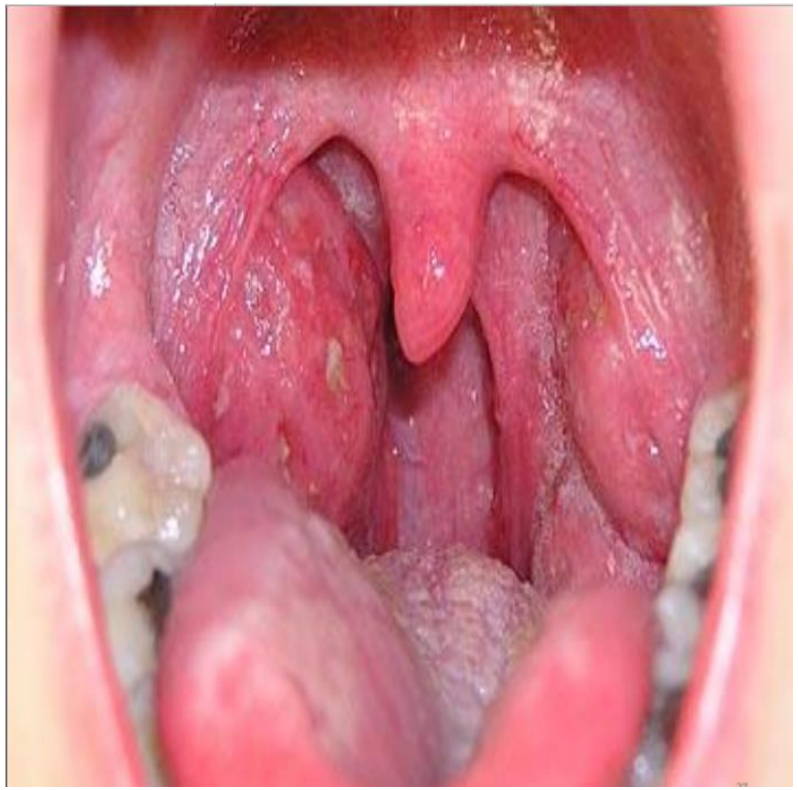

Tonsillopharyngitis

Acute tonsillopharyngitis

- Many infectious agents can cause pharyngitis are
- Viruses – adenoviruses, rhinoviruses, EBV, enteroviruses….
- Bacteria
  - *others include Arcanobacterium haemolyticum , Francisella tularensis , Chlamydophila pneumoniae* etc..
  - group A ß-hemolytic *Streptococcus is the most common and important,*
- spread by close contact.
- occur most commonly in winter and spring

Clinical Manifestations

- sore throat and fever.
- Headache and gastrointestinal symptoms may occur
- pharynx is red,
- and the tonsils are enlarged and classically covered with a yellow, blood-tinged exudate.



Diagnosis

- Clinical presentations
- The goal of specific diagnosis is to identify GABHS infection
- Throat culture remains an imperfect gold standard for diagnosing streptococcal pharyngitis

Treatment.

- The primary benefit of treatment is the prevention of acute rheumatic fever
- A single intramuscular dose of benzathine penicillin
  - 600,000U for children 27kg; 1.2 million U for larger children and adults OR
  - Amoxicillin 250mg po tid for 10days.

Complications and Prognosis.

- Viral respiratory tract infections may predispose to bacterial middle ear infections.
- complications of streptococcal pharyngitis
  - local suppurative complications
    - parapharyngeal abscess etc..
  - nonsuppurative illnesses
    - acute rheumatic fever
    - acute postinfectious glomerulonephritis

prevention

- Multivalent streptococcal vaccines
- Antimicrobial prophylaxis to prevent recurrent GABHS infections.
  - recommended only to prevent recurrences of acute rheumatic fever

Croup

- Croup is a respiratory illness characterized by inspiratory stridor, cough, and hoarseness
- Which is a heterogeneous disease
- Most commonly occurs in children 6 to 36 months of age.
- Narrowing of the trachea in the subglottic region is a hallmark sign of croup
- The most common form of acute upper airway obstruction
- It is more common in boys than in girls

Etiology

- ✓ Parainfluenza viruses – commonest (75%)
- ✓ Haemophilus influenza A and B
- ✓ Adenovirus
- ✓ Respiratory syncytial virus (RSV)
- ✓ Measles
- ✓ Mycoplasma pneumoniae

Clinical Presentation

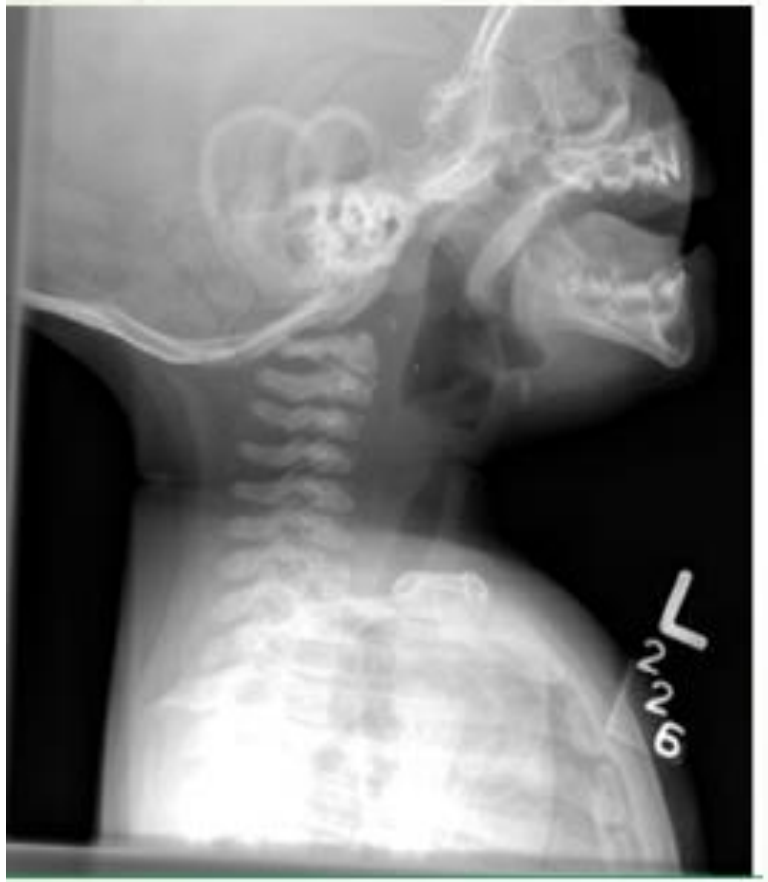
Symptoms of upper respiratory tract infection like

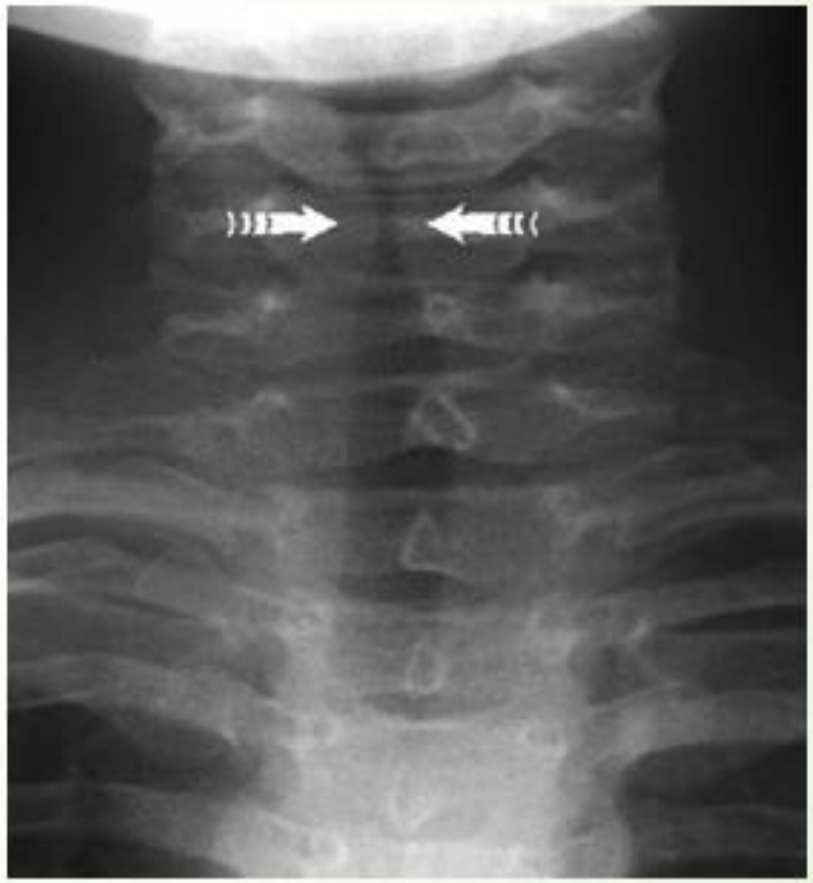
- Barking cough
- Hoarseness
- Inspiratory stridor
- Fever
- Nasal flaring; suprasternal, infrasternal, and intercostal retractions

Diagnosis

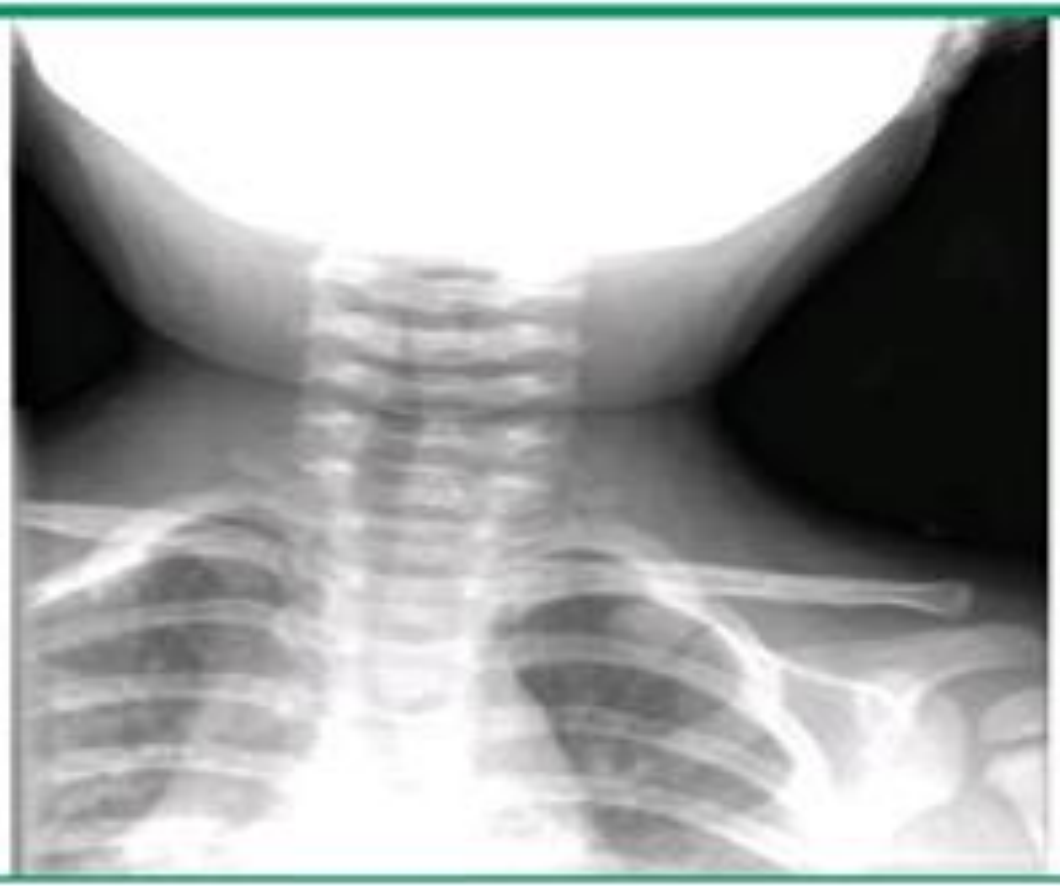
- Croup is a clinical diagnosis
- Radiography of the neck may show the typical subglottic narrowing or “steeple sign” of croup on the posteroanterior view
- The radiographs do not correlate well with disease severity

Radiograph of an airway of a patient with croup, showing typical subglottic narrowing (steeple sign).





Steeple sign



The AP view demonstrates tapering of the upper trachea, known as the "steeple sign" of croup. Note that the finding can be simulated by differing phases of respiration even in normal children. *Courtesy of the Department of Diagnostic Imaging, Texas Children's Hospital.*

- **Croup scoring**

Elements	0	1	2	3
Strider	None	Mild	Moderate	Severe
Retraction	None	Mild	Moderate	Severe
Air entry	Normal	Mild	Moderate	Marked
Color	Normal	Dusky	Cyanotic	Cyanotic on oxygen
Mentation	Normal	Restless	Lethargic	Obtunded

Management based on scores

Total score	severity	treatment
0-6	mild	Mist, home care
7-8	moderate	Admit, steroid racemic epinephrine
9-14	sever	The same
15	terminal	Racemic epinephrine,steroid,intubation

Treatment

- The mainstay of treatment for children with croup is airway management
- Supportive management
- Dexamethasone 0.6 mg/kg im or iv or po
- Nebulized epinephrine
- Antibiotics are not indicated in croup
- Intubation or tracheostomy

Nursing interventions

- Exposure of child to cool water.
- Cool humidification during sleep with cool mist tent or room humidifier.
- Encourage clear liquid intake to keep mucus thin.
- Monitor vital signs and pulse oximetry.
- Administer medication (Antipyretic, antibiotics, corticosteroids.
- Oxygen administration if necessary.
- IV fluid to prevent dehydration.
- Care of tracheostomy if indicated.

Pneumonia

Definition

- Is an inflammatory process of the lung parenchyma that is commonly caused by infectious agents.

Classification of pneumonia

According to causes

- Bacterial (the most common cause of pneumonia)
- Viral pneumonia
- Fungal pneumonia e.g PCP
- Chemical pneumonia (ingestion of kerosene or inhalation of irritating substance)
- Inhalation pneumonia (aspiration pneumonia)

Classification ……

According to areas involved

- Lobar pneumonia
- Interstitial pneumonia
- Broncho-pneumonia

Mode of transmission

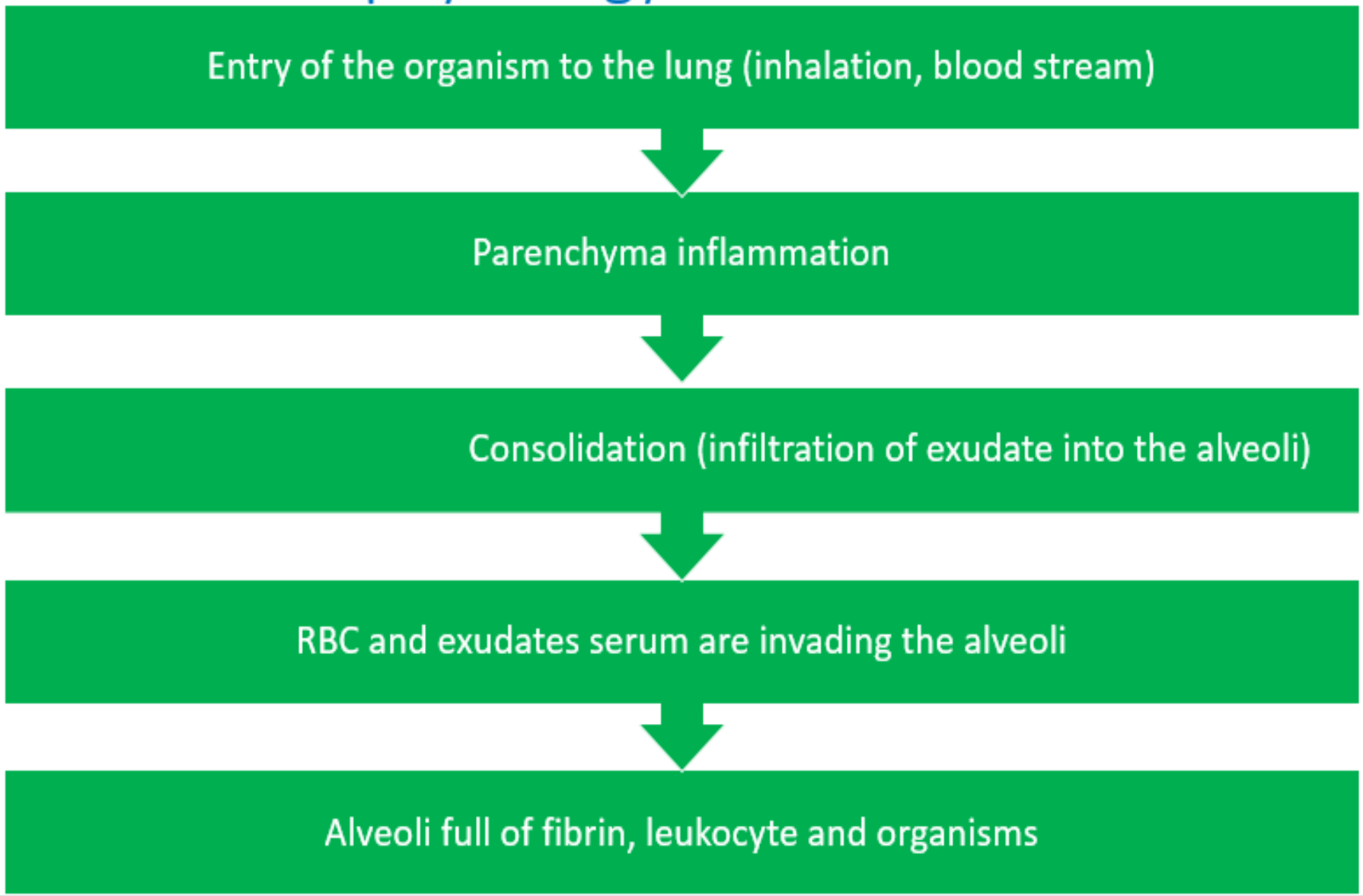
➢ *Ways you can get pneumonia include:*

- Bacteria and viruses living in your nose, sinuses, or mouth may spread to your lungs.
- You may breathe some of these germs directly into your lungs (droplets infection).
- You breathe in (inhale) food, liquids, vomit, or fluids from the mouth into your lungs (aspiration pneumonia).

Predisposing factors

- Immuno-suppresed patients
- Cigarette smoking
- Patient with swallowing difficulty
- Impaired consciousness
- Chronic lung disease
- Frequent suction
- Other serious illness such as heart disease, liver cirrhosis, and DM
- Recent cold, laryngitis or flu

Pathophysiology



Clinical manifestations

Clinical manifestation:

-Preceding URTI

-Non specific symptoms

-Grunting, lethargy

-Cough, fast breathing, cyanosis

-Fever with chills and rigors

-Tachypnea

-Chest recession

-Crepitation/ Bronchial breath sounds,

-Dullness, signs of effusion

Diagnostic tests

- History taking
- Physical examination
- Chest x-ray
- Blood test
- Sputum culture

HOSPITALIZATION OF CHILDREN WITH PNEUMONIA

- Age <6 mo
- Multiple lobe involvement
- Immunocompromised state
- Toxic appearance
- Moderate to severe respiratory distress
- Dehydration
- Requirement for supplemental oxygen
- Vomiting or inability to tolerate oral fluids or medications
- No response to appropriate oral antibiotic therapy
- Social factors (e.g., inability of caregivers to administer medications at home or follow up appropriately

Medical management

Inpatient Management

- Neonate – Ampicillin +Gentamycine
- Children _ Crystalin penicillin +/- chloramphenicol

If antibiotic sensitivity pattern and causative agent known:

- Streptococcus-penicillin
- Staphylococcus - Cloxacillin
- H.influenza-Chloramphenicol, Cephalosporin

Cont…

- Children with pneumonia are treated at outpatient level with amoxicillin or cotrimoxazole orally for 5 days

Treatment of complications

- Empyema-
  - Antibiotics 4-6wks
  - Chest tube drainage
  - Chest physiotherapy

Nursing intervention

- ✓ Maintain a patent airway and adequate oxygenation.
- ✓ Obtain sputum specimens as needed.
- ✓ Use suction if the patient can't produce a specimen.
- ✓ Perform chest physiotherapy.
- ✓ Provide a high calorie, high protein diet of soft foods.
- ✓ Check the position of tube, and administer feedings slowly.
- ✓ Dispose secretions properly.
- ✓ Monitor the patient's ABG levels
- ✓ Auscultate breath sounds at least every 4 hours.
- ✓ Monitor fluid intake and output.
- ✓ Evaluate the effectiveness of administered medications.

Preventive measures

- Frequent turning of bed ridden patients and early ambulation as much as possible.
- Coughing and breathing techniques.
- Sterilization of respiratory therapy equipment
- Suctioning of secretion in the unconscious who have poor cough and swallowing reflexes,

Prognosis

- With treatment, most patients will improve within 2 weeks.

Complications

- Acute respiratory distress syndrome (ARDS)
- Pleural effusion
- Lung abscesses
- Respiratory failure (which requires mechanical ventilator)
- Sepsis, which may lead to organ failure

DIARRHEAL DISEASES

DIARRHEA

- **Diarrhoea –** is the passage of three or more loose or watery stool per 24 hours.
- Causes about 2 million deaths annually in children of under five
- ˜80% of these deaths occur in children in the first 2 years
- Common in children of age below 5yrs
- Peak incidence is during the age of 6-11months
- Transmission is by feco-oral route

Types of diarrhea

- Classification:

- Acute watery-acute onset, no mucus or blood and lasts < 14days
- Persistent- starts acutely, watery and lasts ≥ 14days
- Dysentry – blood in the stool(historical,witnessed,microscopy)
- Severe persistent –persistent diarrhea with any form of dehydration

RISK FACTORS

- Environmental contamination and increased exposure to enteropathogens.
- Young age
- Other infections
- Malnutrition
- Lack of exclusive or predominant breast-feeding
- Vitamin A deficiency
- Zinc deficiency
- Bottle feeding
- Failure of proper hand hygiene

Etiology:

Bacteria

- Shigella, Salmonella, Vibrio cholerae
- E.coli, Campylobacter jejuni,
- Clostridium difficile

Viruses

- Rota virus, Astro agent, Calici virus
- Enteric Adeno virus
- CMV(in immunocompromized)

Parasites

- Gardia lamblia, Entamoba histiolytica
- Strongyloidiasis, Isospora belli
- Cryptosporidium prvum

Fungi

- Candida albicans

WHO/IMNCI classification of DHN

-Lethargic/unconscious Sunken eyeball Not able to drink/drinks poorly Skin pinch goes very slowly	• Severe dehydration
Restless ,irritable Sunken eyeball Drinks eagerly ,thirsty Skin pinch goes slowly	• Some dehydration
No enough criteria to classify as severe or some DHN	• No dehydration

Mechanism of diarrhea

I. Secretary

✓ Decreased absorption and increased secretion

E.g. cholera, toxigenic E.coli,

II. Osmotic

✓ maldigestion, ingestion of unabsorbable solutes

e.g. Lactase deficiency, glucose malabsorption,

Mechanism of diarrhoea

III. Decreased absorptive surface

e.g. short bowel syndrome, Rota virus, Celiac disease

IV. Motility disorders

- ✓ increased motility with decreased transit time (thyrotoxicosis, irritable bowel syndrome---)

Principles of treatment

1. Fluid replacement/Dehydration management

A. **No Dehydration-** give extra fluid

- ✓50-100ml ORS if <12months
- ✓100-200ml ORS if >12months per loose stool

-continue feeding (breast)

- Zn therapy (10 mg/day for under 6 months and 20 mg/day for 10 days for 6 months to 5 years) and advise when to return

Remark –this rehydration protocol is for well nourished patients .

A. **Some dehydration**

✓75 ml/kg of ORS over 4hours and then reassess after 4hours and treat accordingly

- Children with acute diarrhea should NOT receive antimotility agents or antiemetics.

Age	First 30ml/kg	Then 70ml/kg
<12months	1hr	5hr
>12months	30minutes	21/2hrs

- Repeat 30ml/kg if still radial pulse is weak.
- Give ORS (5ml/kg/hr) as soon as child starts to drink
- If no IV line ,give 20ml/kg /hr ORS over 6 hours.
- Assess the child after the bolus of 30ml/kg and at the end of rehydration. Preferably through out the therapy course.

2. Antibiotics

-not for watery diarrhea

-**S/E** –pus cells, usually seen in bacterial so give antibiotics cotrimoxazole, nalidixic acid, TTC and pencillins

-for dysentery and cholera cases give antibiotics

3. Nutrition

- diarrhea is an important cause of malnutrition.

causes- reduced food intake

-decreased absorption of nutrients

-increased nutrient requirements

So =increase breast feeding

=fermented milk products

=give vitamin A

4. follow up

- advise the mother to return if child :

  - not able to drink or breastfed.

  - develops fever

  - passes bloody stool

  -becomes sicker (consciousness)

- The sodium content of ORS is too high for malnourished children therefore ReSoMal should be used.

Complications of diarrhea

- ✓ **Dehydration** –most common cause of death is from acute diarrhea.
- ✓ **Metabolic acidosis**
- ✓ **Hypokalemia**
- ✓ **Malnutrition**

Prevention of diarrhea

1. Breast feeding
2. Improved weaning practices
3. Use clean water
4. Hand washing
5. Use latrines
6. Vaccination
7. Safe disposal of waste

Acute Bacterial Meningitis

Definition

- Is inflammation of the membrane surrounding the brain and spinal cord.
- Most common cause of fever associated with signs and symptoms of CNS disease
- Occurs at all ages but commonest during infancy (6-12mo).
- The incidence of bacterial meningitis is sufficiently high in febrile infants.

Etiology

- **Neonatal period**
  - ✓ Group B streptococcus
  - ✓ Gram –ve enteric bacilli
  - ✓ L. monocytogenes
- **Children 2 mo – 12 yrs of age**
  - ➢ N. meningitidis
  - ➢ Hib
  - ➢ S.pneumonia
- **Alterations of host defense**
  - – Pseudomonas aeruginosa
  - – Staphylococcus aureus, Coagulase-negative staphylococci
  - – Salmonella spp
  - – L. monocytogenes

Predisposing factors

- Lack of immunity associated with young age, and bacterial virulence factors.
- Recent colonization with pathogenic bacteria
- Close contact with patients having invasive disease caused by N.meningitidis
- Congenital or acquired CSF leak factors
- Mucocutaneous barrier –cranial or midline facial defect and middle or inner ear fistulas
- Basal skull fracture into the cribriform plate or paranasal sinus increased risk of pneumococcal meningitis

- Mode of transmission is by person to person contact through respiratory droplets or secretions.

Routes of infection

- Hematogenous dissemination-most common
- Direct invasion of the CNS from contiguous focus of infection(otitis media, mastoiditis, sinusitis)

Clinical manifestations

- **Infants** – fever
  - -poor feeding
  - -projectile vomiting
  - -altered level of consciousness
  - -convulsions
  - -neck stiffness
  - -bulging fontanel
  - -rash

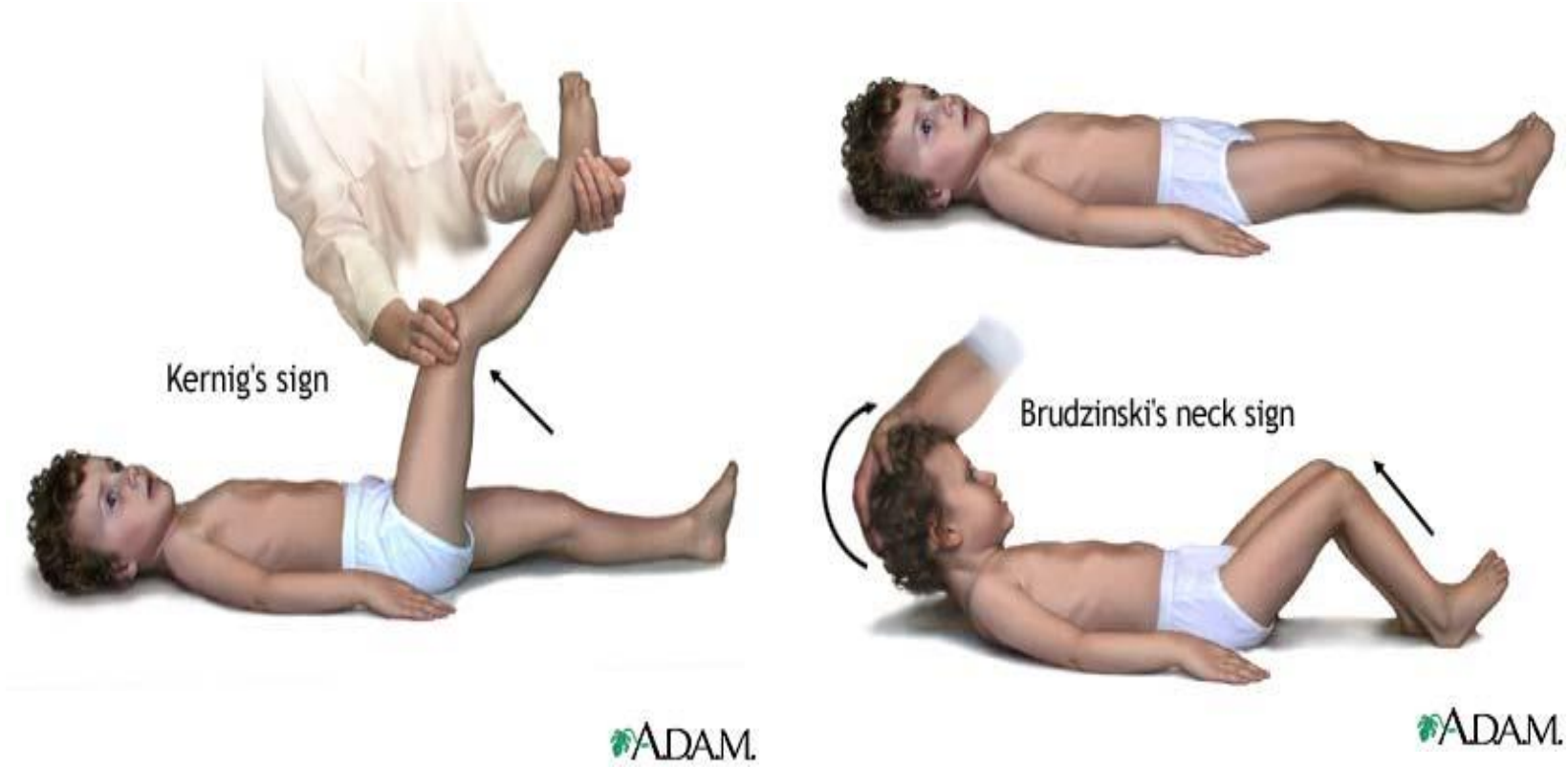
Clinical manifestations

- **Older children**-classic signs are preceded by URT or GIT symptoms
  - Fever
  - Headache
  - Projectile vomiting
  - Poor feeding
  - Seizure are common in 20-30% of patients before or during the first 3 days of diagnosis

P / E

- Neck stiffness
- Positive meningeal signs
- Altered state of consciousness
- Cranial nerve palsies
- Positive kerning and Brudzinski signs
- Meningococcal meningitis
    - Generalized pruritic rash
    - Peripheral cyanosis
    - Toxic and comatose
    - Tachycardia , hypotension and coma

Kerning Vs Brudzinski signs



Diagnosis

- High index of suspicion
- LP and CSF analysis
- Leucocytosis (>1000) with neutrophil predominance (75-95%)
- Turbid CSF when the WBC count is >200-400/mm3
- Elevated protein
- Hypoglycorrchia
- Gram stain
- Culture

Typical CSF findings

CSF finding	Bacterial	Viral	Tuberculous
WBC(MM3) PMNLs	>100-10000 usually 300-2000 PMNL predominance	PMNLS early but mononuclear cells predominance through out the course	10-500PMNLs early but lymphocytes predominate through most of the course
Glucose (mg/dl)	Decreased , usually <40 or <50% of serum glucose	Generally normal	Decreased
Protein(mg/dl)	Increased , usually 100-500	Low 50-200	elevated

Contraindications for LP

- Elevated ICP with focal neurologic deficit
- Sever cardio respiratory compromise
- Infection of the overlying skin
- Thrombocytopenia- relative

Differential diagnosis

- Aseptic meningitis
- Tuberculous meningitis
- Cerebral malaria
- Brain abscess
- Brain tumor

Management

1 . Supportive measures

- Vital signs q 15-30 min
- Frequent neurologic assessment
  - Level of consciciousness
  - Pupillary size and reactivity
  - Pattern of breathing
  - Posture
  - Seizure
  - Cranial nerve palsy or focal neurologic deficit
  - Daily HC measurement- for children <18 mos.

Cont'd

- Strict input and output measurement
- Serum electrolytes
- Body weight
- Antipyretics
- Fluid restriction to 2/3 of maintenance except in cases of hypotension
- Seizure control- active seizure arrest with diazepam 0.1-0.3 mg/kg iv
- Prevention of recurrence of seizure

  phenytoin 20 mg/kg loading the 5 mg/kg bid

Cont'd

- Phenobarbital can be added for refractory seizure

II. Antibiotic therapy

Empirical therapy – crystalline pencilin and Chloramphenicol

Second choice- ceftriaxone 100 mg/kg/24 hr bid

III. Corticosteroids – dexamethasone 0.15 mg/kg qid for 2 days starting before the 1st dose of antibiotics for infants > 6 wks.

- Corticosteroids appear to have maximum benefit if given 1–2 hr before antibiotics are initiated.

Complications

- **Acute complications**
  - Seizures
  - Increased ICP
  - Hydrocephalus
  - Subdural effusion/empyema
  - Cranial nerve palsies
  - Stroke
- ***Chronic complications-***
  - Blindness
  - Hearing loss
  - Spasticity
  - Epilepsy
  - Mental retardation

Cont....

- ***Poor prognostic factors***
  - Infants <6 month
  - >1million CFU/ml of csf
  - Coma
  - Focal neurologic sign at presentation
  - Pneumococcal meningitis
  - Seizure that persists after 4 days of illness

Prevention

- Chemoprophylaxis
- Vaccination

MEASLES

Measles

- Is a highly infectious disease caused by a **virus**.
- As the virus enters to the body, it multiplies in the back of **throat**, **lungs** and **lymphatic system**.
- **Kills more children** than any other vaccine preventable diseases (CFR 3%, as high as **30%** reported)
- Accounted for **4%** of <5 yr mortality.
- Up to **2 million deaths per year** would be expected in the absence of vaccination.

Measles

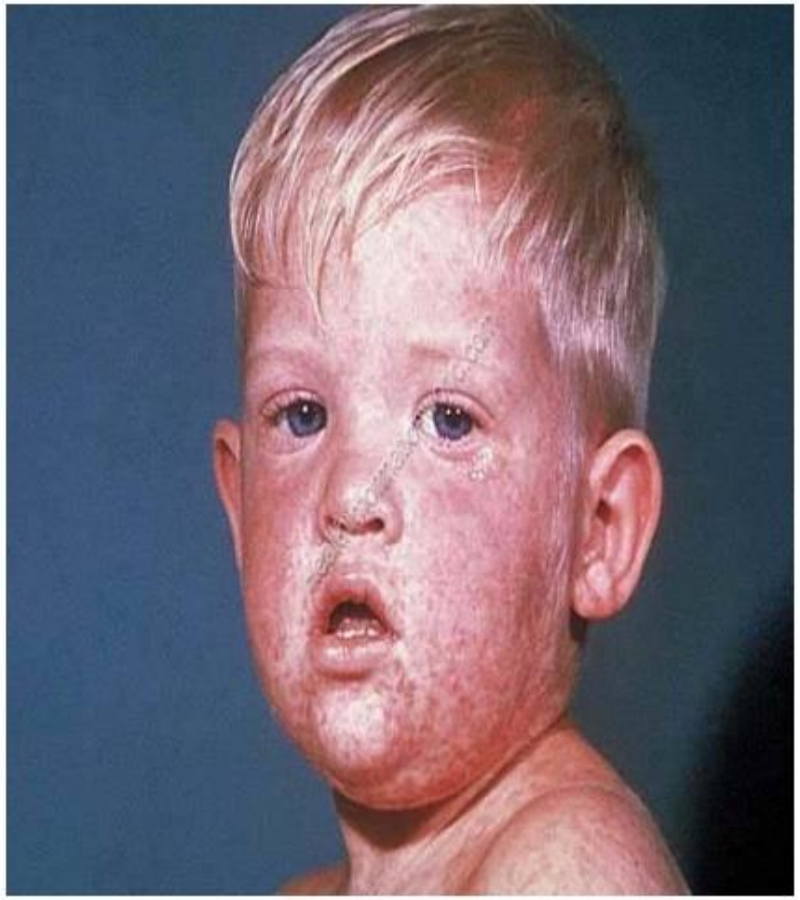
Mode of spread

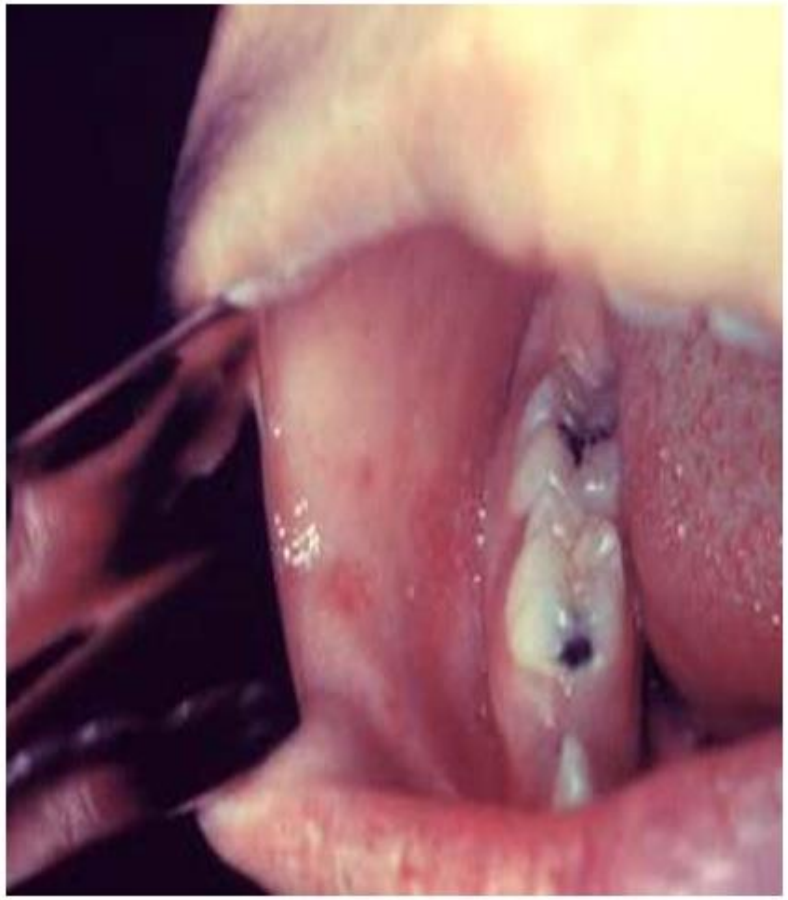
- **Airborne droplets** released when an infected person sneezes or coughs
- **90%** of susceptible household contacts acquire the disease.
- Cases can infect others for several days **before and after** they develop symptoms
- Spreads easily in **over crowded areas** (schools, military camp, health facilities etc)

Measles clinical presentation

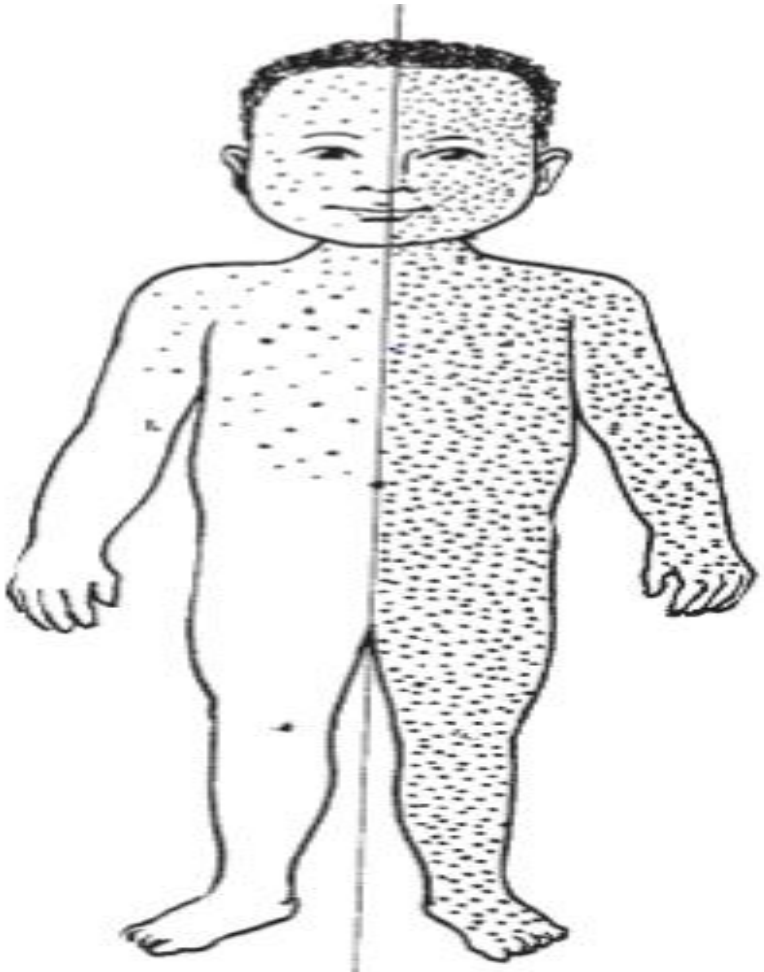
- **High fever** which begins approximately 10 -14 days after exposure and lasts for several days
- **Runny nose**, **cough**, **red and watery eyes** and small **white spot** inside the cheeks
- After a couple of days slight raised **rash** develops usually on the face and neck
- Over a period of three days the rash spreads to the **body** and then to **the hands and feet**
- Lasts three to five days and fades
- The incubation period from exposure to the onset of the rash averages **14 days** (range 7 -18 days)

Measles clinical presentation





Measles clinical presentation



Distribution of measles

Measles complications

- Un immunized children < 5 years and infants are at highest risk of measles and its complications.
- **Dehydration**,
- **Otitis media**, **other respiratory tract infections**
- **Blindness** and **mouth ulcer**
- **Pneumonia** is the most common cause of death as the virus weakens the immune system

Measles

Treatment

- No specific antiviral treatment for measles.
- General **nutritional support** and **Rx of Dehydration**
- **Vitamin A supplementation** - prevents blindness and reduces the number of deaths from measles by 50%.
  - ➢50 000 IU (for a child aged <6 months),
  - ➢100 000 IU (6–11 months),
  - ➢200 000 IU (12 months up to 5 years).

Prevention

- Measles **vaccine (herd immunity, 95% of eligible population should be vaccinated)**
- Isolation

NUTRITIONAL DEFICIENCIES

PROTEIN ENERGY MALNUTRITION

By: Selam.F

4/24/2020

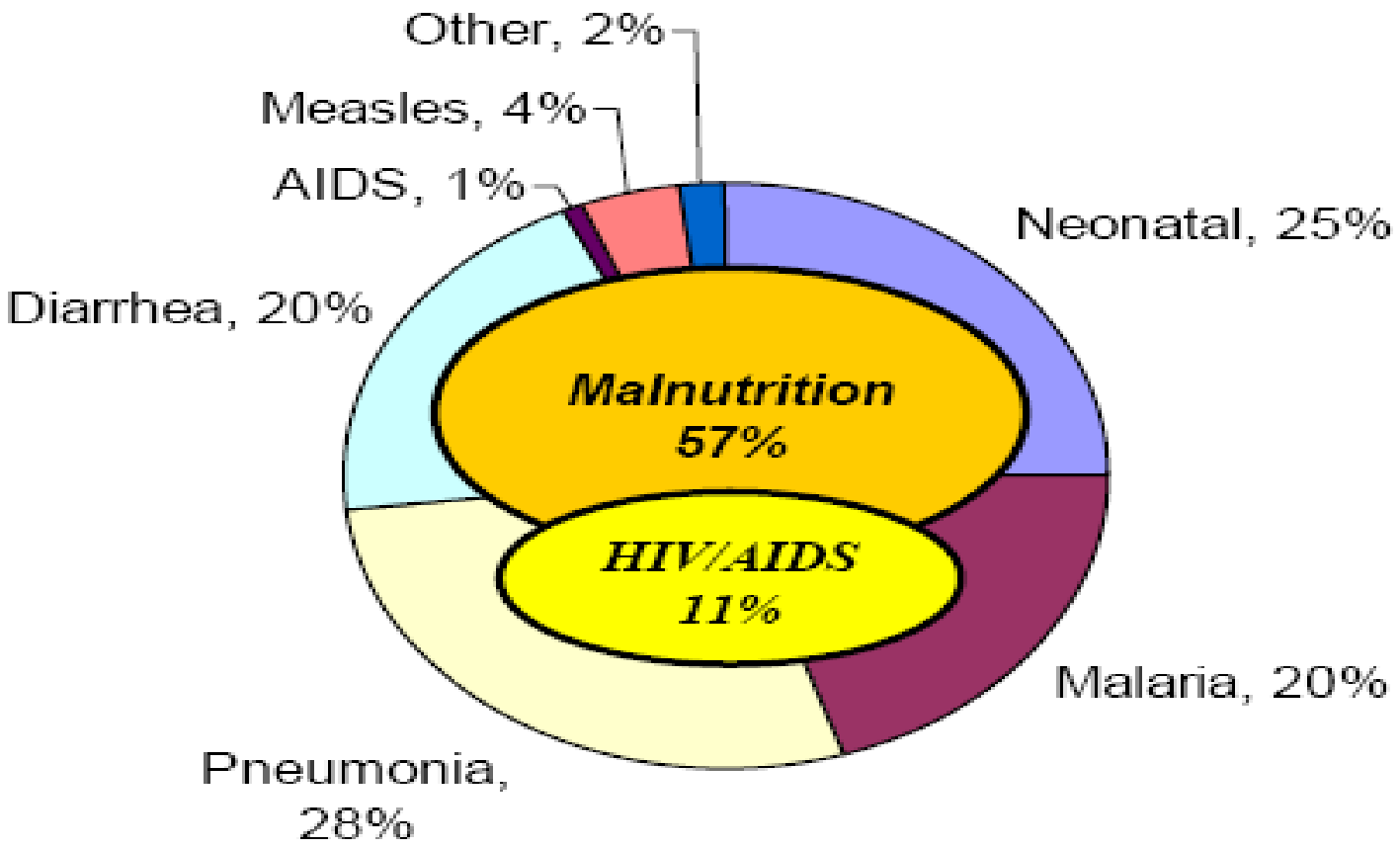
Nutrition

- Nutrients are substances that are crucial for **human life**, **growth** and **well-being**
- **Macronutrients** (carbohydrates, lipids and proteins) are needed for energy and cell multiplication and repair.
- **Micronutrients** are trace elements , vitamins and water which are essential for metabolic processes**.**
- **Obesity** and **under-nutrition** are the 2 ends of the spectrum of malnutrition.
- A healthy diet provides a balanced nutrients that satisfy the metabolic needs of the body without excess or shortage.
- Dietary requirements of children vary according to age, sex and development.

OVERVIEW OF PEM

- PEM is the major nutritional problem of third world countries and its prevalence is 20- 40% in Africa and Southeast Asia
- According EDHS 2016, the prevalence of stunting, wasting, and underweight were 38.3%, 10.1%, and 23.3%, respectively.
- About 19.47% of children were both stunted and underweighted
- Lack of food and clean water, poor sanitation, infection and social unrest lead to LBW and PEM.

Contribution of malnutrition to Under 5 Mortality in Ethiopia



PEM

- Is a diagnosis that includes overlapping syndrome & is caused due to the deficiency of protein and energy,
- Is also refer as protein calorie malnutrition
- All children with PEM have **micronutrient deficiency**.
- Can be primary or secondary.
- The two commons are:
  - **Marasmus** : is common in children less than 12 months
  - **Kwashiorkor:** is prevalent in children less than five years commonly in the age group 2-3 years

PEM…

Precipitating factors for PEM

- Lack of food (famine, poverty)
- Inadequate breast feeding
- Wrong concepts about nutrition
- Diarrhoea and malabsorption
- Infections (worms, measles, T.B)
- Agricultural patterns, droughts, floods, wars, and forced

KWASHIORKOR

- A nutritional disorder due to deficiency of protein and calories, **particularly proteins**
- Cecilly Williams, a British nurse, had introduced the word Kwashiorkor to the medical literature in 1933.
- The word is taken from the language in Ghana and used to describe the **sickness of weaning**.
- It is physiological adaptation to unbalanced deficiency.

ETIOLOGY

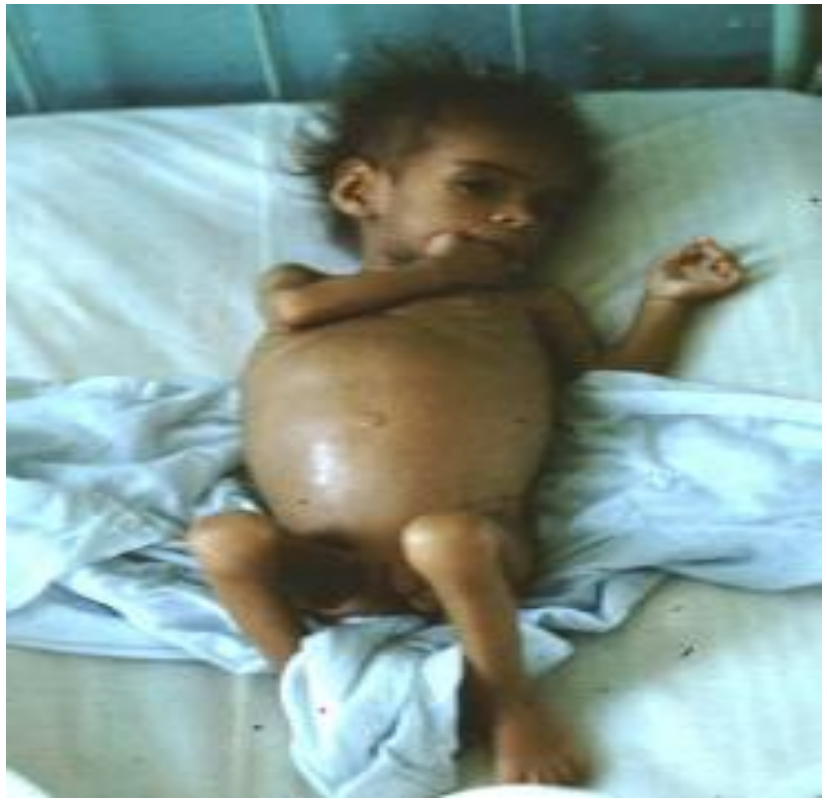
- Lack of knowledge about diet
- Poverty
- Natural calamities like drought, earthquakes, etc
- Repeated infections like diarrhoea, measles, etc
- Taboos
- Religious customs (people of certain religions avoid non-vegetarian diet which has high-quality proteins)

Clinical Presentation

- Kwash is characterized by certain **constant features** in addition to a variable spectrum of symptoms and signs.

Constant Features of Kwash

- Oedema
- Psychomotor changes
- Growth retardation
- Muscle wasting



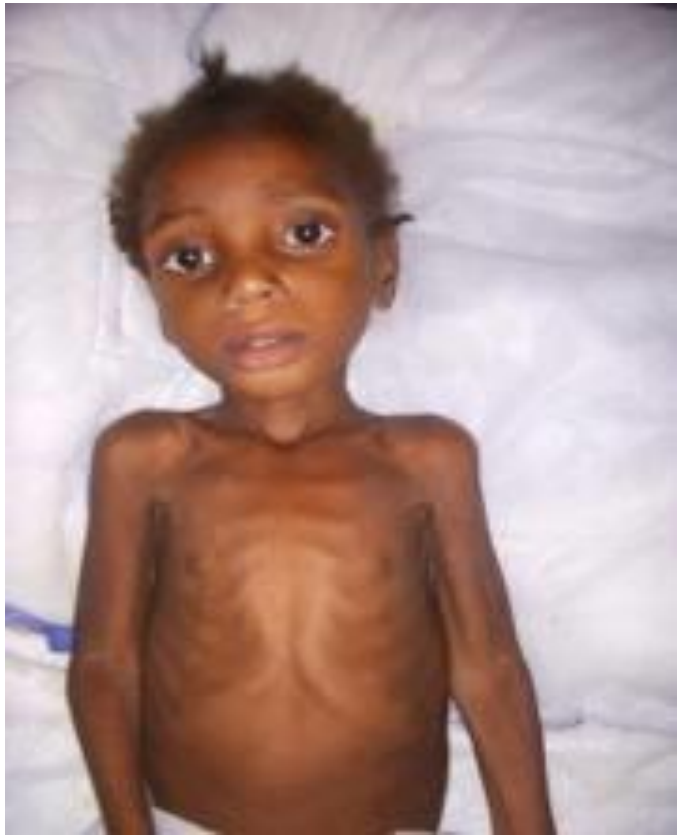
Grading..

Grades of bilateral pitting oedema	Definition
Absent	Absent
Grade +	Mild: Both feet/ankles
Grade ++	Moderate: Both feet, plus lower legs, hands or lower arms
Grade +++	Severe: Generalised bilateral pitting oedema, including both feet, legs, arms and face

Usually Present Signs

- ❖ Moon face due to hanging of cheeks as a result of edema and preserved subcutaneous fat
- ❖ Hair changes
- ❖ Skin depigmentation
- ❖ Anaemia
- ❖ Loss of appetite

- Kwashiorkor



Dermatosis in kwash

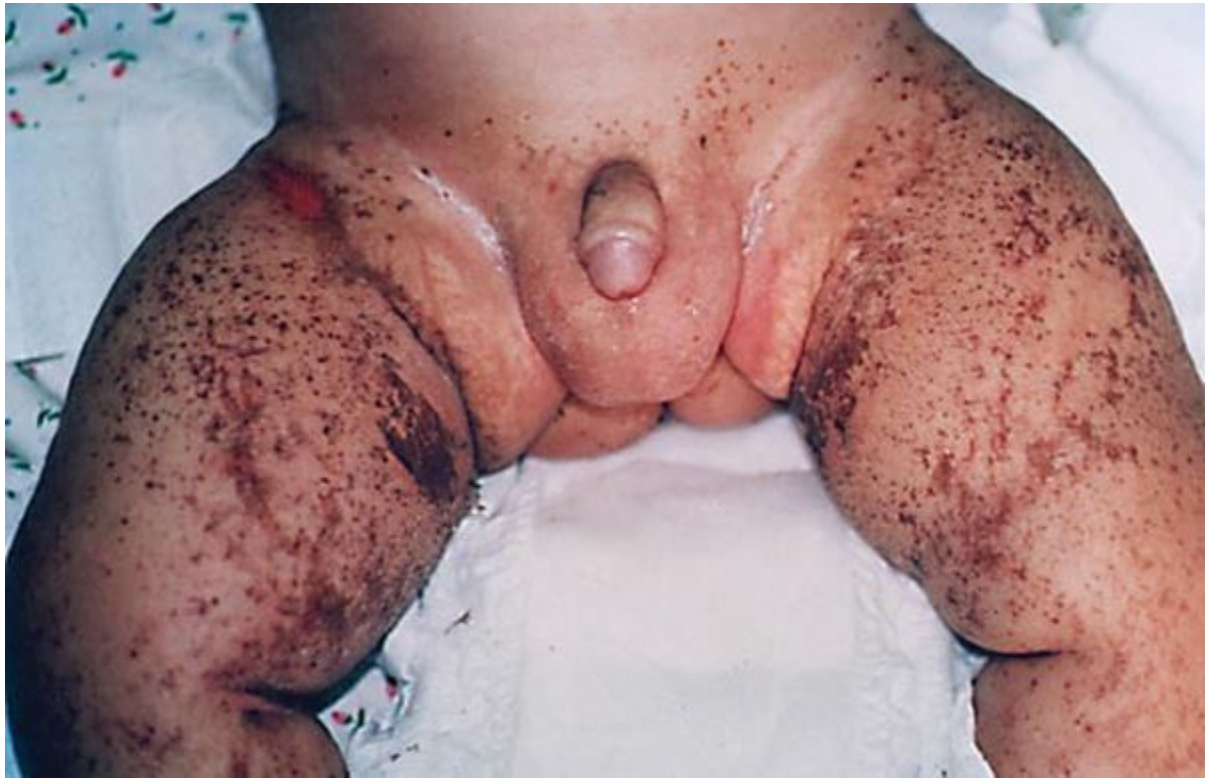
- The extent of dermatosis can be described in the following way:

+ mild: discoloration or a few rough patches of skin

+ + moderate: multiple patches on arms and/or legs

+ + + severe: flaking skin, raw skin, fissures (openings in the skin)

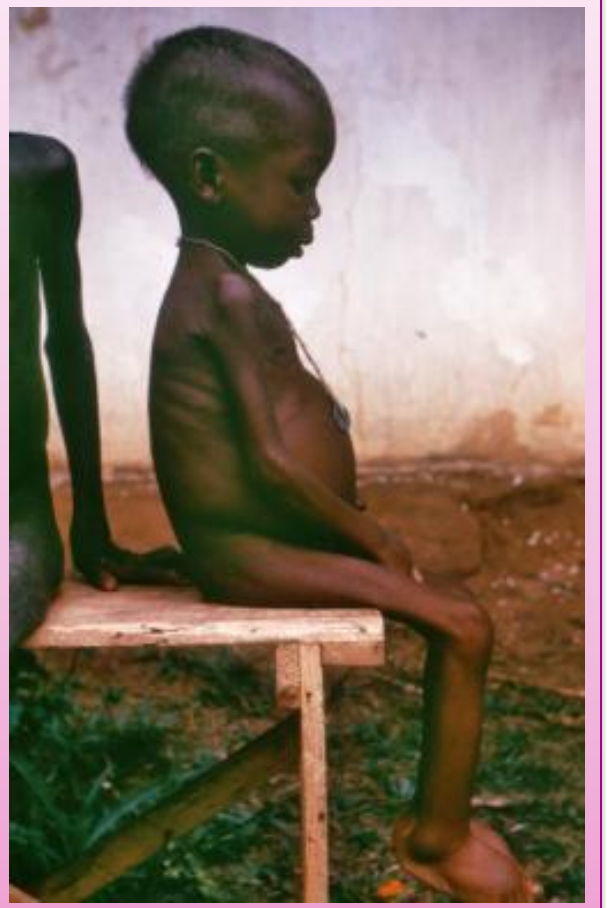
Kwash Dermatitis



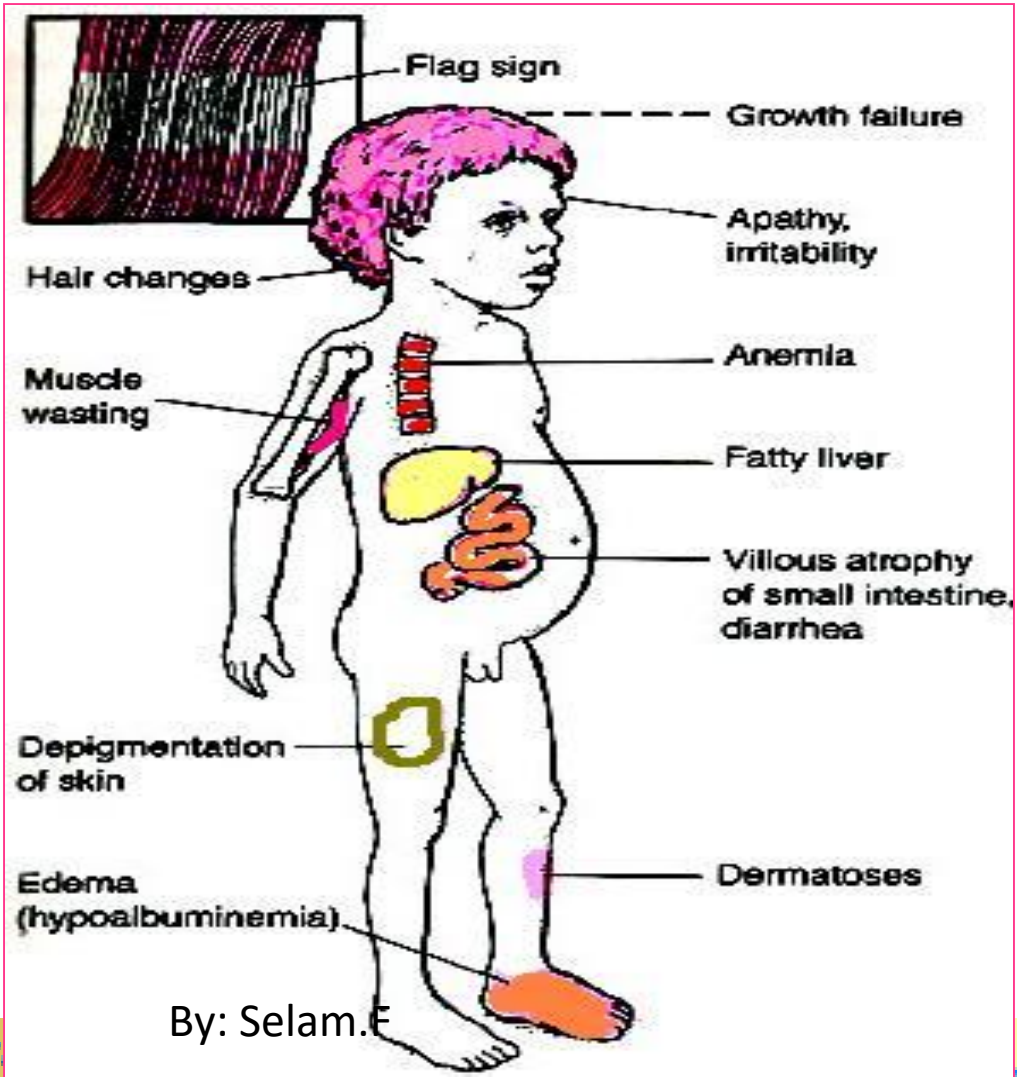
Kwash Dermatitis

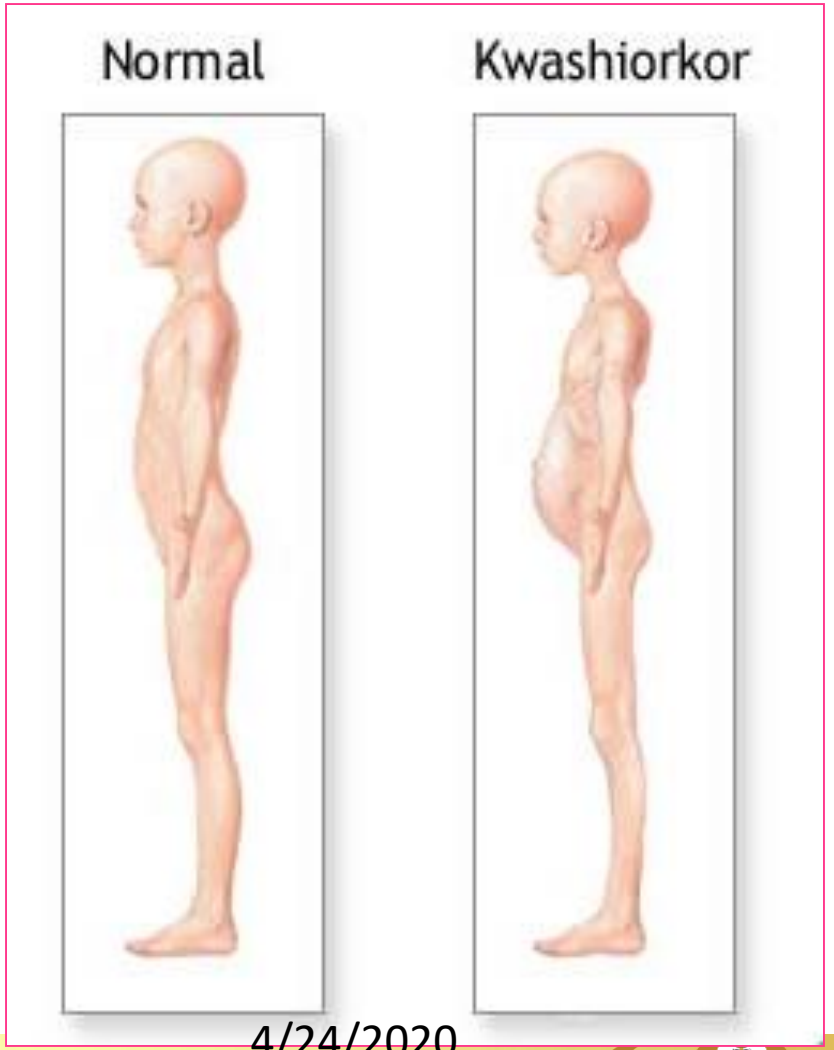
Occasionally Present Signs

- Hepatomegaly
- Flaky paint dermatitis
- Dehydration (diarrhea and Vomiting)
- Signs of vitamin deficiencies
- Signs of infections



CLINICAL PRESENTATION





Differential diagnosis

- Nephrotic syndrome
- Cirrhosis of liver
- Congestive heart failure

Investigations

- **Blood**
  - CBC
  - Serum electrolytes, plasma protein estimation
  - Blood culture & sensitivity for evaluation of septicaemia
- **Urine**
  - Albumin, sugar, deposits, urine culture & sensitivity
- **Stool**
  - Ova of parasite, culture & sensitivity if there is diarrhoea
- **Chest X-ray:**
- **Mantoux test**

MARASMUS

- A nutritional disorder due to deficiency of protein and calories, **particularly calories**
- Associated with insufficient intake or malabsorption of nutrient
- It represents the end result of starvation where both proteins , calories and other nutrients are deficient.
- Is characterized by emaciation
- Marasmus represents an adaptive response to starvation, whereas kwashiorkor represents a maladaptive response to starvation

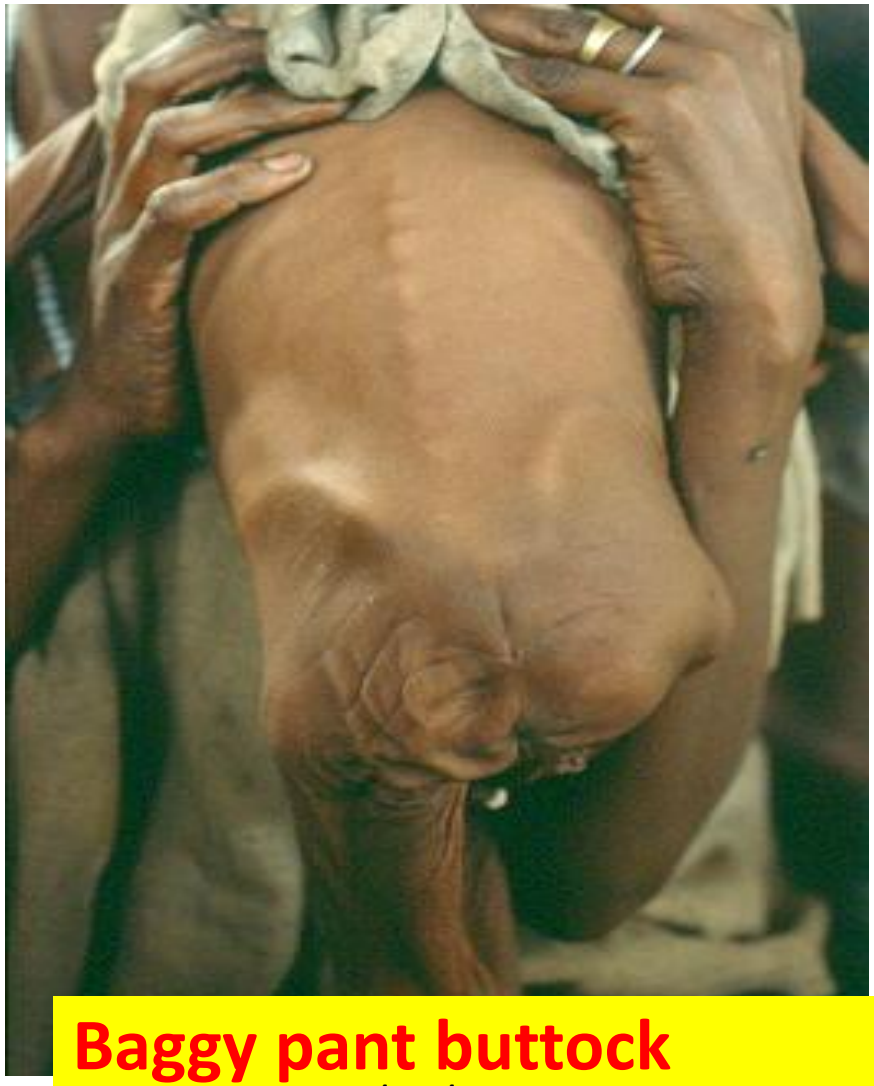
Epidemiology and Etiology

- Seen most commonly in the first year of life due to lack of breast feeding and the use of dilute animal milk.
- Poverty or famine and diarrhoea are the usual precipitating factors
- Ignorance and poor maternal nutrition are also contributory

Clinical Features of Marasmus

- Severe wasting of muscle and s/c fats. (flabby muscle)
- Severe growth retardation
- Wizened monkey (old man face)
- No edema
- Alert but miserable
- Baggy pant buttock
- Hungry / increase appetites
- DHN /sunken eye balls/
- Mood change (always irritable)
- No skin & hair changes

Clinical Features Of Marasmus



Baggy pant buttock

Complications

1. Immediate complications

- Hypoglycaemia
- Hypothermia
- Septicaemia
- Electrolyte imbalance

2. Late complications

- Intellectual sub-normality
- Growth retardation

Anthropometric Indices based Methods to classify PEM

1- Gomez classification/Community

- **Parameter:** weight for age

❑ Edema is not considered

❑ **Grades:**

- ❖ > 90 % normal
- ❖ 75-89 % grade I PEM (Mild)
- ❖ 60-74 % grade II PEM (Moderate):
- ❖ < 60 % grade III PEM (Severe)

Anthropometric Indices based Methods to classify PEM…cont'd

2. Well come classification/ Harvard standard

- **Parameter:** weight for age ± oedema
- **Grades:**
  - 80-60 % without oedema is under weight
  - 80-60% with oedema is Kwashiorkor
  - < 60 % with oedema is Marasmic-Kwash
  - < 60 % without oedema is Marasmus

Anthropometric Indices based Methods to classify PEM…cont'd

Indicator		No edema	With edema
Wt For age	60-80%	Under weight	kwashiorkor
	Less than 60 %	Marasmus	Marasmic-kwashiorkor

- Disadvantages of welcome system are:
  - Relies on age
  - Does not consider height
  - Does not differentiate acute Vs chronic malnutrition

Anthropometric Indices based Methods to classify PEM…cont'd

3. The water low system classification

- water low classification important in priority making

Wt for Ht	Nutritional status	Height for age	Nutritional status
90-100%	Normal	>95%	Normal
85-90%	Mild	90-95%	Normal
75-85%	Moderate	85-90%	Moderate
<75%	Severe wasting	<85%	Severe stunting

Anthropometric Indices based Methods to classify PEM…cont'd

Based on water low assessment:

- ❖ Wasting suggests acute malnutrition
- ❖ Stunting suggests chronic malnutrition

❑ **Advantages WLS**

- ✓ It is the best method for screening malnutrition in the community.
- ✓ It can detect mild forms of PEM
- ✓ It can distinguish acute from chronic malnutrition

Management of SAM

- The principles of management of severe acute malnutrition, whatever the programme setting, are based on 3 phases.

Phase I

Transition Phase

Phase II

Phase 1 (Stabilization phase)

- children with complicated SAM are initially admitted to an inpatient facility for stabilization.
- These children are admitted to phase 1 room. During this phase:

- Life-threatening medical complications are Rxed
- Routine drugs are given to correct specific deficiencies
- Feeding with F-75 milk (low caloric and sodium) is begun

Phase 1…

- The children in Phase 1 should be together in a separate room or section of the ward and not mixed with other patients
- Routine drugs has to be started immediately after they are admitted
  - ❖Amoxacilline
  - ❖Vitamin A
  - ❖Follic acid

Transition phase

- Once the child appetite recovers and the main medical complications are under control and oedema start to reduce, a transition phase is started with F-100 or RUTF

- This phase is important for slow transition as the introduction of large amounts of RUTF or F100 could lead to imbalance of body fluids and severe medical complications.

Criteria to move back from transition phase to phase1

- Move the child back to Phase 1:
  - If the patient gains weight more rapidly than 10g/kg/d.
  - If there is increasing oedema
  - If a child who does not have oedema develops oedema
  - If there is a rapid increase in the size of the liver
  - If any other signs of fluid overload develop.

Move the child back to Phase 1 …

- If tense abdominal distension develops
- If the patient gets significant re-feeding diarrhea so that there is weight loss.
- If patient develops medical complication
- If NG-tube is needed
- If patient takes less than 75% of the feeds in Transition Phase

Criteria to move from transition phase to phase 2

- Marasmic pt. spends a minimum of 2 days and if tolerating the new diet with out complication
- Completing the diet with good appetite.
- Complete loss of or radical decreasement of edema (in kwashiorkor).

Phase 2 (Rehabilitation Phase)

- ❑ Children that progress through phase 1 and transition phase enter phase 2 when they have **good appetite** and **no major medical complication**.
- ❑ During phase 2:
  - Routine drugs, deworming tablets and iron, are started
  - Feeding with RUTF or F100 is increased in amount
  - Child starts gaining weight
- ❑ Whenever possible, phase 2 is implemented as OTP with RUTF. Otherwise, it can be implemented in in-patient centers with RUTF or F100.

Composition F-75 and F-100

	F-75	F-100
☐ **Dried skimmed milk**	25g	80g
☐ **Sugar**	70g	50g
☐ **Vegetable oil**	27g	60g
☐ **Water**	1l	1l
☐ **Protein**	0.9g	2.9g
☐ **Lactose**	1.3g	4.2g
☐ **K**	3.6mmol	5.9mmol
☐ **Na**	0.6mmol	1.9mmol
☐ **Mg**	0.43mmol	0.73mmol
☐ **Zn**	2.0mmol	2.3mmol
☐ **Copper**	0.25mg	0.25mg

Criteria to move back from phase 2 to phase 1

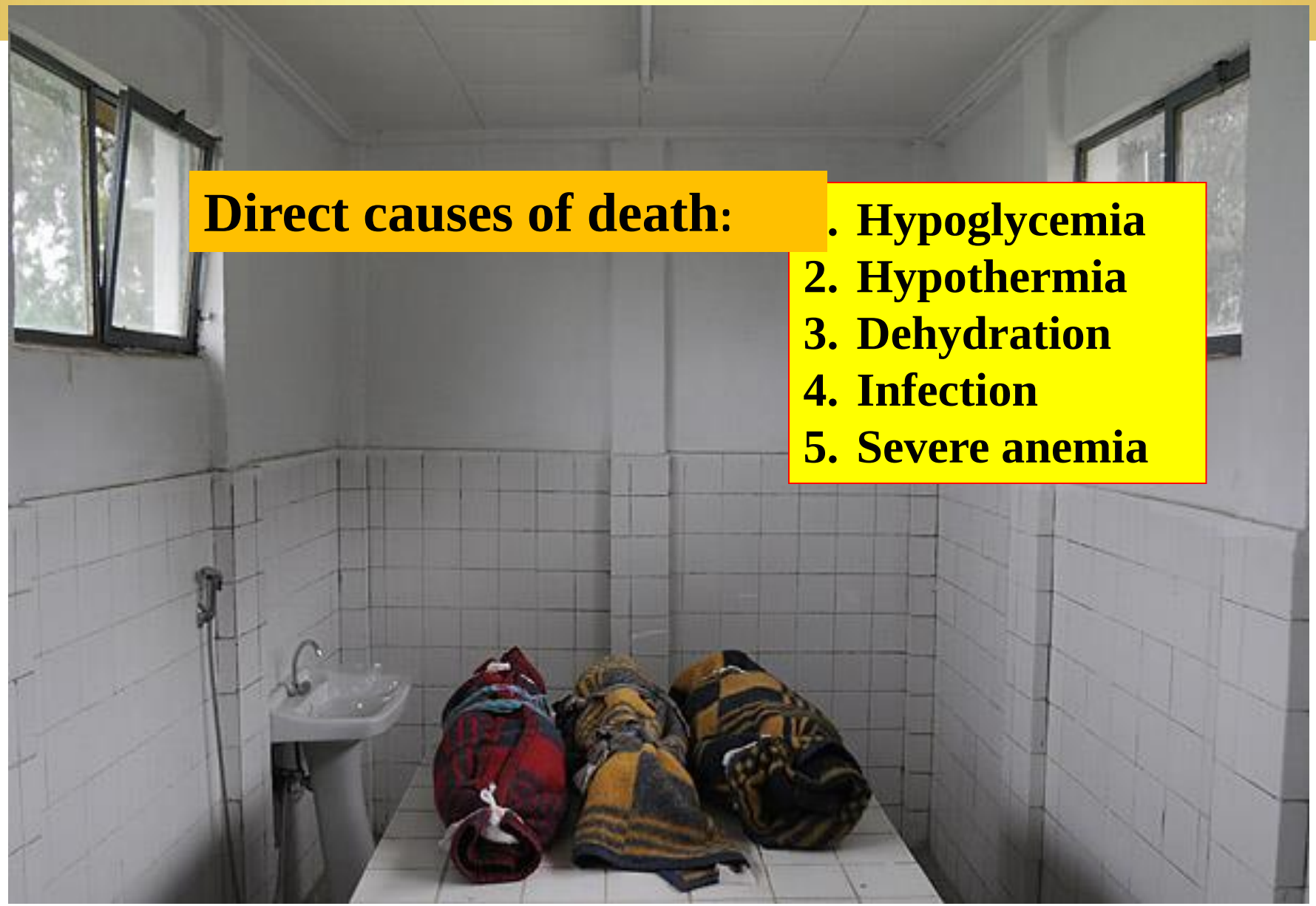
- Develops any signs of a complication
- Increase/development of oedema
- Development of re-feeding diarrhea sufficient to lead to weight loss.
- Weight loss for 2 consecutive weighing
- Static weight for 3 consecutive weighing
- Fulfilling any of the criteria of “failure to respond to treatment”

Complications of PEM

- Hypoglycemia
- Hypothermia
- Electrolyte imbalance
- Heart failure
- Dehydration
- Infections (bacterial, viral & thrush)

Prognosis

- Kwash & Marasmus-Kwash have greater risk of morbidity & mortality compared to Marasmus and under weight


Direct causes of death:
1. Hypoglycemia
2. Hypothermia
3. Dehydration
4. Infection
5. Severe anemia

MANAGEMENT OF MEDICAL COMPLICATIONS

Dehydration

- All signs of dehydration in normal child are present in severe malnourished children with no dehydration
- History of significant recent fluid loss and history of a recent change in the child's appearance
- Resomal(rehydration solution for malnutrition) 50-100ml over 12hrs

Hypoglycemia

- In severely malnourished children, the level considered low is less than <54 mg/dl
- Clinical signs that occur in normal person doesn't occur in malnourished children
- Eye lead retraction is one important sign

– If conscious - 50 ml of 10%sugar in water or F75 diet by mouth

– If loosing consciousness -give 50 ml of 10% sugar-water by Naso-gastric tube

– If unconscious - 5ml/kg of 10% glucose solution IV, followed by 50 ml of 10% sugar by NG tube

Hypothermia

- Commonest cause is due to environmental or lack of cover
  - Use the “kangaroo technique” for children with a caretaker
  - Put a hat on the child and wrap mother and child together
  - The room should be kept warm, especially at night thermo-neutral temperature range for malnourished patients is 28oC to 32oC

Discharge Criteria

- The child is discharged if he/she fulfills the following criteria:

  -Wt/Ht > or = 85%

  -No edema for the last 10 days

  -Complications are adequately treated

  -Health education completed

  -Immunization Up to date.

Important things NOT to do

- *Do not give diuretics to treat oedema.*
- *Do not give iron during phase 1 and transition phase.*
- *Do not give high protein formula (over 1.5 g protein per kg body weight daily).*
- *Do not give IV fluids routinely*

Home take assignment

Read about:

- ❑ Micronutrient deficiency

Thank You

THANK YOU!!!

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University of Gondar

Integrated Management of Newborn and Childhood Illness (IMNCI)

By: Selam Fisiha (Bsc, Msc)

Lecturer of Pediatrics and Child Health Nursing

Questions

- What is IMCI?
- The case management process of IMNC?

Objective

At the end of this session you will be able to:

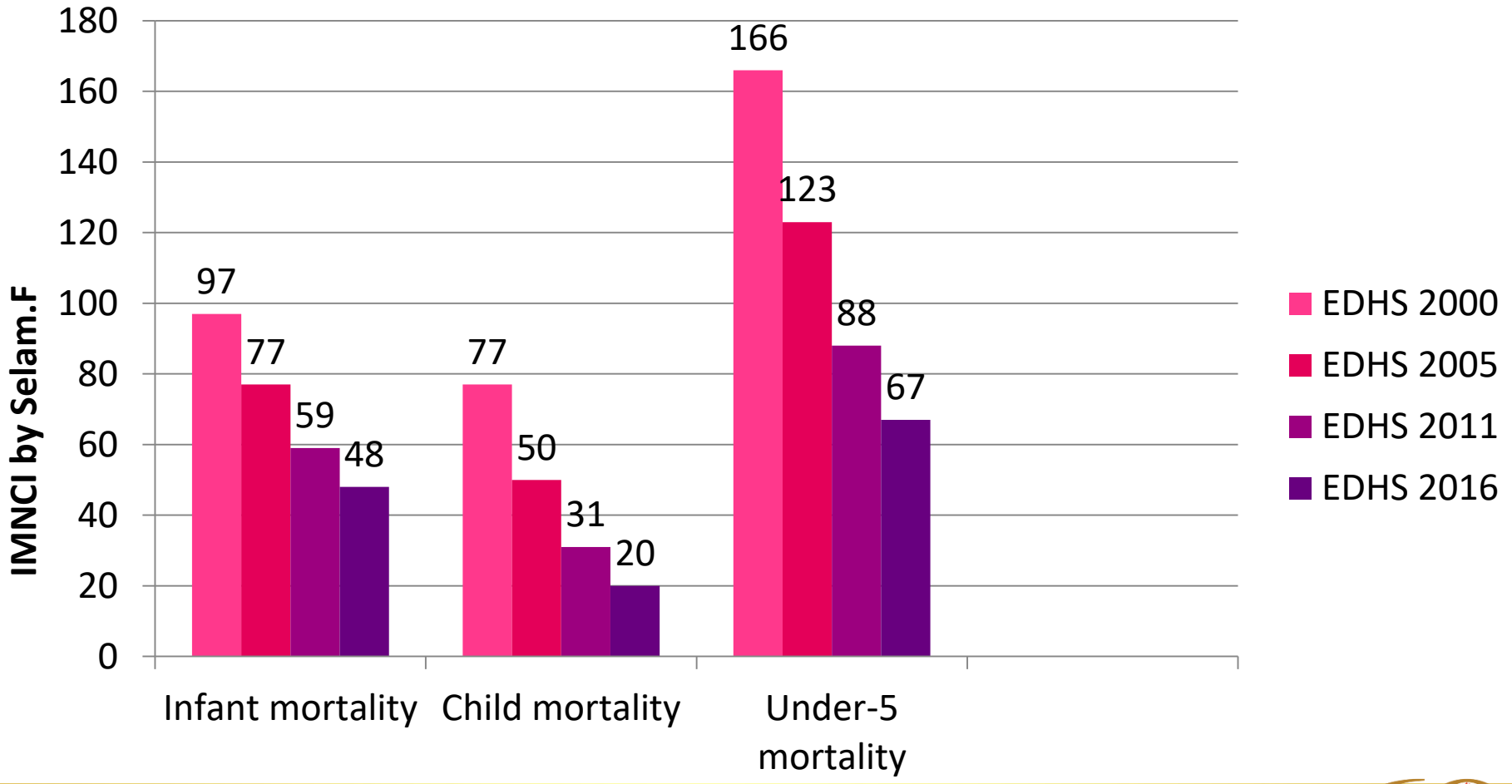
- ❖Assess, classify and treat newborns and children according to IMNCI
- ❖Recognize the general danger sign that should seek great attentions when we try to treat children according to IMNCI.

INTRODUCTION

- Under 15 years constitute **44.7%** of the population
- Of which **40% are under five** and **8% are under one year.**
- Infant mortality rate is 48/1000 live births
- Under five mortality rate 67/1000 live births

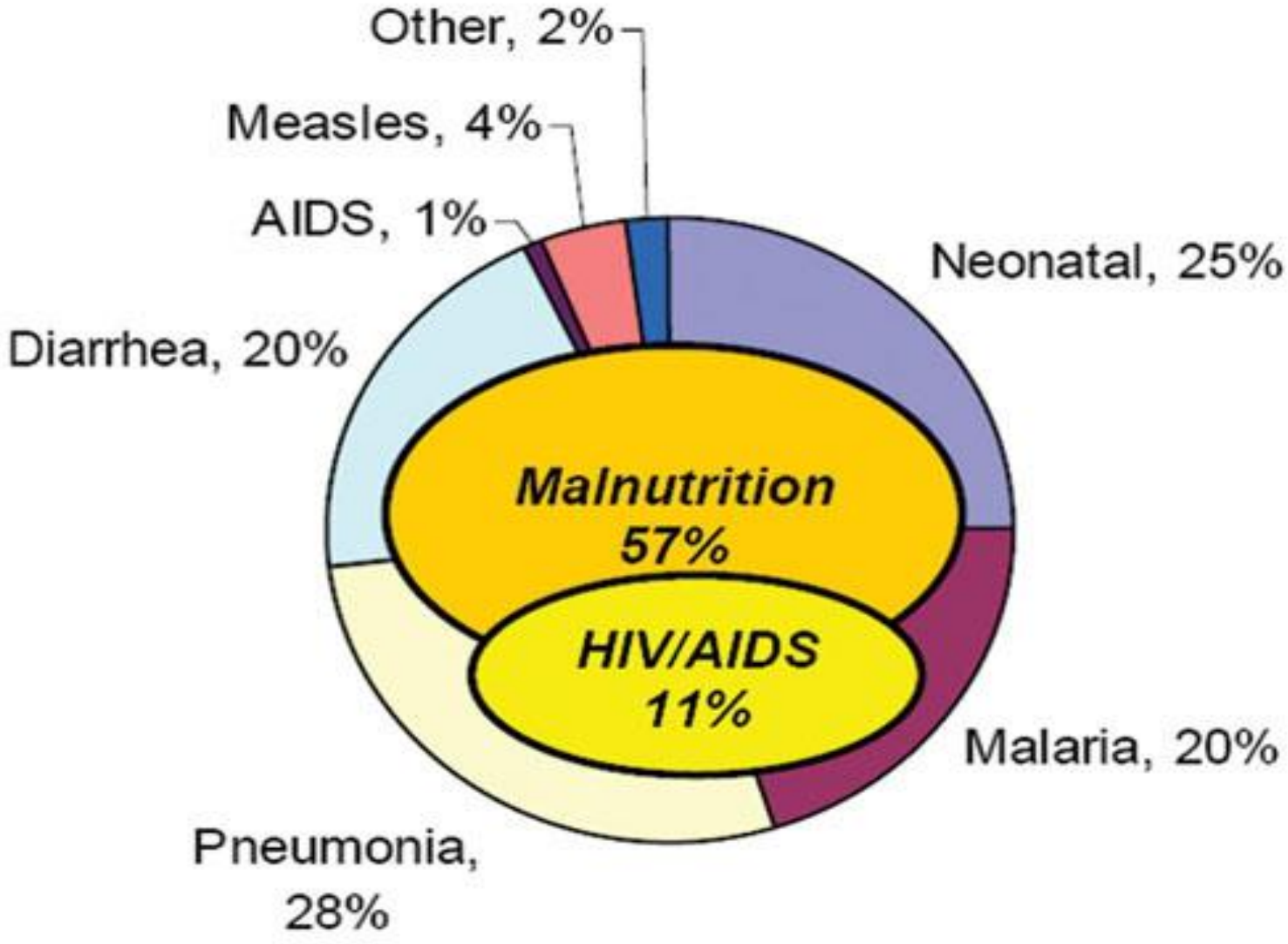
Introduction

Fig. 1 Trends in Early Childhood Mortality, EDHS 2016



Introduction

- More than 70% of childhood deaths are due to the five diseases.
  - ➢Pneumonia 28.9%
  - ➢Malaria 21.6%
  - ➢Diarrhea 12%
  - ➢Measles 5%
  - ➢60% of these deaths are associated with malnutrition
  - ➢HIV/AIDS 11%.


Other, 2%
Measles, 4%
AIDS, 1%
Neonatal, 25%
Diarrhea, 20%
Malnutrition
57%
HIV/AIDS
11%
Malaria, 20%
Pneumonia,
28%

IMNCI

WHAT IS IMNCI?

- **IMNCI is a strategy to reduce morbidity & mortality associated with the major illness.**

IMNCI

- Action-oriented classifications , rather than exact diagnoses.
- Use few clinical signs/symptoms to treat the major health problems of children.
- The IMNCI guidelines rely on detection of cases based on simple clinical signs without laboratory tests and offer empiric treatment.

IMNCI Cont…

- **WHO/UNICEF suggested the management of these illnesses as an integrated (combined) rather than each specific illness.**
- **There are also important relationship between the illnesses. E.g. repeated diarrhea episodes often lead to malnutrition.**

The case mgt process

It has the following steps

1. **Assess the child or young infant:**
   - ❖ Checking ***first for general danger signs***
   - ❖ **Taking History & Physical examinations.**
2. **Classify the illness: means select category or classification based on the major symptoms, or** classify a child's illnesses using a colour-coded triage system.

3. Identify Rx:

- ❖ Identify specific treatments for the child conditions based on our classifications.

4. Treat the child:-

- ❖ Administering the actual treatment
- ❖ Teaching the caretaker how to give oral drugs,
- ❖ How to feed and give fluids during illness, and
- ❖ How to treat local infections at home.

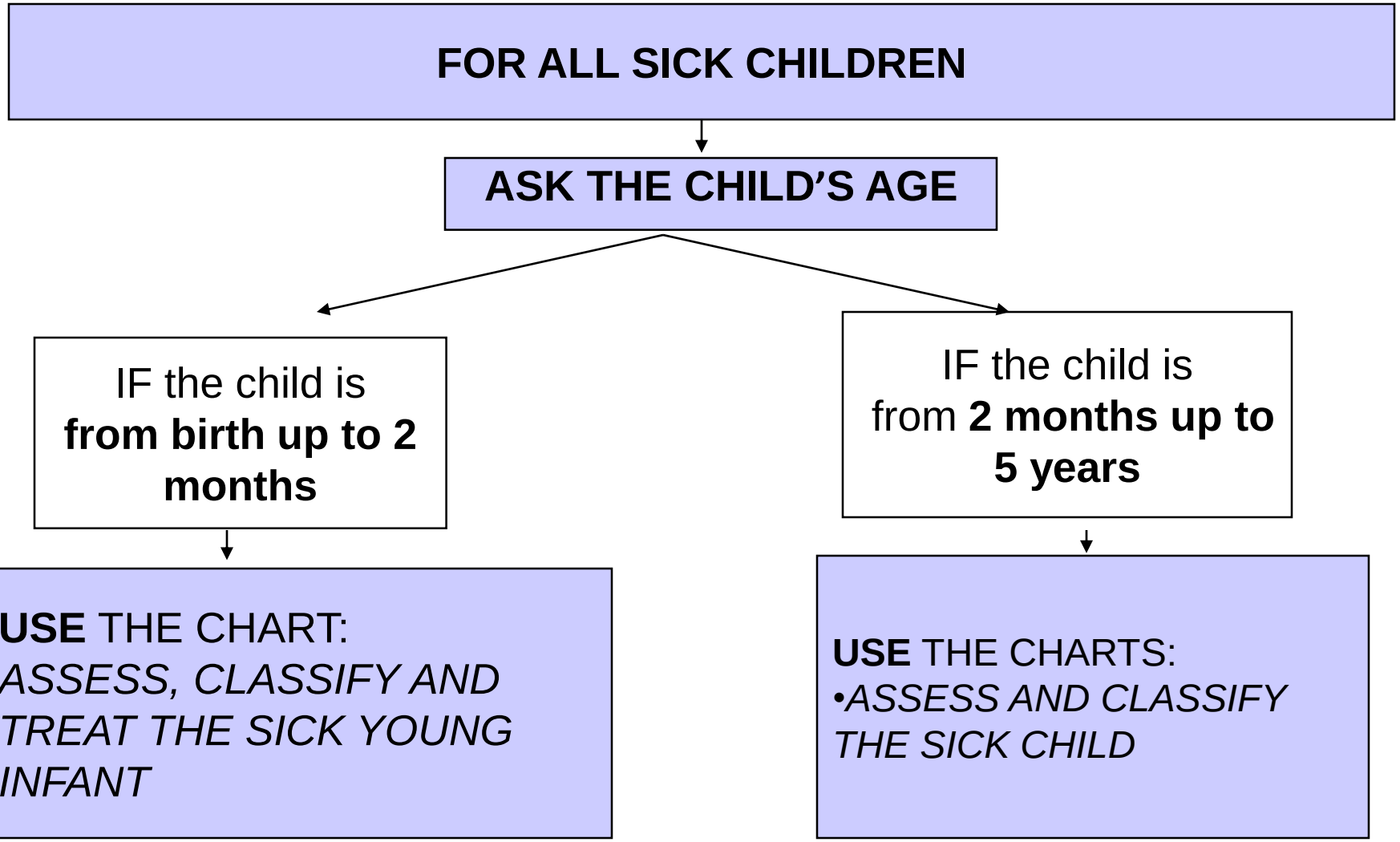
5. Counsel the mother.

- About the disease process
- Feeding practice
- When to return

6. Give follow up care: -

- Give follow up for reassessment.
- To now the treatment success.

Two chart booklets



THE LEGEND

RED	A CLASSIFICATION THAT NEEDS URGENT REFERRAL AFTER FIRST DOSE OF APPROPRIATE ANTIBIOTIC
YELLOW	A CLASSIFICATION THAT NEEDS TREAMENT AT HOME, ANY HEALTH INSTITUTION AND HEALTH EDUCATION
GREEN	A CLASSIFICATION THAT NEEDS HEALTH PROMOTION & EDUCATION

ESSENTIAL NEW BORN CARE

- 50% of neonatal death occur in the first **2 days of life.**
- 3 out of 4 newborn deaths occurred in the first week of life.
- Therefore, **timely** provision of **essential new born care** significantly reduce morbidity and mortality.

Essential New born Care (ENC)

Definition

- Is a comprehensive strategy designed to improve the health of newborns through interventions **before conception**, **during pregnancy**, **soon after birth**, and in the **postnatal period**.
- It is simple, to-the-point, globally accepted evidence-based protocol

Steps in immediate newborn care

Step 1

Deliver the baby onto the mother's abdomen or a dry warm surface close to the mothers

Steps in immediate care…

Step 2

- **Dry baby's body with dry towel. Wrap with another dry warm cloth and cover head.**
- Dry the baby, including the head, immediately. Wipe the eyes. Rub up and down the baby's back, using a clean, warm cloth.

Drying The Newborn

Drying the newborn:- Stimulates the newborn to breathe normally and minimizes heat loss.

BUT do not remove the vernix !!

Step 3

Assess breathing and color

Counting the APGAR score

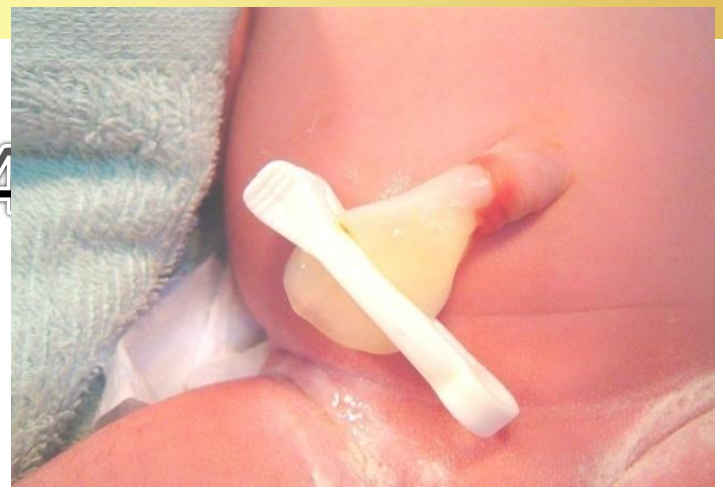
Step 3…

if the new born is:-

- **Not breathing,**
- **Gasping or < 30 BPM**

Then resuscitate

Step 4



Tie the cord

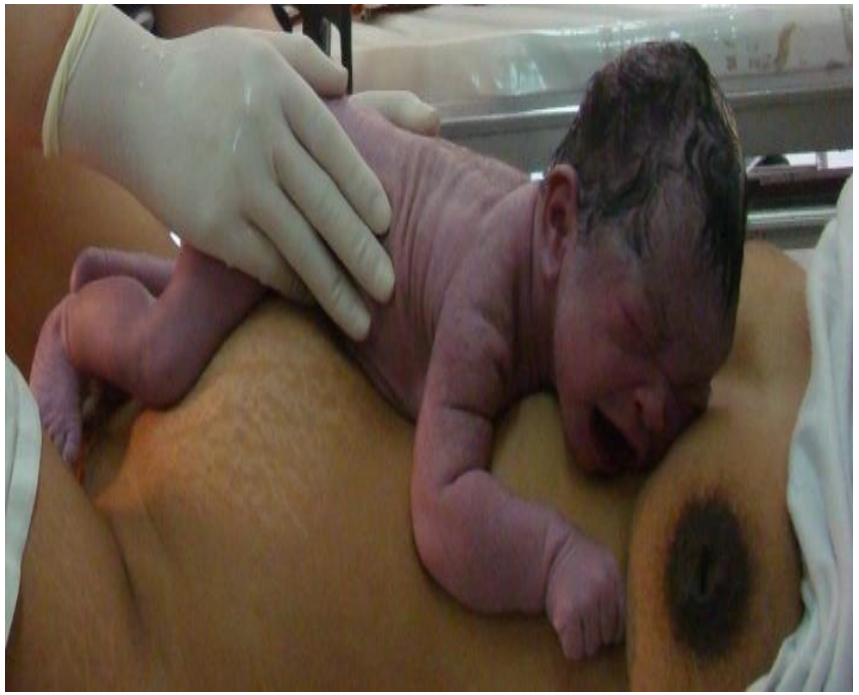
- **Tie the cord two fingers from abdomen and another tie two fingers from the first one. Cut the cord between the first and second tie.**
  - **Make sure that tie is well secured.**
  - **Make sure that the thread you used to tie the cord is clean and safe.**

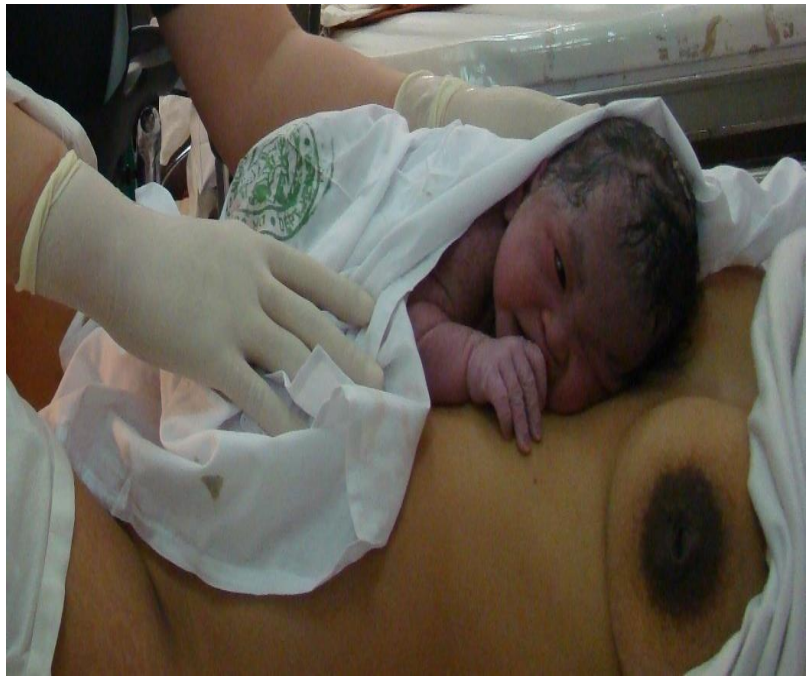
Do not put anything on the cord stump

Step 5

- **Place the baby in skin-to-skin contact and on the breast to initiate breastfeeding**
- The warmth of the mother passes easily to the baby and helps stabilize the baby's temperature→ prevents hypothermia

Immediate skin-to-skin contact





Breast Crawling

Immediate skin-to-skin contact…

- The first skin-to-skin contact should be
  - ❖For at least 1 hour after birth.
  - ❖Until after the first breastfeed.
- The baby should not be bathed at birth
- After 24 hours the child may the first sponge bath if the temperature is stabilized

Immediate skin-to-skin contact…

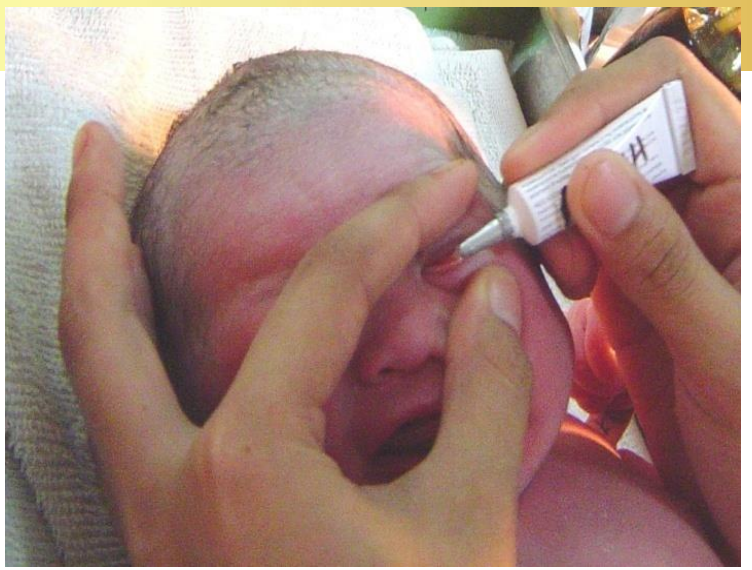
- Start breastfeeding as early as possible

1. Help the mother begin breastfeeding within the first hour of birth.

2. Help the mother at the first feed.

✓Make sure the baby has a good position, attachment, and suck.

Step 6



Give eye care

- Give the newborn eye care with an antimicrobial medication.
- Eye care protects the baby from serious eye infection which can result in blindness or even death.

Prevent and manage ophthalmia neonatorum.

Step 7

- **Give Vitamin K, 1mg IM on anterior lateral thigh (while baby held by his mother).**

Step 8

Weigh baby (if <1,500 gm refer urgently)

Weigh the baby after an hour of birth or after the first breastfeed

Assess and Classify

The Sick Young Infant Age Birth Up to 2 Months:

LEARNING OBJECTIVES

At the end of this session you will be able to:

- Assess and classify a young infant for birth asphyxia.
- Assess & classify for birth wt. and gestational age.
- Assess and classify a young infant for possible bacterial infection and jaundice.
- Assessing and classifying a young infant with diarrhea.
- Assess and classify a young infant for HIV infection.
- Checking for a feeding problem or low weight, assessing breastfeeding and classifying feeding.
- Checking immunization status.

YOUNG INFANT

Young infants

- Sick and die very quickly
- Limited movements, fever, or low body temperature were their danger signs.
- Mild chest indrawing is normal in young infants.

Assess & classify for birth asphyxia.

-Asses for birth asphyxia if you are attending delivery or if baby is brought immediately after birth.

Assess for breathing

-If not breathing:

- Gasping: - Count breathing: normal breathing rate of the new born is 30-60 beat/min.

Classify: there are two possible classifications

- Birth asphyxia

- No birth asphyxia

Signs	Classify	Treatment
If any of the following sign: - not breathing - gasping - breathing less than 30 per minute	BIRTH ASPHYXIA	Start resuscitation - position the new born supine with neck slightly extend. - clear the mouth & nose with gauze or clean cloth. - ventilate with appropriate size mask & self inflating bag - If the resuscitation is successful continue giving immediate new born care - if the baby is having irregular breathing after 20 minutes resuscitation; refer urgently to hospital. - Monitor continuously for 6 hrs. - follow after 12hrs, 3days & 6weeks

- Strong cry - Breathing more than 30b/m	NO BIRTH ASPHYXIA	■ Give immediate new born care - cord care - eye care - vitamin K - initiate skin to skin contact - initiate exclusive breast feeding - advice the mother when to return - follow after 6hrs; 3days, & 6 weeks

Assess & classify for birth weight & Gestational age/G.A

- **Assess**

- Ask the Gestational age /duration of pregnancy in wks, if not possible use weight to classify the new born.

Classify

There are 3 possible classifications

- Very low birth weight & or very preterm
- Low birth weight & or pre term
- Normal weight & or term.

Classify for birth weight & Gestational age…cont…

Signs	Classify as	Treatment
Weight < 1500gm or Gestational age < 32 wks	VERY LOW BIRTH WEIGHT AND /OR VERY PRETERM	-Give first dose of I.M Ampicillin & Gentamycin - continue feeding with expressed breast milk - continue KMC - Give vitamin K 1mg I.M on anterior mid thigh - refer urgently to hospital.

Classify for birth wt. & Gestational age cont…

Weight 1500 to <2500gm or Gestational age 32-37 wks	**LOW BIRTH WEIGHT AND/OR PRETERM**	**-kangaroo mother care -counsel on optimal breast feeding -counsel mother/family on prevention of infection -give vitamin K 1mg I.M on anterior mid thigh -provide follow up visits at age 6 hrs 2 days & then every week for 6weeks -advice the mother when to return immediately**

Classify for birth wt. & Gestational age cont…

Weight ≥2500gm or Gestational age ≥ 37 wks	**NORMAL WEIGHT AND/OR TERM**	- counsel on optimal breast feeding -counsel mother/family on prevention of infection -provide three follow up visits at the age 6- 24 hrs, 3 days & 6 weeks. -Give vitamin K 1mg I.M on anterior mid thigh -advice the mother when to return immediately

Assess & classify the sick young infant for possible bacterial infection & jaundice.

- The young infant must be calm & may be sleep while you assess the first 3 signs, i.e. count breathing, chest in drawing & grunting/stridor.
- Ask the family what the young infant's problems are

- determine if this is an **initial** or **follow up** visits for this problem.

Check for possible bacterial infection & jaundice..

Ask:

- **Has the infant had convulsion?**
- **is there any difficulty of feeding?/ check by offering breast feeding (B/F)**

- Look: count the breaths in one minute.

If the 1st count is 60 breaths or more repeat count

- Look for chest in drawing: when the infant breath in.

Check for possible bacterial infection… con't…

Look & Listen for grunting.

- Grunting= is the soft, short sounds a young infant makes when breathing out.

Look at the umbilicus: is red or draining pus?

- There may be some redness around the umbilicus or the umbilicus may be draining pus.

-

possible bacterial infection …Cont…

- Measure temperature/ or feel for fever or low body temperature.
- Fever - axillary Tº greater or equal to 37.5 ^{0}c.
- Low body Tº - b/n 35.5 & 36.4 ^{0}c
- Look for skin pustules:

  - examine the skin on the entire body

Skin pustules are red spots or blisters when contains pus.

possible bacterial infection …Cont…

- Look at the young infant's movements; are they less than normal?

  - A wake young infant will normally move his arms or legs or turns his head several times in a minute.

  - Does the infant moves only when stimulated?

  - Does not move even when stimulated.

- Look for jaundice: yellow discoloration of the skin.

Assess & classify the sick young infant for possible bacterial infection & jaundice.

Signs	Classify as	Treatment
- not feeding well or - convulsion/convulsing now - fast breathing/60b/m or - severe chest in drawing	VERY SEVERE DISEASE	-Give first dose of I.M Ampicillin & Gentamycin - warm the young infant by skin to skin contact if Tº less than 36.5ºc (or feels cold touch) while arranging referral

Classify possible bacterial infection & jaundice…Con…

-grunting or -fever(38°c or above or feels hot) or -Body temperature <35.5°c or feels cold) or -movement only when stimulated or no movement even stimulated	VERY SEVERE DISEASE	- advice the mother how to keep the young infant warm on the way to hospital - refer urgently to hospital

Classify possible bacterial infection & jaundice…Con…

· Red umbilicus or draining pus or · Skin pustules	LOCAL BACTERIAL INFECTION	„Give Cotrimoxazole or Amoxycillin for 5 days „Teach the mother to treat local infections at home „Advise mother when to return immediately „Follow-up in 2 days
- None of the signs of possible serious bacterial infection or local bacterial infection.	BACTERIAL INFECTION UNLIKELY	- Advice the mother to give home care for the young infant.

Classify possible bacterial infection & jaundice…Con…

-Temperature b/n 35.5-36.4c^0 (both values inclusive)	LOW BODY TEMPRATURE	- Treat to prevent low body T^o - Warm the young infant using skin- to skin contact for 1hr & re-assess. If T^o remains the same or worse, **refer.** - Advice mother when to return immediately - Follow up in 2days.

Classify possible bacterial infection…con't…

- palms and Or soles yellow or - age <24hrs or - age 14 days or more	SEVERE JAUNDICE	- Treat to prevent low blood sugar - Warm the young infant by skin to skin contact if Tº less than 36.5ºc (or feels cold touch) while arranging referral - Advice the mother how to keep the young infant warm on the way to hospital - Refer urgently to hospital

Classify possible bacterial infection con't…

✓ Only skin or eyes yellow.	JAUNDICE	- Advice the mother to give home care - Advise the mother when to return - Follow up in 2 days

Assess Diarrhea

Young infant with diarrhea is assessed for:

- How long the child has had diarrhea
- Blood in the stool to determine if the young infant has dysentery
- Signs of dehydration.

Ask: does the young infant have diarrhea?

- If the answer is no, you don't need to assess the child further for signs to diarrhea.
- If yes; assess the child for signs of DHN, dysentery & persistent diarrhea.

Assess Diarrhea…

Check for signs of DHN:

- Restless & irritable
- If DHN continues the infants spontaneous & stimulated movement will decreased and becomes lethargy.
- As the child's body loses fluids, the eyes may be look sunken.
- When pinched, the skin will go back slowly or very slowly (>2 sec).

Cont…

Classify Diarrhea

- **Sever DHN**
- **Some DHN**
- **No DHN**
- **Persistent diarrhea**
- **Dysentery**

Con…

Signs	Classify as	Treatment
Two of the following signs - movement only when stimulated or no movement even stimulated - sunken eyes - skin pinch goes back very slowly	SEVERE DHN	-Give the first dose of I.M Ampicillin and Gentamycin -If infant has another severe classification: Refer URGENTLY with mother giving frequent sips of ORS -Advise mother to continue BF *Plan C ?????????*

Two of the following signs - **Restless, irritable** - **sunken eyes** - **skin pinch goes back slowly**	**SOME DHN**	Give fluid, Zinc supplement & food for some DHN (***plan- B??????)*** - If the child has severe classification: . Refer urgently to hospital with mother giving frequent sips of ORS on the way - Continue B/F - Advise the mother when to return immediately. - Follow up for "5" day
No enough sign to classify as some or sever dehydration	**NO DHN**	-Give Fluid, Zinc supplement & food to treat diarrhea (***plan – A***) -Advise the mother when to return immediately -Follow up in 5 days if not improving

Con…

• Diarrhea lasting 14 days or more with dehydration	SEVERE PERSISTENT DIARRHEA	- Give the first dose of IM Ampicilline Or Gentamycin - Treat to prevent low blood sugar - Advice how to keep infant warm on the way to the hospital - Refer to hospital

Con…

Blood in the stool	**Dysentery**	**-Give the first dose of I.M Ampicillin or Gentamycin** **-Treat to prevent low blood sugar.** **-Advice how to keep infant warm on the way to the hospital** **-Refer to hospital**

Assess for HIV infection

Ask: - has the mother or the child have positive HIV test?

- If the child has had an HIV test, determine whether the test was an Antibody test or a PCR test.

Positive HIV test

- **HIV infection diagnosed by serological & virological tests.**
- **Serological is anti body test, from the mother pass on to the child & in some instances does not disappear until the child is 18 months of age.**

Con…

- This means that a positive antibody test in children under the age of 18 months is not reliable & does not confirm that the child is truly HIV infected.
- On the other hand, virological tests, such as PCR test directly detect HIV in the blood.
- PCR tests can there fore detect HIV infection in the child before the child is 18 months old.

Con…

SIGN	CLASSIFY AS	TREATMENT
Positive PCR test in the young infant	CONFIRMED HIV INFECTION	- Give cotrimoxazole prophylaxis from 6wks of age. - Refer for ARV - Assess feeding & counsel as necessary - Advice the mother on home care - Follow up in 14dys

Con…

- Mother HIV positive OR - Infant has positive HIV antibody test	POSSIBLE HIV INFECTION (HIV EXPOSED)	- Assess feeding & counsel as necessary - Give cotrimoxazole prophylaxis from 6wks of age - Confirm HIV status as soon as possible using PCR - Follow up in 14dys
Negative HIV test in the mother or the child	HIV INFECTION UNLIKELY	- Advice the mother to give home care for the young infant

Check for feeding problem or low weight

- Adequate feeding is essential for growth & dev't.
- Poor feeding during infancy can have lifelong effects.
- The best way to feed a young infant is to breastfeed exclusively.

- **EBF** means that the infant takes **only breast milk, and no additional food, water or other fluids.** (Medicines and vitamins are exceptions.)

Check for feeding problem or low weight..

- The recommendation is that the young infant be breastfed **as often** and **for as long as the infant wants, day and night.** This should be a minimum of 8 times or more times in 24 hours.

Check for feeding problem or low weight..

Ask about feeding & determine wt. for age.

Ask if there is any difficulty of feeding.

- is the infant B/F, if yes for how long?
- Do you empty one breast before switching to the other?
- Do you increase frequency of B/F during illness?
- Does the infant receive any other foods or drinks?
- What do you use to feed the infant? / Cup, bottle or other.

Check for feeding problem…

Determine weight for age

Use wt. for age chart to determine if the young infant is low wt. for age.

- For young infant you should use the low wt. for age line, instead of very low wt. for age.

Assess breast feeding

- If the infant is exclusively breast feed with out difficulty & is not low wt. for age, there is no need to assess B/F.

- If the infant is not breast feed at all, do not assess B/F.

Check for feeding problem...

- If the infant has serious problem requiring urgent referral to hospital do not assess B/F.

If an infant

- has any difficulty of feeding
- is breast feeding less than 8 times in 24hrs
- is the mother switching the breast frequently
- Breast feeding not increased during illness
- is taking any other foods or drinks, or
- is low wt. for age &
- has no indications to refer urgently to hospital assess breast feeding.

Cont….

Assess breast feeding

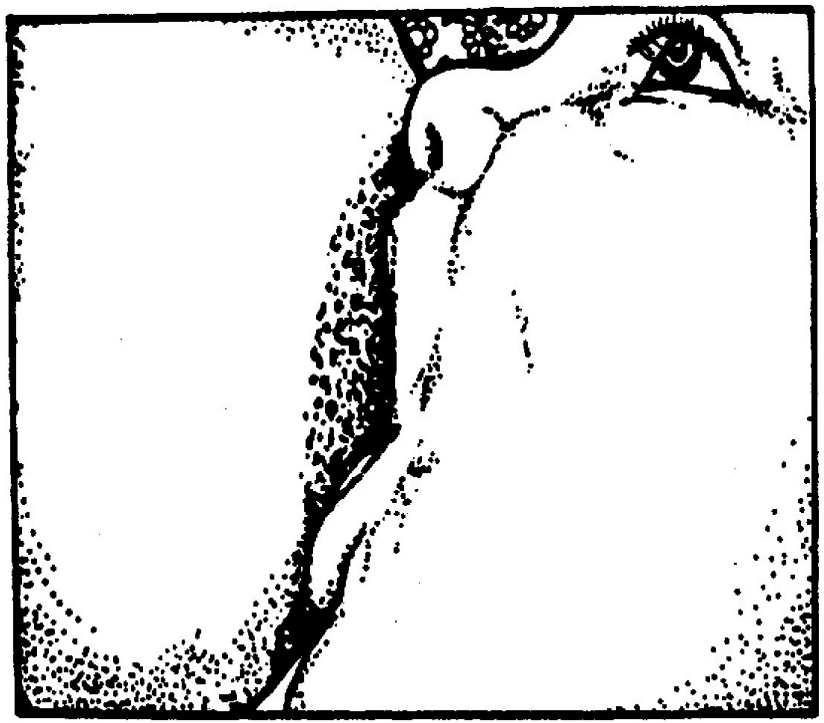
- has the infant B/F in the previous hr?
- If the infant has not feed in the previous hr ask the mother to put her infant to breast, observe the breast feeding for 4 minutes.

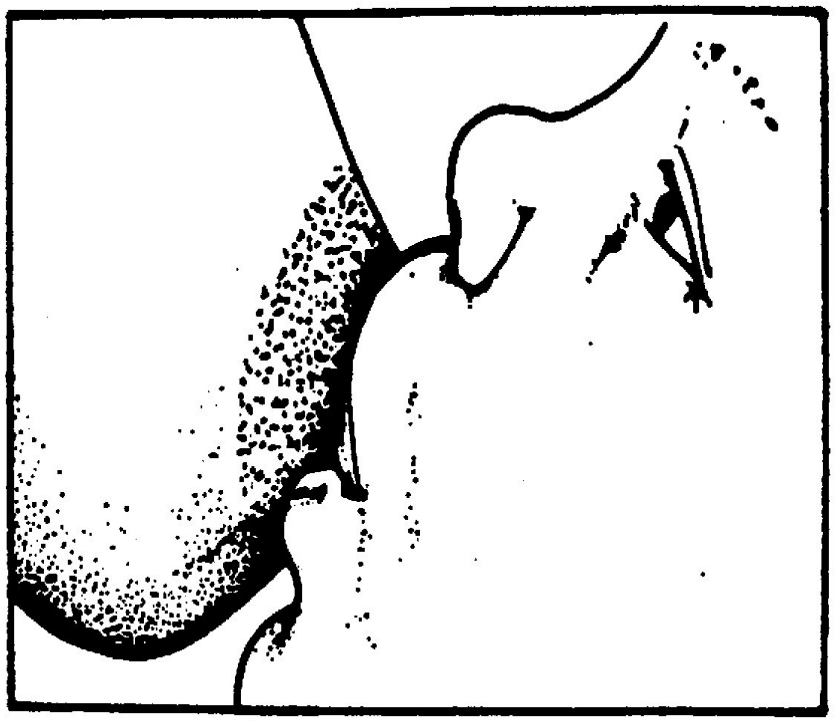
  - is the infant well positioned?

  looks for the sign of good positioning (not well positioned, good positioned)

  - is the infant able to attach? (No attach at all, not well attached, good attachment)

GOOD POSITIONING	GOOD ATTACHMENT
- Infant's head and body straight - Facing her breast - Infant's body close to her body -Supporting the infant's whole body - all of these signs should be present if the positioning is good	- Chin touching the breast - Mouth wide open - Lower lip turned outward -More areola visible above than below the mouth -all of these signs should be present if the attachment is good





- ***A baby well attached to his mother's breast***

A baby poorly attached to his mother's breast

Classification of feeding problem

SIGN	CASSIFY AS	TREATMENT
If any of the following - Not well positioned or - Not well attached to breast or - Not suckling effectively or - Less than 8 breast feeds in 24hrs or	FEEDING PROBLEM OR LOW WEIGHT	-Advise the mother to breast feed as often & for as long as the infant wants, day & night - if not well attached or not suckling effectively, teach correct positioning & attachment - If breast feeding less than 8 times in 24hrs, advise to increase frequency of feeding - empty one breast completely before switching to the other.

Classification of feeding problem Con…

-Switching the breast frequently or -Not increasing frequency of breast feeding during illness or	FEEDING PROBLEM OR LOW WEIGHT	-Increase the frequency of breast feeding during & after illness -If receiving other foods or drinks counsel mother about breast feeding more, reducing other foods or drinks & using a cup -If not breast feed at all, refer for breast feeding counseling.

Classification of feeding problem Con…

-Receive other foods or drinks or -The mother not breast feeding at all or -Low weight for age or -Thrush(ulcers or white patches in mouth)	FEEDING PROBLEM OR LOW WEIGHT	-Advice about correctly preparing breast milk substitutes & using a cup -If thrush, teach the mother to treat thrush at home -Advise the mother to give home care -Follow up any feeding problem or thrush in 2 days. -Follow up low weight for age in 14days.

Classification of feeding problem Con…

Not low weight for age & no other sign of in adequate feeding	NO FEEDING PROBLEM	-Advise mother to give home care -Praise the mother for feeding the infant well

HOW TO CHECK THE YOUNG INFANT'S IMMUNIZATION STATUS

- **The vaccine that should be given to Y/I are**

➢ **BCG and polio zero at birth**

➢ **OPV,** DPT, Hib, Hep B, PCV, **and** ROTA **1 at the age of 6 weeks**

❑ **Remember that you should not give OPV 0 to an infant who is more than 14 days old. Therefore, if an infant has <u>NOT</u> received OPV 0 by the time he is 15 days old, you should wait to give OPV1 until s/he is 6 weeks old.**

THE YOUNG INFANT CASE RECORDING FORM

Example 1: Top three sections of the young infant case recording form.

MANAGEMENT OF THE SICK YOUNG INFANT AGE birth UP TO 2 MONTHS

Child's Name: Jemal Age: 6 weeks Weight: 4.5 kg Temperature: 37 °C

ASK: What are the Infant's problems? Diarrhoea and rash Initial Visit? ✓ Follow-up Visit? ____

ASSESS (Circle all signs present) **CLASSIFY**

CHECK FOR POSSIBLE BACTERIAL INFECTION and Jaundice

- Has the Infant had convulsions?
- Count the breaths in one minute. 55 breaths per minute.
  Repeat if elevated Fast breathing?
- Look for severe chest indrawing.
- Look and listen for grunting
- Look at the umbilicus. Is it red or draining pus?
  Does the redness extend to the skin?
- Fever (temperature 37.5 °C or feels how) or
  low body temperature (below 35.5 °C or feels cool).
- Look for skin pustules.
- Movement only when stimulated or
  no movement even when stimulated
- Look for Jaundice:
  Are the palms and soles yellow?
  Are skins on the face or eyes yellow?

Local bacterial infection

DOES THE YOUNG INFANT HAVE DIARRHOEA? Yes ✓ No ___

- For how long? 3 Days
- Is there blood in the stool?
- Look at the young Infant's general condition. Is the Infant:
  - Movement only when stimulated or
    no movement even when stimulated
  - Restless or Irritable?
- Look for sunken eyes.
- Pinch the skin of the abdomen. Does it go back:
  Very slowly (longer then 2 seconds)?
  Slowly?

Some dehydration

Summary

- List the essential newborn care?
- Possible classification of jaundice?
- What are the two major questions that we need to ask the mother to assess Diarrhea in infant?
- Parameters used to diagnose dehydrations?
- What are the classification of HIV ?
- List the 4 positioning and 4 attachments?
- Feeding problem

Assess and Classify
The Sick child
Age 2 Months Up to 5 yrs

LEARNING OBJECTIVES

After the end of this session the students will be able to:

- Identify the presence or absence of general danger sign in older children
- List the four main symptoms
- Assess and classify cough and difficulty of breathing.
- Assessing and classifying diarrhea in children.
- Assessing and classifying fever in children.

2 Months – 5 years sick children

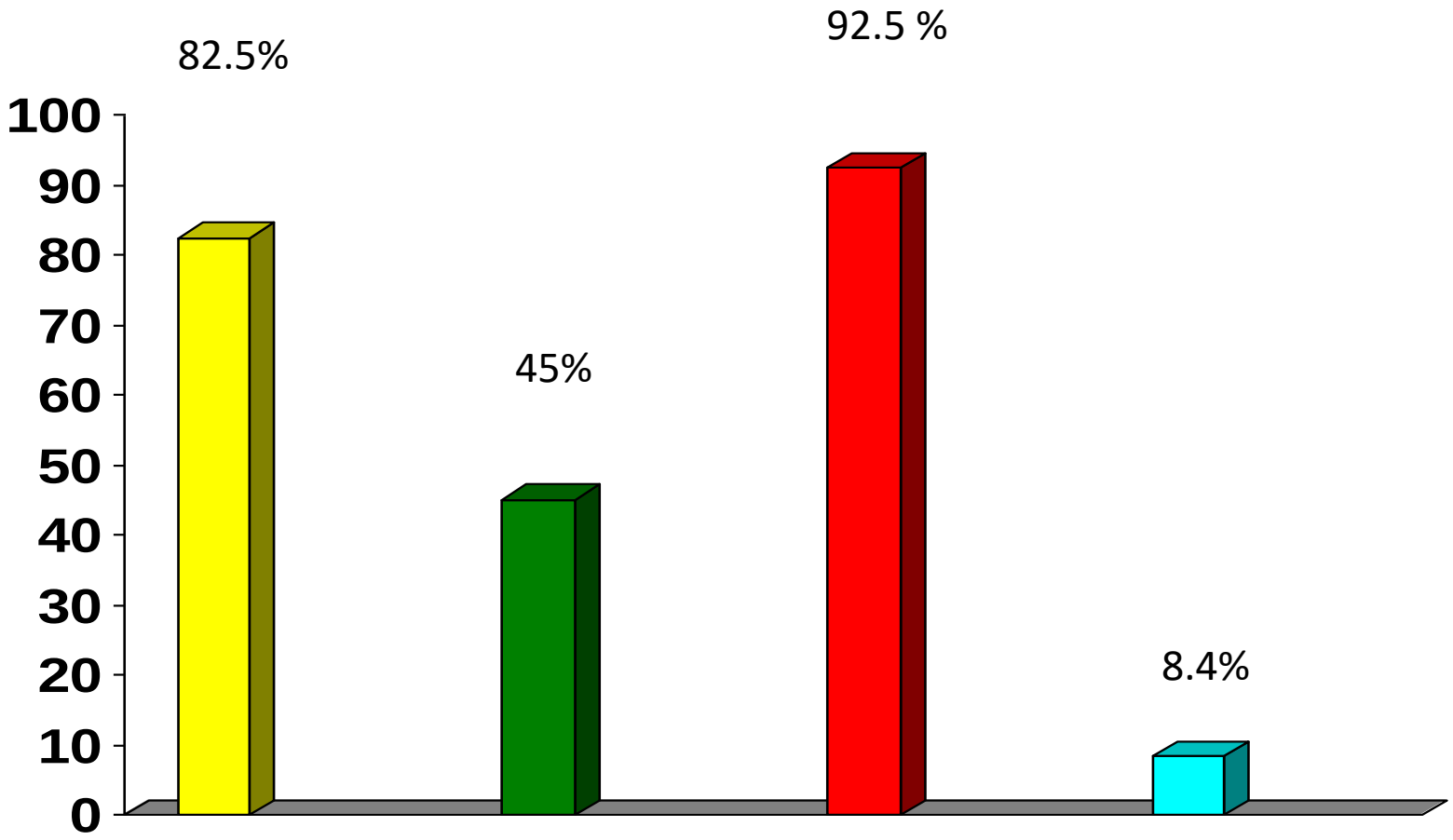
This age group of children are usually assessed by : -

- 1. Checking the presence or absence of general danger sign.

2 Months – 5 years sick children..

2. Ask the four main symptoms
   - ❑Cough or difficult breathing,
   - ❑Diarrhoea,
   - ❑Fever, and
   - ❑Ear problem.

Main symptoms of 450 sick children



- For

CHECK FOR GENERAL DANGER SIGNS

ASK:	LOOK:
• Is the child able to drink or breastfeed? • Does the child vomit everything? • Has the child had convulsions?	• See if the child is lethargic or unconscious. • See if the child is convulsing now.

A child with any general danger sign needs *URGENT* attention; complete the assessment and any pre-referral treatment immediately so referral is not delayed

Top part of the case recording form for 2mth -5 yrs

MANAGEMENT OF THE SICK CHILD AGE 2 MONTHS UP TO 5 YEARS

Child's Name: xxxx Age: x months Weight: x Temperature: x

ASK: What are the child's problems? cough, trouble breathing Initial Visit? ✓ Follow-up Visit?

ASSESS (Circle all signs present)	**CLASSIFY**
CHECK FOR GENERAL DANGER SIGNS NOT ABLE TO DRINK OR BREASTFEED LETHARGIC OR UNCONSCIOUS VOMITS EVERYTHING CONVULSIONS	General danger sign present? Yes ✓ No **Remember to use danger sign when selecting classifications**

Classify COUGH or DIFFICULT BREATHING

- **Ask about the main symptoms**
- **Does the child has cough or difficulty of breathing.**

IF YES, ASK:	*LOOK, LISTEN, FEEL:*		**Classify COUGH or DIFFICULT BREATHING**
• For how long?	• Count the breaths in one minute. • Look for chest indrawing • Look and listen for stridor	**CHILD MUST BE CALM**	

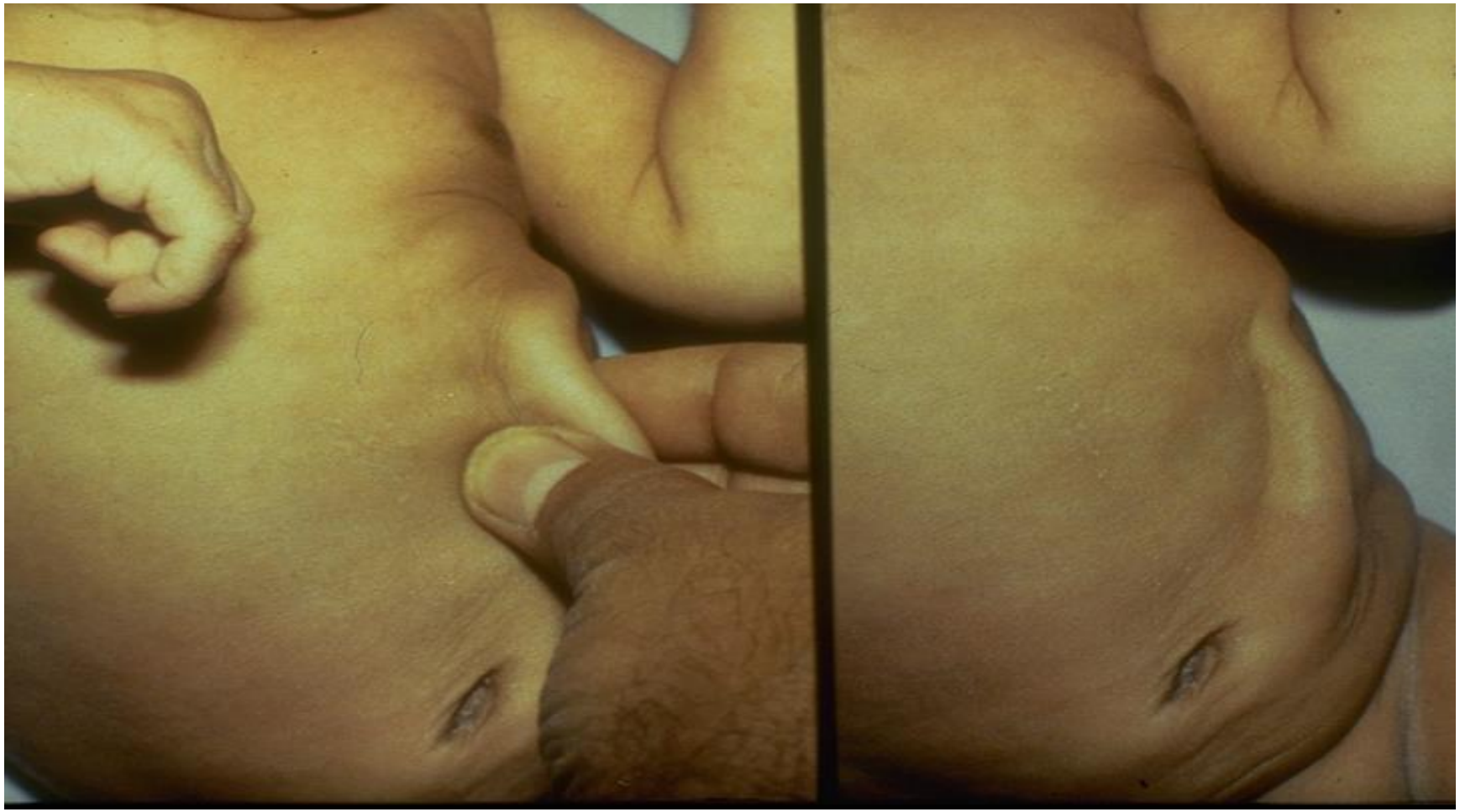
Assess	Classify	Treatment
Any general danger sign	Very sever disease	• Give diazepam if convulsing now ► Quickly complete the assessment ► Give appropriate pre-referral treatment immediately ► Treat to prevent low blood sugar ► Keep the child warm, Refer URGENTLY.
Any general danger sign or stridor in calm child	Sever pneumonia /very sever disease	Give 1st dose of ampicillin $ gentamycin Refer urgently to hospital
Fast breathing or chest in drawing	Pneumonia	Give oral amoxicillin for 5 days If wheezing (or disappeared after rapidly acting bronchodilator) give an inhaled bronchodilator for 5 days*** ► Soothe the throat and relieve the cough @ a safe remedy ► If Chest in drawing in HIV exposed child, give first dose of amoxicillin and refer ► If coughing for > 14 days or there is contact with TB patient do assessment for TB****. Advise mother when to return immediately, Follow-up in 2 days
No sign of very severe disease or pneumonia	Cough or cold no pneumonia	If wheezing(or disappeared after rapid acting bronchodilators) give inhalator bronchodilators for 5 days. Soothe the throat with safe remedies If the cough is > 14 day or if there is any contact Hx assess for TB Advise the mother when to return, Follow-up in 5 days

After checking the general danger sign and asking the presence or absence of cough then we need to ask does the child have diarrhea?

Does the child have diarrhea?

IF YES, ASK	LOOK AND FEEL
For how long?	-Look at the child general condition. is the child:
Is there blood in the stool ?	-Lethargic or Unconscious? -Restlessness or irritable -Look for sunken eye - offer the child fluid. is the child: -not able to drinking or drinking poorly ? -Drinking – eagerly, thirsty? - pinch the skin of abdomen, does it go back very slowly (longer than 2 second, or slowly).

Skin pinch technique



HOW TO CLASSIFY DIARRHOEA

- **DHN** all children with diarrhoea are classified for dehydration
- **PERSISTANT** if the child has had diarrhoea for 14 days or more, classify the child for persistent diarrhoea
- **DYSENTERY** if the child has blood in the stool, classify the child for dysentery.

Classify Dehydration (DHN)

They are “3” possible classification DHN

1. **Severe DHN**
2. **Some DHN**
3. **No DHN**

Classification of DHN

Assess	Classify	-Identify Rx
Two of the following signs -Lethargic or unconscious -Sunken eye -Not able to drink or drinking poorly -Skin pinch goes back very slowly	Sever DHN	-If the child has no other sever classification -Given fluid for sever DHN (*plan-C ???)* or -If the child also has another sever classification: -Refer urgently to hospital with mother giving frequent sips of ORS on the way. -Advise mother to continue breast feeding.

Classification of DHN Cont…

Two of the following signs - **Restless, irritable** - **Sunken eye** - **Drinks eagerly, thirsty** - **Skin pinch goes back slowly**	**Some DHN**	**-Give fluid, Zinc supplement & food for some DHN (*plan- B*)** **- If the child has sever classification:** **. Refer urgently to hospital with mother giving frequent sips of ORS on the way** **- Advise the mother to continue B/F** **- Advise the mother when to return immediately.** **- Follow up for "5" day if not improving**

Classification of DHN Cont…

- No enough sign to classify some or severe DHN	NO DHN	-Give Fluid ,Zinc supplement & food to treat diarrhea (plan – A) -Advise the mother when to return immediately -Follow up in 5 days if not improving - If confirmed/ suspected symptomatic HIV, follow up in 2 days if not improving

Classify Persistent Diarrhea

- **If the diarrhea lasts 14 days or more classify for persistent diarrhea.**

Two classifications

1. Severe persistent diarrhea if some or sever DHN present

2. Persistent diarrhea if no some or sever DHN present.

Classify Persistent Diarrhea con't…

DHN present	Sever - persistent diarrhea	➢Treat DHN before referral if the child has no sever disease classification ➢Refer to hospital ➢Vit – A supplementation
No DHN	Persistent diarrhea	✓Advise the mother on feeding a child ✓Follow up for in 05 day ✓Give vit – A

Classify dysentery

III. Dysentery: Diarrhea with blood in the stool, with or with out mucous.

- **If the child has blood in the stool classify for dysentery**

Blood in the stool	**Dysentery**	**-Treat for 05 days with oral antibiotic (*ciprofloxacin*)** **- Follow up for 2 days**

Assess and classify FEVER

- **DOES THE CHILD HAVE FEVER?** (by history or feels hot or temperature 37.5 **^{0}C** or above)

IF YES:

- **Decide Malaria** Risk: high or low or no
- if “Low or no” malaria risk, then ask:
  - Has the child travelled outside this area during the previous 2 weeks?
  - If yes, has he been to a malarious area?

Then ask

- For how long?
- If more than 7 days, has fever been present every day?
- Has the child had measles within the last 3 months?

Look and feel

- Look or feel for stiff neck
- Look or feel for bulging fontanels (< 1year old)
- Look for runny nose
- Look for signs of MEASLES

Generalized rash and one of these: cough, runny nose,

~~Look for mouth ulcers~~
Are they deep and extensive?
Look for pus draining from the eye.
Look for clouding of the cornea.

If the child has measles now or within the last 3 months

Classification of FEVER for *high malaria risk*.

SIGN	CLASSIFY AS	IDENTIFY TREATMENT
• Any general danger sign or • Stiff neck or Bulging fontanel	VERY SEVERE FEBRILE DISEASE	➢ Give quinine for severe malaria (first dose). ➢ Give first dose of an appropriate antibiotic. ➢ Treat the child to prevent low blood sugar. ➢ Give one dose of paracetamol in clinic/HC for high fever (38.5° C or above). ➢ Refer URGENTLY to hospital.
• Positive blood film/positive RDT (if blood film/RDT available), or • Fever (by history or feels hot or temperature 37.5° C** or above)	MALARIA	➢ Treat with oral antimalarial. ➢ Give one dose of paracetamol in clinic for high fever (38.5° C or above). ➢ Advise mother when to return immediately. ➢ Follow-up in 2 days if fever persists. ➢ If fever is present every day for more than 7 days, REFER for assessment.

Classification of FEVER in Low Malaria Risk

SIGN	CLASSIFY AS	IDENTIFY TREATEMENT
• Any general danger sign • Stiff neck	VERY SEVERE FEBRILE DISEASE	➢ *Give quinine for severe malaria (fist dose).* ➢ *Give first dose of an appropriate antibiotic.* ➢ *Rx to prevent low blood sugar.* ➢ *Give one dose of paracetamol in clinic for high fever (38.5° C or above).* ➢ *Refer URGENTLY to hospital.*
• Positive blood film/positive RDT (if blood film/RDT available), or -NO runny nose and -NO measles and -NO other cause of fever	MALARIA	➢ *Treat with oral antimalarial.* ➢ *Give one dose of paracetamol in clinic for high fever (38.5° C or above).* ➢ Advise mother when to return immediately. ➢ Follow-up in 2 days if fever persists. ➢ If fever is present every day for more than 7 days, REFER for assessment.

Classification of FEVER in Low Malaria Risk…

SIGN	CLASSIFY AS	IDENTIFY TREATEMENT
• Runny nose PRESENT OR • Measles PRESENT OR • Other cause of fever PRESENT.	FEVER - MALARIA UNLIKELY	➢ Give one dose of paracetamol in clinic for high fever *(38.5° C or above).* ➢ Treat other obvious cause of fever ➢ Advise mother when to return immediately. ➢ Follow-up in 2 days if fever persists. ➢ If fever is present every day for more than 7 days, REFER for assessment.

Classification for *NO malaria risk* and *NO travel to a malaria risk area*.

- Any general danger sign or -Stiff neck	**VERY SEVERE FEBRILE DISEASE**	➢ *Give first dose of an appropriate antibiotic.* ➢ *Treat the child to prevent low blood sugar.* ➢ *Give one dose of paracetamol in clinic for high fever (38.5° C or above).* ➢ *Refer URGENTLY to hospital.*
-NO general danger sign AND -NO stiff neck.	**FEVER - (NO MALARIA)**	**-Give one dose of paracetamol in clinic for high fever *(38.5° C or above).*** ➢ **Treat other obvious causes of fever** ➢ **Advise mother when to return immediately.** ➢ **Follow-up in 2 days if fever persists.** ➢ **If fever is present every day for more than 7 days,** ➢ **REFER for assessment.**

Classification table for measles

(if measles now or within the last 3 months).

• Any general danger sign or • Clouding of cornea or • Deep or extensive mouth ulcers.	SEVERE COMPLICATED MEASLES	➢ *Give vitamin A therapeutic dose.* ➢ *Give first dose of an appropriate antibiotic.* ➢ *If clouding of the cornea or pus draining from the eye, apply tetracycline eye ointment.* ➢ *Refer URGENTLY to hospital.*
• Pus draining from the eye or • Mouth ulcers	MEASLES WITH EYE OR MOUTH COMPLICATIONS	➢ *Give vitamin A, therapeutic dose..* ➢ *If pus draining from the eye, treat eye infection with tetracycline eye ointment.* ➢ If mouth ulcers, treat with gentian violet. ➢ Follow-up in 2 days.
• Measles now or within the last 3 months	MEASLES	➢ Give vitamin A, therapeutic dose. ➢ Advise when to return immediately

Assess and classify EAR PROBLEM

- Ask if the child has ear problem

IF YES, ASK:	*LOOK AND FEEL:*
▪ **Is there ear pain?**	**-Look for pus draining from the ear**
▪ **Is there ear discharge?**	**-Feel for tender swelling behind the ear**
If yes, for how long?	

Then CHECK **for malnutrition and anaemia, HIV infection, immunization status and for other problems.**

Sign	Classify as	Treatment
Tender swelling behind the ear	Mastoiditis	► Give first dose of Ampicillin and Choramphenicol IV/IM ► Give first dose of Paracetamol for pain ► Refer URGENTLY to hospital
Ear pain, or Pus is seen draining from the ear and discharge is reported for less than 14 days	Acute ear infections	► Give Amoxicillin for 5 days ► Give Paracetamol for pain ► Dry the ear by wicking ► Follow-up in 5 days
Pus is seen draining from the ear and discharge is reported for 14 days or more	Chronic ear infections	► Dry the ear by wicking ► Treat with topical Quinolone eardrops for 2 weeks ► Follow-up in 5 days
No ear pain and No pus seen draining from the ear	No ear infections	No additional treatment

Sign	Classify as	Treatment
Sever palmar pallor	Sever anemia	Refer urgently to hospital
Some palmar pallor	Anemia	• Assess the child's feeding and counsel the mother on feeding according to the FOOD box on the COUNSEL THE MOTHER chart ► Give Iron** ► Do blood film or RDT for malaria, if malaria risk is high or has travel history to malarious area in last 30 days. ► Give Mebendazole or Albendazole, if the child is ≥ 2 years old and has not had a dose in the previous six months ► Advise mother when to return immediately ► Follow-up in 14 days
No palmar pallor	No anemia	Counsel the mother on feeding

Check the child for anemia

- Look for palmar pallor
- Is it severe, some or no palmar pallor

- If the child have malnutrition and taking RUTF the don’t give iron because there is enough in RUTF.

Check for acute malnutrition <6months

- Check for the presence of edema
- Check the weight for length Z score
- Check the presence of medical complications
  - Any General Danger Sign
  - Any severe classification
  - Pneumonia
  - Dehydration*
  - Persistent diarrhoea
  - Dysentery Fever ≥ 38.5ºC
  - Measles [now or with eye/mouth complications]
  - Low body temperature (<35ºC axillary)
  - Dermatosis+++

Sign	Classify as	Treatment
WFL <-3Z score, and presence of complications OR Oedema of both feet	Complicated severe acute malnutrition	► Give first dose of Ampicillin and Gentamaycin IM ► Treat the child to prevent Low Blood Sugar ► Advise mother on the need of referral ► Refer Urgently to Hospital
WFL < -3Z score AND no complications AND No oedema of both feet	Uncomplicated Severe acute malnutrition	► Counsel on breast feeding and care ► Undertake appropriate counseling and feeding advise in cases where a child is orphaned with no other option for breastfeeding ► Assess for TB infection
WFL ≥ -3Z to < -2Z score, AND No oedema of both feet	Moderate acute malnutrition	Assess feeding and advise the mother on feeding ► Assess for TB infection ► Follow up in 5 days if feeding problem ► Follow up in 30 days
WFL ≥ -2Z score AND No oedema of both feet	No acute malnutrition	► Assess feeding and advise the mother on feeding ► Follow up in 5 days if feeding problem ► If no feeding problem-praise the mother

Acute malnutrition in children 6mo-5yrs

Check for presence of oedema of both feet (orsacrum) ?

Does the child have oedema**? (+, ++, +++)

Check the weight and height

Check MUAC

Check for signs of medical complications:

- Any General Danger Sign, Any severe classification, Pneumonia, Dehydration*, Persistent diarrhea, Dysentery, Fever ≥ 38.5ºC, Measles [now or with eye/mouth complications], Low body temperature (<35ºC axillary), Dermatosis+++

- We should do Appetite test (Passed, Failed)
- Appetite test should be done ONLY when there is:
  - ❖ NO medical complication, and
  - ❖ NO +++ oedema, and
  - ❖ NO +++ dermatosis***, and
  - ❖ NO marasmic kwashiorkor ****

Sign	Classify as	Treatment
WFL/H < -3Z score or MUAC <11 cm or Oedema of both feet (+, ++), and any of the following: Any one of the medical complications , or Failed Appetite test +++ Oedema OR Marasmic Kwashiorkor (WFL/H < -3Z with oedema or MUAC <11 cm with oedema)	Complicated Sever acute malnutrition	Give 1st dose of Ampicillin and Gentamycin IM ► Treat the child to prevent low blood sugar ► Advise the mother to feed and keep the child warm ► Advise mother on the need of referral ► Refer Urgently to Hospital or admit to inpatient care
WFL/H < -3Z score or MUAC <11 cm or oedema of both feet (+, ++) AND No medical complication and Pass appetite test	Uncomplicated severe acute malnutrition	► Give RUTF for 7 days, ► Give oral Amoxicillin for 7 days ►single dose of 5 mg folic acid for anemia ► Counsel on how to feed RUTF to the child ►Follow-up in 7 days
WFL/H ≥ -3Z to < -2Z score or MUAC 11 cm to <12 cm AND No oedema	Moderate acute malnutrition	► Asses for feeding and counsel the mother accordingly ► If feeding problem, follow up in 5 day
WFL/H ≥ -2Z score or MUAC ≥ 12 cm AND No oedema of both feet	NO ACUTE MALNUTRITION	► Assess feeding & advise the mother on feeding ► Follow up in 5 days if feeding problem ► If no feeding problem-praise the mother

Check for HIV infection for <18months

- ASK:

What is the HIV status of the mother?

- Positive • Negative • Unknown

What is the HIV antibody test result of the sick child?

- Positive • Negative • Unknown

What is the DNA/PCR test result of the sick child? *

- Positive • Negative • Unknown

- Is child on breastfeeding?
  - Yes • No •

If no, was child breastfed in the last 6 weeks?

- Yes • No

Sign	Classify as	Treatment
DNA PCR positive	HIV infected	HIV INFECTED ► Give Cotrimoxazole prophylaxis ► Assess feeding and counsel ► Advise on home care ► Refer to ART clinic for ART initiation/care & treatment
Mother positive, and child Antibody or DNA/PCR negative, and breastfeeding OR Mother positive, and child antibody & DNA/PCR unknown OR Child antibody positive	HIV EXPOSED	► Give Co-trimoxazole prophylaxis ► Assess feeding and counsel ► If child DNA/PCR is unknown, test as soon ► Ensure mother is tested & enrolled in mother-baby cohort follow up at ANC/PMTCT clinic
Mother and child not tested	HIV status unknown	Counsel the mother for HIV testing for herself & the child ► Assess feeding and counsel
Mother negative, OR Mother positive, and child DNA PCR negative, and not breastfeeding, OR Mother HIV status unknown, and child antibody negative	HIV INFECTION UNLIKELY	► Advise on home care ► Assess feeding and counsel ► Advise on HIV prevention ► Encourage mother to be tested ► If mother HIV status is unknown, advise her on HIV testing

Assess and classify TB

- ASK:
  - ❖Cough of >14 days
  - ❖Fever and night sweats*
  - ❖Contact history with TB patient **
  - ❖Swelling or discharging wound***
  - ❖Signs of acute malnutrition ****
- DO THE FOLLOWING IF AVAILABLE:
  - ❖AFB or Gene Xpert if there is sputum production Chest X-ray*****

Sign	Classify as	Treatment
Contact with a known MDR TB patient	Suspected MDR TB	► Advise mother on the need of referral ► Refer Urgently for MDR TB investigation
Contact with TB patient And two or more of the signs / One or more of the signs if known HIV+ And/ Or A sign AND AFB/ GeneXpert +ve Or A sign AND Chest X ray suggestive of TB (eg. Military pattern	TB	► Council the mother on DOTS principle ► Advise mother to bring any other contacts ► Do provider initiated HIV testing and Counseling ► Link to TB clinic for initiation of treatment and follow up
Contact to TB patient (non—MDR) and no other finding	TB exposed child	Council the mother on the diagnosis of TB exposure and the need for INH prophylaxis Link to TB clinic for INH prophylactic-treatment initiation and follow up
No conclusive sign and No Contact with TB patient AFB/GeneXpert –ve And Chest X– ray not suggestive	No TB infections	Look and treat for other causes for the main compliant ► Council the mother on the need for INH prophylaxis in the presence of HIV infection for HIV +ve children ► Link to TB clinic for INH prophylactic-treatment initiation and follow up for HIV +ve children ► Follow up in 30 days

CHECK THE CHILD'S IMMUNIZATION AND VITAMIN A STATUS

	AGE	VACCINE	
IMMUNIZATION SCHEDULE:	Birth	BCG	OPV - 0
	6 weeks	DPT1-HepB1-Hib1, PCV-1	OPV - 1 Rota -1
	10 weeks	DPT2-HepB2-Hib2, PCV-2	OPV - 2 Rota -2
	14 weeks	DPT3-HepB3-Hib3, PCV-3	OPV - 3
	9 months	Measles	Vitamin A (if not given with in last 6 months)

VITAMIN A SUPPLEMENTATION

If 6 months or older

- Check if child has received a dose of Vitamin A during the previous 6 months. If not, give Vitamin A supplementation every 6 months up to the age of 5 years.
- Record the dose on the child's card.

ROUTINE WORM TREATMENT

If 2 years or older

- Check if child has received Mebendazole or Albendazole during the previous 6 months. If not, give child Mebendazole or Albendazole every 6 months.
- Record the dose on the child's card.


THANK
YOU

?

Chapter –six

Systemic disorders

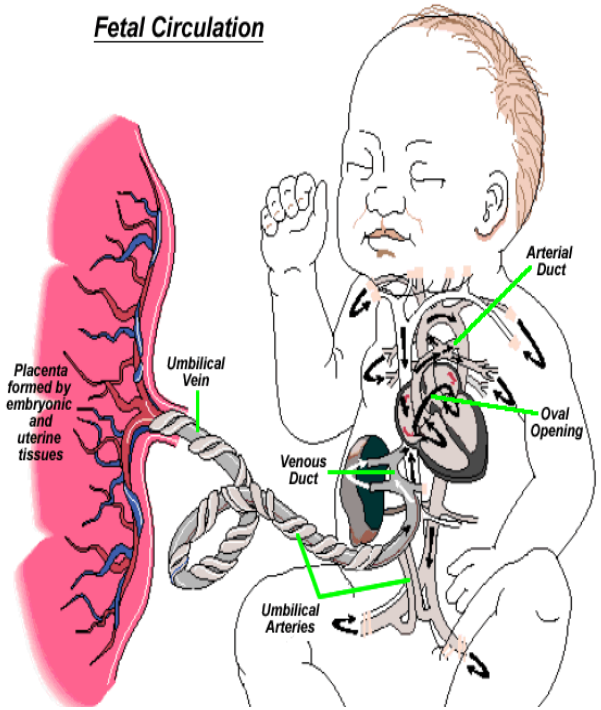
CARDIO VASCULAR DISEASE (CVS)

LEARNING OBJECTIVES: At the end of this topic the students will be able to:

- **Explain the physiological change of CVS in newborn**
- **Describe congenital heart disease**
- **Discuss common CHD**
- **Explain the common acquired heart diseases**
- **Discuss the mechanism, c/m and management of heart failure**

PHYSIOLOGY OVERVIEW

- Right-to-left shunting at atrial level (PFO) and at arterial level (ductus arteriosus)
- High pulmonary vascular resistance
- Little pulmonary blood flow
- Ventricles work in parallel



A. CONGENITAL HEART DISEASE (CHD)

- Globally, CHD affects over one million live births annually and is the leading cause of infant mortality attributable to birth defects.
- Critical congenital heart disease (CCHD) refers to lesions of the cardiovascular system, present at birth, which if left undiagnosed it will result in infant morbidity and mortality.
- Gross structural abnormality of the heart or great vessels that is actually or potentially of functional significance

CAUSE

- **Mostly unknown**
- **Multifactorial: Genetic-environmental interaction**

– Genetic/chromosomal

– Environmental: CMV, maternal hypoxia, hyperthermia, DM (10 ´ risk), drugs: like, phenytoin and other anticonvulsants, alcohol, thalidomide

ANATOMIC CLASSIFICATION

RIGHT TO LEFT SHUNT

- TOF
- TGA(transpositions of great artery
- Tricuspid Atresia

LEFT TO RIGHT SHUNT

- ASD
- VSD
- PDA

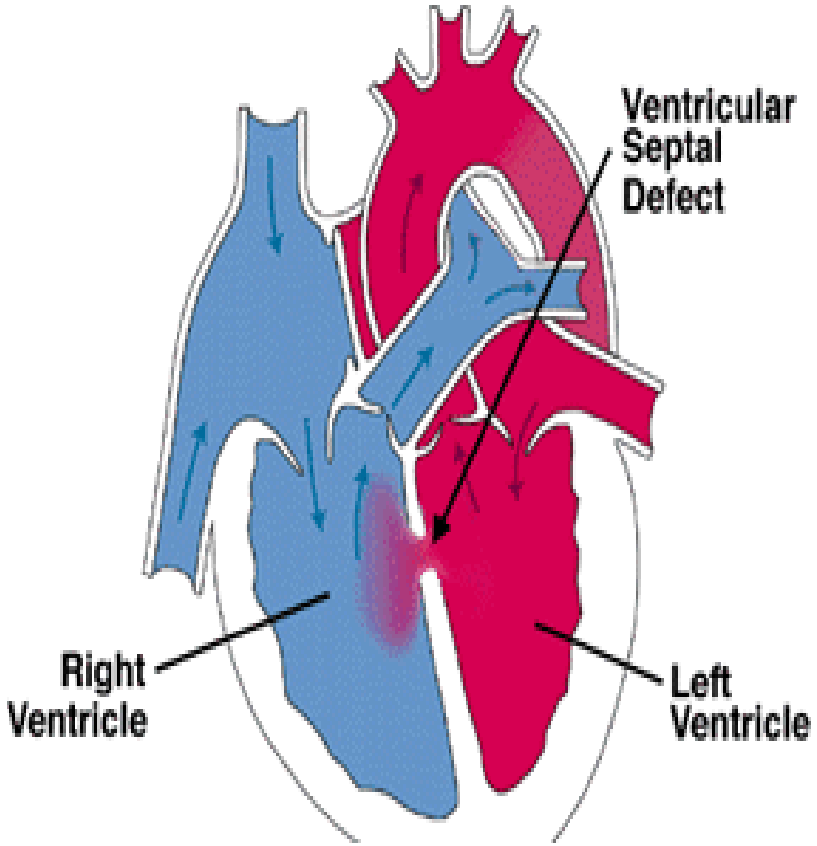
STENOTIC

- AVS
- PVS
- Aortic coarctation

MIXING

- Total Anomalous Pulmonary Venous Return
- Hypoplastic left heart syndrome

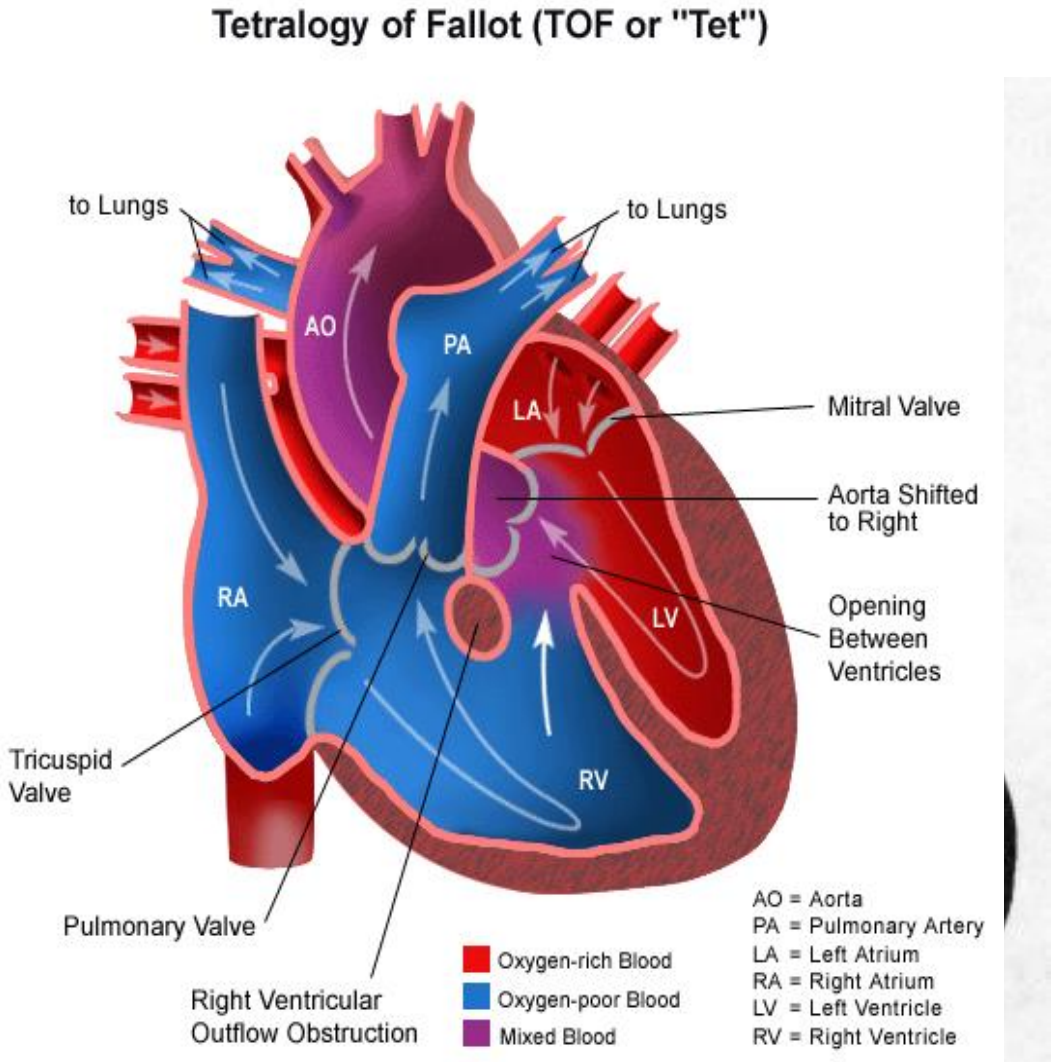
VSD



- Most common congenital lesion
- Large VSD's may be silent and become symptomatic in first few weeks as pulmonary resistance

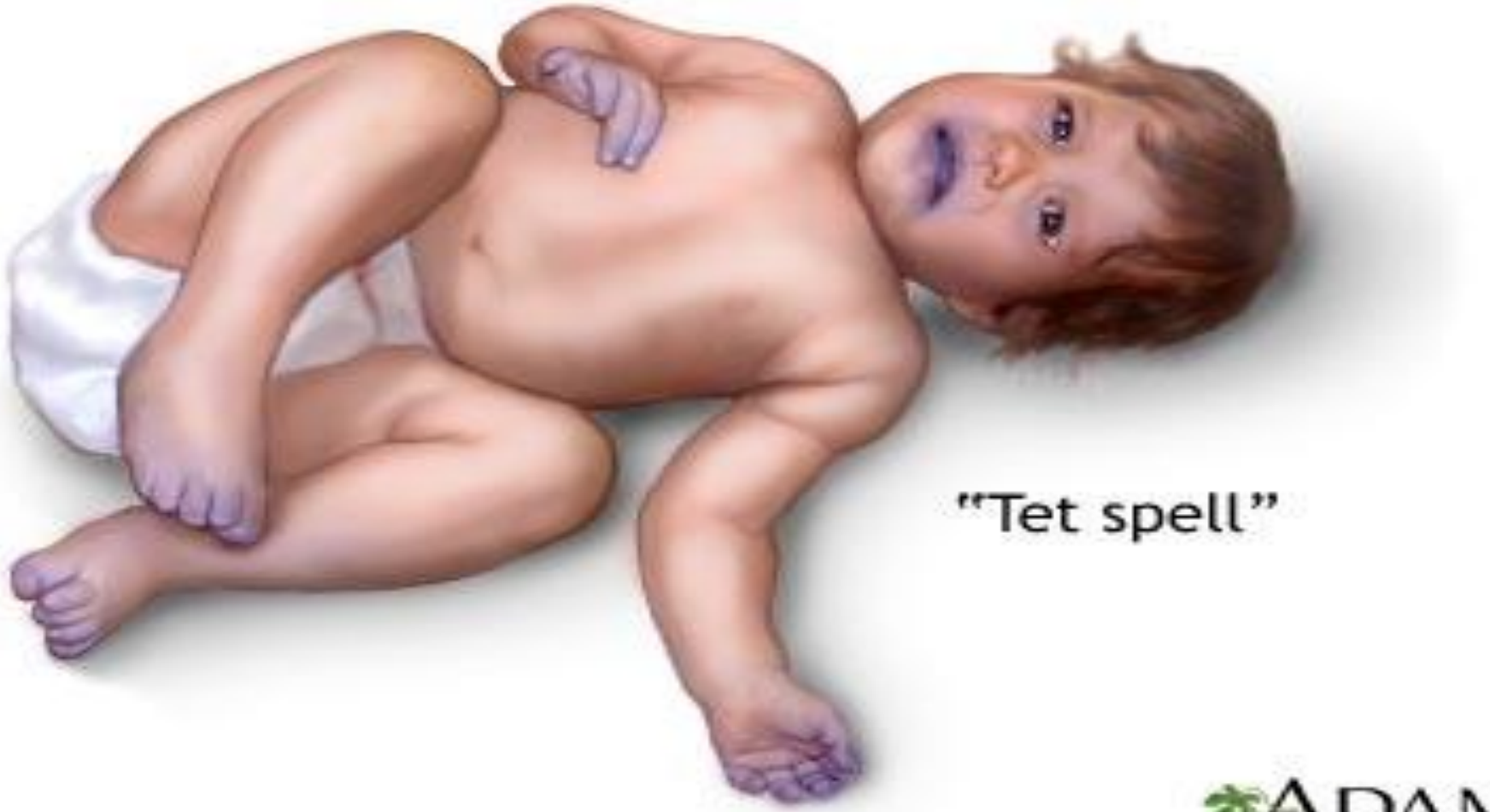
↓

- SOB and diaphoresis w feeds
- Poor weight gain
- Systolic murmur
- CXR demonstrates CHF



- RVH
- VSD
- overriding aorta
- CXR reveals boot shaped heart with decreased pulmonary blood flow

Children with Tetralogy of Fallot exhibit bluish skin during episodes of crying or feeding.



TOF

Hypoxemic spells, also called cyanotic or Tet spells, are one of the hallmarks of severe ToF and are characterized by:

- Sudden onset of cyanosis or deepening of cyanosis
- Sudden dyspnea
- Alterations in consciousness, in a spectrum from irritability to syncope
- Decrease or disappearance of the systolic murmur.
- These episodes most commonly start at age 4–6 months

Evaluation for suspected congenital heart disease

- At birth, Nada's criteria are used to evaluate a newborn and the presence of one Major or two Minor Criteria indicates Presence of Congenital Heart Disease.

Nada's Major Criteria

- Systolic murmur with thrill
- Any diastolic murmur
- Cyanosis (central)
- Congestive cardiac failure

Evaluation cont’d

Nada’s Minor Criteria

- Systolic murmur without thrill
- Abnormal P2 (accentuated P2)
- Abnormal BP (hypo / hypertension)
- Abnormal CXR
- Abnormal ECG
- If the Nada’s criteria are positive then, send the baby where he can be definitely diagnose with echocardiography and evaluated further.
- All babies suspected to have CHD should be managed with cautions in IV fluid administration to avoid congestion.

Clinical evaluation

- History
  - feeding difficulties
  - tachypnea
  - diaphoresis
  - syncope
  - cyanotic episodes
  - failure to thrive
- Physical Examination
  - color: pink, blue, gray
  - vitals: tachypnea, tachycardia, BP
  - symptoms suggestive of infection
  - palpation and auscultation of precordium
  - chest auscultation
  - survey for organomegaly
  - pulses in all extremities

Major components of Evaluation

1. Presence or absence of cyanosis, which can be determined by **physical examination** aided by pulse oximetery.

- Heart sounds - the presence and character of any murmurs.

2. Chest radiograph- Less informative but helps to see the heart size

and shows evidence of increased, normal, or decreased pulmonary vascular markings

3. Electrocardiogram – To look for the rate, rhythm and chamber hypertrophy and axis. can be used to determine whether right, left, or biventricular hypertrophy exists.

4. **Echocardiography**

– It's a definitive diagnostic method to evaluate the heart

Time of onset of congestive heart failure

Age	Lesions
Birth - 72 hrs	Pulmonary, Mitral, and Aortic atresia or critical stenosis
4 days - 01 week	Hypoplastic Lt and Rt heart, Transposition of great arteries
1wk - 4wks	VSD and PDA in premature infant and the lesions mentioned above
4 – 6 wks	Endocardic cushion defect (ECD)
6wk – 6 mo	Large VSD, large PDA

MANAGEMENT

- Strict cardio respiratory support and monitoring
- Supportive oxygen therapy
- Restrict fluid intake to one half to two third of daily maintenance.
- Treat or correct precipitating factors
- Treat metabolic derangements (hypoglycemia, hypothermia)
- After stabilization of the patient refer to a higher center for proper diagnosis and management.

B. ACQUIRED HEART DISEASE

I. RHEUMATIC HEART DISEASE (RHD)

Rheumatic fever (ARF) :- is an inflammatory disease affecting the heart , joint & subcutaneous tissue.

- ARF remains an important preventable cause of cardiac disease
- **Usually follow 2-6 wks after hemolytic streptococcal respiratory infection.**
- A family history of rheumatic fever and lower socioeconomic status are additional factors.

Jones Criteria for Diagnosis of Rheumatic Fever.

Major manifestation

- **Carditis**
- **Polyarthritis**
- **Chorea**
- **Subcutaneous nodules**
- Erythema marginatum

-N.B Two major or one major and two minor manifestations (plus supporting evidence of streptococcal infection) are needed

Minor manifestation

- Fever

- Arthralgia

- ↑ ESR

- ↑ WBC

- Anemia

- ECG abnormal

-*Clinical* Previous rheumatic fever or rheumatic heart disease

MANAGEMENT

- All patients with acute rheumatic fever should be placed on **bed rest and monitored closely for evidence of carditis**.
- They can be allowed to ambulate as soon as the signs of acute inflammation have subsided..

❖ ANTIBIOTIC THERAPY

- The patient should receive 10 days of orally administered penicillin or erythromycin, or a single intramuscular injection of benzathine penicillin to eradicate GAS from the upper respiratory tract.
- After this initial course of antibiotic therapy, the patient should be started on long-term antibiotic prophylaxis.

Mgt cont…

❖ Anti-Inflammatory Therapy.

- ❑ Aspirin is 100 mg/kg/day in 4 divided doses PO for 3–5 days, followed by 75 mg/kg/day in 4 divided doses PO for 4 wk.
- ❑ Prednisone is 2 mg/kg/day in 4 divided doses for 2–3 wk followed by a tapering of the dose that reduces the dose by 5 mg/24 hr every 2–3 days
- ❑ In the case of Sydenham Chorea Sedatives may be helpful early in the course of chorea;

- phenobarbital (16–32 mg every 6–8 hr PO) is the drug of choice.
- If phenobarbital is ineffective, then haloperidol (0.01–0.03 mg/kg/24 hr divided bid PO) or chlorpromazine (0.5 mg/kg every 4–6 hr PO) should be initiated

RHEUMATIC HEART DISEASE (RHD)

- **RHD is damage of the heart, particularly the valves by one or more attacks of RF.**
- **Pattern of valvular disease**
- Mitral stenosis
- Aortic insufficiency
- Tricuspid valve disease
- Pulmonary valve disease

HEART FAILURE

- HF is defined as the heart fail to pump sufficient amount of blood to supply blood to either systemic or pulmonary circulation at an appropriate rate of flow, or to receive venous return at an appropriate filling pressure

PATHOPHYSIOLOGY

Four Basic Mechanisms

1. Increased Blood Volume (Excessive Preload)

Etiology

- Mitral Regurgitation
- Aortic Regurgitation
- Volume Overload
- Left to Right Shunts
- Chronic Kidney Disease

Pathophysiology cont’d

2. Increased Resistant to Blood Flow (Excessive Afterload)

Etiology

- Aortic Stenosis
- Aortic Coarctation
- Hypertension

Pathophysiology cont’d

3. Decreased contractility

Etiology

- ❖Ischemic Cardiomyopathy like, Myocardial Infarction, Myocardial Ischemia
- ❖ Myocarditis
- ❖Toxins eg. Anthracycline, Alcohol, Cocaine

Pathophysiology cont’d

4. **Decreased Filling**

Etiology

- Mitral Stenosis
- Constriction
- Hypertrophic
- Cardiomyopathy

Clinical Features

- Fast breathing or interruption of feeding wit diaphoresis
- Tachycardia (heart rate >160/minute in a child under 12 months old; >120/minute in a child aged 12 months to 5 years).
- laboured respirations with intercostal and subcostal retractions
- Nasal flaring
- Feeding difficulties
- Failure to thrive
- weak cry

- Effort intolerance
- oedema of the feet, hands or face, or raised JVP
- Basal crackles on chest exam
- Gallop rhythm on auscultation with or without murmurs.
- Enlarged, tender liver
- If the diagnosis is in doubt, a chest X-ray can be taken and will show an enlarged heart

ROSS HEART FAILURE CLASSIFICATION FOR CHILDREN for dx purpose.

Class I

- Asymptomatic

Class II

- Mild tachypnea or diaphoresis with feeding in infants
- Dyspnea on exertion in older children

Class III

- Marked tachypnea or diaphoresis with feeding in infants
- Marked dyspnea on exertion
- Prolonged feeding times with growth failure

Class IV

- Symptoms such as tachypnea, retractions, grunting, or diaphoresis at rest

Diagnosis Modalities

- History taking
- Physical examination

✓ Vital sign

✓ Growth appearance

✓ General appearance

✓ cardio vascular exam

✓ pericardial exam

Cont…

- Laboratory investigations

✓ chest x-ray

✓ electrocardiogram

✓ urine test

✓ blood test

✓ echocardiogram

MANAGEMENT

- The underlying cause must be removed or alleviated if possible.
- Medical treatment is indicated to prepare the patient for surgery and in the immediate postoperative period.
- If the lesion is not reversible, heart failure management usually allows the child to return to normal activities

General measure

- **Strict bed rest** is rarely necessary except in extreme cases, but it is important that the child be allowed to rest during the day as needed and sleep adequately at night.
- **DIET**

- **Infants with heart failure may fail to thrive because of increased metabolic requirements and decreased caloric intake.**
- **Increasing daily calories is an important aspect of their management.**
- **In some circumstances, nasogastric feedings may be helpful .**
- **In many children with cardiac enlargement, gastroesophageal reflux is a major problem.**

Pharmacological Mgt

DIURETICS

- Most often used in conjunction with digitalis therapy in patients with severe congestive heart failure.
- Give furosemide (frusemide): a dose of 1 mg/kg should cause increased urine flow within 2 hours.
- If the initial dose is not effective, give 2 mg/kg and repeat in 12 hours, if necessary. Thereafter, a single daily dose of 1–2 mg/kg orally is usually sufficient.
- Supplemental potassium: when digoxin and furosemide are given, or if frusemide is given for more than 5 days, give oral potassium (3–5mmol/kg/day).

Pharmacological Mgt

❑ Digitalis

- **Digoxin is the digitalis glycoside used most often in pediatric patients.**

-↑ the force of myocardial

Contraction ⇒ ↑Co

- Diuretic effect (↓ edema)

- **Afterload-Reducing Agents and ACE Inhibitors**

(e.g catoproil)

- **β-Blockers (e.g Metoprolol)**

Management cont'd

- **Oxygen:** Give oxygen if the child has a respiratory rate of ≥ 70/min, shows signs of respiratory distress, or has central cyanosis

SUPPORTIVE CARE

- Avoid the use of IV fluids, where possible.
- Support the child in a semi-seated position with head and shoulders elevated and lower limbs dependent.
- Relieve any fever with paracetamol to reduce the cardiac workload.
- Avoid unnecessary movement and transportation

Prognosis

The outcome for patients experiencing HF depends largely on its cause.

- When noncardiac disorders are responsible, the improvement in HF is related to successful treatment of the systemic disease.
- For many cardiac malformations (preloading and afterloading conditions), surgical correction can be curative

DISORDER OF RESPIRATORY TRACT

Learning objectives

At the end of this topic the student will able to:

- Discuss the respiratory pathophysiology and regulation
- Analyze **Child presenting with an airway or severe breathing problem**
- Manage the selective respiratory disorders of childhood

Respiratory Pathophysiology and Regulation

- The age- and growth-dependent changes in **physiology and anatomy of the respiratory control mechanism, airway dynamics, and lung parenchymal characteristics** have a profound influence on the pathophysiologic manifestations of the disease process.

ACUTE pharyngo-tonsillitis

- Frequent upper airway infections in children and teenagers.
- Uncommon before 2-3 years old
- Peak incidence: 4-7 years old

ETIOLOGY

- usually viral, most often caused by the common cold viruses (adenovirus, rhinovirus, influenza, coronavirus, and respiratory syncytial virus), but occasionally by Epstein-Barr virus, herpes simplex virus, cytomegalovirus, or HIV.

Etiology

- In about 30% of patients, the cause is bacterial. Group A β-hemolytic streptococcus (GABHS) is most common but Staphylococcus aureus, Streptococcus pneumoniae, Mycoplasma pneumoniae, and Chlamydia pneumoniae are sometimes involved.
- GABHS occurs most commonly between ages 5 and 15 and is uncommon before age 3.
- Rare causes include pertussis, Fusobacterium, diphtheria, syphilis, and gonorrhea.

Clinical Feature

- Pain with swallowing is the hallmark and is often referred to the ears.
- Very young children who are not able to complain of sore throat often refuse to eat.
- High fever, malaise, headache, and GI upset are common, as are halitosis and a muffled voice.
- The tonsils are swollen and red and often have purulent exudates.
- Tender cervical lymphadenopathy may be present.

CHRONIC INFECTION

The tonsils and adenoid can be chronically infected by multiple microbes

Children with chronic or cryptic tonsillitis

- frequently present with halitosis
- chronic sore throats
- foreign body sensation
- or a history of expelling foul-tasting and smelling cheesy lumps.

Complications of GAβHS

Suppurative

- Peritonsillar abscess
- Retropharyngeal abscess
- Otitis media
- Sinusitis

Non-suppurative

- Acute rheumatic fever
- Acute glomeriolonephritis

MANAGEMENT

- Most untreated episodes of streptococcal pharyngotonsilitis resolve uneventfully in a few days, but early antibiotic therapy hastens clinical recovery by 12–24 hr.
- The primary benefit of treatment is the prevention of acute rheumatic fever, which is almost completely successful if antibiotic treatment is instituted within 9 days of illness

Mgt

-A variety of antimicrobial agents are effective.

-GABHS remains universally susceptible to penicillin, which has a narrow spectrum and few adverse effects.

- Benzanthine Penicillin 600,000 IU IM stat for children <27 kgs of weight and 1.2 million IU IM stat for children >27kgs of weight

OR

- Amoxicillin 20- 40mg/Kg/ d po in three divided doses for 10 days
- For patients allergic to penicillin , Erythromycin 4o mg/kg/d in four divided doses for 10 days
- Follow up in two days if no improvement

CROUP (LARYNGOTRACHEOBRONCHITIS)

- The term croup refers to a heterogeneous group of mainly acute and infectious processes that are characterized by a bark-like or brassy cough and may be associated with hoarseness, inspiratory stridor, and respiratory distress resulting from upper airway obstruction.
- Usually have sudden onset
- The term is given mainly for viral origin

Etiology

- Viral
  - Para-influenza viruses (75% of cases).
  - influenza A and B, Measles, adenovirus & RSV
- Bacterial
  - Myco-plasma Pneumonia
- Allergy
  - Spasmodic croup

Clinical manifestation

Prior to obstruction

- upper respiratory tract infection with rhinorrhea
- pharyngitis
- mild cough
- low grade fever

After obstruction

- ❖ barking cough
- ❖ hoarseness
- ❖ inspiratory stridor
- ❖ fever
- ❖ coryza
- ❖ inflamed phary
- ❖ Tachypena

The modified Westley clinical scoring system for croup

- **Inspiratory stridor**:

  -Not present - 0

  -When agitated/active - 1

  – At rest - 2 points.

- **Intercostal recession**:
  - Mild - 1 point.
  - Moderate - 2 points.
  - Severe - 3 points.
- **Air entry**:
  - Normal - 0
  - Mildly decreased - 1
  - Severely decreased - 2 points
- **Cyanosis**:
  - None - 0 .
  - With agitation/activity - 4 points.
  - At rest - 5 points.
- **Level of consciousness**:
  - Normal - 0 point.
  - Altered - 5 points

<4 = mild croup,
4-6 = moderate croup
>6 =severe croup

Management

- Nebulized epinephrine
  - O.5mg/kg 1:1000 dilution inhaled over 15-20 minute PRN
- Corticosteroids
  - dexamethasone used a *single dose of 0.15- 0.6 mg/kg* IM/IV/Oral stat
- Antibiotic
  - Incase of bacterial croup

Management

In child with severe croup who is deteriorating, consider

Intubation and tracheotomy

➢

Supportive care

- Don’t disturb the child
- If the child has fever (≥ 39 ° C or ≥ 102.2 ° F) give paracetamol.
- Encourage breastfeeding and oral fluids.
- Encourage the child to eat as soon as food can be taken.

MONITORING

- The child’s condition, especially respiratory status, should be assessed by nurses every 3 hours
- The child should occupy a bed close to the nursing station, so that any sign of incipient airway obstruction can be detected as soon as it develops.

CHILDHOOD ASTHMA

INTRODUCTION

A chronic inflammatory disease of the airways with the following clinical features:

- Episodic and/or chronic symptoms of airway obstruction
- Bronchial hyper-responsiveness to triggers
- Evidence of at least partial reversibility of the airway obstruction
- Alternative diagnoses are excluded
- Most common childhood chronic disease

ETIOLOGY

Usually has not been determined, contemporary research implicates a combination of :

- Environmental exposures
- Inherent biological and
- Genetic vulnerabilities

Types of Childhood Asthma

Main types of childhood asthma:

- **Recurrent wheezing** in early childhood
- **Chronic asthma** associated with allergy that persists into later childhood and often adulthood.
- **Triad asthma** associated with hyperplastic sinusitis/nasal polyposis and hypersensitivity to aspirin and non-steroidal anti-inflammatory medications (ibuprofen), rarely has its onset in childhood.

❖ The most common persistent form of childhood asthma is that associated with allergy

Clinical manifestation

Wheezing is the most characteristic sign of asthma.

Wheezing with upper respiratory infections is very common in small children, but:

- Many of these children will not develop asthma.
- Asthma medications may benefit patients who wheeze whether or not they have asthma.

All that wheezes is not asthma

c/m cont'd

❖cough and shortness of breath.

Consider asthma in children with:

- Recurrent episodes of cough with or without wheezing
- Nocturnal awakening because of cough
- Cough that is associated with exercise/play
- Cough without wheeze is often not asthma

Cough may be the only symptom present in patients with asthma.

C /f

- Symptoms may include "chest congestion," prolonged cough, exercise intolerance, dyspnea, and recurrent bronchitis or pneumonia.
- As the obstruction becomes more severe, wheezes become more high-pitched and breath sounds diminished
- Flaring of nostrils
- intercostal and suprasternal retractions
- Flushed, moist skin may be noted, and mucous membranes may be dry
- Cyanosis

Asthma Predictive Index

≥4 wheezing episodes in the past year
(at least one must be diagnosed)

PLUS

OR

<u>One major criterion</u>

- Parent with asthma
- Atopic dermatitis/eczema
- Aero-allergen sensitivity

- <u>Two minor criteria</u>
- Food sensitivity
- Peripheral eosinophilia (≥4%)
- Wheezing not related to infection

Four Components of Optimal Asthma Management

1. Regular assessment and monitoring

2.Control of factors contributing to asthma severity

3. Asthma pharmacotherapy

4. patient education

Pharmacologic

- Salbutamol
- Aminophylline
- Prednisolone

PREVENTION

- Investigations into the environmental and lifestyle factor
- Avoidance of environmental tobacco smoke (beginning prenatally)
- prolonged breastfeeding (>6 mo)
- An active lifestyle, and a healthy diet—might reduce the likelihood of asthma development.

PNEUMONIA

- **Pneumonia** is an inflammatory process of the lung **parenchyma** (the functional tissue of lungs) that is commonly caused by infectious agents.

EPIDEMIOLOGY

- Childhood pneumonia is the leading single cause of mortality in children aged less than 5 years.

Common pathogens of pneumonia according to their age

Age Group	Common Pathogens (in Order of Frequency)
Newborn	Group B *Streptococci, Escherichia coli,* Gram-negative bacilli, streptococcus pneumoniae, H. influenza *Listeria monocytogenes* Herpes Simplex Cytomegalovirus Rubella
1-3 months	*Chlamydia trachomatis,* streptococcus pneumoniae, H. influenza, Respiratory Syncytial virus Other respiratory viruses(rhino, para-influenza, influenza, adenoviruses
3-12 months	Respiratory Syncytial virus Other respiratory viruses *Streptococcus pneumoniae* *Haemophilus influenzae* *Chlamydia trachomatis* *Mycoplasma pneumoniae*

Common pathogens of pneumonia according to their age

Age Group	Common Pathogens (in Order of Frequency)
2-5 years	Respiratory Viruses *Streptococcus pneumoniae* *Haemophilus influenzae* *Mycoplasma pneumoniae* *Chlamydia pneumoniae*
5-18 years	*Mycoplasma pneumoniae* *Streptococcus pneumoniae* *Chlamydia pneumoniae* *Haemophilus influenzae* Influenza viruses A and B Adenoviruses Other respiratory viruses

Classification of pneumonia

Pneumonia can be classified based on the:

1. The cause
2. Area involved
3. Setting acquired
4. Clinical presentation
5. Severity of illness

Classification cont'd…

1. According to causes

- **Bacterial: the most common cause of pneumonia**
- **Viral pneumonia**
- **Fungal pneumonia**
- **Chemical pneumonia: ingestion of kerosene or inhalation of irritating substance**
- **Inhalation pneumonia (aspiration pneumonia)**

Classification cont'd…

2. According to areas involved

- **Lobar pneumonia;** if one or more lobe is involved
- **Broncho-pneumonia;** the pneumonic process has originated in one or more bronchi and extends to the surrounding lung tissue.

3. According to the setting:

- Community acquired pneumonia
- Hospital acquired pneumonia
- Healthcare associated pneumonia

Classification cont'd…

4. According to clinical features

- Typical pneumonia
- Atypical pneumonia

5. According to the severity of illness (used in IMNCI)

- No pneumonia or cough or cold
- Pneumonia
- Severe pneumonia

Mode of transmission

Pneumonia can be acquired from:

- **Naso-oral floras:** bacteria and viruses living in the nose, sinuses, or mouth may spread to lungs.
- **Droplets infection:** directly breathe in some of these germs into our lungs .
- **Aspiration:** breathe in (inhale) food, liquids, vomit, or fluids from the mouth into your lungs

RISK FACTORS

- **Definite risk factors**

✓ Malnutrition (weight-for-age z-score < –2)

✓ Low birth weight (≤ 2500 g)

✓ Non-exclusive breastfeeding (during the first 6 months of life)

✓ Lack of measles immunization (within the first 12 months of life)

✓ Indoor air pollution

✓ Crowding

✓ Immuno-suppresed patients (HIV patients)

Risk factors…

- **Likely risk factors**

✓ Parental smoking

✓ Zinc deficiency

✓ Mother's experience as a caregiver

✓ Concomitant diseases (e.g. diarrhea, heart disease, asthma, liver disease, DM…)

✓ Difficult swallowing (due to stroke, or other neurological conditions)

✓ Impaired consciousness

✓ Chronic lung disease (COPD, bronchostasis)

Risk factors

- **Possible risk factors**

✓ Mother's education
✓ Day-care attendance
✓ Rainfall (humidity)
✓ High altitude (cold air)
✓ Recent cold, laryngitis or flu
✓ Vitamin A deficiency
✓ Birth order
✓ Outdoor air pollution
✓ Frequent suction

CLINICAL MANIFESTATIONS

- Fast breathing
- Nasal flaring
- Grunting
- Lower chest wall indrawing
- Abnormal vocal resonance (decreased over a pleural effusion, increased over lobar consolidation
- Central cyanosis
- signs of pneumonia on auscultation (decreased breath sounds, bronchial breath sounds, crackles, pleural rub).

Diagnostic modalities

- History taking
- Physical examination
- Chest x-ray
- Blood test
- Sputum culture
- Lung ultrasound

Medical management

WHO guideline

- Children with fast breathing and chest in-drawing should be treated with
- Oral amoxicillin: at least 50mg/kg/day for five days.
- In areas with low HIV prevalence, give amoxicillin for three days.

- Children with severe pneumonia should be treated with
  - ✓ Ampicillin: 50 mg/kg, or benzyl penicillin: 50 000 units per kg IM/IV every six hours for at least five days
  - ✓ Gentamicin: 7.5 mg/kg IM/IV once a day for at least five days
- Ceftriaxone should be used as a second-line treatment

- For HIV-infected and exposed infants and for children under 5 years of age with chest in-drawing pneumonia or severe pneumonia.
- Ampicillin or penicillin plus gentamicin or ceftriaxone are recommended as a first-line antibiotic regimen
- Ceftriaxone alone is recommended for use as second-line treatment .

- Empiric cotri-moxazole treatment for suspected PCP is recommended as an additional treatment for HIV-infected and exposed infants aged from 2 months up to 1 year with severe or very severe pneumonia.
- However, it is not recommended for above 1 year of age with chest in-drawing or severe pneumonia.

Pathogen	Inpatient	Out patient
Str. pneumoniae	Ampicillin 150-200mg/kg/d q8hr or penicillin Ceftriaxone 50-100mg/kg/d	Amoxicillin 90mg/kg/d Cefpodoxime, cefuroxime, levofloxacin
Group A streptococcus	Penicillin 100000-250000u/kg/d Ceftriaxone	Amoxicillin or penicillin Oral clindamycin
Staph.aureus	Cefazolin	Cephalexin 50-75mg/kg/d/ in 2 doses

Pathogens	Inpatient	Out patient
Haemophilus influenza, typeable (A-F) or nontypeable	ampicillin (150-200 mg/kg/day every 6 hours, ceftriaxone (50–100 mg/kg/day every 12-24 hours) cefotaxime (150 mg/kg/day every 8 hours); ciprofloxacin (30 mg/kg/day levofloxacin (16-20 mg/kg/day every 12 hours for	amoxicillin (75-100 mg/kg/day in amoxicillin clavulanate (45 mg/kg/day in 3 doses or cefdinir, cefixime, cefpodoxime, or ceftib
Mycoplasma pneumoniae	azithromycin (10 mg/kg erythromycin lactobionate (20 mg/kg/day every 6 hours) or levofloxacin (16-20 mg/kg/day every 12 hours;	azithromycin (10 mg/kg on day 1, followed by 5 mg/kg/day once daily on days 2–5); clarithromycin
Chlamydia trachomatis or Chlamydophila pneumoniae	azithromycin (10 mg/kg on days 1 and 2 of therapy; erythromycin lactobionate (20 mg/kg/day every 6 hours) or levofloxacin (16-20 mg/kg/day in 2 doses	azithromycin (10 mg/kg on day 1, followed by 5 mg/kg/day clarithromycin (15 mg/kg/day in 2 doses) or oral erythromycin (40 mg/kg/day in 4 doses); doxycycline (2-4 mg/kg/day in 2 doses

OXYGEN THERAPY

- Give oxygen to all children with very severe pneumonia

- Where pulse oximetry is available, use this to guide oxygen therapy (give to children with oxygen saturation less than 90%,

- Where there is sufficient oxygen available Continue with oxygen until the signs of hypoxia (such as severe lower chest wall in drawing or breathing rate of ≥ 70/minute) are no longer present.

SUPPORTIVE CARE

- If the child has fever (≥ 39 ° C or ≥ 102.2 ° F), give Paracetamol.
- If wheeze is present, give a rapid-acting bronchodilator
- Remove by gentle suction any thick secretions in the throat,
- Ensure that the child receives daily maintenance fluids
- Encourage breastfeeding and oral fluids.

Tuberculosis

- A child with persistent fever for more than 3 weeks and signs of pneumonia should be evaluated for tuberculosis.
- If another cause of the fever cannot be found, **tuberculosis** should be considered and treatment for tuberculosis, following national guidelines, may be initiated and response to anti-Tb treatment evaluated

Genitourinary system disorder

Objectives

At the end of this chapter you will be able to

- Mention the common manifestations of GUT problems.
- Diagnosis common GUT disorders
- Manage common GUT disorders

Anatomy and physiology

- Consists of kidney ureters, bladder, urethra

Functions

- Regulating blood volume and pressure
- Regulating plasma concentrations of sodium, potassium, chloride and other ions
- Stabilising blood pH
- Conserving nutrients
- Detoxifying poisons (with the liver)

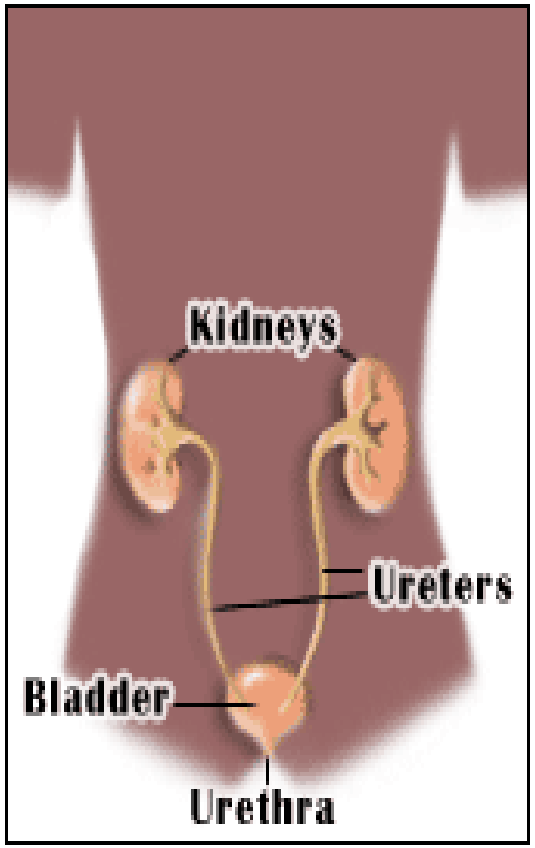
URINARY TRACT INFECTION

- Urinary tract infections (UTI) is common in the pediatric age group.
- Upper urinary tract infections (i.e, acute pyelonephritis) may lead to renal scarring, hypertension, and end-stage renal diseases.

- Difficult on clinical grounds to distinguish cystitis from pyelonephritis, particularly in young children (those younger than 2 years)

Types of UTI

- Urethritis – infection of the urethra
- Cystitis – an infection in the bladder that has moved up from the urethra
- Pyelonephritis – a urinary infection of the kidney as a result of an infection in the urinary tract



ETIOLOGY

- Bacterial infections are the most common.
- E coli is the most common causing 75-90% of UTI episodes.
- Other bacteria include:
  - Klebsiella species
  - Proteus species
  - Enterococcus species
  - Staphylococcus saprophyticus
- Adenovirus (rare)
- Fungal in immune compromised patients

CLINICAL PRESENTATION

- In young children, UTI often presents with non-specific signs

In young children (<2 yrs)

- Fever, vomiting, poor feeding, abdominal tenderness, irritability, failure to thrive.

Older Children

- Fever, urinary symptoms (dysuria, urgency, frequency, incontinence, macroscopic haematuria), and abdominal pain
- The constellation of fever, chills, and flank pain is suggestive of **pyelonephritis** in older children

Laboratory Investigations

- Urinalysis
  - Urine Microscopy
- Urine Culture
- Blood Culture
- Lumbar Puncture in a febrile child < 3 months

MANAGEMENT

The goals of Treatment

- Elimination of infection and prevention of urosepsis
- Prevention of recurrence and long-term complications
- Relief of acute symptoms

MANAGEMENT

Treat the child as an outpatient, but Hospitalization is necessary:

- when there is high fever and systemic upset (such as vomiting everything or inability to drink or breastfeed)
- Patients who are toxemic or septic
- Patients with signs of urinary obstruction or significant underlying disease
- Patients unable to tolerate adequate PO fluids or medications
- Infants younger than 3 months with febrile UTI (presumed pyelonephritis)
- All infants younger than 1 month with suspected UTI even if not febrile

MANAGEMENT

- Start antibiotics after urinalysis and culture are obtained.
- A 10-day course of antibiotics is recommended, even for uncomplicated infection.
- For cystitis, oral antibiotic therapy is adequate, but if pyelonephritis is suspected, a combination of parenteral antibiotics is recommended.
- Recent evidence indicates that oral antibiotics are adequate therapy for febrile UTI in young infants and children; short-term (fever) and long-term (renal scarring) outcomes are comparable to parenteral therapy.

MANAGEMENT

- Oral cotrimoxazole (4 mg trimethoprim/20 mg sulfamethoxazole per kg every 12 hours) for 5 days. Alternatives include ampicillin, amoxicillin and cefalexin.
- If there is a poor response to the first-line antibiotic or the child's condition deteriorates, give gentamicin (7.5 mg/kg IM once daily) plus ampicillin (50 mg/kg IM/IV every 6 hours) or a parenteral cephalosporin.
- Consider complications such as pyelonephritis (tenderness in the costo-vertebral angle and high fever) or septicaemia.

Supportive care

- The child should be encouraged to drink or breastfeed regularly in order to maintain a good fluid intake, which will assist in clearing the infection and prevent dehydration.

Follow-up

- Investigate all episodes of UTI in >1-year-old males and in all children with more than one episode of UTI in order to identify the underlying cause.
- This may require referral to a larger hospital with facilities for appropriate X-ray or ultrasound investigations.

Complications

- **DEHYDRATION** is the most common complication of UTI in the pediatric population. IV fluid replacement is necessary in more severe cases.
- Treat febrile UTI as pyelonephritis, and consider parenteral antibiotics and admission for these patients.
- Untreated UTI may progress to renal involvement with systemic infection (e.g. urosepsis).
- Long-term complications include renal parenchyma scarring, hypertension, decreased renal function, and, in severe cases, renal failure.

ACUTE POSTSTREPTOCOCCAL GLOMERULONEPHRITIS

(APSGN)

INTRODUCTION

- PSGN is caused by prior infection with specific nephritogenic strains of group A beta-hemolytic streptococcus.
- The clinical presentation of PSGN varies from asymptomatic, microscopic hematuria to the full-blown acute nephritic syndrome, characterized by red to brown urine, proteinuria, edema, hypertension, and acute kidney injury.

CLINICAL PRESENTATION

- Abrupt onset of hemutaria (100%)

- Proteinuria (80%)
- Edema (90%)
- HTN (60-80%)
- Mild to moderate renal insufficiency (25-40%)
- Latent period → (1-2 wks, throat infection , 3-6 wks skin infection)
- Subclinical to clinically overt dx → 4-5:1

LABORATORY FINDINGS

- Urinalysis
- Serology
- Culture
- Because PSGN presents weeks after an antecedent GAS infection, only about 25 percent of patients will have either a positive throat or skin culture.
- In patients with impetigo, there is an increased likelihood of obtaining a positive skin culture

DIAGNOSIS

- PSGN is usually diagnosed based upon clinical findings of acute nephritis and demonstration of a recent group A beta-hemolytic streptococcal (GAS) infection.
- The clinical findings of acute nephritis include hematuria with or without red blood cell casts, variable degrees of proteinuria, edema, and hypertension.
- Documentation of a recent GAS infection includes either a positive throat or skin culture or serologic tests (eg, ASO or streptozyme test)

MANAGEMENT

- Management is directed at treating the acute effects of renal insufficiency and hypertension.
- Although a 10-day course of systemic antibiotic therapy with penicillin is recommended to limit the spread of the nephritogenic organisms, antibiotic therapy does not affect the natural history of glomerulonephritis.
- Sodium restriction, diuresis usually with intravenous Lasix, and pharmacotherapy with calcium channel antagonists, vasodilators, or angiotensin-converting enzyme inhibitors are standard therapies used to treat hypertension.

NEPHROTIC SYNDROME

NEPHROTIC SYNDROME (NS)

- It is primarily a pediatric disorder
- 15 times more common in children than adults.
- The incidence is 2-3/100,000 children per year; and the majority of affected children will have steroid-sensitive minimal change disease.
- NS defined by the clinical triad of
  - Oedema
  - Nephrotic range proteinuria and
  - Hypoalbuminaemia
    - Typically accompanied by
      - Dyslipidaemia with elevated plasma cholesterol and triglycerides.

Etiology

- Nephrotic syndrome may occur as a result of any form of glomerular disease and may be associated with a variety of extra renal conditions.
- Approximately 90% of children with this condition have some form of the idiopathic nephrotic syndrome.
- In the remaining 10%, the syndrome is secondary to some form of glomerulonephritis.

Clinical Manifestations

- It usually presents with pitting edema, initially noted in periorbital area and in the lower extremities. The edema becomes generalized with time.
- Some children present with hypotension secondary to significant shift of fluid from intravascular to third space and they may rarer develop renal failure
- Abdominal pain
- Diarrhea (intestinal edema) or respiratory distress (pulmonary edema or pleural effusion) may be present

DIAGNOSIS

- Urinalysis reveals proteinuria (+3or +4 on dipstick).
- Serum albumin level is generally < 2.5g /24 hr.
- The serum cholesterol and triglyceride levels are generally high

MANAGEMENT

❖ **Diet**

- Normal protein intake
- Salt restriction during relapses

❖ **Antibiotics**

- Oral penicillin should be given during both initial illness and relapses.

❖ **Diuretics** Careful use of frusemide only in the absence of hypovolaemia, if fluid restriction (e.g. 70% maintenance) and salt restriction alone not effective in controlling oedema formation.

Steroid therapy for first presentation:

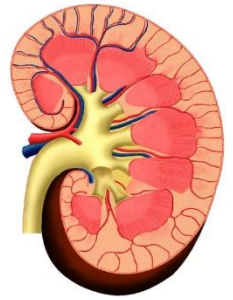
STEROID THERAPY

- This is the mainstay of treatment and should be commenced once the diagnosis is established
- Prednisone or Prednisolone - start at 60mg/m2/day (max 80mg) in a single daily dose to complete a total of 42 days.
- Then switch to alternate day therapy at 40mg/ m2/day (max 60mg) for further 42 days.
- Then wean steroid dose gradually over 8-10 weeks and stop.
- Total treatment duration of first presentation for at least 20 weeks.

Complications of Nephrotic Syndrome

- Spontaneous bacterial peritonitis
- Bacteremia
- Steroid-related toxicity
- Immunosuppression-related toxicity
- Acute renal failure
- **Thrombosis**

Acute kidney injuries

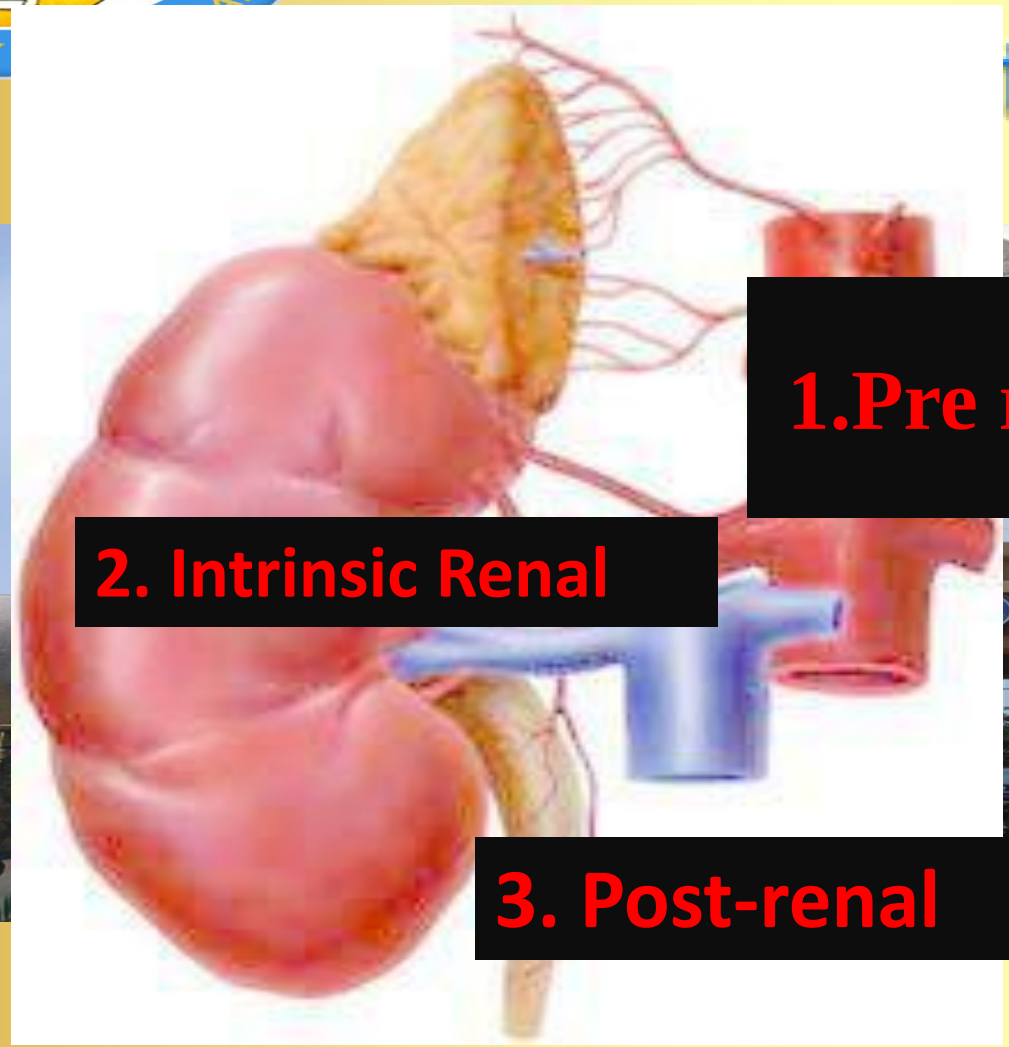


- ✓ It is a Rapid deteriotion of renal function resulting in retention of nitrogenous wastes and inability of kidney to regulate fluid and electrolyte homeostasis. Nelson 20 ed

Table 535-1	Pediatric-Modified Rifle (pRIFLE) Criteria	
CRITERIA	**ESTIMATED CCL**	**URINE OUTPUT**
Risk	eCCl decrease by 25%	<0.5 mL/kg/hr for 8 hr
Injury	eCCl decrease by 50%	<0.5 mL/kg/hr for 16 hr
Failure	eCCl decrease by 75% or eCCl <35 mL/min/1.73 m^2	<0.3 mL/kg/hr for 24 hr or anuric for 12 hr
Loss	Persistent failure >4 wk	
End-stage	End-stage renal disease (persistent failure >3 mo)	

CCl, creatinine clearance; eCCl, estimated creatinine clearance; pRIFLE, pediatric risk, injury, failure, loss, and end-stage renal disease.

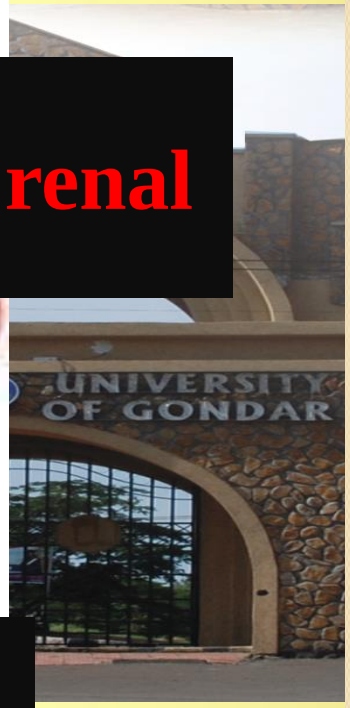
ETHIOLOGY

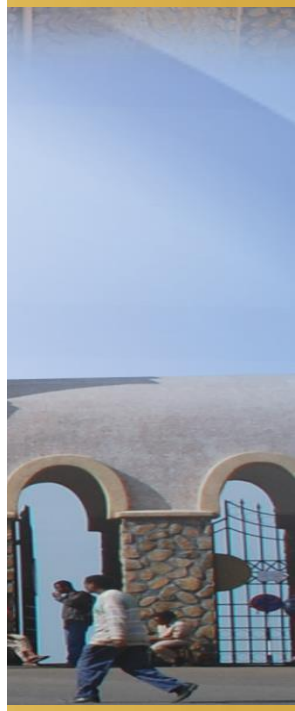


1.Pre renal

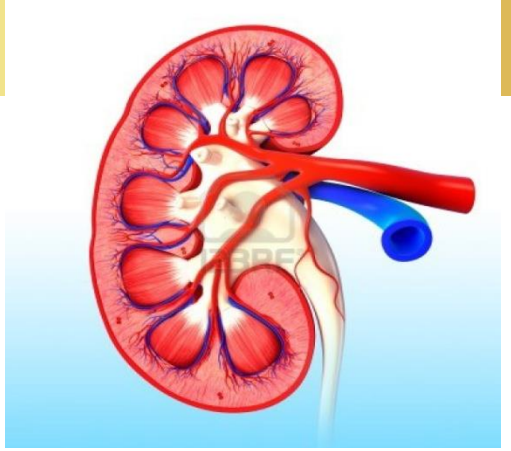
2. Intrinsic Renal

3. Post-renal



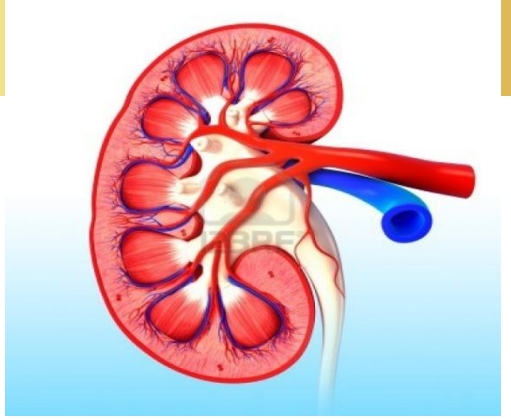


Pre-renal



- vomiting, diarrhea, poor fluid intake,
- fever, use of diuretics
- hemorrhage
- cardiac failure
- liver dysfunction, or
- septic shock

Intrinsic renal



I. Renal Major vessel obstruction

-renal vein thrombosis , renal arterial obstruction, hemolytic uremic syndrome , HSP , polyarteritis and other vasculitis.

II. Glomerular

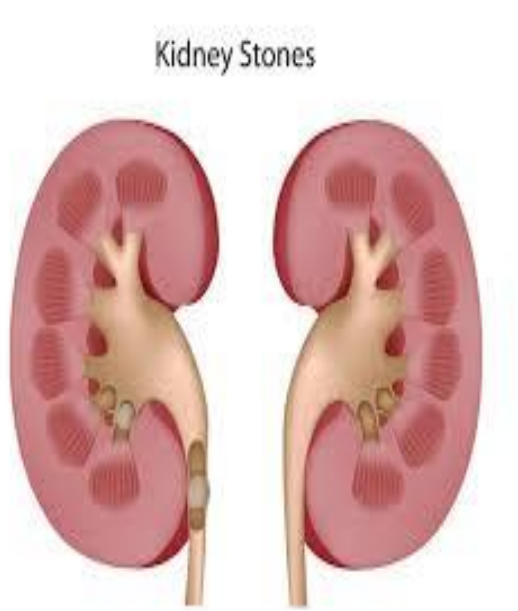
- Acute glomerulonephritis (post streptococcal , other infections).

III. Acute tubulointerstitial nephritis

IV. Acute tubular necrosis

- Prolongation of pre-renal insult , intravascular hemolysis , sepsis , nephrotoxic agents , multiorgan failure , snakebite etc.

Post renal



- ✓ Posterior urethral valves
- ✓ Ureteropelvic junction obstruction
- ✓ Ureterovesicular junction obstruction
- ✓ Ureterocele
- ✓ Tumor
- ✓ Urolithiasis
- ✓ Hemorrhagic cystitis
- ✓ Neurogenic bladder

Cited by Up to date 21.2

Clinical presentation

Pre renal

There may be history of volume loss from vomiting, diarrhea, or blood loss and may present with dehydration , hypotension , tachycardia , pallor , and **decreased urine output ...**

Renal

- ✓ Hematuria, edema, and hypertension indicates a glomerular etiology for AKI.
- ✓ Dysentery, petechiae and pallor- HUS
- ✓ Presence of rash, arthritis might suggest SLE
- ✓ History of prolong hypotension or with exposure to nephrotoxic medication most likely have ATN.
- ✓ Allergic interstitial nephritis should be suspected with fevers, rash, arthralgia, and exposure to certain medications

Post renal

- History of interrupted urinary stream and palpable bladder or kidney suggest obstructive uropathy.
- Abdominal colic hematuria and dysuria suggest urinary tract calculi.

Diagnosis

History and

Physical examination:-Obtaining a thorough physical examination is extremely important when collecting evidence about the etiology of AKI.

Skin :- **P**alpable purpura - Systemic vasculitis

Maculo papular rash - Allergic interstitial nephritis

Eye :- Evidence of uveitis may indicate interstitial nephritis and necrotizing vasculitis.

Ear :- Hearing loss - Alport disease and amino glycoside toxicity

Mucosal or cartilaginous ulcerations – Wegener granulomatosis.

Pulmonary system :- Respiratory rate , pattern

On Auscultation of lungs creptation

Cont..d

Cardiovascular examination may reveal the following:

- Murmurs - Endocarditis
- Pericardial friction rub - Uremic pericarditis
- Increased jugulovenous distention, S_3 - Heart failure

Abdomen

- Abdominal or costovertebral angle tenderness - Nephrolithiasis, papillary necrosis, renal artery thrombosis, renal vein thrombosis
- distended bladder – Urinary obstruction

Laboratory investigation

- ✓Blood urea and S. creatinine level
- ✓Serum electrolyte and C3 level
- **Urinary indices** may be useful in differentiating prerenal AKI from intrinsic AKI.
- **Ultrasound -** evaluates renal size, able to detect masses, obstruction, stones
- **Renal biopsy** - Patient in whom the etiology **is not identified**

Clin J Am Soc Nephrol. 2014 Feb 7

Complication of AKI

Metabolic

- Hyponatremia
- Hyperkalemia
- Hypocalcemia, hyperphosphatemia
- Hyperuricamia

Pediatrics lecture note

Con..d

Metabolic acidosis

Cardiovascular

- Pulmonary edema
- CHF
- Hypertension
- Arrhythmias
- Pericarditis

Neurologic :- Coma and Seizures

Hematologic :-Anemia and Coagulopathies & bleeding diathesis E.T.C

Pediatrics lecture note

TREATMENT

Medical Management

- In infants and children with urinary tract obstruction, such as in a newborn with suspected posterior ureteral valves, a bladder catheter should be placed immediately to ensure adequate drainage of the urinary tract.
- however, precautions to prevent iatrogenic infection should be

Maintain fluid

- Determination of the volume status is of critical importance when initially evaluating a patient with AKI.
- If there is no evidence of volume overload or cardiac failure, intravascular volume should be expanded by intravenous administration **of isotonic saline, 20 mL/kg over 30 min.**

Cont…d

- Determination of the central venous pressure may be helpful if adequacy of the blood volume is difficult to determine.
- After volume resuscitation, hypovolemic patients generally void within **2 hr**; failure to do so suggests intrinsic or postrenal AKI.
- Hypotension caused by sepsis requires vigorous fluid resuscitation followed by a continuous infusion of nor - epinephrine.

Chronic kidney disease

Patient has CKD if either of the following criteria are present:

1. Kidney damage for ≥3 mo, as defined by structural or functional abnormalities of the kidney, ***with or without*** decreased GFR, manifested by 1 or more of the following features:
   - Abnormalities in the composition of the blood or urine
   - Abnormalities in imaging tests
   - Abnormalities on kidney biopsy
2. GFR <60 mL/min/1.73 m_2 for ≥3 mo, with or without the other signs of kidney damage described above

STANDARDIZED TERMINOLOGY FOR STAGES OF CHRONIC KIDNEY DISEASE (K/DOQI(2002))

STAGE	DESCRIPTION	GFR (mL/min/1.73 m^2)
1	Kidney damage with normal or increased GFR	>90
2	Kidney damage with mild decrease in GFR	60-89
3	Moderate decrease in GFR	30-59
4	Severe decrease in GFR	5-29
5	Kidney failure	<15 or on dialysis

GFR, glomerular filtration rate.

Etiology

- Result of congenital, acquired, inherited, or metabolic renal disease.

❑ **in children <5 yr old is**

– most commonly a result of congenital abnormalities such as **renal hypoplasia, dysplasia, or obstructive uropathy**

❑ **After 5 yr of age**

acquired diseases (various forms of glomerulonephritis including lupus nephritis) and inherited disorders (Alport syndrome) predominate.

Clinical Manifestations

- The clinical presentation of CKD is varied and depends on the underlying renal disease
  - Children and adolescents with CKD can present with
  - edema,
  - hypertension,
  - hematuria, and
  - proteinuria

Diagnosis

On P/E:-Pallor and **a sallow appearance**.

– ***short stature and the bony abnormalities of renal osteodystrophy*** (length/height-for age <3rd percentile).

– Children with CKD due to chronic glomerulonephritis (edema, hypertension and fluid overload)

Laboratory Findings(Elevated BUN and serum creatinine, hyperkalemia, hyponatremia, hypernatremia Acidosis, hypocalcemia, hyperphosphatemia, and an elevation in uric acid, hypoalbuminemia, hematuria and proteinuria.

Management

GENERAL PRINCIPLES

- *Treat reversible kidney dysfunction*
- Prevent or slow the progression of kidney disease
- Treat the complications of CKD
- Identify and adequately prepare the child/family in whom renal replacement therapy will be required

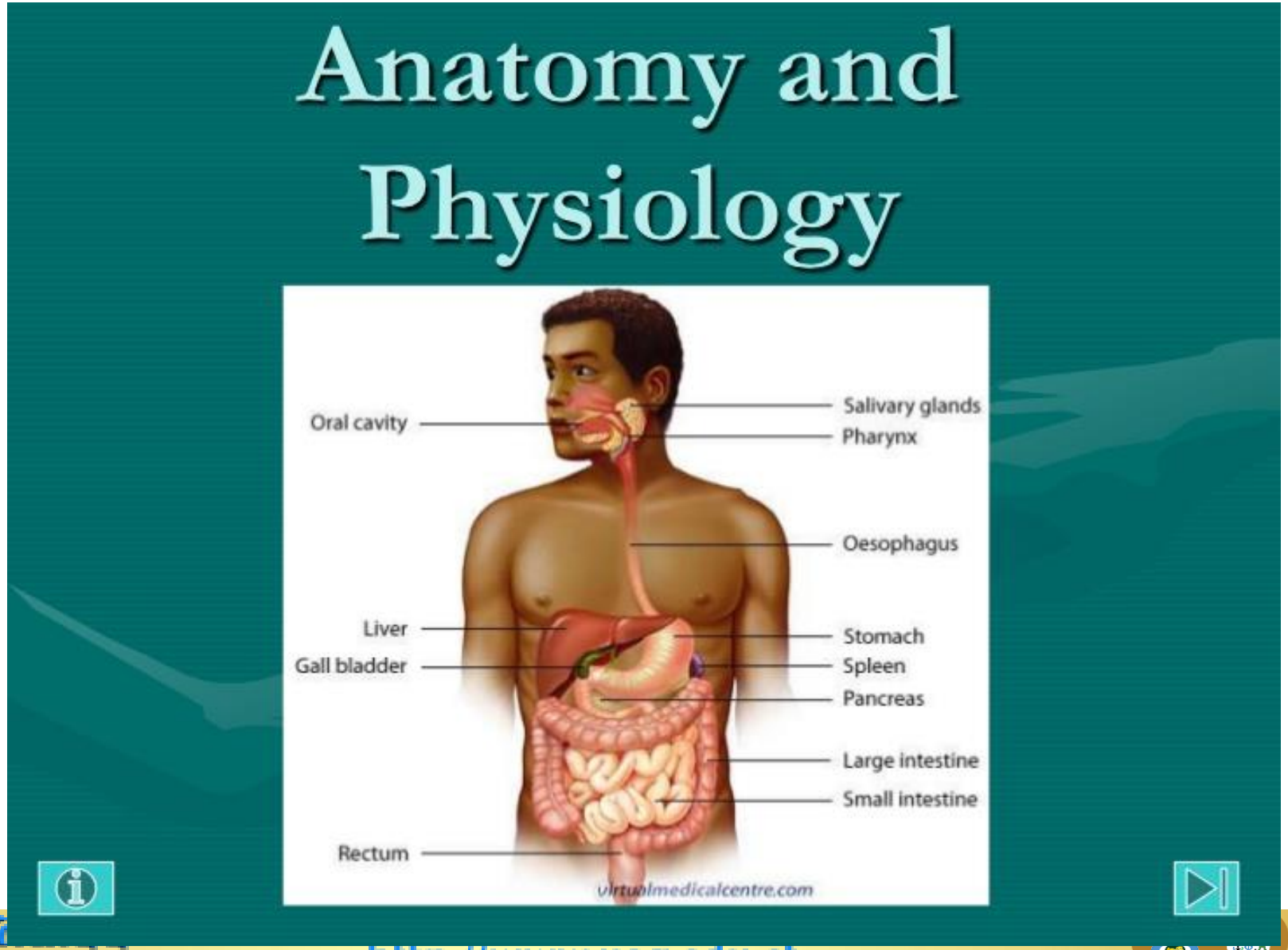
COMMON GASTRO-INTESTINAL DISORDER

LEARNING OBJECTIVES

By the end of this topic the student will able to:

- Mention the common manifestation of GID
- Recognize the evaluation of abdominal pain and vomiting
- Discuss the common problems of GI obstruction in children
- Discuss appendicitis in childhood

Anatomy and physiology of the GIS



Anatomy and physiology

- It consists of the mouth/oral cavity, esophagus, stomach, intestine, rectum and anus and other accessory glands like liver, gallbladder, pancreas and salivary
- **Functions**
- The main function of GIS is Ingestion digestions and absorptions of foods and eliminations of food ruminants

Common Manifestations of GID in the Child

- ABDOMINAL PAIN
- VOMITING AND REGURGITATION
- DIARRHEA
- CONSTIPATION
- ABDOMINAL DISTENTION AND ABDOMINAL MASSES

FUNCTIONAL GASTROINTESTINAL DISORDERS WITH ABDOMINAL PAIN

- Abdominal pain in a child is one of the most common presentations with both trivial and life threatening etiologies, ranging from functional pain to acute appendicitis.
- Diagnosing abdominal pain in children is also a challenging task.
- The majority of pediatric abdominal complaints are relatively benign
- But it is important to pick up on the cardinal signs that might suggest a more serious underlying disease.

- The majority of children with recurrent or chronic abdominal pain have a **functional** gastrointestinal disorder.
- **Functional disorders** are defined as conditions in which symptoms are present in the absence of any readily identifiable structural or biochemical abnormality.

Common Causes of Abdominal Pain

NEWBORN	INFANT (<2 YEARS)
Intestinal obstruction (ie. volvulus, pyloric stenosis), GE Reflux, Hernia, Peritonitis (i.e. GI perforation), Trauma (i.e. during birth)	Constipation , Toxin ingestion, Acute gastroenteritis , Trauma, Hernia, volvulus, intussusception, Colic, Respiratory illness
CHILDREN (2 – 18 YEARS)	**ADOLESCENTS (12 – 18 YEARS)**
Acute gastroenteritis, UTI / Pyelonephritis, Constipation, Toxin ingestion, food poisoning, Intestinal obstruction Trauma, Testicular torsion, Respiratory illness, pneumonia, Appendicitis, pancreatitis,cholecystitis	Trauma ,Toxin ingestion, food poisoning Dysmenorrhea , Pregnancy (i.e. ectopic) Pelvic inflammatory disease, Testicular torsion, Ovarian torsion/cysts, Gastroenteritis, Constipation

PRESENTATION AND EMERGENT CONSIDERATIONS

- Acute pain lasts several hours to days
- While chronic pain can last from days to weeks to months.

RED FLAG SIGNS INCLUDE:

- Bilious vomiting
- Bloody stool or emesis
- Night time waking with abdominal pain
- Hemodynamic instability
- Weight loss

Evaluation of the Child with Vomiting

- Vomiting is a complex, coordinated reflex mechanism that may occur in response to a variety of stimuli and results in forceful expulsion of gastric contents.
- The differential diagnosis is not limited to the gastrointestinal tract and includes conditions that are pediatric emergencies.
- Assessment of the child with recurrent vomiting starts with a complete history, physical examination, and description of the vomits .

THE RED FLAGS OF AN ACUTELY PRESENTING CHILD WITH VOMITING

- Any child who has vomiting blood or bile or severe abdominal pain or abdominal signs needs immediate investigation in a hospital emergency room setting.

❖**OTHER RED FLAGS INCLUDE**:

- projectile vomiting
- abdominal distension, tenderness
- high fever
- persistent tachycardia or hypotension
- neck stiffness and/or photophobia.

GASTRO-OESOPHAGEAL REFLUX DISEASE(GERD)

- **GER** is defined as the effortless retrograde movement of gastric contents upward into the esophagus or oropharynx with or without regurgitation and vomiting.

-Most episodes of GER in healthy individuals last <3 minutes, occur in the postprandial period, and cause few or no symptoms.

- In contrast, **GERD** is present when the reflux of gastric contents causes troublesome symptoms and / or complications.

- GE reflux is common in young infants and usually resolves spontaneously by the age of walking.
- Infants, in particular, are predisposed to GER because they **have a short intra-abdominal esophagus and an immature LES.**
- Postprandial regurgitation, which ranges from effortless to forceful, is the most common symptom in infants with GE reflux.

CLINICAL MANIFESTATIONS

- Symptoms associated with GERD are quite vast
- However, within infants regurgitation is

the classic symptom.

- As the child becomes older, particularly within the second to third years of life, substernal or epigastric pain becomes the predominant presenting complaint of GERD.

C/M

Other symptoms associated with GERD vary and include:

- **Symptoms due to regurgitation** such as emesis and weight loss
- **Symptoms due to esophagitis** such as chest pain, irritability, feeding aversion, choking, gagging, anemia, hematemesis, and esophageal obstruction due to stricture
- **Respiratory symptoms** including pneumonia, wheezing, bronchospasm , apnea, cyanotic episodes, stridor, cough, hiccups, and hoarseness;
- **Neurobehavioral symptoms** including seizure-like events,

EVALUATION

- Barium radiography (Upper GI) allows for evaluation of whether anatomy is normal and is typically chosen in children with vomiting and dysphagia
- Endoscopy is also indicated in children whom the clinician suspects erosive esophagitis

Management

- Treatment of GERD has classically been divided into the following three discrete phases:

1) Lifestyle modification/Conservative therapy

2) Pharmacologic treatment

3) Antireflux surgery

Management

❖**Conservative Therapies**

- Towel on caregiver's shoulder
- Thickened feedings
- Enhances nutrition Smaller, more frequent feedings
- Some benefit Positional therapy-upright in seat, elevate head of crib or bed Prone positioning with head up.

Mgt cont’d

- **Pharmacologic treatment :** involves the use of cytoprotective agents including H2 receptor blockers, or proton-pump inhibitors (PPI).
- **Surgical intervention** is reserved for patients who fail aggressive medical therapy and continue to have life-threatening complications of reflux.

ETIOLOGY

- The cause of pyloric stenosis is unknown, but many factors have been implicated.
- Pyloric stenosis has been associated with eosinophilic gastroenteritis, trisomy 18.
- Abnormal muscle innervation, elevated serum levels of prostaglandins
- A deficiency in inhibitory neuronal signals, mediated by nitric oxide, may contribute to the pathogenesis of pyloric stenosis

Clinical manifestation

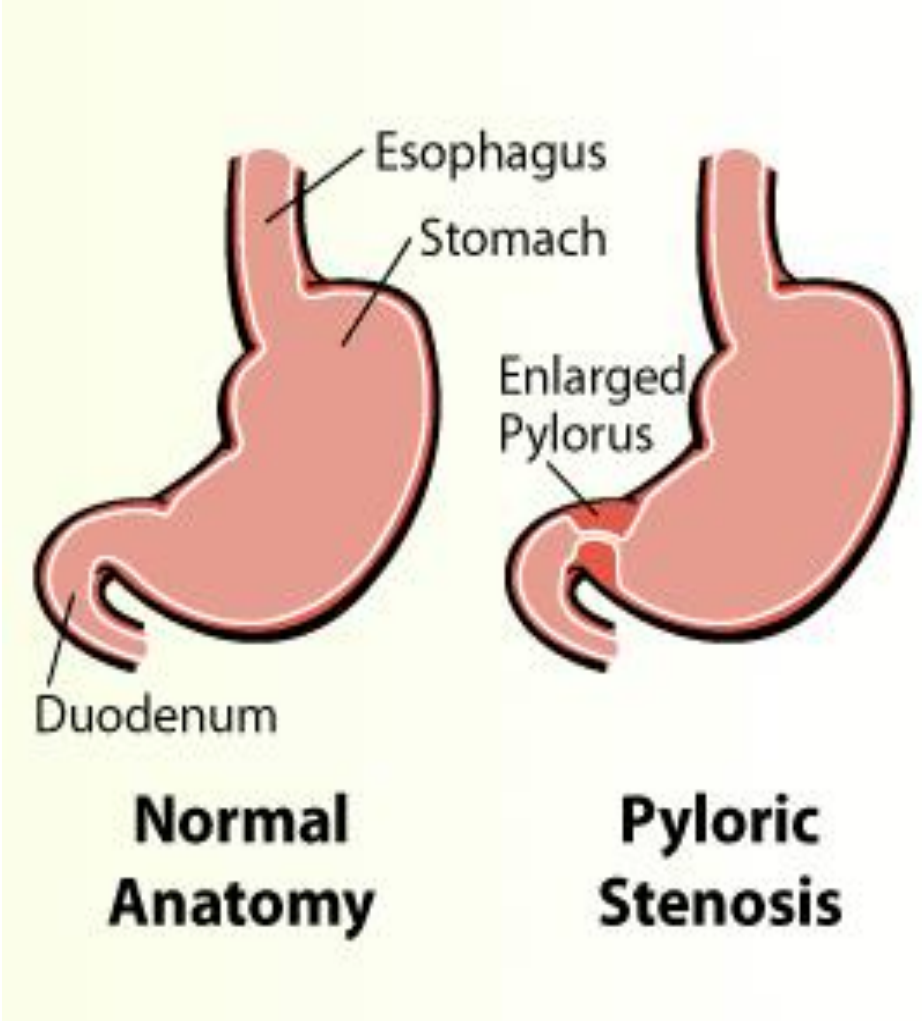
- Non-bilious vomiting is the initial symptom of pyloric stenosis.
- The vomiting may or may not be projectile initially but is usually progressive, occurring immediately after a feeding.
- Emesis may follow each feeding, or it may be intermittent. After vomiting, the infant is hungry and wants to feed again.
- Jaundice

c/m

- The stomach becomes massively enlarged with retained food and secretions, and gastric **peristaltic waves** are often visible in the left upper quadrant
- As the illness progresses the child becomes progressively thinner and more dehydrated.
- **Greater awareness of pyloric stenosis has led to earlier identification of patients with fewer instances of chronic malnutrition and severe dehydration.**

Pyloric Stenosis

- The classic presentation of IHPS is the three- to six-week-old baby who develops immediate postprandial, non-bilious, often projectile vomiting and demands to be re-fed soon afterwards (a "hungry vomiter").



Diagnosis

- Criteria for diagnosis include pyloric thickness >4 mm
- Ultrasound examination confirms the diagnosis in the majority of cases and allows an earlier diagnosis in infants with suspected disease.

TREATMENT

- Definitive management is surgical corrections
- Correcting the fluid volumes
- Correcting the electrolytes
- Feeding

ILEUS

- Ileus is the failure of intestinal peristalsis without evidence of mechanical obstruction.
- Ileus can be caused by:
- Systemic infections/Diseases
- Metabolic abnormalities,
- Anti-motility drugs

C/M

- Increasing abdominal distention, emesis, and initially minimal pain.
- Pain increases with increasing distention.
- Bowel sounds are minimal or absent,

Treatment of ileus

- Nasogastric decompression.
- Ileus after abdominal surgical procedures usually results in return of normal intestinal motility in 24–72 hr.
- Prokinetic agents such as metoclopramide can stimulate the return of normal bowel motility and be of assistance to children with prolonged ileus.

Adhesions

- Adhesions are fibrous bands of tissue that are a common cause of postoperative small bowel obstruction after abdominal surgery.
- The risk not well studied .
- Diagnosis and C/M
  - Abdominal pain,
  - constipation,
  - emesis, and
  - A history of intra-peritoneal surgery.
- Nausea and vomiting quickly follow the development of pain.

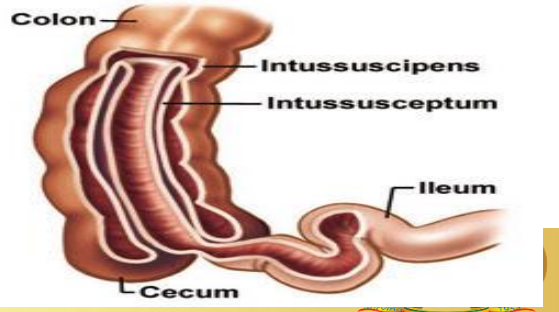
Adhesions

Treatment

- Patients with suspected obstruction should have
  - **Nasogastric decompression,**
  - **Intravenous fluid resuscitation, and**
  - **Broad-spectrum antibiotics in anticipation of surgery**.

INTUSSUSCEPTIONS

- Intussusception is the "telescoping" of a segment of proximal bowel (the intussusceptum) into downstream bowel (the intussuscipiens)
- It is the most common cause of intestinal obstruction between 3 mo and 6 yr of age.
- A few intussusceptions reduce spontaneously, but if left untreated, most will lead to intestinal infarction, perforation, peritonitis, and death.



- The proximal segment of bowel telescopes into the distal segment, dragging the associated mesentery with it.

Leads to the development of venous and lymphatic congestion with resulting intestinal edema, which can ultimately lead to ischemia, perforation and peritonitis.

CLINICAL MANIFESTATIONS

- Severe, crampy, progressive abdominal pain.
- Inconsolable crying, Guarding and knees drawing up
- Bloody stool
- Feedings are refused.
- Bilious vomiting
- **lethargy or altered consciousness**.

MANAGEMENT

- **Reduction of an acute intussusception is an emergency procedure and performed immediately after diagnosis in preparation for possible surgery**
- Therapy must begin with placement of an IV catheter and a nasogastric tube.
- Child must have adequate **fluid resuscitation** to correct the often severe dehydration caused by vomiting and third space losses.

Closed-Loop Obstructions

- Intestinal obstruction can be caused by defects in the mesentery (“internal hernias”) through which loops of small bowel may pass and become trapped.
- Symptoms
- bilious vomiting, abdominal distention, and abdominal pain. Peritoneal signs suggest ischemic bowel
- Supportive management includes intravenous fluids, antibiotics, and nasogastric decompression.
- Prompt surgical intervention is needed

APPENDICITIS

- Appendicitis is the most common surgical emergency in childhood.

POSITIONS OF APPENDIX

Right lower quadrant of the abdomen.

CLINICAL MANIFESTATIONS

- Visceral pain, localized to the periumbilical region.
- The pain localizes to the right lower quadrant.
- Nausea and vomiting
- Anorexia
- Diarrhea and urinary symptoms are also common,
- low-grade fever unless perforation has occurred

- Voluntary guarding is present initially, progressing to rigidity, then to rebound tenderness with rupture and peritonitis
- Rebound tenderness and referred rebound tenderness (Rovsing sign) are also consistent findings in acute appendicitis but not always present.
- Rectal examination when a pelvic appendix or abscess is suspected, or in adolescent females when ovarian pathology is suspected

MANAGEMENT

- Treatment of appendicitis is surgical.
- Simple appendectomy is curative if performed before perforation.
- With perforation, a course of postoperative IV antibiotics is required.
- Broad-spectrum coverage is necessary to cover the mixed bowel flora.

Read and take short note

- **Volvulus**
- **RECTAL PROLAPSE**
- **Acute Gastro Entritis**
- **ANORECTAL MALFORMATIONS**

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University of Gondar

Nervous system disorders

Objectives

At the end of this session you will be able to:

- Assess, diagnose and manage common nervous system problems in children

Anatomy and physiology

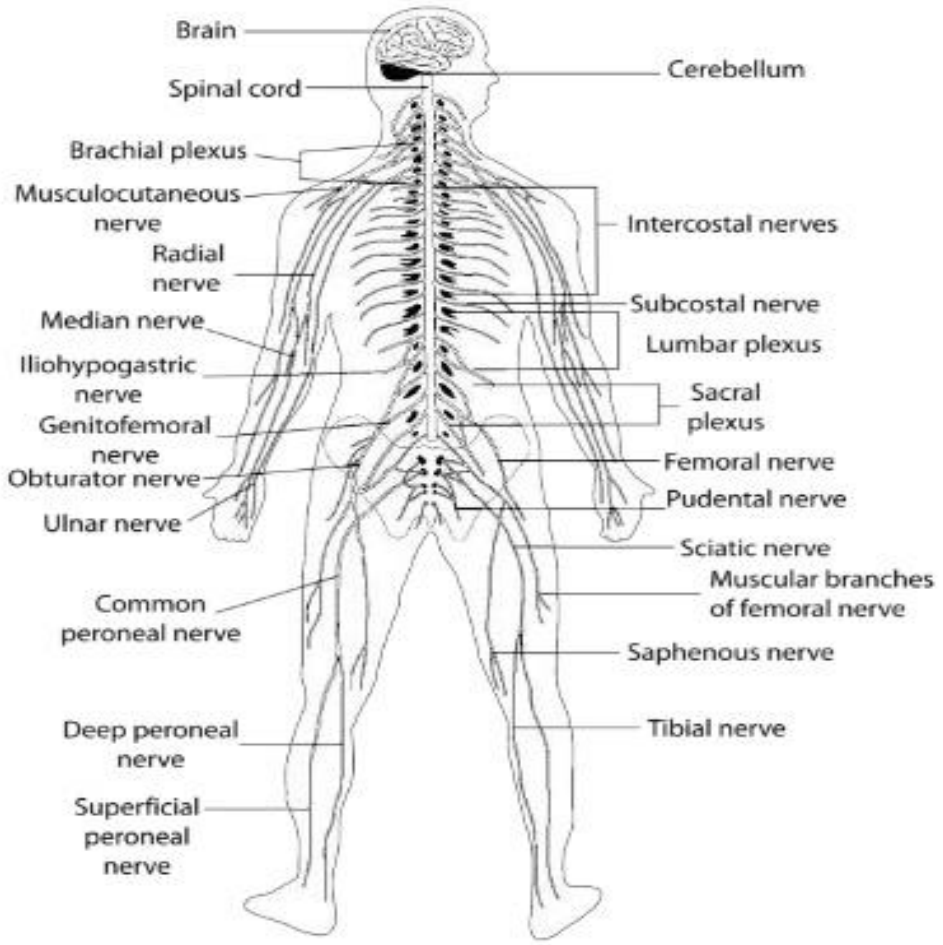
Organs

CNS:

- Brain
- Spinal Cord

PNS:

- Nerves



Functions

- Control and coordinates all parts of the body
- Receives stimuli from body's interior and from the external environment through the system.
- Determines the body's responses to these impulse-messages-through the motor system.
- Contains the human higher functions e.g. memory and reasoning.

MENINGITIS

INTRODUCTION

- **Meningitis**, inflammation of the meninges
- Caused by
  - bacteria
  - Virus
  - Fungus
- The most common bacterial infections

Age Group	Causes
Newborns	Group B ***Streptococcus, Escherichia coli***, *Listeria monocytogenes*
Infants and Children	***Streptococcus pneumoniae, Neisseria meningitidis***, *Haemophilus influenzae* type b
Adolescents and Young Adults	***Neisseria meningitidis, Streptococcus pneumoniae***

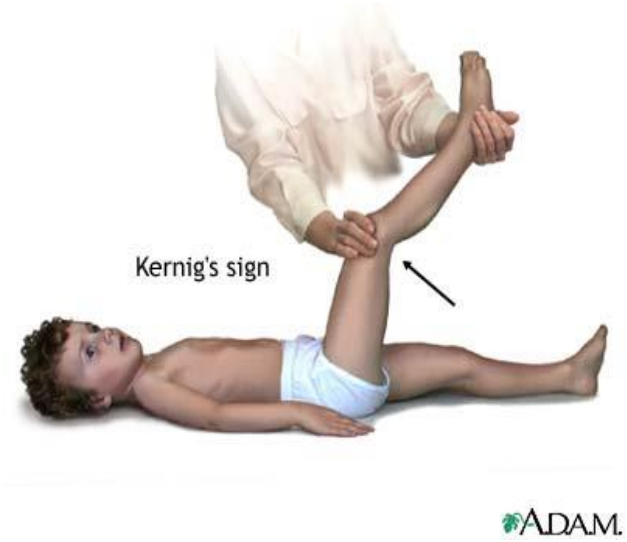
CLINICAL FEATURES

- Preceding upper respiratory tract symptoms are common.

Rapid onset is typical of *S. pneumoniae* and *N. meningitidis*.

- Fever
- Altered consciousness, irritability, photophobia
- Vomiting, poor appetite
- Seizures 20 - 30%
- Bulging fontanel 30%
- Stiff neck or nuchal rigidity
- Meningismus (stiff neck + Brudzinski + Kernig signs)

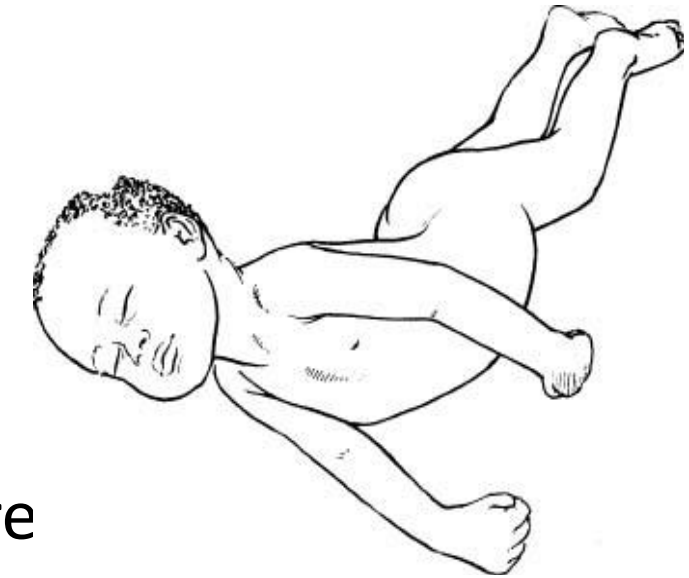
Clinical signs of meningeal irritation



CLINICAL FEATURES

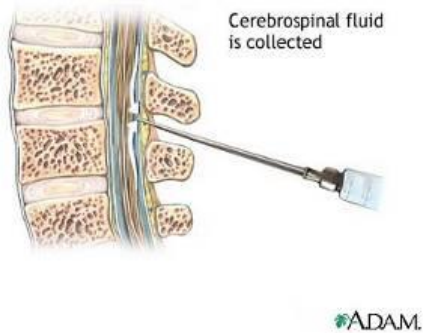
- In young infants, signs of meningeal inflammation may be minimal with only irritability, restlessness, depressed mental status, and poor feeding.
- Focal neurologic signs, seizures, arthralgia, myalgia, petechial or purpuric lesions, sepsis, shock, and coma may occur.
- Increased intracranial pressure is reflected in complaints of headache, diplopia, and vomiting.
- A bulging fontanel may be present in infants.

signs of raised intracranial pressure:



- Opisthotonus and rigid posture in any of the limbs or trunk
- unequal pupils
- Irregular breathing

Diagnosis – lumbar puncture



- **Contraindications:**
  - Respiratory distress (positioning)
  - ↑ ICP reported to increase risk of herniation
  - Cellulitis at area of tap
  - Bleeding disorder

CSF EVALUATION

Condition	WBC	Protein (mg/dL)	Glucose (mg/dL)
Normal	<7, lymphs mainly	5-45	>50
Bacterial, acute	100 – 60K PMN's	100-500	Low
Bacterial, part rx'd	1 – 10,000	100+	Low to normal
TB	10 – 500	100-500	<50
Fungal	25 – 500	25-500	<50
Viral	<1000	50-100	Normal

Consider tuberculous meningitis if:

- Fever persists for 14 days
- Fever persists for more than 7 days and there is a family member with tuberculosis
- chest X-ray suggests tuberculosis
- patient remains unconscious
- CSF continues to have moderately high white blood cell counts (typically, <500 white cells per ml, mostly lymphocytes), elevated protein levels (0.8–4 g/l) and low glucose levels (< 40 mg/dl).
- In children known or suspected to be HIV-positive, tuberculous or cryptococcal meningitis should also be considered.

TREATMENT

- If there is any suspicion, treat immediately with antibiotics before the results of laboratory CSF examination are available.
- If the child has signs of meningitis and a lumbar puncture is not possible, treat immediately.

Antibiotic treatment

- Give antibiotic treatment as soon as possible. Choose one of the following two regimens:
- Crystalline penicillin loading dose of 250,000IU/ kg IV. Stat followed by 500,000IU/kg/24 hours IV divided in 8 doses (Q3hourly) **PLUS**
- Chloramphenicol, 50 mg/kg IV stat followed by 100mg/kg/day IV Q6 hourly .
- Duration of treatment depends on the etiology but in general course of treatment ranges between 10-15 days.

- Haemophilus Influenza B: Chloramphenicol, 100mg/kg/day i.v. Q6hourly for 10 days
- Pneumococcus : penicillin G 500,000IU /kg/day i.v. Q 3 hourly for 14 days
- Meningococcus: penicillin G 500,000IU /kg/day i.v. Q 3hourly for 7 days OR
- Ceftriaxone, 100mg/kg IV , in two divided doses for 10 days for all cases
- Adjunct therapy: Dexamethasone, 0.6mg/kg/day div Q6 hours for two days.

SUPPORTIVE CARE

- Examine all children with convulsions for hyperpyrexia and hypoglycemia.

❖ In unconscious child:

- Maintain a clear airway.
- Nurse the child on the side to avoid aspiration of fluids.
- Turn the patient every 2 hours.
- Do not allow the child to lie in a wet bed.
- Pay attention to pressure points.

Fluid and nutritional management

- Give half to two third of the daily fluid requirement.
- Monitor IV fluids very carefully and examine frequently for signs of fluid overload.
- Fluid restriction is not appropriate in the presence of systemic hypotension because reduced blood pressure may result in reduced cerebral perfusion and CNS ischemia.
- Feed the child as soon as it is safe.
- Breastfeed every 3 hours, if possible, or give milk feeds of 15 ml/kg if the child can swallow.
- Continue to monitor the blood glucose level and treat accordingly, if found to be <2.5 mmol/ litre or <45 mg/dl.

- **Hypoglycaemia**
- Give 2 ml/kg of 10% glucose (dextrose) solution IV rapidly.
- Recheck the blood glucose in 30 minutes and if the level is low (<2.5 mmol/litre or <45 mg/dl), repeat the glucose (2ml/kg)
- Prevent further hypoglycaemia by feeding; where possible
- **Convulsions -** If convulsions occur, give anticonvulsant treatment with rectal diazepam.

COMPLICATIONS

- Neurologic complications include seizures, increased ICP, cranial nerve palsies, brain abscess, hydrocephalus, stroke, herniation and subdural effusion.
- Sensorineural hearing loss is the most common sequelae of bacterial meningitis.
- Other common sequelae include mental retardation, seizures, and delay in the acquisition of language and visual impairment.

PREVENTION

- Routine **immunizations** against Hib and *S. pneumoniae* are recommended for children beginning at 2 months of age.
- Vaccines against *N. meningitidis* are recommended for young adolescents and college freshmen as well as military personnel and travelers to highly endemic areas.
- **Chemoprophylaxis** is recommended for close contacts of *N. meningitidis* infections and the index case and for close contacts of Hib and the index case; rifampin, ciprofloxacin, or ceftriaxone is recommended

Thank you

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University of Gondar

Immunizations

Kendalem Asmare

Lecturer of Pediatrics and Child Health Nursing

Introductions

- What is immunizations?
- What do you think is the importance of immunization?
- Do you have an experience of vaccinations?

Learning objectives

At the end of this sessions you will be able to:

- Define immunizations
- Understand the target diseases of immunizations.
- Explain the delivery strategies of immunizations
- Identify the schedule of immunizations
- Realize the concepts and rates of immunizations
- Describe the principles (care of vaccine/cold chain monitoring)

Immunizations

- **Immunity:-**
- **Immunization:-**
- **Vaccines: -**

Target diseases EPI to immunization

❖

- tuberculosis
- measles
- poliomyelitis
- diphtheria
- pertusis /whooping cough
- tetanus
- hepatitis -B
- heamophillus influenza type B
-Rota virus
-pneumonia

Contact	Vaccine	Age of child
• 1st vaccination	Polio-o & BCG	at birth
• 2nd. Vaccination	DPT1-HepB- Hib PCV -1& polio-1 Rota.v1	6wks
• 3rd Vaccination	DPT2-HepB- Hib PCV-2& polio-2, Rota .v2	10 wks.
• 4th vaccination	DPT3-HepB- Hib PCV-3 & polio-3	14 wks.
• 5th vaccination	Measles	9 month

Immunization Delivery strateges .

- **There are “4” types of vaccination delivery strategies.**

1. **Static site: -** vaccination is given at the health facility.
2. **Out reach -** the health staffs of the health unit go out & administer vaccine to the mothers & children in their catchments area.

Cont…

3.Mobile - used in a single doss of vaccination.

- **used to control epidemic / such as meningitis & measles/**

4. Campain -

- Increase and sustain high immunization coverage rates
- Increase the quality of immunization services
- Reduce missed vaccination opportunities and trace defaulters

- Improve public awareness and community participation in immunization programmes

- Ensure prompt reporting and improved control of vaccine-preventable diseases.

Types of vaccine

(micro organism) e.g. pertussis

e.g. measles, BCG, polio.

The organism in these vaccine are weakened so that no harm /no infected/ the child, rather than stimulate the child to produce Ab.

e,g. Diphtheria & tetanus.

are harmless substances w/h are made from the toxins (Poisons) of bacteria.

-

- All <1 years of children &
- All women of child bearing age (15-49) years.

- BCG scar
- Immunization card.

Contra indication (C/I)

Dose & route of administration of vaccine

BCG	<1yr=0.05 >1yr=0.1ml	One	I.D	right upper arm	-Local inflammation or deep abscess.
Polio	2drops	4	Orally	Mouth	-Usually none
Penta PCV	0.5 ml	3	I.M	Anterior-thigh	-Fever -Local swelling -Convulsion
Measle	0.5 ml	One	SC.	left upper arm	-Fever &Rash

Contact	Minimum interval	Duration of protection	S/E (Side effect)
TT1	At the 1st contact during pregnancy or all women child bearing age (15-49)	0	-Pain -Redness -Swelling a few days at the injection.
TT2	At least 4wks after TT1	3 Years	
TT3	A t least 6 month after TT2	5 Years	
TT4	at least 1 year's after TT3	10 Years	
TT5	at least 1 yr after TT4	Life long years	

- Vaccine can easily damage if not handle properly.
- If the vaccine is in good condition, and able to make a child immune is
- If vaccine is damaged, and not able to make a child immune, then it has lost its potency.
- Vaccine has an expiry date.

- Heat and sunlight damage all vaccine, but (live vaccine) most sensitive
- Freezing damage DPT and TT vaccine.
- Keep all vaccine at the correct cold temp.
- If vaccine once damaged, you can’t make potent it again.
- Chemicals (disinfectant, soap) e.t.c can damage the vaccine.

Temperature

Polio-Vaccine

- It is freeze dried.
- To use the vaccine, mix the dry vaccine with diluent’s water.
- This is called reconstituting the vaccine.
- is easily damaged by heat.
- Reconstituted vaccine losses its potency very quickly, you must use it in same immunization session, or throw it out.

BCG-Vaccine.

DPT-HepB + Hib and TT Vaccine

- **Are liquid vaccine**

a. All vaccine to be stored at +2c^0 to 8c$^{0.}$

b. Vaccine storage time at health center is up to 1 month.

c. measles & polio be kept frozen.

d. Never freeze DPT or tetanus vaccine.

E. Keep diluents in refrigerator.

Or diluents must never be frozen.

is an equipment that ensure vaccine potency by keeping vaccine cold from the manufacturer to the mother /child?

-Thermo-meter -Cold boxes

-Refrigerator -Ice packs

-Vaccine carriers

- Check the temperature twice daily at the morning & evening.
- Manufacturer ➔national airport ➔ central vaccine stores ➔ regional store ➔ zonal stores ➔ district - health center ➔ health post or child & mother.

COLD CHAIN con,t…

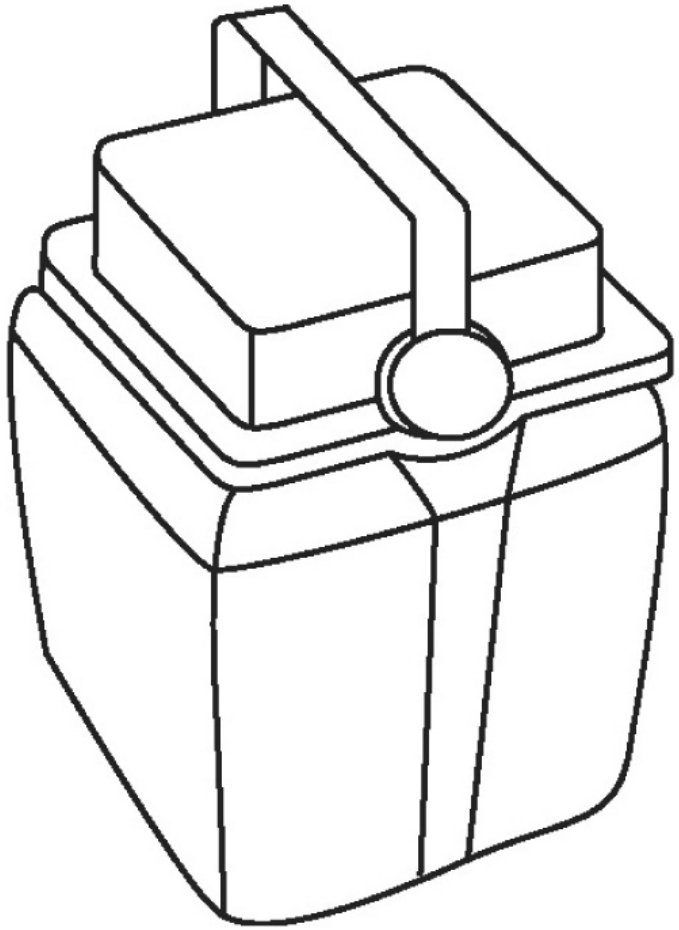
Cold box:

COLD CHAIN con,t…

- Similar definition Like cold boxes.
- They are smaller than cold boxes and are easier to carry if walking.
- But they do not stay cold as long as a cold box – maximum for 48 hours with the lid closed.
- Vaccine carriers are used to transport vaccines and diluents to outreach sites immunization sessions.

- Vaccine carriers are also used to store vaccines when the refrigerator is out of order or is being defrosted.

Figure-B: Vaccine carrier



COLD CHAIN con,t…

Ice-packs

- Ice-packs are flat, square plastic bottles that are filled with water and frozen.
- Ice-packs are used to keep vaccines cool inside the vaccine carrier or cold box.
- The number of icepacks required for a cold box or vaccine carrier varies.

Figure-C: Ice-packs

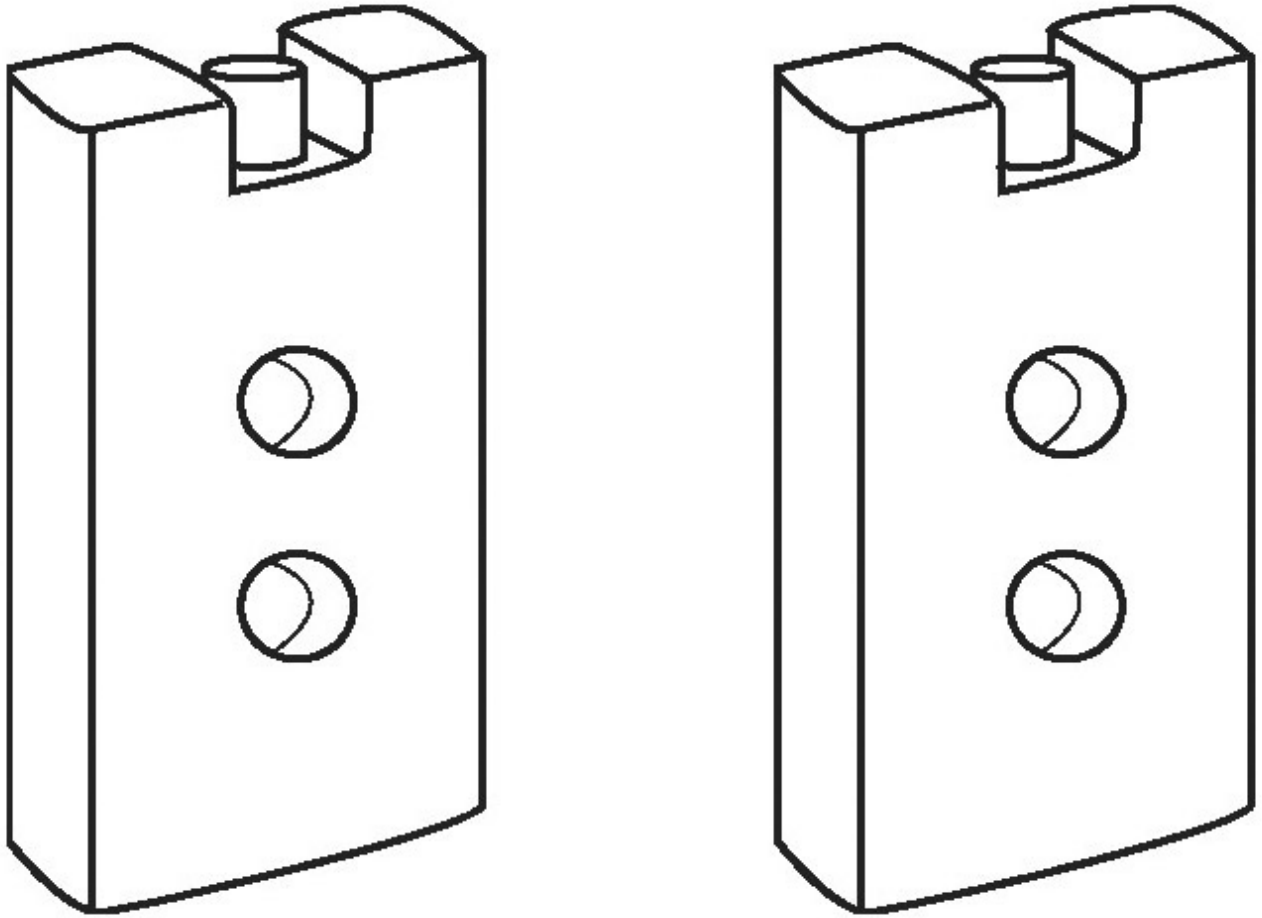
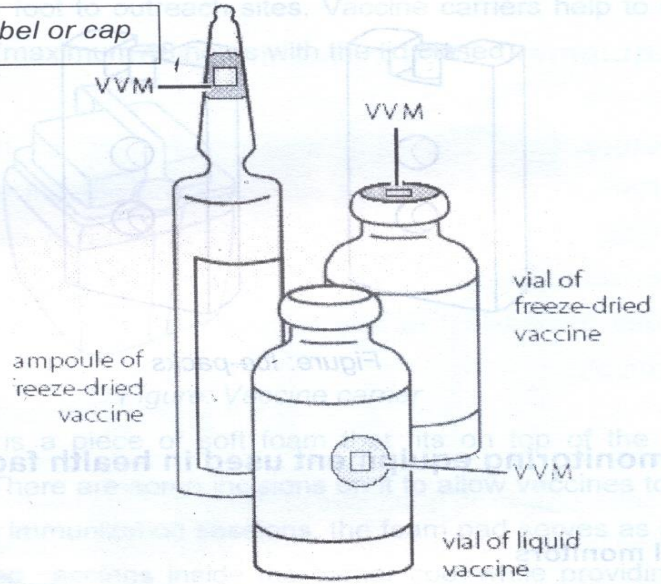


Figure: VVM on vial label or cap



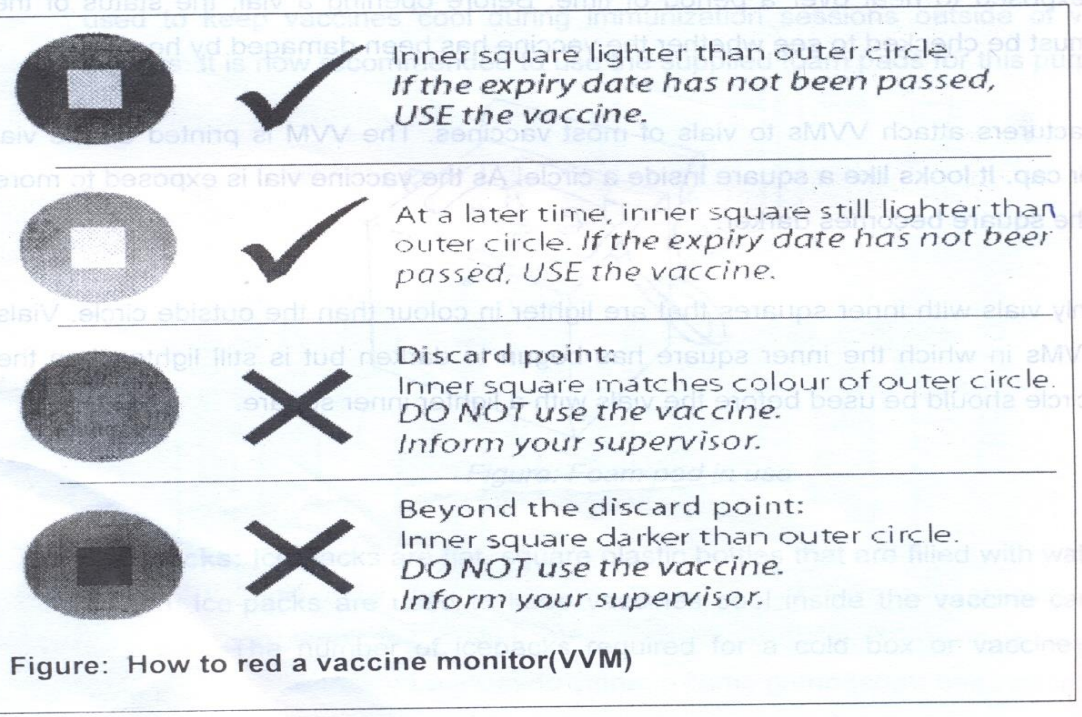
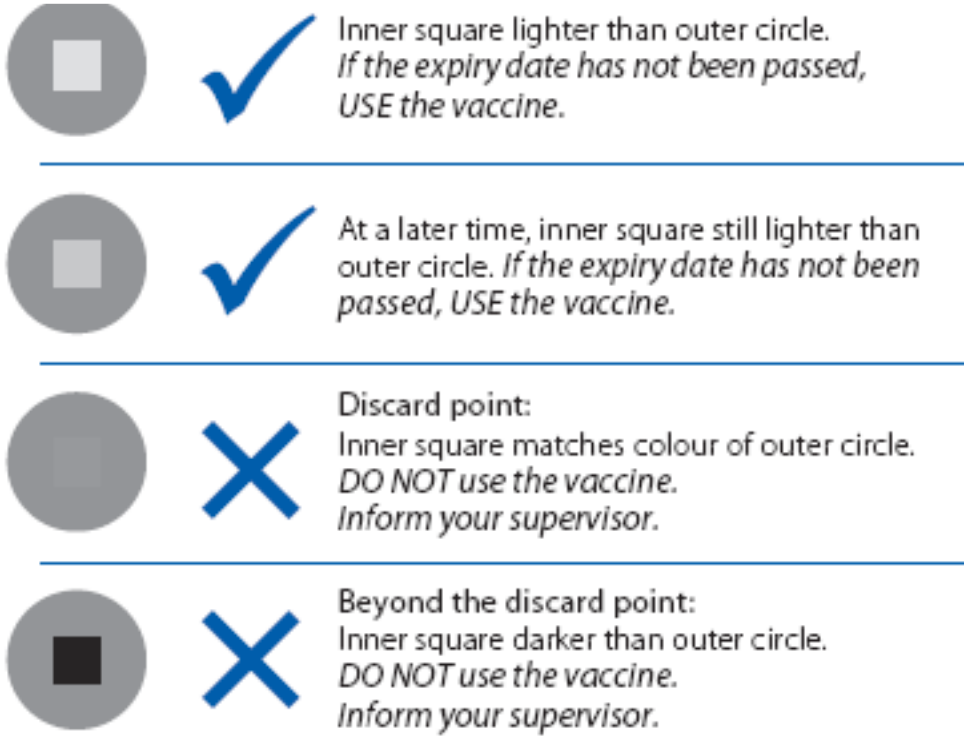


Figure: How to red a vaccine monitor(VVM)

VVL con’t…


Inner square lighter than outer circle.
If the expiry date has not been passed, USE the vaccine.
At a later time, inner square still lighter than outer circle. If the expiry date has not been passed, USE the vaccine.
Discard point:
Inner square matches colour of outer circle.
DO NOT use the vaccine.
Inform your supervisor.
Beyond the discard point:
Inner square darker than outer circle.
DO NOT use the vaccine.
Inform your supervisor.

Cold chain monitoring equipment
Cont…

Cont…

Time of observation:	Not frozen vaccine	A suspected frozen vaccine.

Cont…

- **N.B - Don't take out the vaccines from the refrigerator until the vaccine carrier is ready.**
- **Don't let DPT & TT vaccines touch the ice /cover them with news paper./**

- Arranging the flow of mothers & children
- registering
- weighting
- health education on immunization
- screening clients
- treating clients
- immunization

Vaccine supply period

Examples...

- **Central cold store…… 6 months**
- **Regional cold store…. 3 months**
- **District cold store……. 1 month**
- **Health center……. 1 month**
- **Health post…….. 1 week**

Looking vaccine at H.C refrigerator.

1.Load and use the refrigerator correctly.

a. In the main compartment store vaccine

-OPV & measles at the top shelf.

-BCG-At the middle comportment.

-Diluents, DPT & TT at the lower compartment

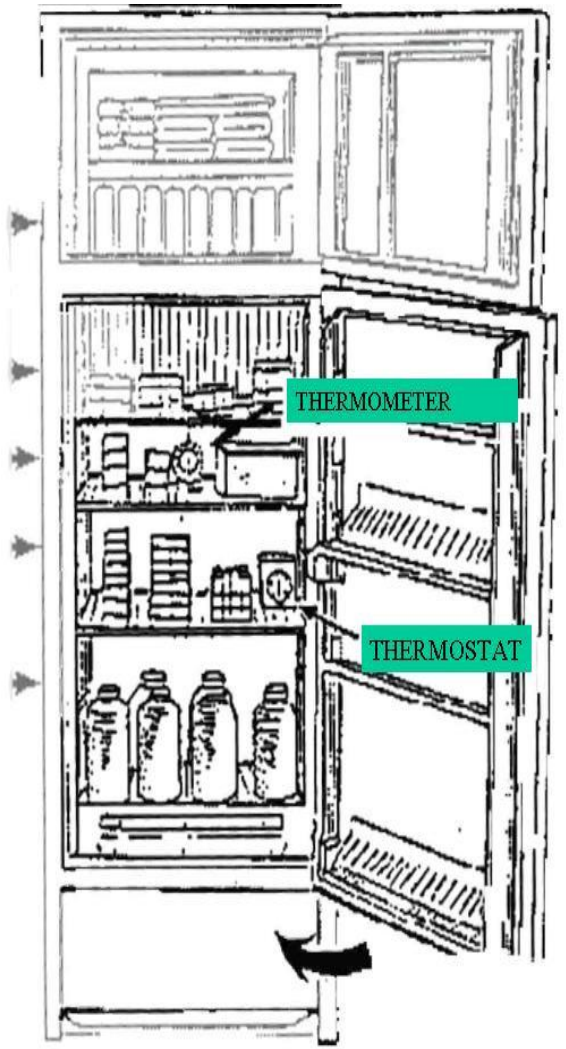
-Bottle of water at 4th comportment if the refrigerator consists 4 comportment.

-The freezing compartment “freezer” used to make ice packs, hence it’s Tc^0 should be $<0c^0$.

Arranging Vaccine in the CC

Vertical refrigerators:

- Top: Ice packs
- Shelf 1: Live viral vaccines (OPV, Measles)
- Shelf 2: BCG, returned vials of other antigens
- Shelf 3: Penta, TT on lowest shelf away from freezer space
- Bottom: Water bottles
- Diluents: next to its vaccine or clearly marked



Loading top-opening (chest) refrigerators

- All the vaccines should be stored in the basket provided with the refrigerator

1. Measles, BCG and OPV in the bottom only; and

2. Freeze-sensitive vaccines (DTP, TT, hepB, DTP-hepB, Hib, DTP-hepB+Hib,

Meningococcal and yellow fever, vaccines) in the top only.

Calculation of target population & EPI coverage

- Target population /children under one years old/:
- Their proportion depends on the available recent demographic data of the area e.g. if it is k %
- yearly target children = total population X k/100
- monthly target children = yearly target children / 12

- Immunization coverage with specific vaccine. e.g.DPT1

-Monthly coverage =No of children who received

$$\frac{\text{DPT1 the specific month}}{\text{target popun for the month}} \times 100$$

-Annual coverage = No of children who received

$$\frac{\text{DPT3 in the specific year}}{\text{target popun for the year}} \times 100$$

Dropout: - a child or women who failed to return for subsequent doses of vaccine Possible cause of dropout.

1. Unsure date of return.
2. Long wait at the vaccination center.
3. Failure to explain the need of completing vaccination.
4. Negative attitude of H.W to words the program.
5. Mother usually busy. e.t.c.

Possible cause of dropout Cont…

$$\text{DROP OUT RATE} = \frac{\text{DTP1} - \text{DTP3}}{} \times 100$$

Drop out rate calculation con’t…

problem when ever the drop out rate is > 10%.

- All children & mothers at health facility for any reason should be screened for immunization status & vaccinated if eligible. If not vaccinated these eligible called Missed opportunities.

- Lack of Acceptability
- Health worker (H.W) screen but tell pt,s to return later.
- H.W only open avail if there are enough client.
- logistical problem

- * Drop out & missed opportunities are the major cause of low vaccination coverage.

-Social mobilization

-Drop out tracing mechanisms.

-Get commitment by the local leaders.

-Monitoring & supervision the program.

- In service training to community H.w.

-Ensure financial & logistic support for the health institutions.

Thank you

Malnutrition in children

OVERVIEW OF MALNUTRITION

WHO

defines malnutrition as

"the cellular imbalance between supply of nutrients & energy and the body's demand for them to ensure growth, maintenance, and specific functions".

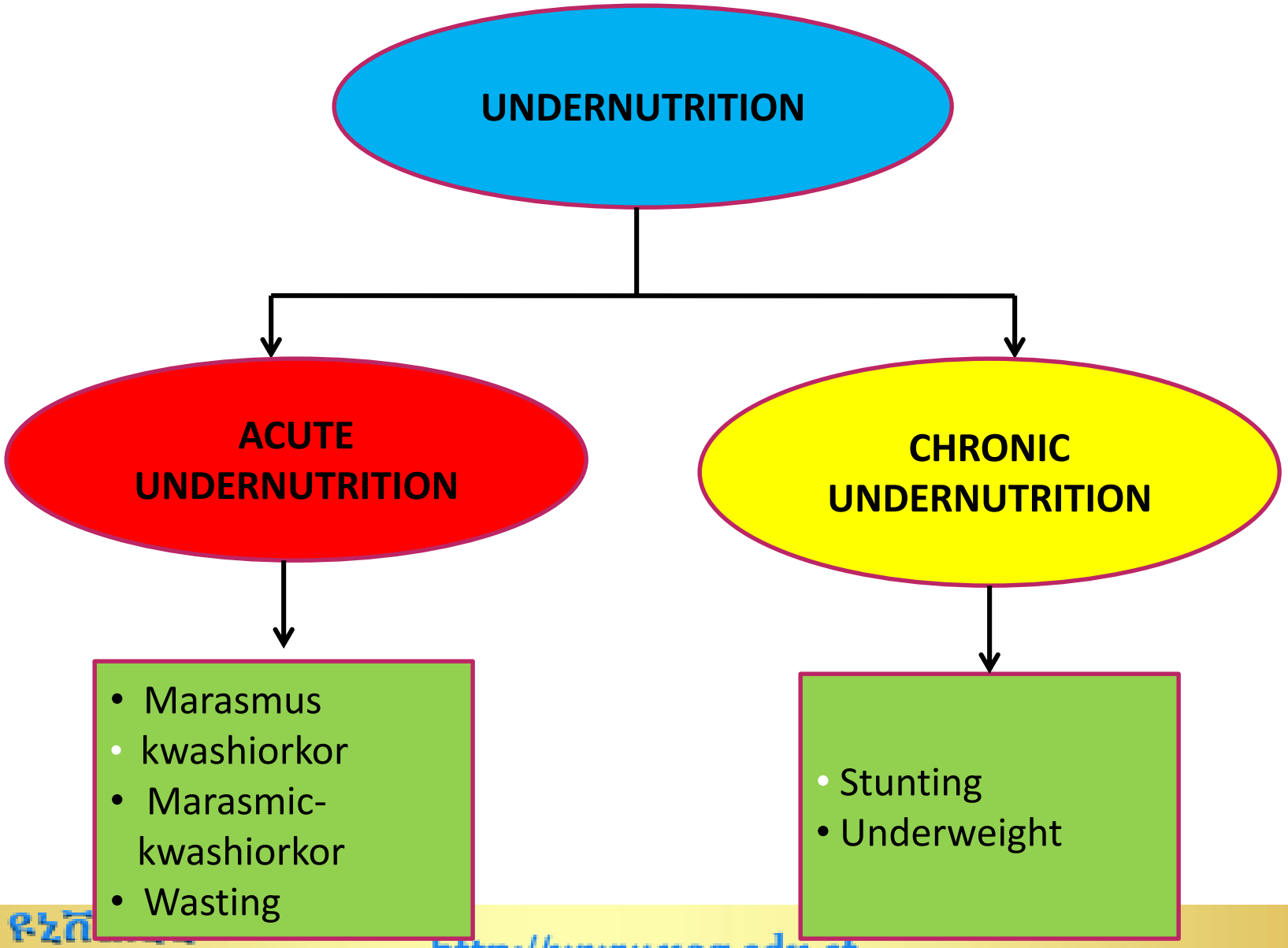
Malnutrition includes:

- Macronutrient deficiency
- Micronutrient deficiency (**Hidden Hunger**)
- Over nutrition-obesity

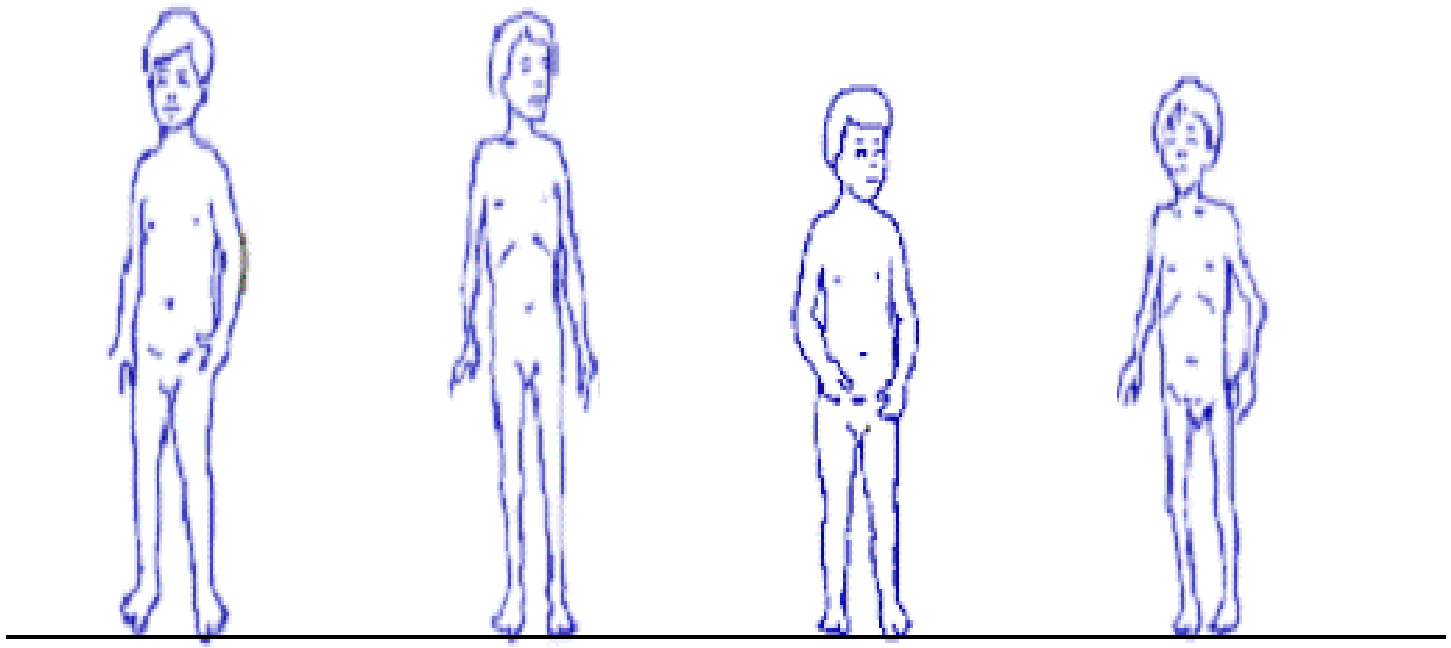
Best assessed by weight & height

Majority of PEM is 'hard to see'

TYPES OF UNDERNUTRITION



PROTEIN-ENERGY MALNUTRITION



Normal
Normal weight and height

Wasted
Thinner than normal

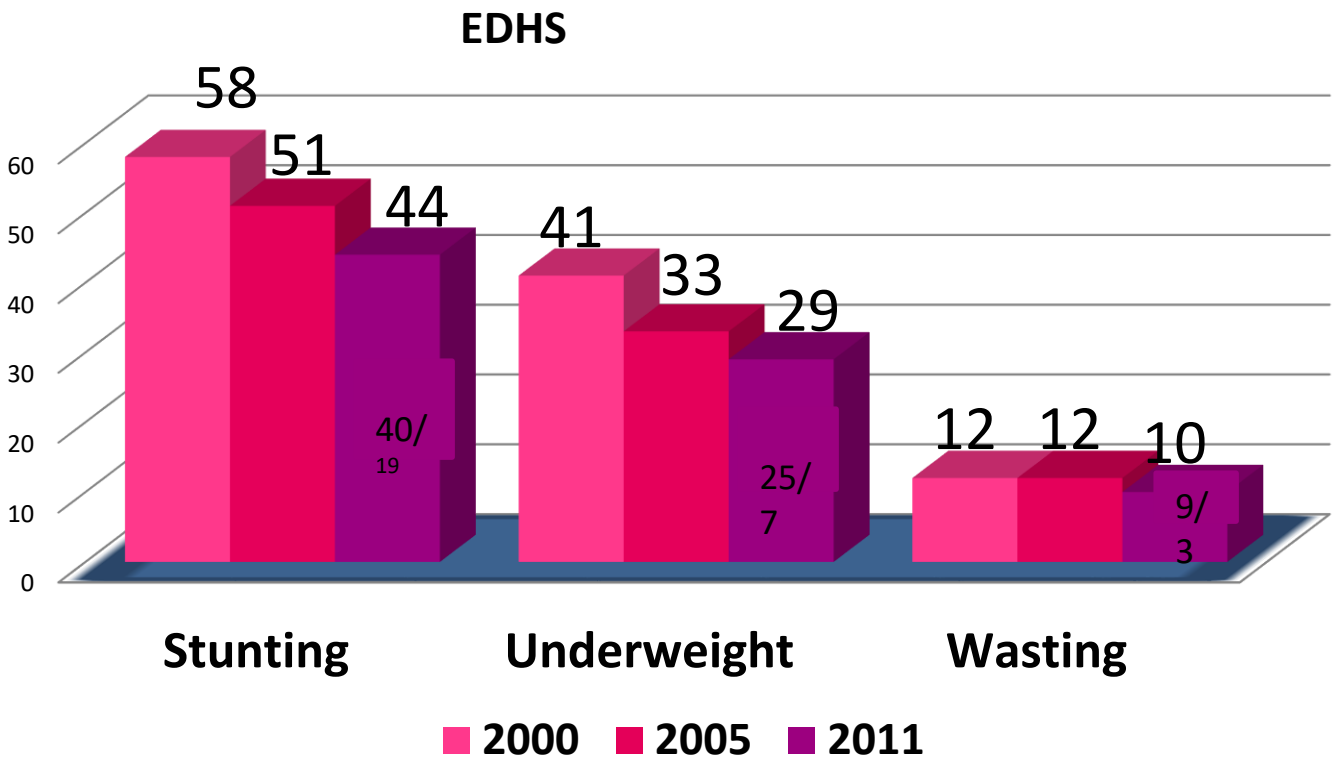
Stunted
Shorter than normal

Wasted and stunted
Thinner and shorter than normal

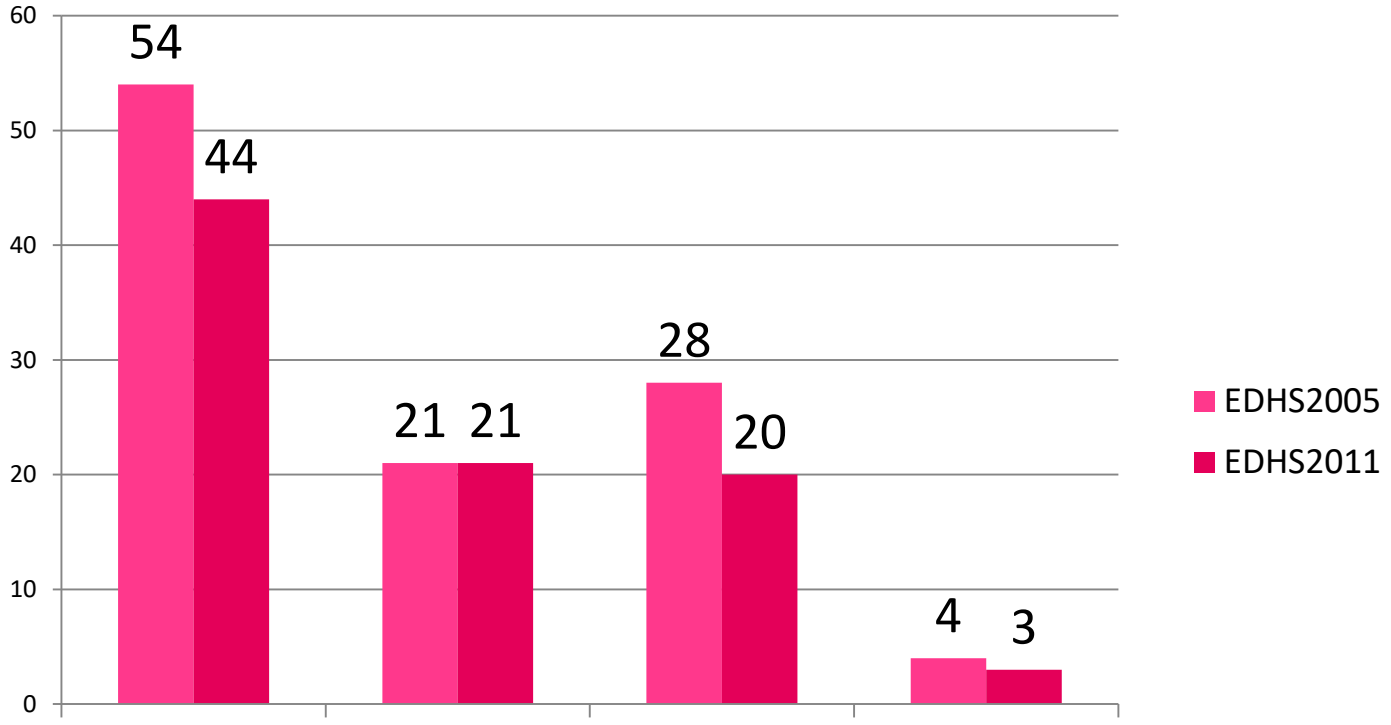
EPIDEMIOLOGY

- The majority of world's children live in developing countries
- Highly prevalent in developing countries
- All children with PEM have micronutrient deficiency.

Trends in Children's Nutritional Status



Trends in Anaemia Status among Children 6-59 Months



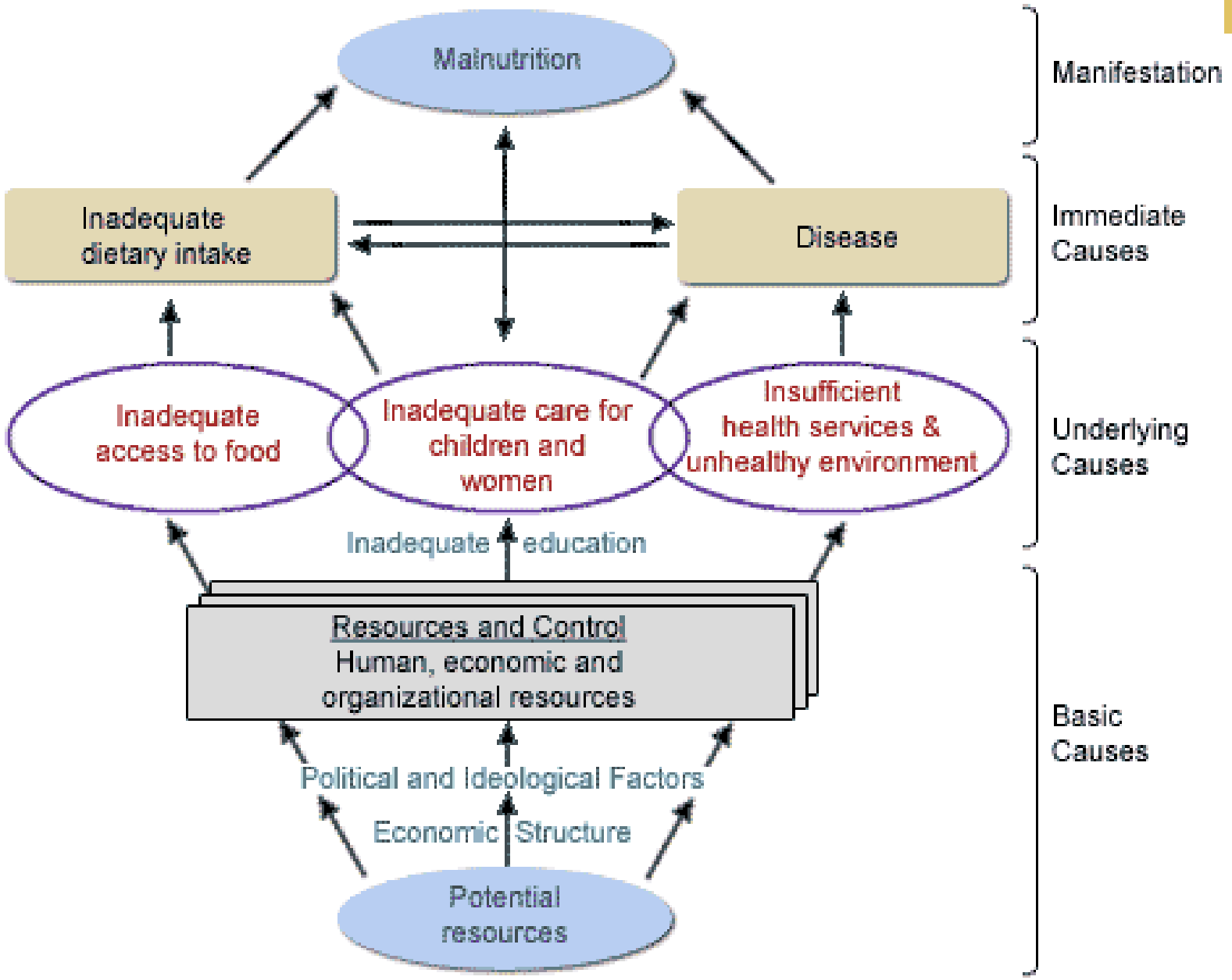
11	10-10.9	7-9.9	<7

DETERMINANTS OF CHILD MALNUTRITION

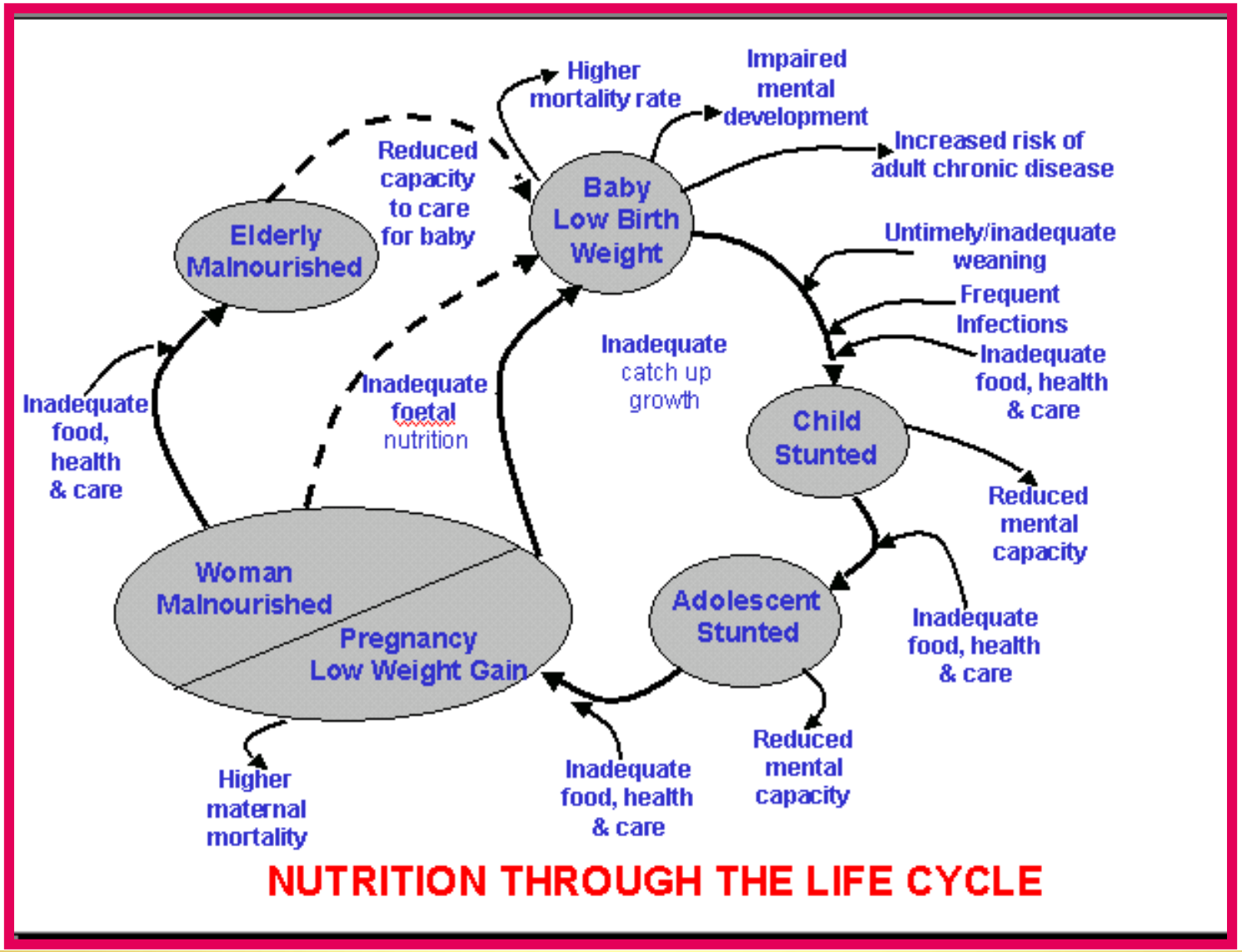
General Understanding:

- No Single cause:
- Can have many causes

Whether acute or chronic has multiple causes that usually **work in conjunction, and reinforcing** each other.


Malnutrition
Inadequate dietary intake
Disease
Inadequate access to food
Inadequate care for children and women
Insufficient health services & unhealthy environment
Inadequate education
Resources and Control
Human, economic and organizational resources
Political and Ideological Factors
Economic Structure
Potential resources
Manifestation
Immediate Causes
Underlying Causes
Basic Causes

Intergenerational link of malnutrition



Source: UNICEF

Abnormal Physiology in Malnutrition

- The malnourished child has abnormal physiology that has implications for case management.
- With severe malnutrition, the physiological systems **slow down or 'shut down'** and do less to allow for survival on **limited nutrients**.
- This slowing down of the systems is called **reductive adaptation.**

Metabolic changes

- The immediate effect of inadequate intake in a child will be: **to slow or stop growth**, so that protein and energy can be used for maintenance of the existing tissue.
- If the energy deficit is so severe that energy balance cannot be maintained there will be a loss of body tissue, the child became lean, this in turn difficult to provide substrates to maintain the metabolism of the remaining cells

Metabolic changes cont’d

- Thus chronic malnutrition results in slow growth, and can be detected by measuring height for age, with low values being classified as stunting.
- More acute malnutrition will tend to cause a decrease in weight for height, and this is classified as wasting.
- In extreme cases malnutrition leads to the syndromes known as marasmus and kwashiorkor.

Metabolic changes cont’d

LIVER

- Gluconeogenesis is reduced, with high risk of hypoglycemia during infection.
- Synthesis of all serum proteins are reduced including complements – and coagulation factors
- There is immune dysfunction and risk of coagulopathy.

Liver function

- Capacity of liver to take up, metabolize and excrete toxins is severely reduced.
- Energy production from galactose and fructose is much slower than normal.
- Bile secretion is reduced.

Metabolic changes cont'd

ENERGY

- Decreased intake yields decreased activity
  - Decreased play and physical activity
- Mobilization of body fat, weight loss,
  - Subcutaneous fat
  - Muscle wasting
- Muscle function is impaired, loss of respiratory muscle leading to impaired ability to cough and thus increased susceptibility to respiratory infections.

Changes in cardiovascular system

- Children with severe PEM have a smaller and thinner heart and the contractile force of the heart is **reduced** and thus the stroke volume and cardiac output.
- The inability of the kidneys to adequately excrete excess fluid and sodium in marasmic-kwashiorkor and kwashiorkor also adversely affects the heart
- Any increase in blood volume (e.g. following large volume feeds, fluid therapy intravenously or orally, or high salt diet) Easily produce **acute heart failure**.

Gastro-intestinal system

- Production of gastric acid is reduced.
- This allows bacterial evasion of the acid barrier. Intestinal motility is reduced.
- This is made worse by potassium and magnesium deficiencies which, in severe cases, can lead to ileus.
  - Poor absorption of lipids, and sugars
  - Decreased enzyme and bile production
  - Increase incidence of diarrhea, and bacterial overgrowth

Gastro-intestinal system…

- Intestinal motility is reduced.
- Pancreas is atrophied and production of digestive enzymes is reduced.
- Small intestinal mucosa is atrophied; secretion of digestive enzymes is reduced.
- Absorption of nutrients is reduced.

Changes in renal function
Genitourinary system

- Glomerular filtration rate and renal blood flow are diminish.
- Capacity of kidney to excrete excess acid or water load is greatly reduced
- Sodium excretion is reduced.
- High salt diet and large volume feeds or fluids can easily lead to plasma expansion that can

  tip the child into **acute heart failure**.

Cellular Ionic Transport

- The sodium-potassium Transport pump is severely depressed leading to intracellular sodium accumulation and loss of potassium from the body.
- The latter is made worse:

  by hypo- magnesenaemia that is associated with

PEM

Skin, Muscles, Exocrine glands

- The skin and subcutaneous fat are atrophied which leads to loose folds of skin and sunken eyes
- Many exocrine glands including the sweat, lacrimal (tear), salivary, and pancreatic glands are atrophied
- Many signs of dehydration (decreased skin turgor, dry oral mucosa, absent tears, sunken eyes) are unreliable in the severely malnourished child.

Immune System

- All aspects of immunity are diminished.
- Cell-mediated immunity is depressed, IgA secretions are reduced, phagocytosis is impaired, lymph glands, tonsils and thymus are atrophied.

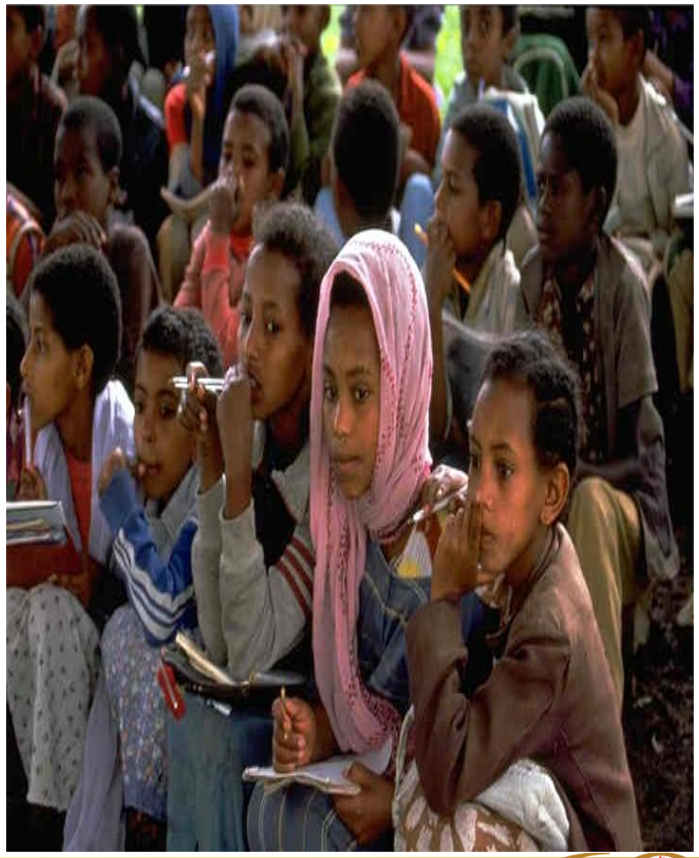
- Tissue damage does not result in inflammation or migration of white cells to the affected area.

- Typical signs of infection like fever are frequently absent.
- Relying on the presence of fever to suspect infection could therefore be **misleading.**

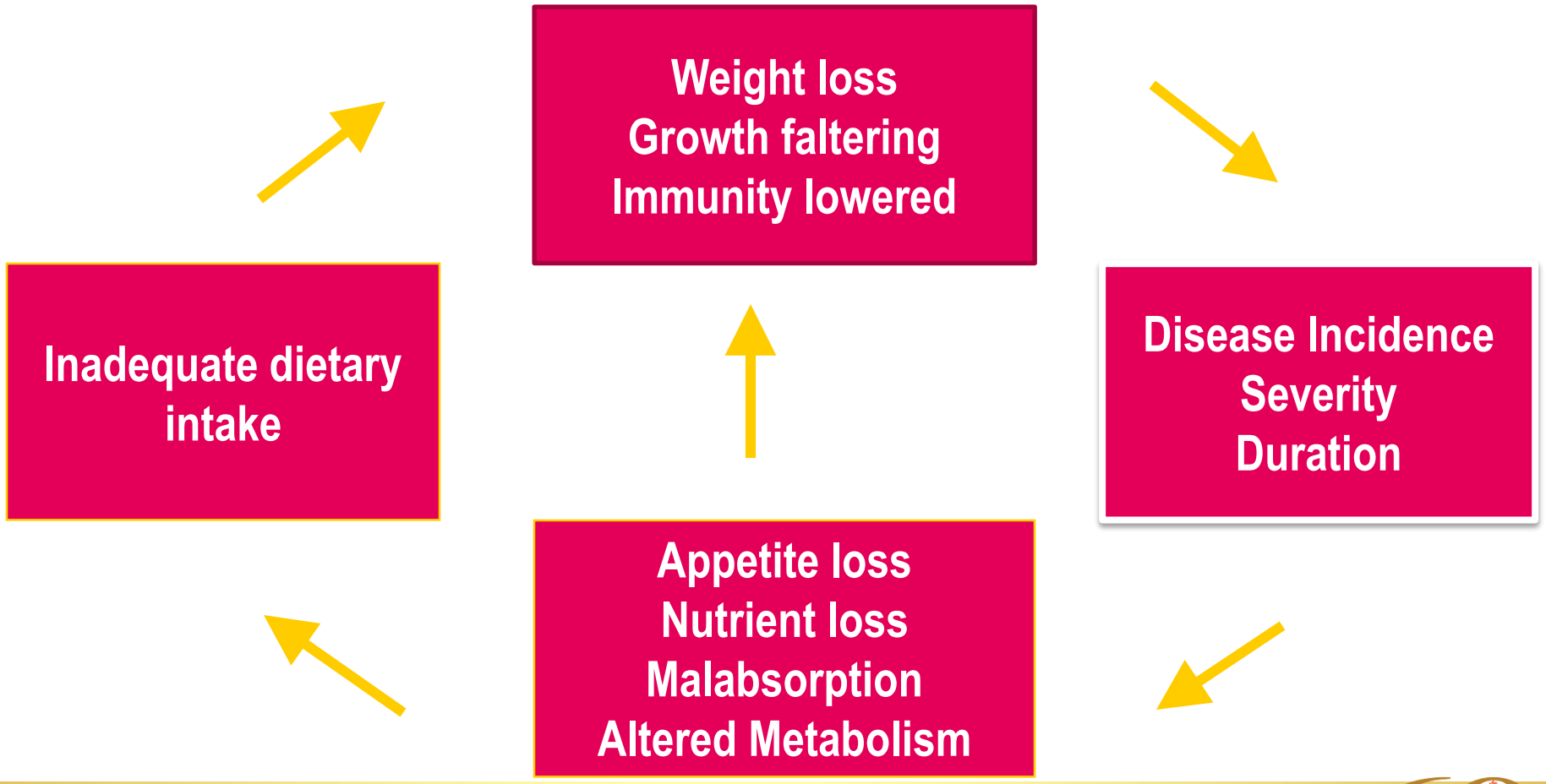
Effects on brain development

Malnutrition negatively effects brain development causing delays in motor and cognitive development, such as:

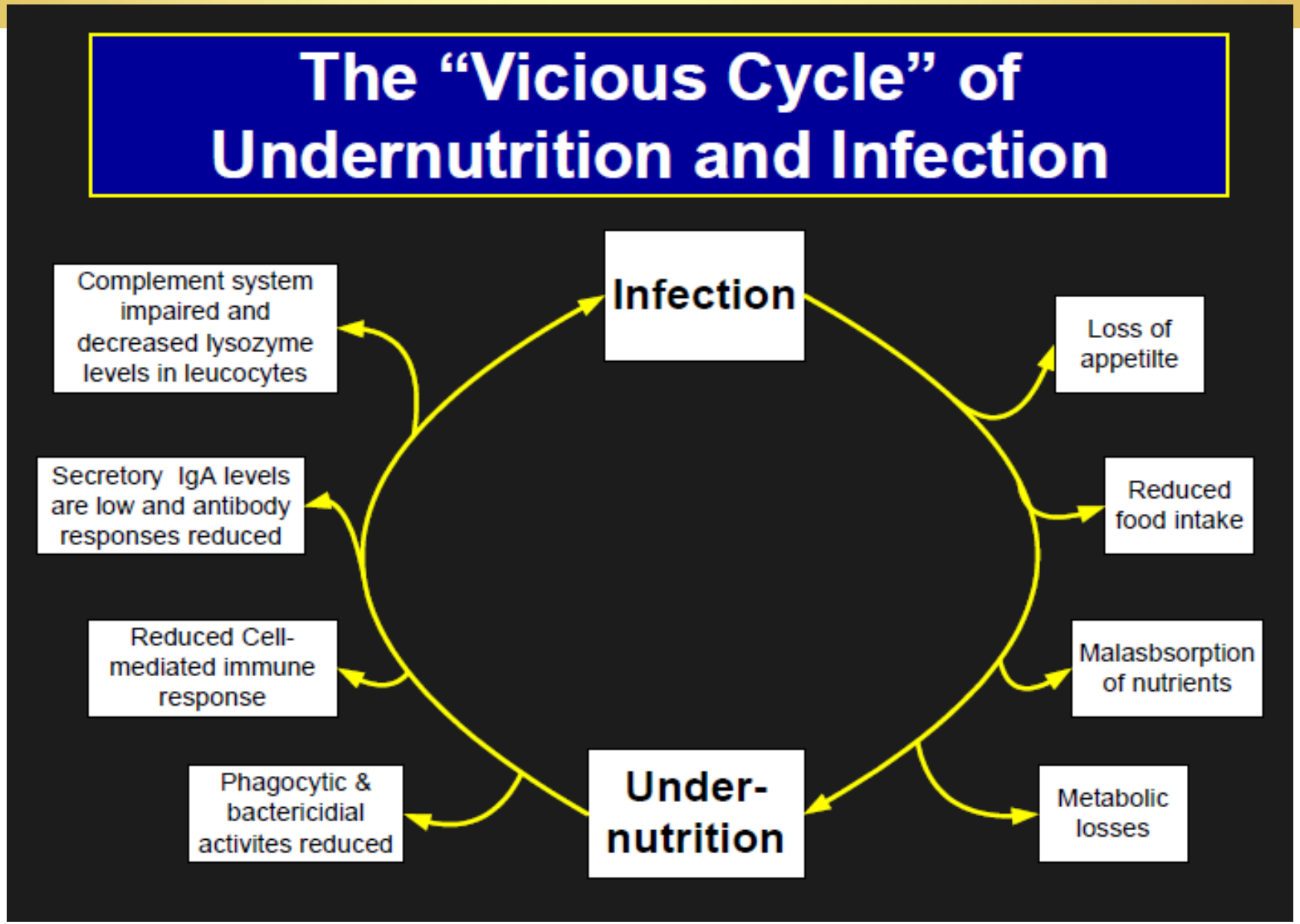
- Attention deficit disorder
- Impaired school performance
- Decreased IQ scores
- Memory deficiency
- Learning disabilities
- Reduced language development
- Reduced problem-solving abilities



Infection-Malnutrition Synergism



The "Vicious Cycle" of Undernutrition and Infection



Pathophysiology of Severe Acute Malnutrition

- Severe acute malnutrition can result in profound metabolic, physiological and anatomical changes.

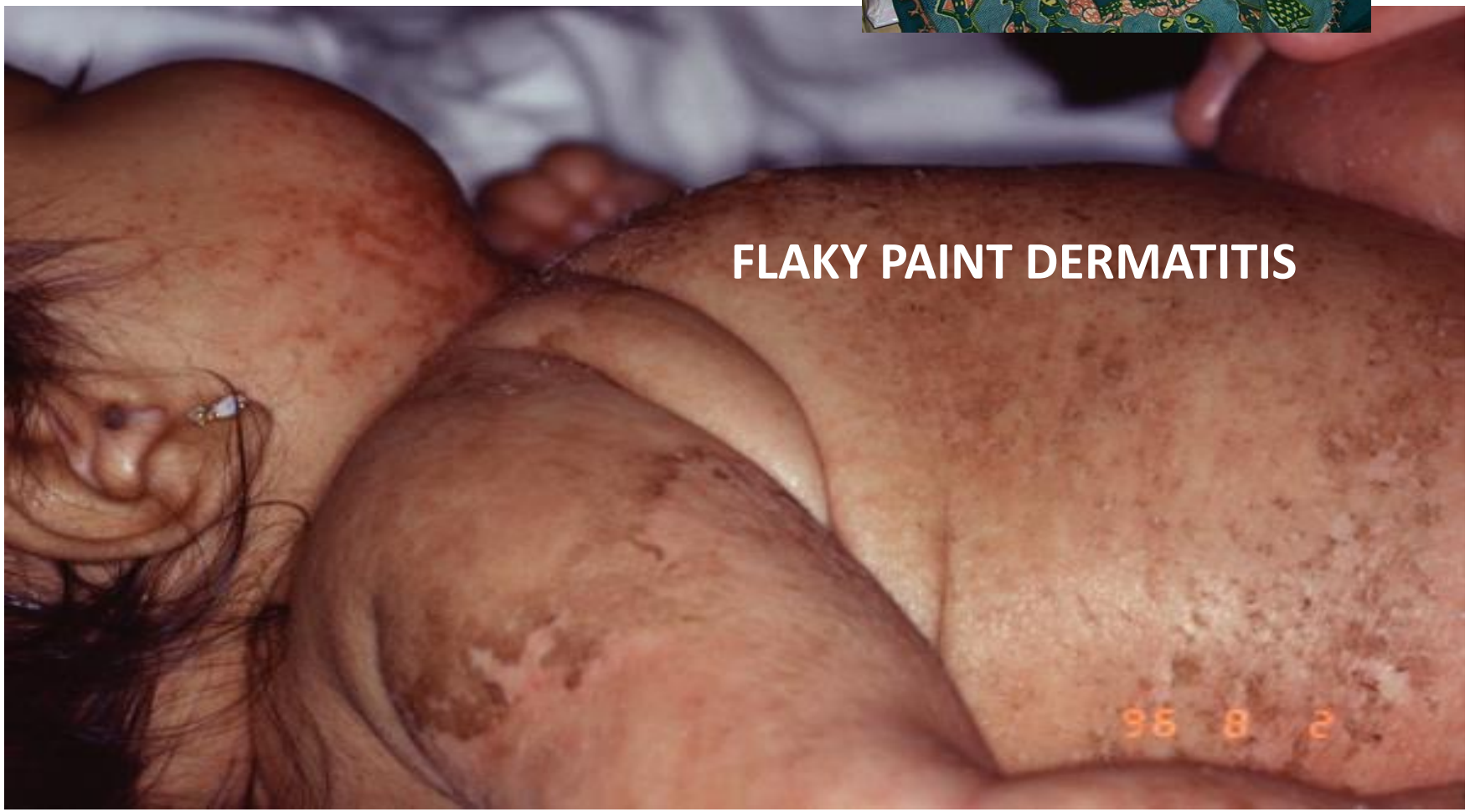
- Virtually all physiological processes are altered due to severe acute malnutrition.

- Every organs and systems are involved in reductive adaptation.

FOUR FUNCTIONAL CONSEQUENCES OF MALNUTRITION

- Illness – via increasing susceptibility to infection
- Intelligence loss
- Reduced productivity
- Mortality

Kwashiorkor



KWASHIORKOR

- Cecilly Williams, **a British nurse**, had introduced the word Kwashiorkor to the medical literature in 1933.
- The word is taken from the Ga tribe in Ghana & used to describe :
  - ‘’The sickness of weaning’’
  - “The sickness the older child gets when the next baby is born”
  - Disease when child is displaced from breast

(Cicely Williams, 1935, Gold Coast, W Africa)

Etiology

- Lack of knowledge about diet
- Poverty
- Natural calamities like drought, earthquakes, etc
- Repeated infections like diarrhoea, measles, etc
- Taboos
- Religious customs (people of certain religions avoid non-vegetarian diet which has high-quality proteins)

Kwashiorkor ...

- **Incidence is more in:**

➢ Low birth weight

➢ Broken families

➢ In children with whose parents are unemployed

➢ Large families

Kwashiorkor ...

- Kwashiorkor is an example of lack of physiological adaptation to unbalanced deficiency where the body utilized proteins and conserve S/C fat.

- Edema: decrease oncotic pressure,
  - Recent: greater Increase Renin activity, Na and fluid retention.

- Amino aciduria due to proximal tubular dysfunction

- Hepatomegaly due to fatty infiltration from lipogenesis of excess CHO

Clinical features of kwashiorkor

Discuss in pair the main clinical features that happen in the following body parts/system/

- **Growth**
- Hair
- Skull: Anterior fontanel
- Eyes
- **Cheeks**

- **Face**
- **CVS**
- Respiratory system/Chest
- GIT/Abdomen
- **Skin**
- Extremities

MARASMUS

Marasmus

- The term marasmus is derived from the Greek *marasmos,* which means **wasting**.

- A nutritional disorder due to deficiency of protein and calories, **particularly calories**, characterized by:
  - Growth failure
  - Gross wasting
  - Absence of oedema

Marasmus…

- Marasmus represents the end result of starvation where both proteins and calories are deficient.
- Affects all age but common < 1 year.

- In Marasmus the body utilizes all fat stores before using muscles.

Causes

Cause: The same as PEM.

but Primary causes

- Lactation failure – the commonest cause

Lactation failure -------→introduction of dilute & dirty formula

-------→ infections (diarrhoea) → starvation therapy due to diarrhoea -------→ Marasmus

Causes …

2. Secondary causes

a. **Birth weight:** common in premature & LBW

b. **Cardiovascular diseases** like VSD, ASD, and PDA due to:

- Recurrent respiratory infections
- Feeding and growth failure
- Cough & breathlessness

Causes …

c. Respiratory causes: TB, etc

d. **Gastrointestinal causes**

- Congenital hypertrophic pyloric stenosis- vomiting
- Congenital megacolon- diarrhoea
- Cleft lip & palate – inadequate intake of feeds, mainly breast feeds

e. **Infections**

- Repeated diarrhoea
- Severe infections like congenital syphilis
- Malabsorption syndrome

Causes …

3. CNS causes

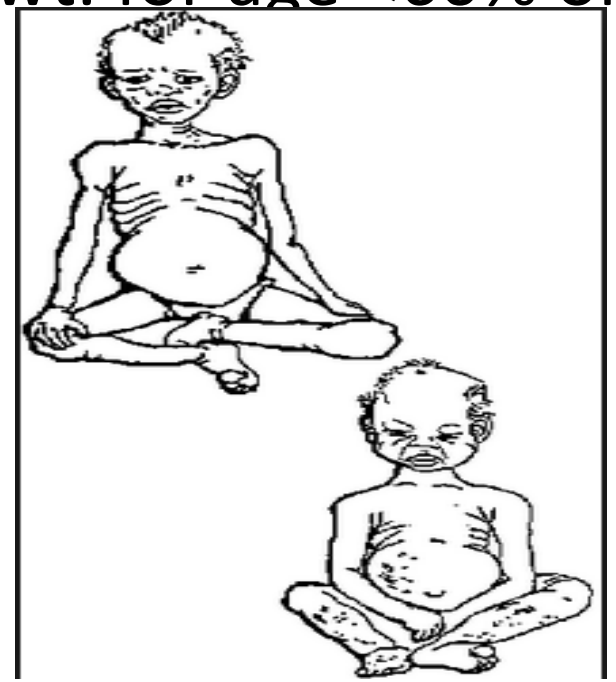
- Hydrocephalus and CNS infections like tuberculosis meningitis, pyogenic meningitis can cause marasmus due to decreased intake & chronic vomiting

Clinical manifestations

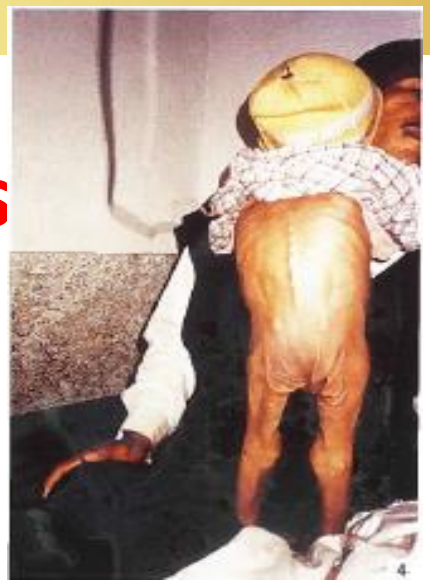
- Growth retardation or growth failure (wt. for age <60% or wt. for Ht < 70%)

or < -3 SD

- Sunken eye balls
- Mood change (irritable)
- Good appetite
- Diarrhea
- “Old man face” appearance
- Mild skin & hair change (less common sign)



Clinical manifestations



- Abdomen may be large or distended
- Wasting of subcutaneous tissue

Steps – Remove the child's cloths.

Look for severe wasting of the muscle of buttocks & legs. The child has no fat & look like bone & skin.

- When the wasting is extreme there are many fold of skin on the buttocks & thigh.
- It look as if the child is wearing **baggy pants**

Assessment of Nutritional status

- **DIRECT**
  - **A**
  - **B**
  - **C**
  - **D**
- **INDIRECT**
  - **Health statistics..**infant/U5 mortality, fertility index
  - **Ecological variables…** crop production

Anthropometric Indicators of Malnutrition

- Anthropometry is the **determination of nutritional status by physical measurements** and comparing them to relevant reference charts.
- Anthropometric measurements that have been used include H/A, W/A, W/H,HC,MUAC, and skin fold thickness

MALNUTRITION INDICATORS

NUTRITION INDICATOR	MEASUREMENT INDICATOR	CLINICAL INDICATOR
Acute Malnutrition (SAM & MAM)	Weight-for-Height	Wasting, kwashiorkor
Chronic Under nutrition	Height-for-Age	Stunting
Underweight (composite indicator)	Weight-for-Age	Underweight
Over nutrition	Body Mass Index (weight/Height2	Overweight/Obesity
Micronutrient Deficiencies	Biochemical indicators	Hypoalbuminemia, Xerophthalmia, stomatitis etc

SD Score Method

Which children are underweight?

(Low Weight for Age)

- Children whose weight is <-2 SD score of the median weight of children of the same age in the reference population

- **Reflects current and past nutritional status**

Methods…

Which children are stunted?

(Low Height for Age)

- Children in a given population whose height is <-2 SD of the median height of children of the same age in the reference population

- **Reflects past nutritional status (chronic malnutrition)**

Methods…

Which children are wasted?

(Low Weight for Height)

- Children in a given population whose weight is <-2 SD of the median weight of children of the same height in the reference population

- **Reflects present nutritional status (acute)**

Diagnosis

- Malnutrition is usually diagnosed through **anthropometry** (weight-for-height, in which the weight and height of the child is compared to those of an international reference; MUAC, or other).

- However, the main symptom that reveals the metabolic status of the child is **“lack of appetite”.**

- Patients with no appetite usually present a severe complication - visible or not- that need specialized treatment.

Anthropometric Cutoffs for Assessing Undernutrition in

Indicator	Basis	Moderate or Severe	Moderate or worse	Mild or worse
Wt for Age	% med SND	<60% <-3 Z	<75% <-2 Z	<90% < -1 Z
Ht for Age	% med SND	<85% <-3 Z	<90% <-2 Z	<95% < -1 Z
Wt for Ht	% med SND	<70% <-3 Z	<80% <-2 Z	<90% < -1 Z
MUAC (cm)	Absolute (1-5 yrs)	<11.5	<12.5	<13.5

Diagnosis

- Normal: ± 1 SD
- Mild: -1.1 to -2 SD
- Moderate -2.1 to -3 SD
- Severe greater than -3
- Less than 5th percentile in US

Differential diagnosis

- Nephrotic syndrome
- Congestive heart failure
- Cirrhosis of liver

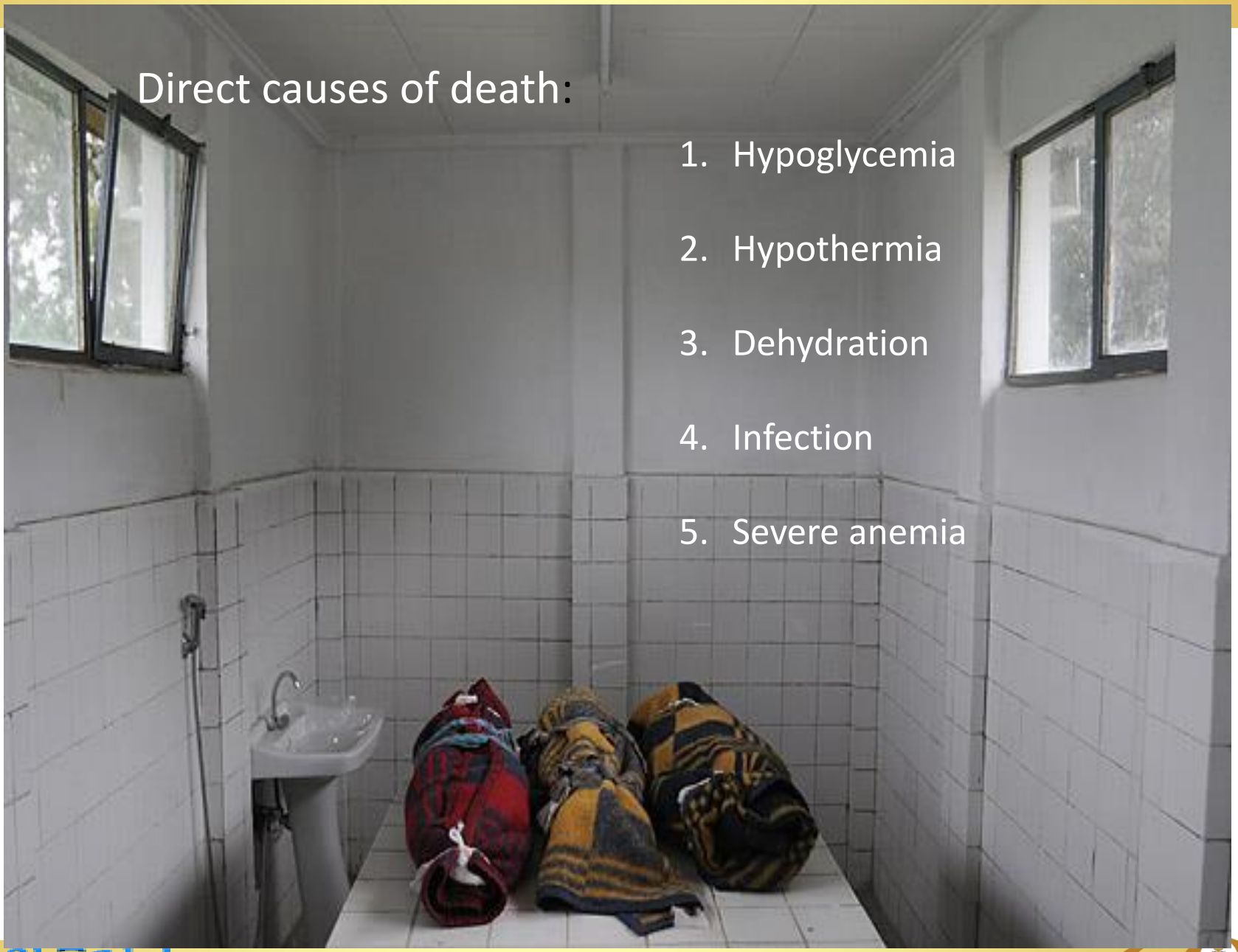
Investigations

- **Blood**
  - CBC
  - Serum electrolytes, plasma protein estimation
  - Blood culture & sensitivity for evaluation of septicaemia
- **Urine**
  - Albumin, sugar, urine culture & sensitivity
- **Stool**
  - Ova of parasite, culture & sensitivity if there is diarrhoea
- **Chest X-ray:** to r/o TB & other infections
- **Mantoux test**

Complications

- Children with SAM are classified as ‘complicated’ if they have clinical features of infection or metabolic disturbance, severe oedema or poor appetite.
- Children with ‘uncomplicated’ SAM are clinically well, alert and have retained their appetite

Kelsey D. J. Jones & James A. Berkley (2014)



Direct causes of death:

1. Hypoglycemia
2. Hypothermia
3. Dehydration
4. Infection
5. Severe anemia

Time Magazine, August, 2008

MANAGEMENT OF MEDICAL COMPLICATIONS

❑ Hypoglycemia

- Hypoglycemia is a low level of glucose in the blood.
- In severely malnourished children, the level considered low is <54 mg/dl (< 3 mmol/litre).
- The hypoglycemic child is usually hypothermic (low temperature) as well.
- Other signs of hypoglycemia include lethargy, limpness, and loss of consciousness.

Hypoglycemia mgt

- 5 to 10 ml/kg of sugar water ‘PO’ for conscious pt. 5 to 10 ml/kg of sugar water by NG-tube or 5 ml/k.g a single injection of 10% glucose solution for unconscious pt.

All malnourished patients with suspected hypoglycemia should be treated with second-line antibiotics

Hypothermia

- A severely malnourished child is hypothermic if the **rectal temperature is below 35.5 0C or if the auxiliary temperature is below 35 0C.**

- Severely malnourished children are at greater risk of hypothermia than other children and need to be kept warm.

- The hypothermic child has not had enough calories to warm the body.

Hypothermia….

- If the child is hypothermic, he is probably also hypoglycemic.
- Both hypothermia and hypoglycemia are signs that the child has a **serious systemic infection**

Mgt Hypothermia

-Use kangaroo care technique with care taker

- put a hat on child
- Wrap the mother & child together.
- Keep the room warm.
- Treat hypoglycemia
- Treat by antibiotic

KMC

Cont …

- **Dehydration (DHN) &septic shock.** - Taker over load of fluid solutes
  - use ReSoMal solution to rehydrate SAM.
- **Anemia** - give 10ml/kg of packed RBC or whole blood
- **Infection** Antibiotics

ReSoMal

- ReSoMal is available commercially.
- However, ReSoMal can also be made by diluting one packet of the standard WHO-recommended ORS in 2 litres of water, instead of 1 litre, and adding 50 g of sucrose (25 g/l) and 40 ml (20 ml/l) of mineral mix solution

Amount of ReSoMal to give

- Starting with 5 ml/kg every 30 minutes for the first 2 hours orally or by NG tube, and then 5–10 ml/kg per hour/for 10 hours, totally 12 hours is required.
- This rate is slower than for children who are not severely malnourished.
- Reassess the child *at least* every hour.

Calculate amount of ReSoMal to give

- For a child who has dehydration but no sign of shock, give ReSoMal as follows, in amounts based on the child's weight:

How often to give ReSoMal	Amount to give
Every 30 minutes for first 2 hours	5 ml/kg body weight
Every hour for up to 10 hours	5 - 10 ml/kg*

Management

REFER THE PROTOCOL FOR THE MANAGEMENT OF SEVERE ACUTE MALNUTRITION

Assessment and Classification of Acute Malnutrition

Children age 6 Months to 5 years		
Assess	**Classify**	**Action to take**
• WFL/H < 70% of median or < -3Z score OR MUAC <11cm OR Edema of both feet (+, ++), **PLUS** o Any one of the medical complications (see list below*), or o Failed Appetite test OR • +++ Edema, OR • Marasmic Kwashiorkor (WFL/H < 70% with edema, OR MUAC <11cm with edema)	**Complicated Severe Acute Malnutrition**	**Admit for in-patient management**
• WFL/H < 70% of median or < -3Z score OR MUAC <11cm OR • Edema of both feet (+, ++) AND • No medical complication AND pass appetite test	**Uncomplicated Severe Acute Malnutrition**	**Manage in OTP using the OTP protocol or manage as in-patient if OTP service is not available**
• WFL/H ≥ 70% to < 80% or ≥ -3Z to < -2Z score OR MUAC 11cm to <12cm AND • No edema of both feet	**Moderate Acute Malnutrition**	**Refer to supplementary feeding program if available, Counsel on infant and child feeding/care**
• If WFL/H ≥ 80% or ≥ -2Z score OR MUAC ≥ 12 cm AND • No edema of both feet	**No acute malnutrition**	**Congratulate and Counsel the mother on infa and child feeding/care**

Management of SAM

- The principles of management of severe acute malnutrition, whatever the programme setting, are based on 3 phases.

Phase I

Transition Phase

Phase II

Phase 1 (Stabilization phase)

- ❑children with complicated SAM are initially admitted to an inpatient facility for stabilization.
- ❑These children are admitted to phase 1 room. During this phase:

- Life-threatening medical complications are treated
- Routine drugs are given to correct specific deficiencies
- Feeding with F-75 milk (low caloric and sodium) is begun

Phase 1…

- The children in Phase 1 should be together in a separate room or section of the ward and not mixed with other patients
- Routine drugs has to be started immediately after they are admitted
  - ❖Amoxacilline
  - ❖Vitamin A
  - ❖Follic acid

Transition phase

- Once the child appetite recovers and the main medical complications are under control and oedema start to reduce, a transition phase is started with F-100 or RUTF

- This phase is important for slow transition as the introduction of large amounts of RUTF or F100 could lead to imbalance of body fluids and severe medical complications. In this phase:
  - Routine drugs are continued
  - Feeding with RUTF or F100 is started

Criteria to move back from transition phase to phase1

❑Move the child back to Phase 1:

- If the patient gains weight more rapidly than 10g/kg/d (this indicates excess fluid retention)
- If there is increasing oedema
- If a child who does not have oedema develops oedema
- If there is a rapid increase in the size of the liver
- If any other signs of fluid overload develop.

Move the child back to Phase 1 …

- If tense abdominal distension develops
- If the patient gets significant re-feeding diarrhea so that there is weight loss.
- If patient develops medical complication
- If NG-tube is needed
- If patient takes less than 75% of the feeds in Transition Phase

Criteria to move from transition phase to phase 2

- Marasmic pt. spends a minimum of 2 days and if tolerating the new diet with out complication
- Completing the diet with good appetite.
- Complete loss of or radical decreasement of edema (in kwashiorkor).

Phase 2 (Rehabilitation Phase)

- Children that progress through phase 1 and transition phase enter phase 2 when they have **good appetite** and **no major medical complication**.
- During phase 2:
  - Routine drugs, deworming tablets and iron, are started
  - Feeding with RUTF or F100 is increased in amount
  - Child starts gaining weight
- Whenever possible, phase 2 is implemented as OTP with RUTF. Otherwise, it can be implemented in in-patient centers with RUTF or F100.

Criteria to move back from phase 2 to phase 1

- Develops any signs of a complication
- Increase/development of oedema
- Development of re-feeding diarrhea sufficient to lead to weight loss.
- Weight loss for 2 consecutive weighing
- Static weight for 3 consecutive weighing
- Fulfilling any of the criteria of “failure to respond to treatment”

ROUTINE MEDICINES

VITAMIN A

- On the day of admission (day 1), give vitamin A for all children except those with oedema or those who received vitamin A in the past 6 months.

FOLIC ACID

- On the day of admission, one single dose of folic acid (5mg) can be given to children with clinical signs of anaemia.

ANTIBIOTICS

- Antibiotics should be given to every severely malnourished patient, even if they do not have clinical signs of systemic infection.
- **First line treatment**: oral amoxicillin (if amoxicillin not available, use oral ampicillin)
- **Second line treatment**:

o add Chloramphenicol (do not stop amoxicillin) or

o add Gentamycin (do not stop amoxicillin)

- "This recommendation for the use of routine antibiotics is based on expert opinion and has not been directly tested in a clinical trial," they continue, "and observational data suggest that antibiotics are unnecessary and perhaps even harmful in children with uncomplicated severe acute malnutrition (i.e., children with good appetite and no clinical signs of sepsis)."

- **METHODS—In this randomized, double-blind, placebo-controlled trial, we randomly assigned** Malawian children, 6 to 59 months of age, with severe acute malnutrition to receive amoxicillin, cefdinir, or placebo for 7 days in addition to ready-to-use therapeutic food for the outpatient treatment of uncomplicated severe acute malnutrition. The primary outcomes were the rate of nutritional recovery and the mortality rate.

- In this randomized, double-blind, placebo-controlled trial, the addition of antibiotics to therapeutic regimens for uncomplicated severe acute malnutrition was associated with a significant improvement in recovery and mortality rates.

Trehan et al. Page

- In the absence of appropriate treatment, case-fatality rates in hospitalized children range from 30% to 50%.

Lancet 2008

MALARIA

- Based on national guideline for malaria treatment Malaria, Diagnosis and Treatment Guidelies for Health Workers in Ethiopia.
- Never give intravenous infusions of quinine to a severely malnourished case within the first two weeks of treatment.

MEASLES

- All children from 9 months without a vaccination card should be given measles vaccine both on admission and discharge.

DEWORMING

- Albendazole or Mebendazole is given at the start of Phase 2
- Worm medicine is only given to children that can walk.

IRON

- added to F-100 in phase II

WARNING: NEVER DO ANY OF THEFOLLOWING:

- Never give diuretics against malnutrition oedema. The oedema is partially due to potassuim and magnesium deficiency, that can easily recover in two weeks.
- Oedema dissapears with appropriate feeding adding a micronutrient solution. Giving diuretics would aggravate the electrolyte imbalance and would risk death.

- Do not give Iron in the first days of treatment (until Phase 2 or Rehabilitation phase). It risks having toxic effects and reduce defense against infections.

- Do not give preparations rich in proteins (more than 1.5 g of protein per kg/day).
- Any excess in the first days can be dangerous, because the severely malnourished child is not able to assume the metabolic effort needed to deal with them. An excess of proteins can overload the liver, the heart and kidneys and provoke death.

- Do not give liquids in perfusion. In the child with severe malnutrition liquids in perfusion can easily produce cardiac overload.
- These are only given when there is a diagnosis of septic shock.

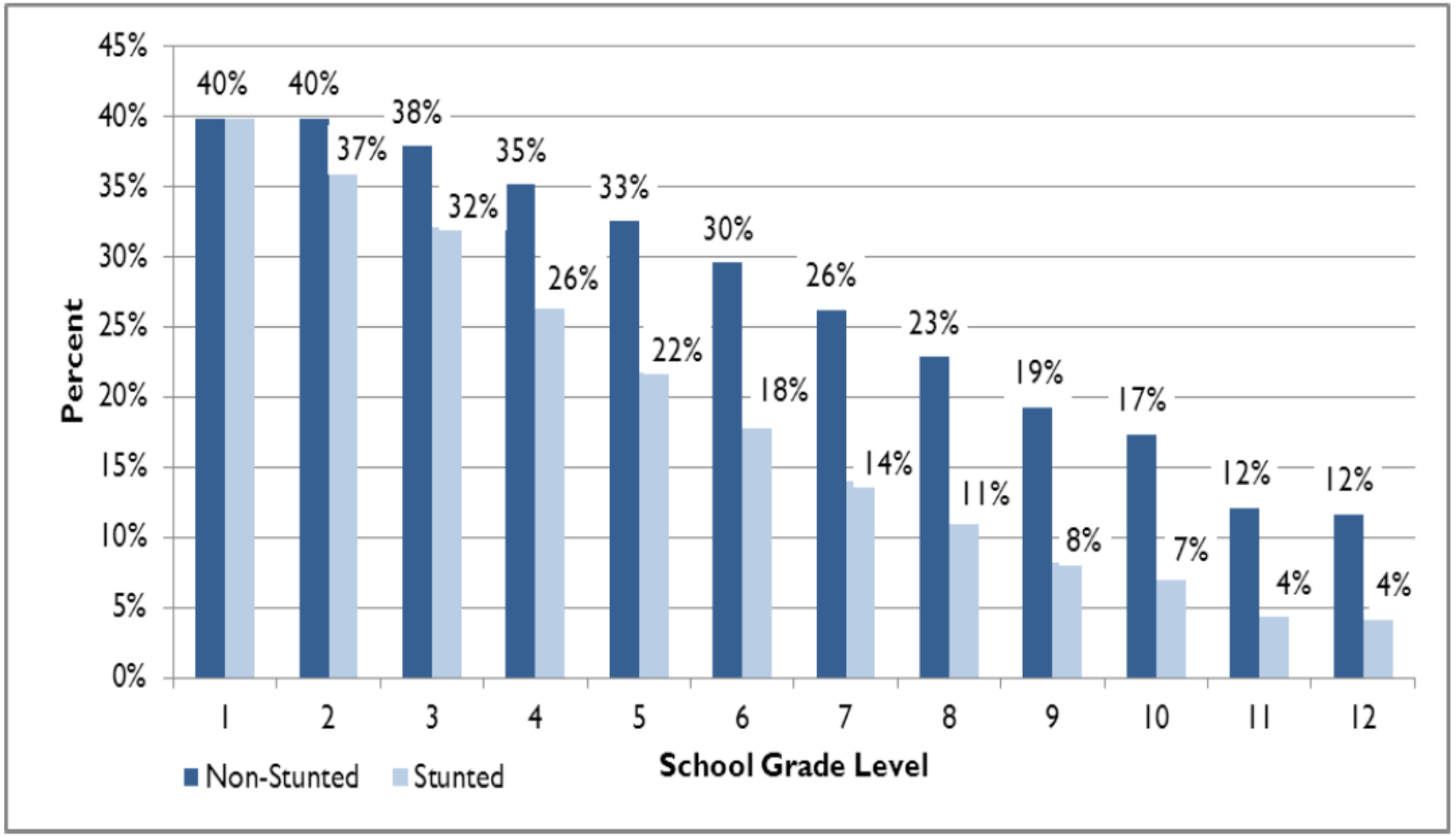
- Do not give blood transfusion.
- Most anaemia in malnourished children under treatment is due to hemo-dilution, secondary to the return of blood stream of liquid accumulated as oedema, or retained in cells (marasmus). This is resolved in less than 2 – 4 days .
- Wrong treatment with transfusion often results in cardiac overload and death from pulmonary oedema.

Evidences

- Effects on Health: **Results from Ethiopia**
- **When a child is undernourished, he or she will have an increased chance of experiencing specific health problems**

- Research shows that undernourished children under five are more likely to experience cases of anaemia, acute diarrhoeal syndrome (ADS), acute respiratory infection (ARI), and in some cases, fever.

- When a child is undernourished, his/her brain is less likely to develop at healthy rates, and that child is more likely to have cognitive delays.
- Stunted children are more likely to repeat grades in school or drop out.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School Grade Level
Non-Stunted
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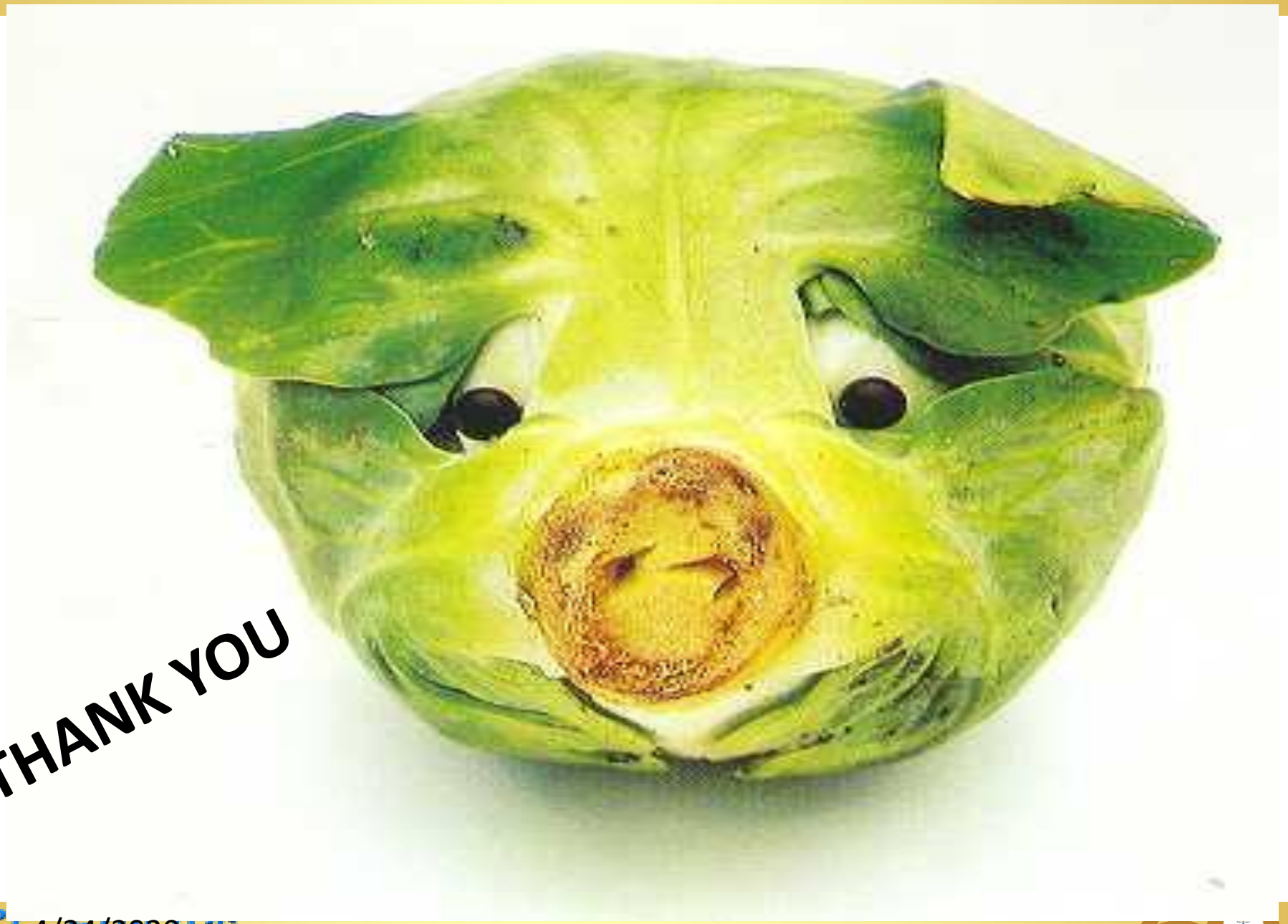
Reff…..

- **The Cost of HUNGER in Ethiopia**

  Implications for the Growth and Transformation of Ethiopia


THANK YOU

Pediatrics HIV

Human Immune Deficiency Virus – HIV/AIDS

- **Learning Objectives:** at the end of the lesson we will be able to

- Define HIV and AIDS
- Describe the natural history of HIV/ADIS
- Describe the life cycles of HIV/AIDs
- Identify the common opportunistic infections
- Make appropriate WHO clinical staging of HIV/AIDS
- Treat a child with HIV/ADIS

INTRODUCTION

- **1981:** AIDS was first recognized in USA among Homosexual males
- **1983:** HIV virus was isolated from a patient with lymphadenopathy
- **1984:** HIV virus was clearly demonstrated to be the causative agent for AIDS

➢ In Ethiopia-First confirmed case-1984

- In 2003- fee based ART
- March 2005- Free ART

Definitions

HIV

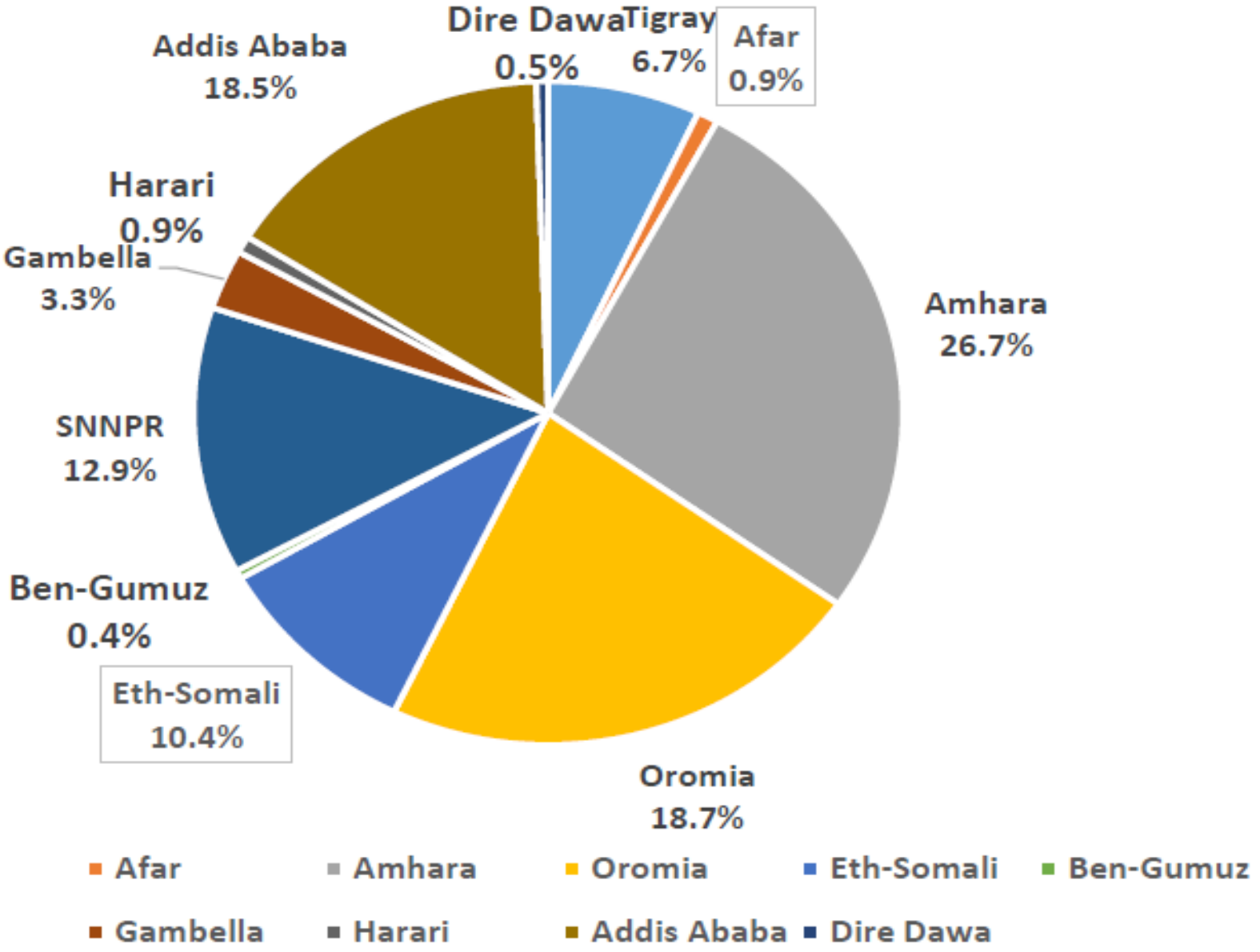
- A specific type of virus (a retrovirus) that causes AIDS
- **HIV infection:** w/n the virus is available/ present in ones blood. [transmit the diseases***]***
- **HIV disease** is a chronic infectious disease caused by the Human Immune Deficiency Virus.
- **ADIS:** Is a disease that limits the body's ability to fight infection.

Epidemiology

- There were 36.7 million people living with HIV of them 46% i.e. 18.2 million were on ART.
- Incidence of HIV in 2015 were 2.1 million of them 150 000 were children.
- 1.1 million people died from AIDS-related causes worldwide (FACT SHEET NOVEMBER 2016).

In Ethiopia

- The national prevalence of HIV infection is 1.16 %
  - There are a total of 722,248 people living with HIV,
  - of which 60.5 % are female.
  - Besides, there were an estimated 22,827 people newly infected during 2017,
  - of whom 60.5% are females. Annual AIDS deaths during the same period are 14,872 (Consolidated HIV training manual 2018).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Amhara
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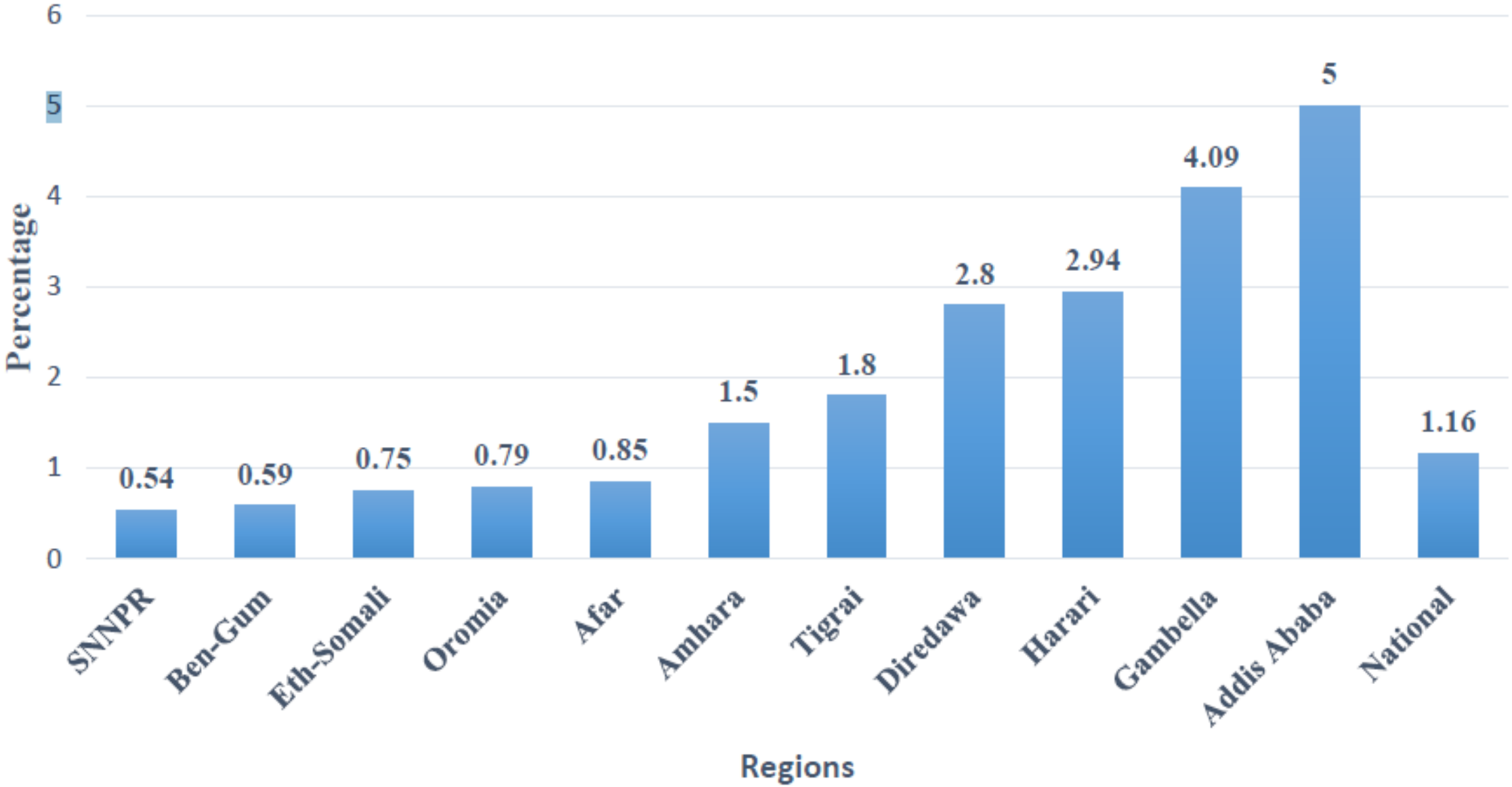
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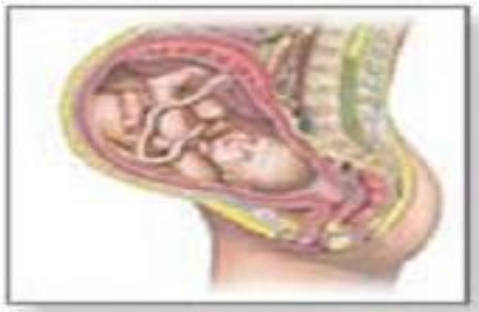
Modes of HIV Transmission of HIV



Transmissions

Mother to Child Transmission

- 90% of HIV infection in children is as a result of MTCT.
- MTCT is 7 of 20 (one – third) or 35%.
  - Pregnancy:- 5 -10 %
  - Labor and Delivery:- 10-15 %
  - Breast Feeding: - 5-15 %

Factors affecting MTCT

- Maternal
- Infant factors

Prevention of mother to child transmission of HIV

Prong 1: Primary prevention of HIV infection

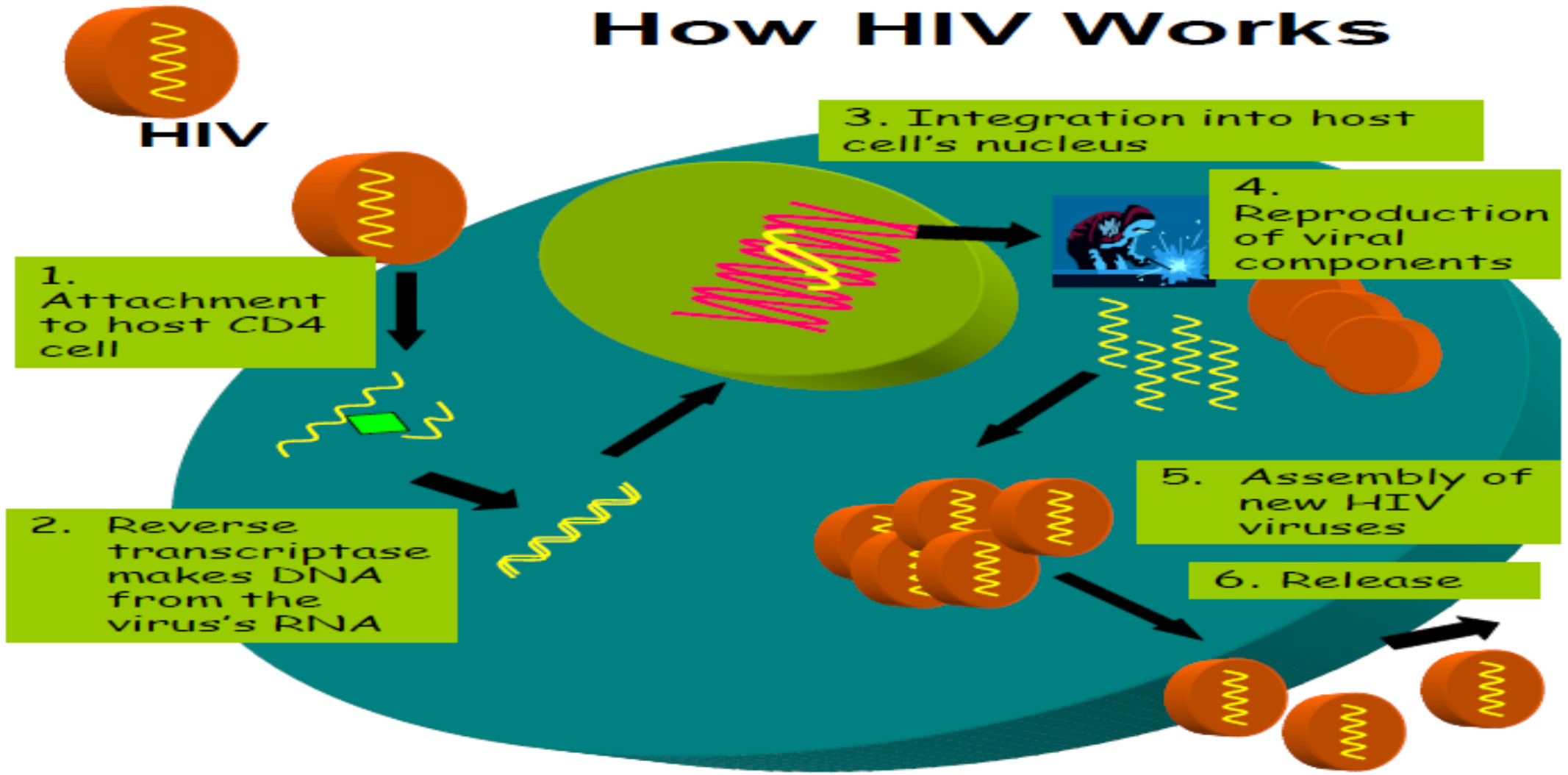
Prong 2: Prevention of unintended pregnancies among women infected with HIV.

Prong 3: Prevention of HIV transmission from women infected with HIV to their infants**.**

Prong 4: Provision of treatment, care, and support for women infected with HIV, their infants, and their families.

Etiologic agent

- HIV is a retrovirus which belongs to the sub family of lente virus.
- There are 2 main Types of the virus
  - ✓HIV 1 and
  - ✓HIV 2



Natural History and Clinical Manifestations of HIV infection

1. **Primary HIV Infection:** Acute HIV syndrome and Sero-conversion.

2. Asymptomatic stage – Clinical latency

3. Early Symptomatic Diseases – mild immunodeficiency

4. AIDS defining illnesses: Advanced immunodeficiency

Diagnosis of HIV in infant and children

HIV test in children born to known HIV positive women			
Age	HIV test	What a result mean	Considerations
<18 months	Rapid HIV anti-body test	+Ve Either mother or child's AB	Confirm the result with PCR
		-Ve not infected if breast feed repeat after 6 wks.	Negative may be in latter if breast feed
	HIV virologic test (DNA PCR)	+Ve start HAART and repeat DBS	Best to perform when the child is 6 wks. old
		-Ve never breast feed in the last six wks. not infected	9-12 months AB can be used before virologic test
>18 months	HIV antibody test	+Ve infected -Ve not infected	If still breast feed repeat after 6 wks.

Presumptive diagnosis

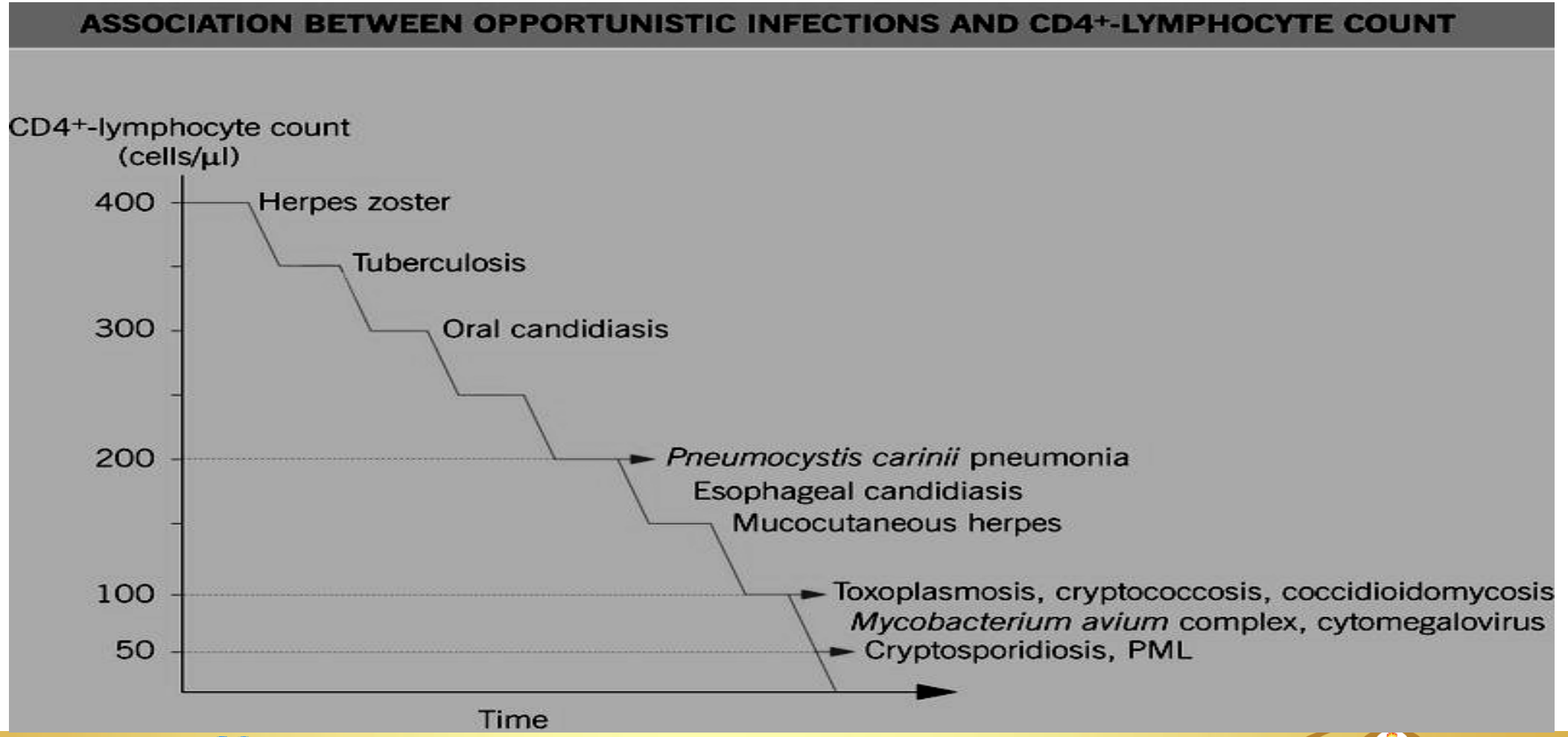
HIV antibody positive infant with

- *Diagnosis of stage 4 or any AIDS defining condition OR*
- *Symptoms with two of the following*
  - o *Oral thrush*
  - o *Severe pneumonia*
  - o *Severe sepsis*
- Supporting factors are
  - o Recent maternal death
  - o Advanced HIV disease in the mother
  - o Cd4 percentage of infant < 20%

HIV/AIDS associated illnesses /OIS and OMs

- OIs are leading causes of morbidity and mortality in HIV-infected persons
- Most of the common OIs are preventable as well as treatable.
- Most OIs develop when the CD4 count drops below 200cells /ml

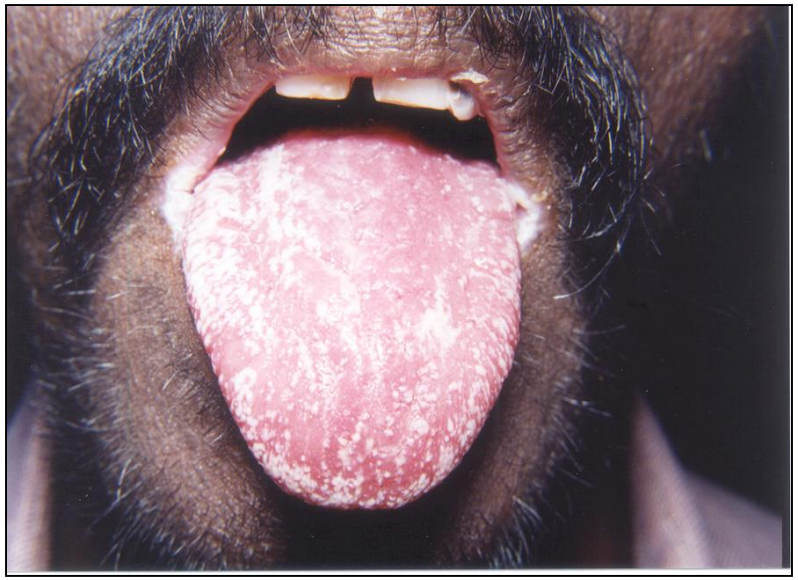
Common OI's Correlating with Time and CD4 Count

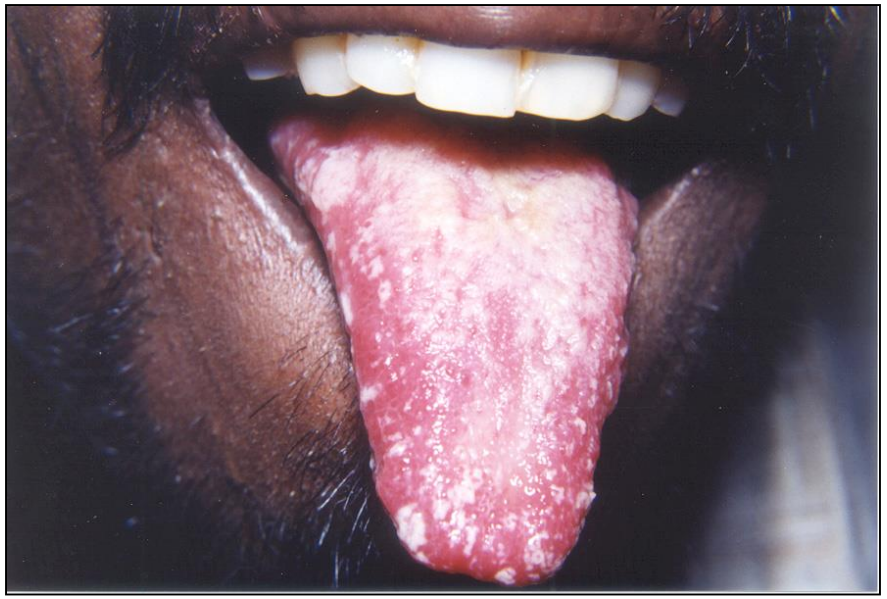


Fungal Infections

- Candidiasis (Thrush)
- Esophageal Candidiasis
- Pneumocystis Jiroveci Pneumonia (PCP)
- Cryptococcal mengitis/Disease

Candidiasis (Thrush)

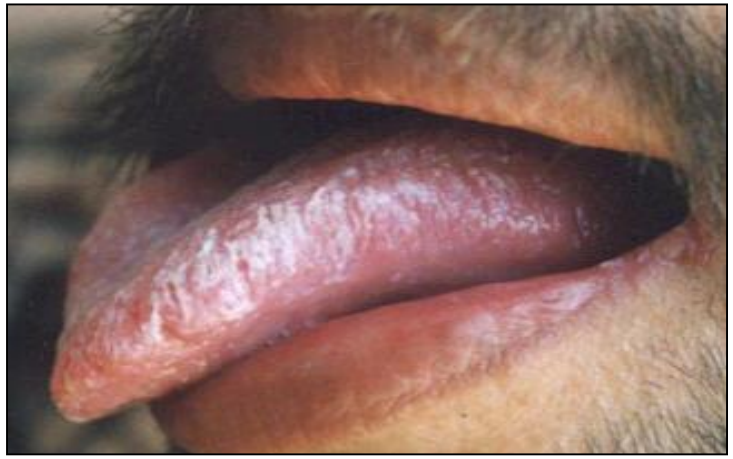


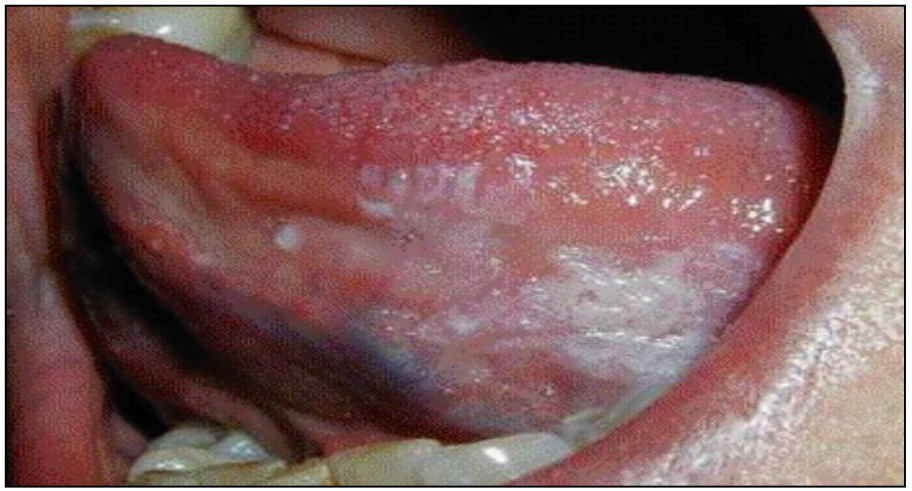


Viral Infections

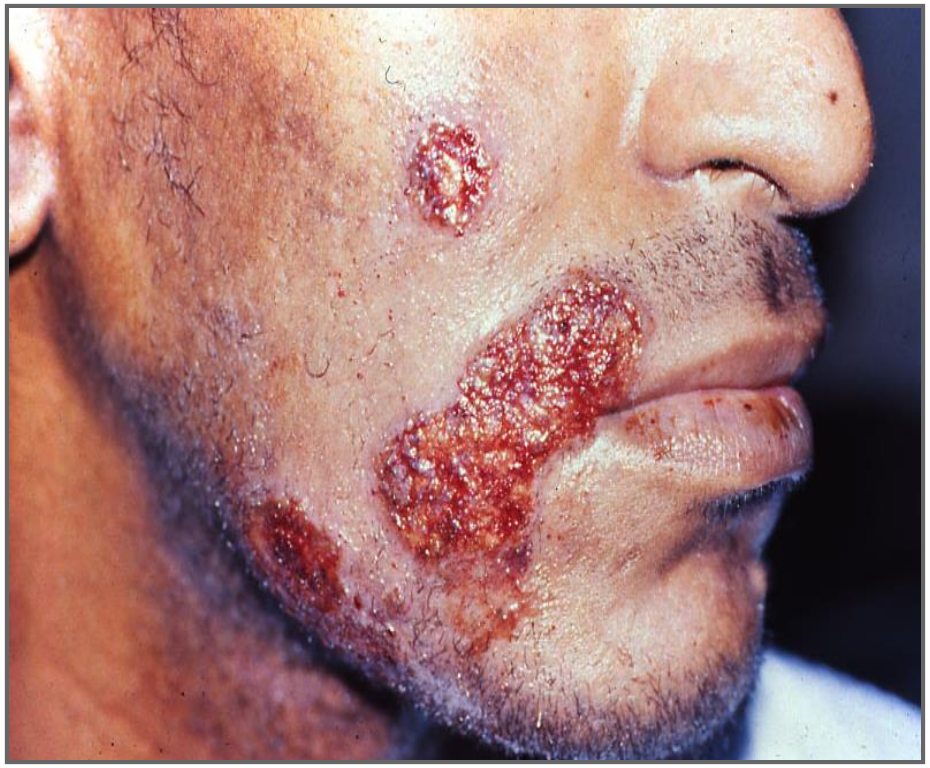
- Oral Hairy Leukoplakia
- Herpes Simplex I & II (mouth, penile, vaginal)
- Herpes Zoster
- Molluscum Contagiosum
- Cytomegalovirus (CMV)
- Encephalopathy (PML)

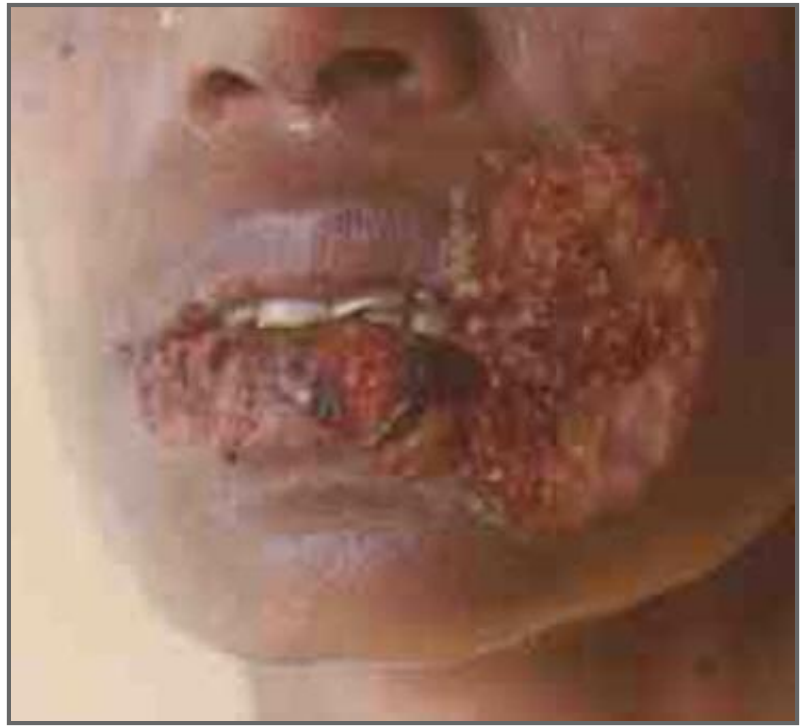
Oral Hairy Leukoplakia



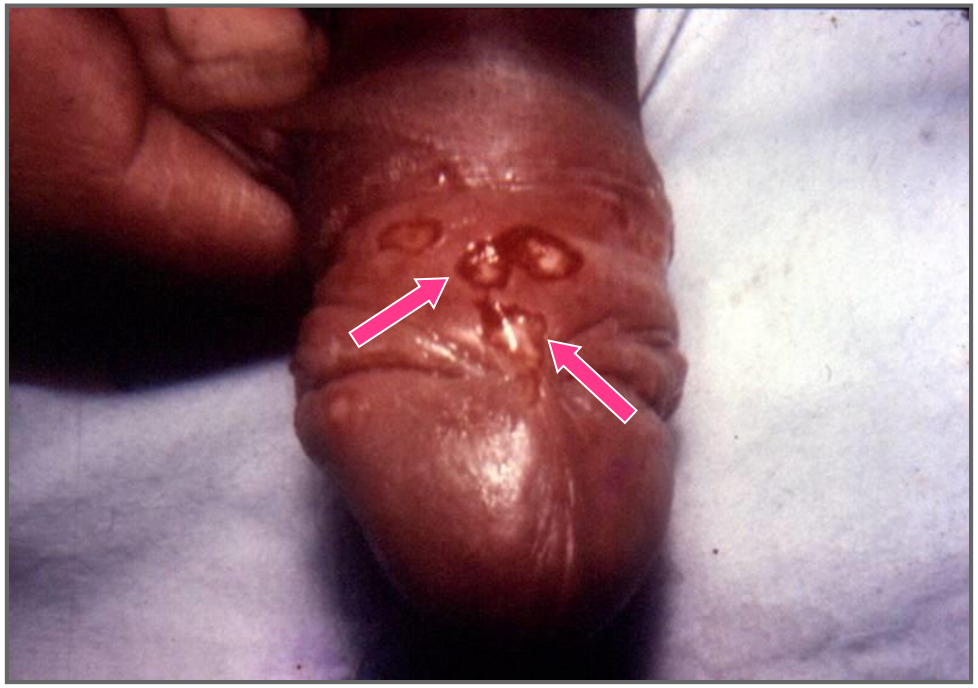


Herpes Simplex Lesions: Mouth

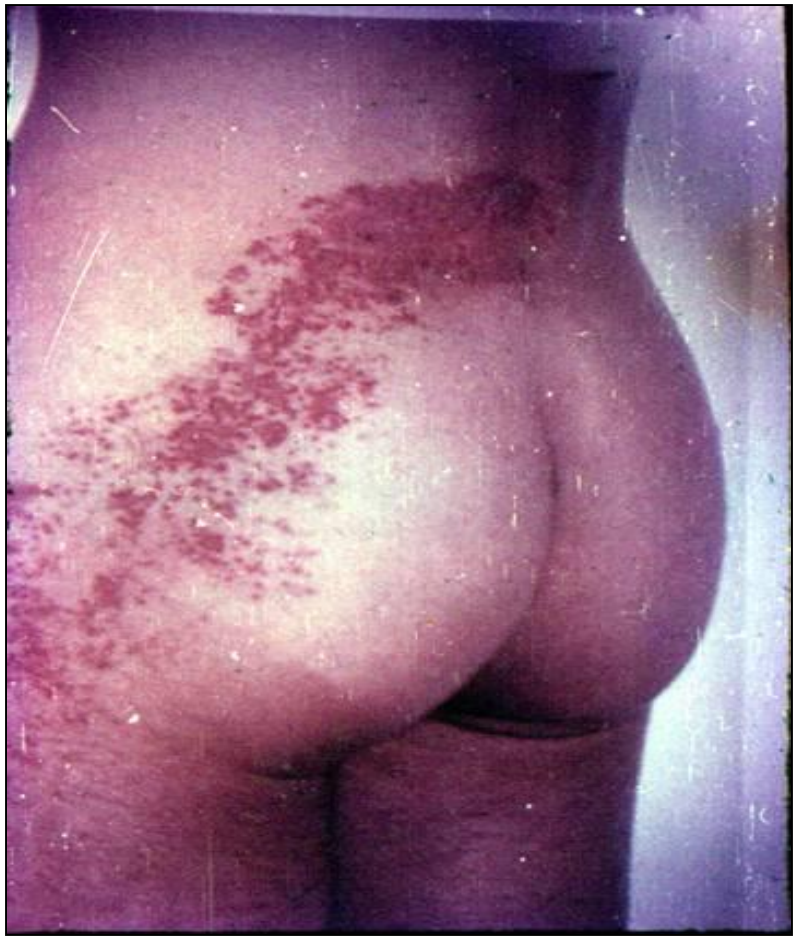


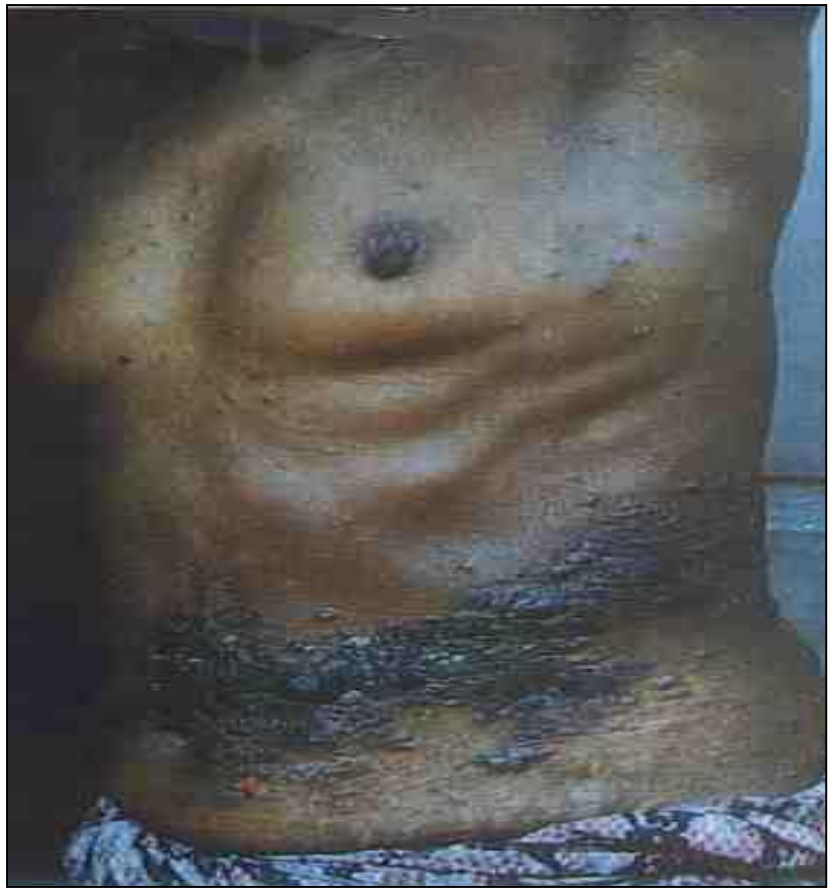


Herpes Simplex Lesions: Penile

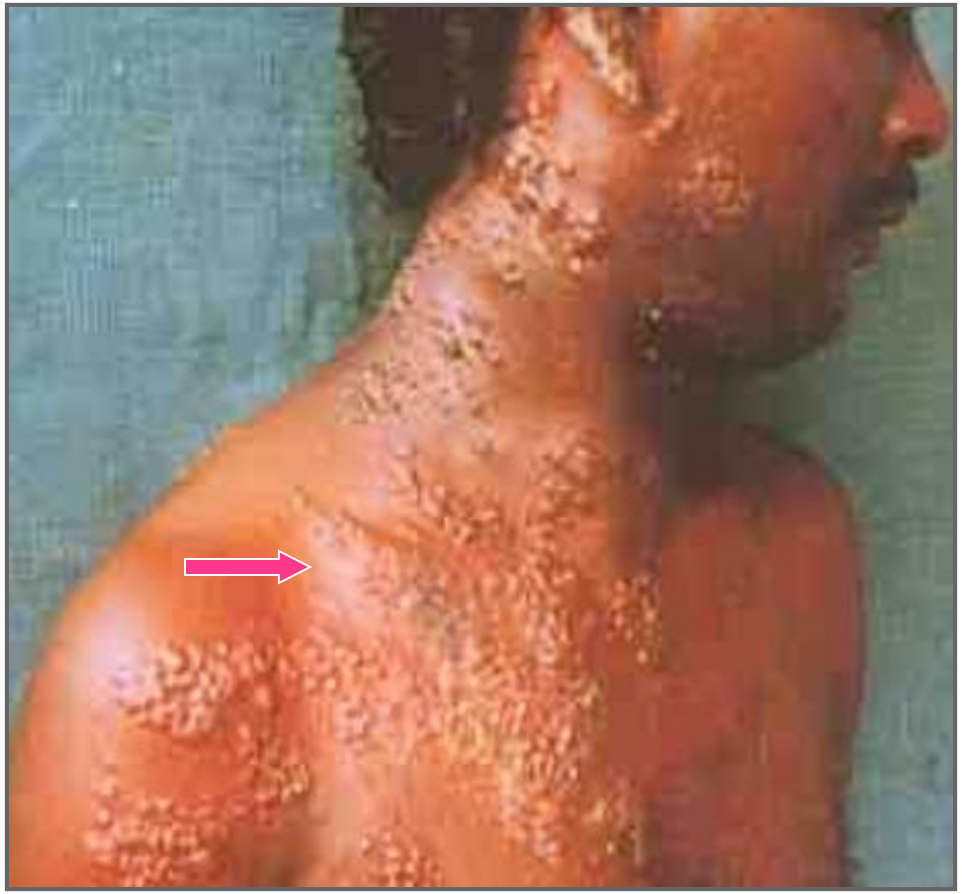


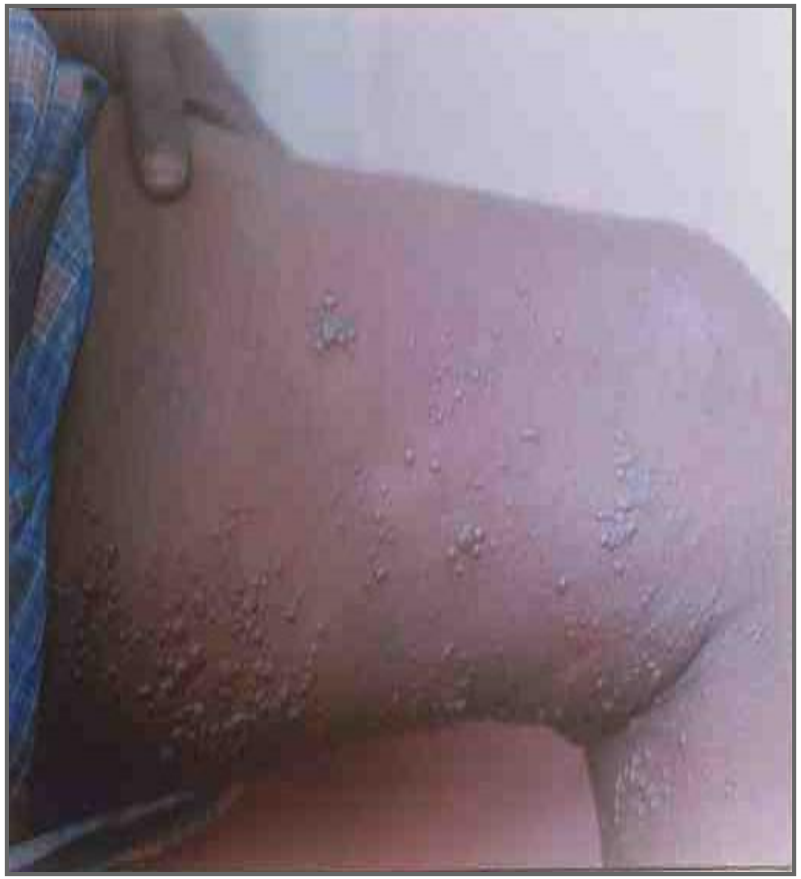
Varicella Zoster Lesions



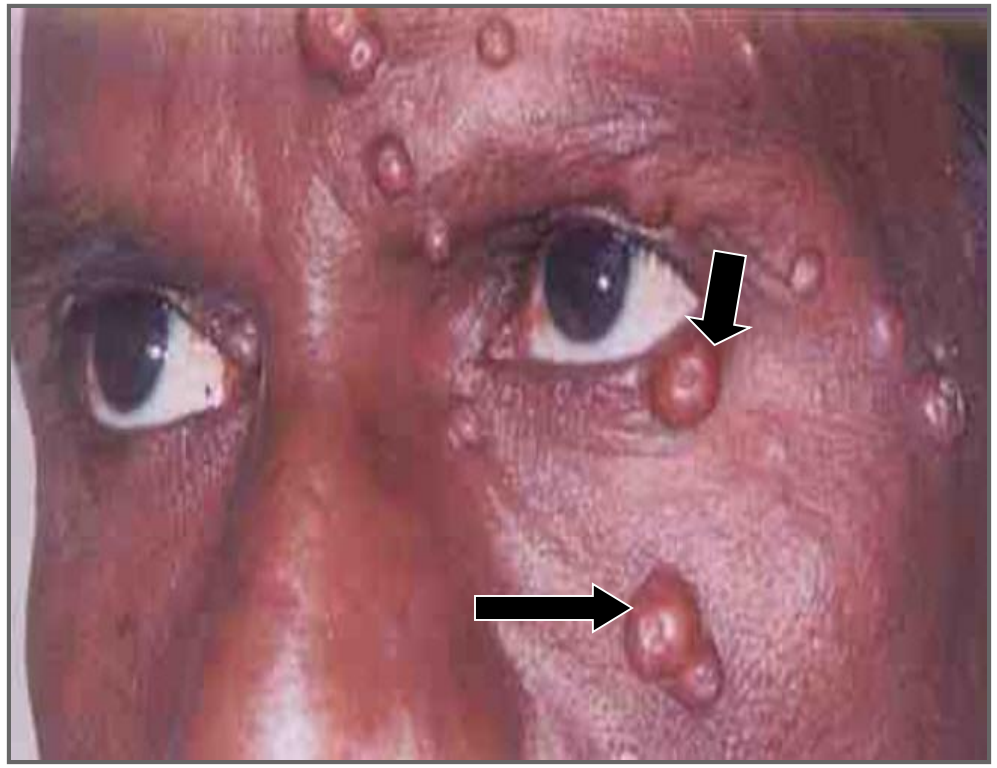


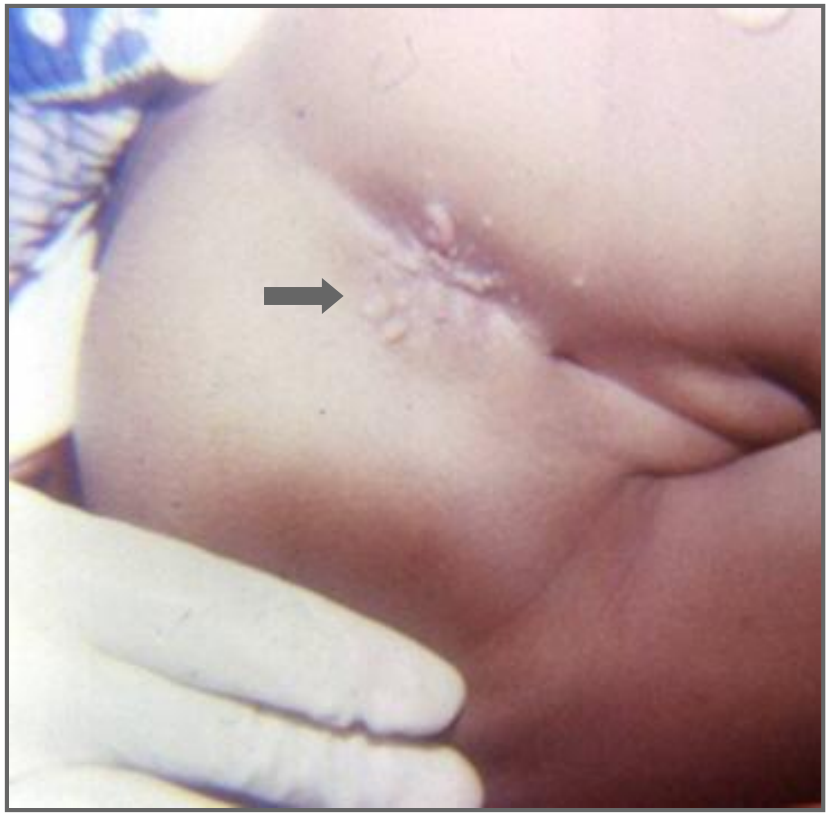
Varicella Zoster Lesions



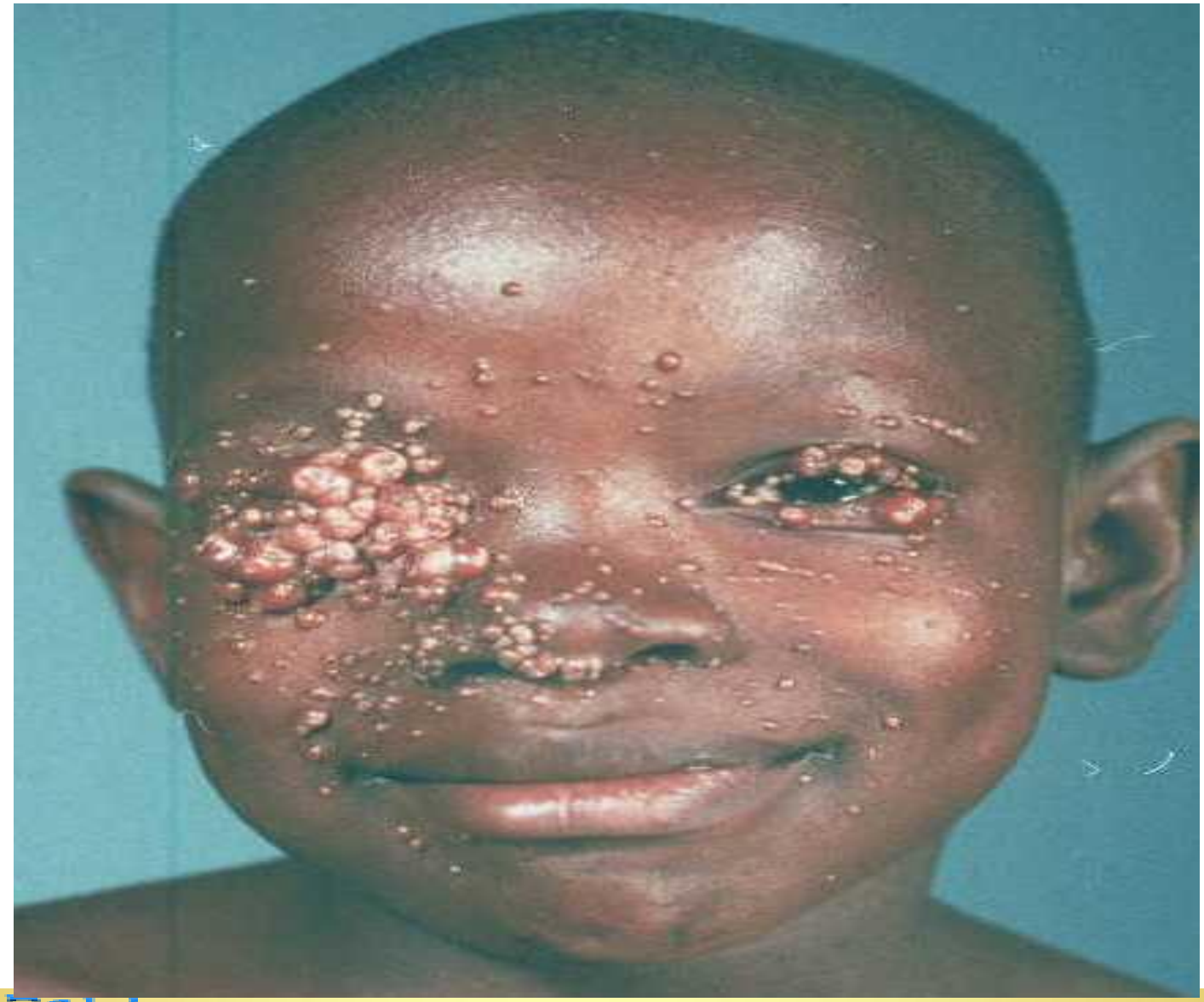


Molluscum Contagiosum Lesions





Severe Molluscum Contagiosum covering the eyes



Parasitic Infections

- Toxoplasmosis
- Cryptosporidiosis
- Isosporiasis

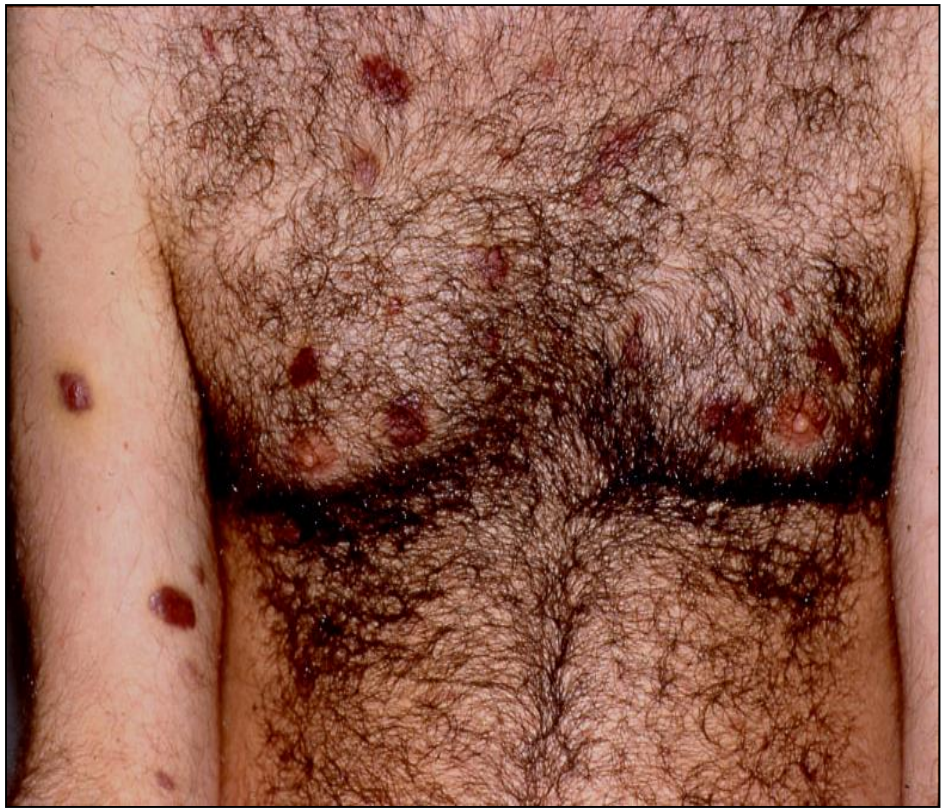
Common OIs: Bacterial Infections

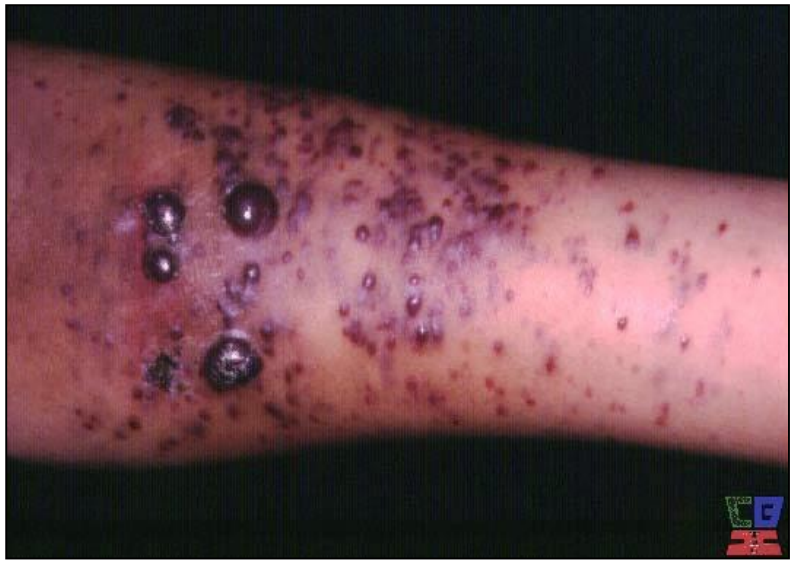
- Pneumonia
- Mycobacterium Tuberculosis
- Other systemic bacterial infections

Neoplasm (Malignancies)

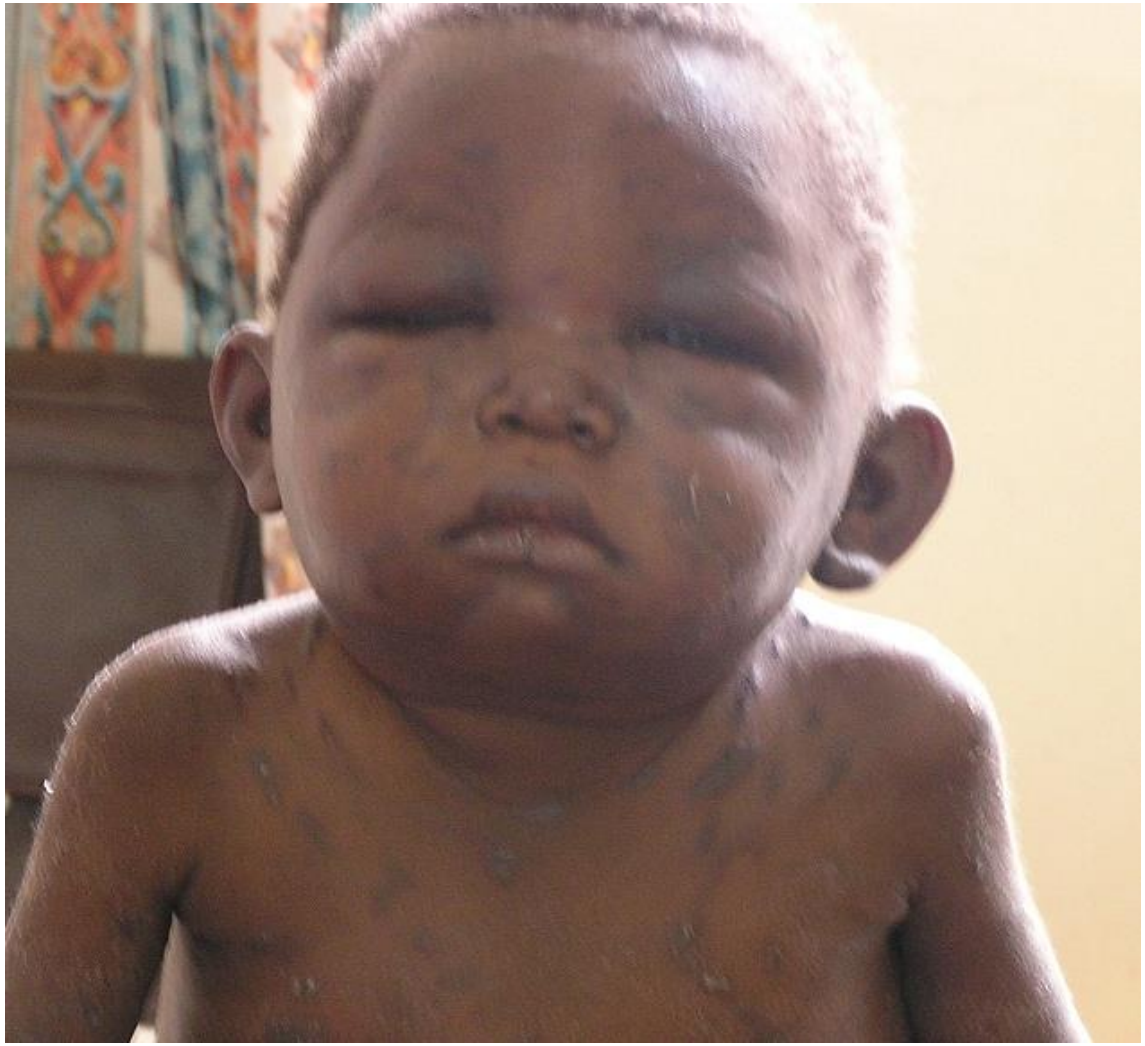
- Kaposi’s Sarcoma (KS)
- Non-Hodgkin's Lymphoma (NHL)

Kaposi’s Sarcoma (KS) Lesions





Disseminated Kaposi sarcoma with diffuse lymphoedema



WHO Clinical Staging System for HIV/AIDS

- It is a system designed for estimating the degree of immuno - suppression on clinical criteria
- Intended for use in patients known to have HIV (i.e. HIV+ antibody test)

WHO clinical stageing of childrens

Stage 1	Asymptomatic, Persistent generalized lymphadenopathy
Stage 2	Unexplainedpersistent hepato-splenomegaly Recurrent or chronic upper respiratory tract infections (otitis media, otorrhoea, sinusitis, tonsillitis) Herpes zoster, Lineal gingival erythema, Recurrent oral ulceration, Papular pruritic eruption, Fungal nail infections, Extensive wart virus infection, Extensive molluscumcontagiosum, Unexplained persistent parotid enlargement

Stage 3	Unexplained moderate malnutrition, not adequately responding to standard therapy, Unexplained persistent diarrhea, Unexplained persistent fever, Persistent oral candidiasis, Oral hairy leukoplakia, Lymph node tuberculosis, Pulmonary tuberculosis, Severe recurrent bacterial pneumonia, Acute necrotizing ulcerative gingivitis, Unexplained anemia, neutropaenia, chronic thrombocytopenia, Symptomatic lymphoid interstitial pneumonitis.

Stage 4	Unexplained severe malnutrition, PCP, Recurrent severe bacterial infections, Chronic HSV, Esophageal candidiasis, Extra-pulmonary tuberculosis, Kaposi sarcoma, CMV, Central nervous system toxoplasmosis, HIV encephalopathy, Extra-pulmonary Cryptococcus's,, Progressive multifocal leuko-encephalopathy, Chronic cryptosporidiosis (with diarrhea), Chronic isosporiasis, Disseminated endemic mycosis, Cerebral or B-cell non-Hodgkin lymphoma, HIV-associated nephropathy or cardiomyopathy

Prophylaxis

A) Cotrimoxazole *preventive therapies /CPT*

B) Isoniazid prophylaxis for TB preventions

C) Fluconazole prophylaxis

ARV PROPHYLAXIS

For HIV exposed infants

- If Infant on breastfeeding:
  - Initiate ART for the mother
  - Provide NVP syrup for the infant for 6 week (consider extending it for 12weeks)
  - Collect specimen for DNA PCR testing

➢Infant not breast feeding

– Initiate ART for the mother based on eligibility criteria

– If the infant is brought within 72 hours of birth provide NVP prophylaxis otherwise there is no need to provide NVP syrup for the infant.

– Collect specimen for DNA PCR testing

Antiretroviral Drugs (ARTs)

- HIV is a retrovirus. So drugs against HIV are called anti-retroviral drugs: shortened to **ARV drugs.**
- Giving ARV drugs in the correct way, with adherence support, is called **ARV T**herapy -shortened to **ART.**

Goal of ART

1) Improve the length and quality of the patient's life
2) Increase total lymphocyte count (TLC) and CD4 cell count, allowing preservation or improvement of immune function
3) HIV RNA < 400 copies/ml or "undetectable" within 4-6 months of ART initiation
4) Reduce HIV-related morbidity and mortality.

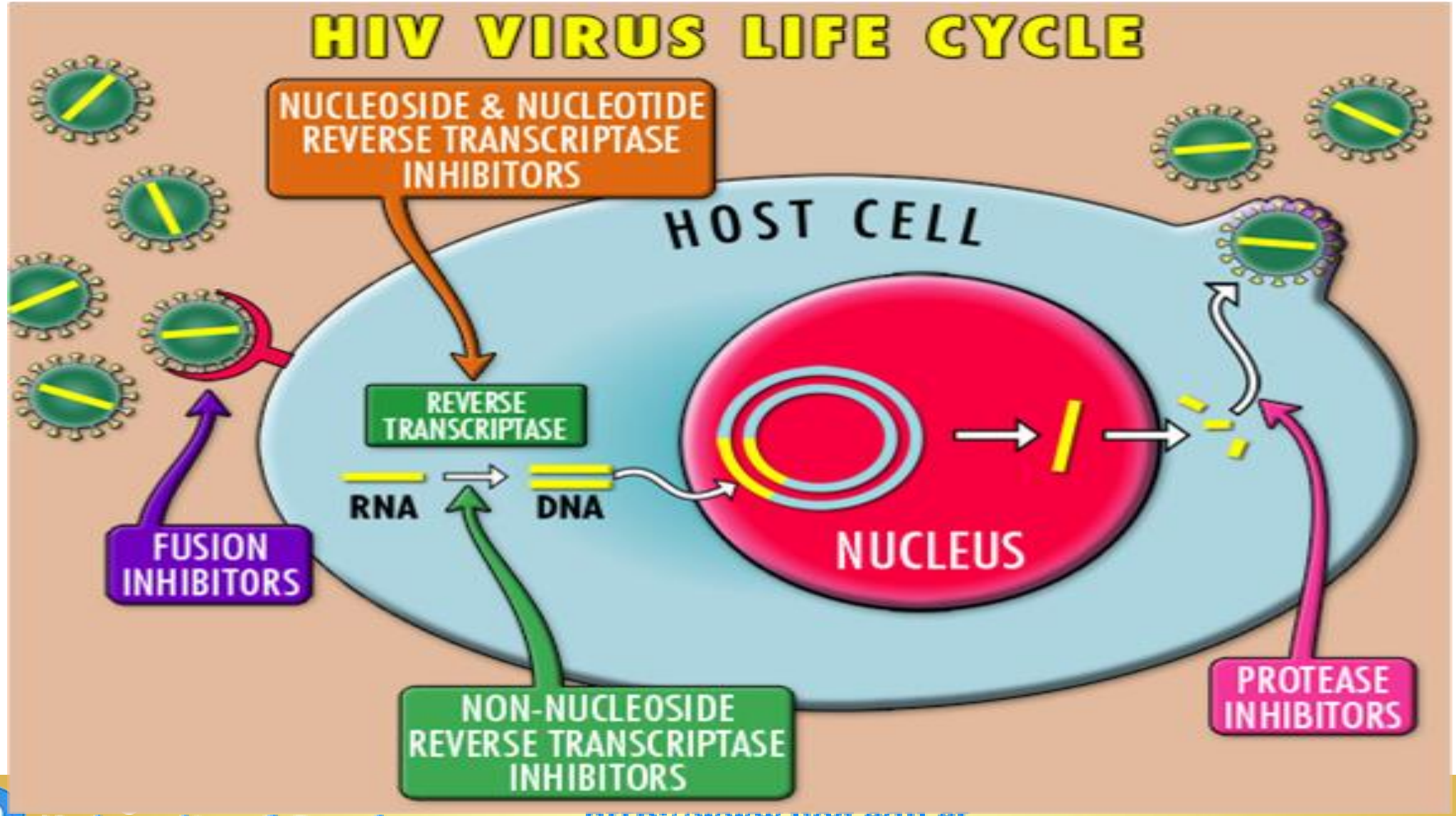
Complete base line assessment

- Baseline medical history
- Physical examination
- Clinical staging(WHO)
- Laboratory testing [e.g. Hcg test, HBV/HCV, CBC , ESR, SGOT and SGPT]
- Development of the patient care plan

Classes and mechanism of actions of antiretroviral drugs

1) *Nucleoside reverse transcriptase inhibitors (NRTIs)*
2) *Non Nucleoside reverse transcriptase inhibitors (NNRTIs)*
3) *Protease inhibitors*
4) *Integrase inhibitors*
5) *Fusion inhibitors*

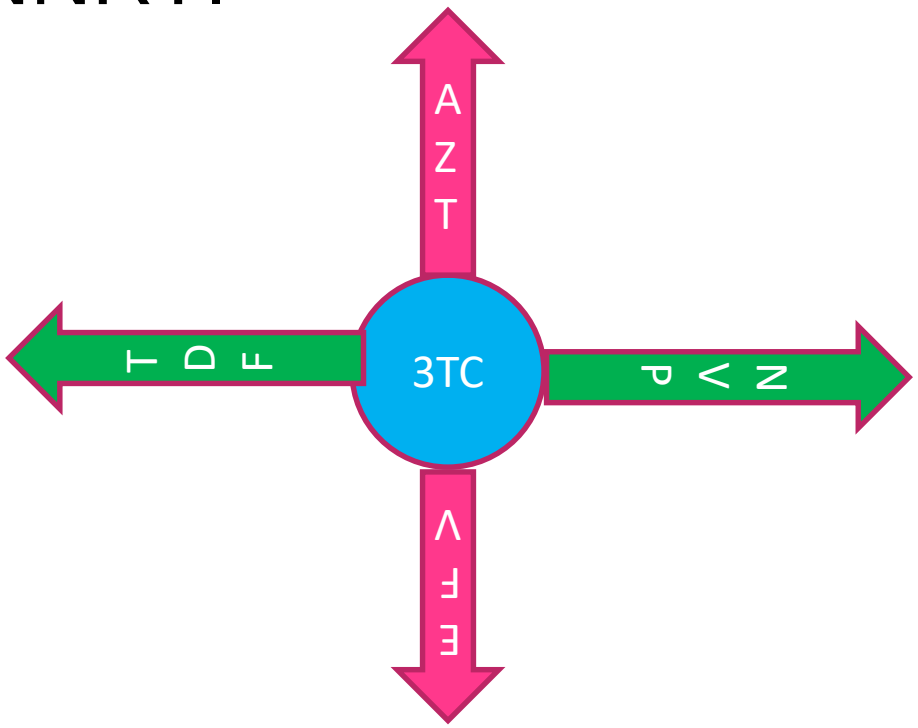
ARV drugs and their action sites on the virus



Combinations

1st line

- 2NRTIs+1NNRTI



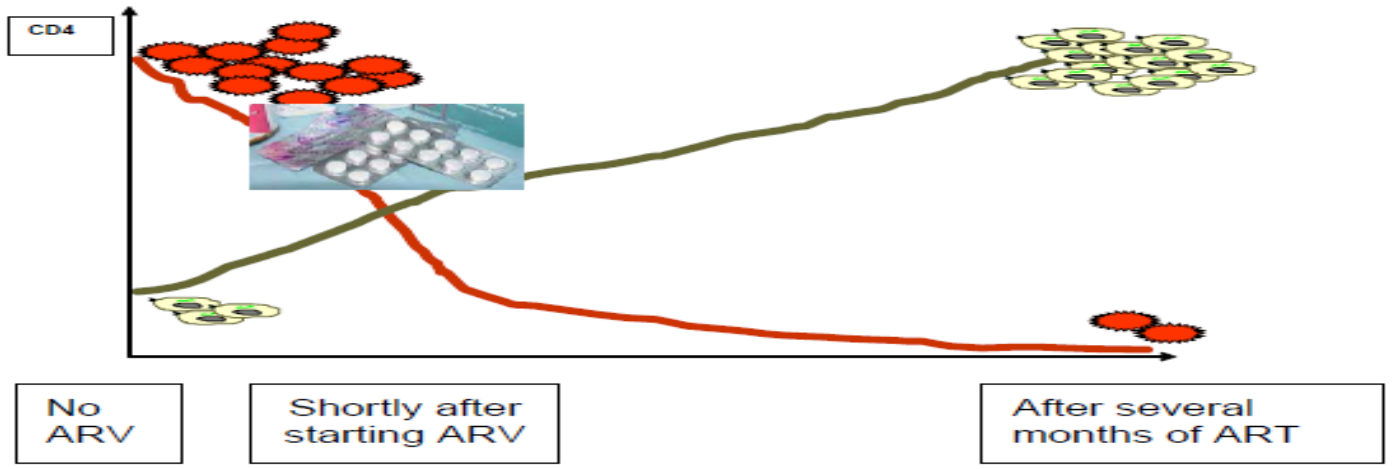
- For children less than 3 years
- Preferred 1st line
  - ABC + 3TC + LPV/r
  - AZT + 3TC + LPV/r
- Alternatives
  - ABC + 3TC + NVP
  - AZT + 3TC + NVP

- Preferred 1st line drugs for children between 3-10 years
  - ABC/3TC/EFV
  - AZT/3TC/EFV
- Alternatives
  - ABC + 3TC + NVP
  - AZT + 3TC + NVP
  - TDF + 3TC + EFV
  - TDF + 3TC + NVP

- For adolescent the preferred 1st line drug
  - TDF/3TC/EFV
- Alternatives
  - AZT + 3TC + EFV
  - AZT + 3TC + NVP
  - TDF + 3TC + NVP
  - ABC + 3TC + EFV

Fig. Impact of ART on CD4 & viral load

Figure showing the most common impact of ART on CD4 and viral load (CD4 increases and viral load declines as viral replication is suppressed)



NB: This inverse relation-ship may not hold true in some cases

Problems with ART

- ARV drug side effect
- IRIS
- Treatment failure

Thank you