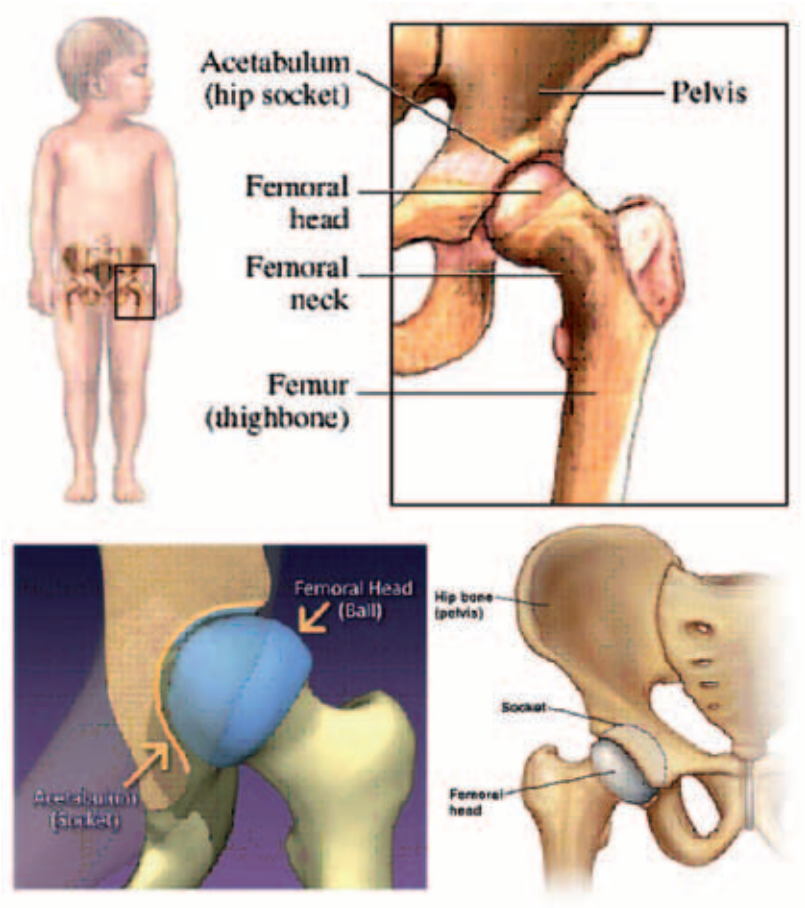
5. Developmental Dysplasia of Hip

5.1 Introduction

Developmental Dysplasia of the Hip (DDH) is a condition that affects the neonatal and infant hip joint. DDH is a term used to describe a spectrum of abnormalities affecting the relationship of the femoral head (top part of thigh bone) to the acetabulum (socket). In many circumstances, symptoms of DDH may be present at birth, however at times it may resolve within the first weeks of life. Alternatively, the hip may be stable at birth and develop an abnormality later hence the use of the term Developmental Dysplasia of the Hip (DDH), rather than Congenital Dysplasia of the Hip (CDH), as this condition was previously known. These may include an immature hip, a hip with mild acetabular dysplasia, a hip that is dislocatable, a hip that is subluxated, or a hip that is frankly dislocated.

The identification of risk factors, including breech presentation and family history, should heighten a physician's suspicion of developmental dysplasia of the hip. Diagnosis is made by physical examination. *Palpable hip instability*, unequal leg lengths, and *asymmetric thigh skinfolds* may be present in newborns with a hip dislocation, whereas gait abnormalities and limited hip abduction are more common in older children.

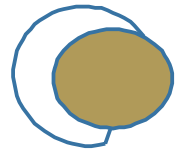


Hip dysplasia refers to an abnormality in the size, shape, orientation, or organization of the femoral head, acetabulum, or both.

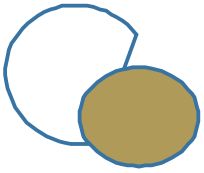
Acetabular dysplasia is characterized by an immature, shallow acetabulum and can result in subluxation or dislocation of the femoral head. In a sub-luxed hip, the femoral head is displaced from its normal position but still makes contact with a portion of the acetabulum. With a dislocated hip, there is no contact between the articular surface of the femoral head and the acetabulum. An unstable hip is one that is reduced in the acetabulum but can be provoked to subluxate or dislocate. Teratologic hip dysplasia, which is outside the scope of this discussion, refers to the more severe, fixed dislocation that occurs prenatally, usually in those with genetic or neuromuscular disorders.

Exercise 2

1. Take a medium size bowl and try to put the ball in it;
2. Then slowly remove the ball from the katori and bring it down to anterio lateral side of the bowl;
3. The hip displacement can be explained to participants in this way;



Normal ball and socket Joint



Position of the ball out of socket after displacement

- Risk factors for DDH should be identified, in all children;
- A careful physical examination is the basis for screening, for DDH;
- Ultrasonography should be ordered for infants six weeks to six months of age to clarify a clinical finding suggestive of DDH, assess a high-risk infant, and monitor DDH as it is observed or treated;

Screening Objective by the Mobile Health Team:

Tools are Questionnaire and Clinical Examination:

Questionnaire:

Ask at 6 weeks or 3 month for Risk factors for DDH (developmental dysplasia of the hip)

a. Ask for H/O breech delivery or family history of childhood limping among parents or sibling;
b. Any shortening of leg;
c. Walking like a duck or limping in a child;

Clinical-Perform

Step 1: Examine for asymmetrical thigh and gluteal skin folds in supine & prone positions;

Step 2: Measuring the length of leg at the level of knee joint in lying down, with hip joint and knee-joint flexed;

Step 3: Range of movement of the hip joint;

Step 4: Examine the child in standing position for spinal curves (Late Sign);

Step 5: Making the child walk for toe walking, limping or duck like walking (Late Sign);

Action: Refer:

a. Refer all children who are born as breech presentation and are female;

b. Refer all children with family history of congenital hip disorders;

c. Refer all children with Asymmetrical thigh and gluteal skin folds or shortening of the leg at the level of knee joint or restricted movement of the hip joint or increased spinal curve while standing or limping or duck like walking;

- Such children should be referred and followed at the age of 6 weeks, 3 month, 6 month and 12 month at the District Early Intervention center.

Screening Objective by the Doctor and staff nurse at the District Hospital or SNCU:

Step 1: Look for Risk factors for DDH (developmental dysplasia of the hip);

Step 2: Clinical Examination for all babies discharged from the District Hospital:

a. Perform Ortolani and Barlowmaneuver;

b. Look for Asymmetrical thigh and gluteal skin folds in supine & prone positions;

Action:

1) Arrange for USG of the HIP joint

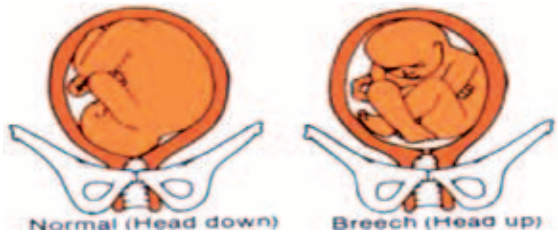
2) Assure follow-up at the age of 6 weeks, 3 month, 6 month and 12 month at the District Early Intervention center or trained pediatrician at the Block or Subdivision level;

High risk associated with

Low levels of amniotic fluid in the womb during pregnancy can increase a baby's risk of DDH.[5]

Other risk factors include:

- Being the first child;
- Breech Presentation (instead of head, leg/hip joint come first);



- Family History of DDH (especially, if in parent or sibling);
- Female Baby (DDH is four times more likely to occur in a female infant);
- Large Baby (>4kg);
- Overdue > 42 weeks;
- Oligohydramnios;
- 1 in 100 infants having some hip instability at birth.1-2 in 1000 births born with dislocated hip.
- Associated with Torticollis and foot deformities.
- First born baby or multiple pregnancies.

a. Signs and Symptoms at Birth: to be seen by the doctor or staff nurse at delivery point

Action (by Delivery room staff/ MO)	Recommendation
Look if child is born through breech	If any of above two conditions is positive, then refer to District hospital/DEIC. At district hospital the child should be seen at regular interval of 6 weeks, 3 months, 6 months and 1 year.
Look if child is female	
Ask Family history of involvement of the hip joint either in the parent or sibling provided we ruled out any trauma, paralysis or any infection of the hip joint (e.g. T.B)	
All babies born in district hospitalshould have hip examination prior to discharge from hospital through Ortolani & Barlow test	If any test is positive refer for USG at 6 weeks and clinical examination at 6 months.

c) Signs and symptoms to be seen at 2-3 months at follow up or if referred by the screening team: By the doctors at the facility e.g. BPHC, Sub divisional hospital or District hospital:

[5]The left hip is affected in 75% cases, due to the position of the hip in relation to the mother's spine in utero. Risk factors such as oligo-hydramnios, large or overdue baby and first-born or multiple pregnancies increase the risk of DDH, as they are associated with decreased intrauterine space.

- Examine for asymmetrical thigh: shortening on one side (measuring the length of leg at the level of knee joint in lying position with hip and knee joint flexed).
- Examine for gluteal skin folds (extra folds) both in supine.
- Examine the child in standing position for spinal curves (for children above 12 months).
- Examine the child during walking for children above 18 months for toe walking.

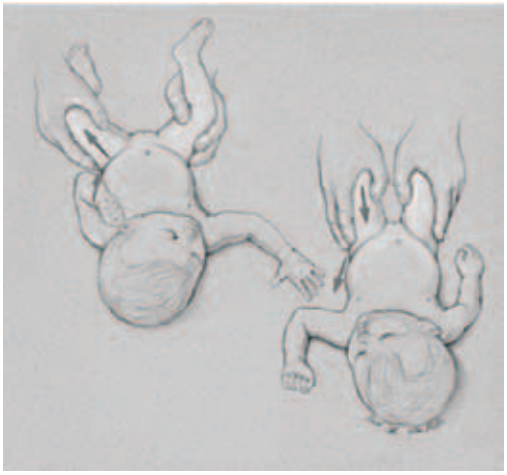
If any test is positive refer for USG at 6 weeks at DH/ DEIC and again for clinical examination at 6 weeks, 3 month, 6 month and 12 month at DH/DEIC

- No first-line method exists for diagnosing DDH during the newborn period;
- However, a careful physical examination is recommended as a screening tool, particularly for high-risk infants;
- Evaluation of the hip begins with observation of both lower extremities;
- The diaper should be removed and the infant relaxed;
- The Doctors of SNCU or DH should perform provocative dynamic tests, such as the Ortolani and Barlow maneuvers, to assess its stability. Because these tests often are difficult to interpret, they should be performed routinely, in children three months or younger;
- Tests commonly used to assess hip stability:

(A) Ortolani maneuver: A gentle upward force is applied while the hip is abducted;

(B) Barlow maneuver: A gentle downward force is applied while the hip is adducted. Each hip must be examined separately;

- The child should be supine with the hips flexed to 90 degrees. The examiner should place his or her index and long fingers laterally over the child's greater trochanter with the thumb medially along the inner thigh near the groin crease. The examiner stabilizes the child's pelvis by holding the contralateral hip still, while the opposite hand examines the hip.
- The examiner should gently abduct the hip being tested while simultaneously exerting an upward force through the greater trochanter, laterally.
- The sensation of a palpable "clunk" is a positive Ortolani test and represents the reduction of a dislocated hip into the bony acetabulum.
- To perform the Barlow test, the pelvis is stabilized and the patient is positioned similar to the Ortolani test position. The difference is that the examiner adducts the child's hip and exerts a gentle downward force. In an attempt to



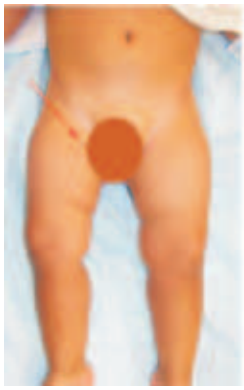
subluxate or dislocate an unstable hip posteriorly. These tests, generally, are only useful in infants three months or younger. Thereafter, soft tissue contractures limit the motion of the hip, even if it is dislocated.

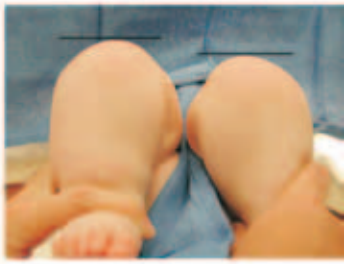
Tests commonly used to assess hip stability.
(A) Ortolani maneuver - A gentle upward force is applied while the hip is abducted.

(B) Barlow maneuver- A gentle downward force is applied while the hip is adducted (2006 American Academy of Family Physicians);

Ortolani maneuver: "O" stands for Open Up: Hip is abducted and you may reduce a dislocated hip joint by putting it back into the acetabulum;

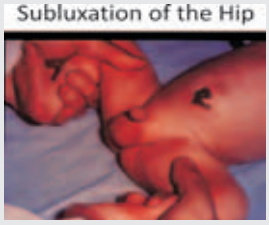
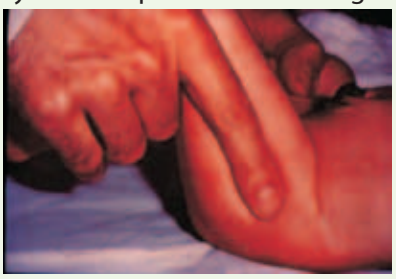
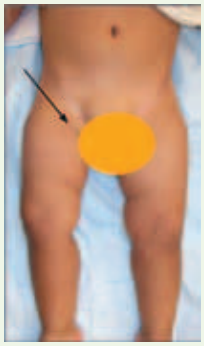
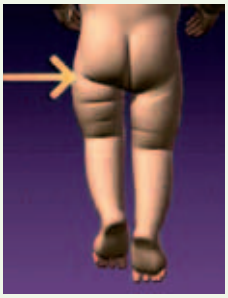
Barlow maneuver: "B" stands for **Band** (*in Hindi) or close : Hip is adducted and you may dislocate a unstable hip joint posteriorly;



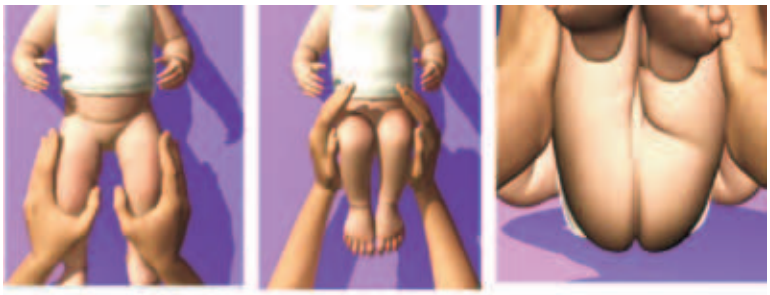


With Infant on a firm flat surface and hip and knees at 90°, turn the hip outwards for any restriction in the range of motion

Above: measuring the length: Infant on his back on a firm flat surface, pelvis stabilized and hips flexed to 90° with knees in flexion. Vertical level of knees is assessed.

Test at Birth to 3 months of Age by Delivery room staff/ MO	Test at Older Infants (> 3 months of age) by the Mobile health team primarily
Ortolani Test (reduction test) "The Ortolani is performed with the newborn supine and the examiner's index and middle fingers placed along the greater trochanter with the thumb placed along the inner thigh. The hip is flexed to 90° but not more, and the leg is held in neutral rotation. The hip is gently abducted while lifting the leg, anteriorly. With this maneuver, a "clunk" is felt as the dislocated femoral head reduces into the acetabulum.  Subluxation of the Hip **Ortolani maneuver**	Check for restricted abduction at the hips Limited abduction is the most sensitive sign associated with DDH in the older infant. With the infant in supine, on a firm, flat surface with pelvis stabilized and hips and knees at 90°, abduct and adduct the hips to check for restricted range of motion. This maneuver should be performed gradually and may need to be repeated a number of times, to ensure an accurate result is obtained. Normal range of motion at the hip is abduction to 60° or more, with range less than this suggestive of DDH.
Barlow Test (stress test) The Barlow provocative test is performed with the newborn positioned supine and the hips flexed to 90°. The leg is then gently adducted while posteriorly directed pressure is placed on the knee. A palpable clunk or sensation of movement is felt as the femoral head exits the acetabulum posteriorly. This is a positive Barlow sign  Barlow maneuver	**Check for leg length discrepancy:** Total leg length discrepancy should be assessed in prone with hips and knees extended, as well as assessing for leg length discrepancy using the Galeazzi Test. This test should be conducted with the infant in supine, on a firm, flat surface with the pelvis stabilized and level. Hips are flexed to 90° and placed in neutral adduction/abduction, with knees in flexion. In this position, the vertical level of the knees can be assessed for asymmetry. **Check for asymmetrical thigh and gluteal skin folds:** With the infant in prone, check for asymmetrical thigh or gluteal folds. Note that asymmetrical skin folds alone do not constitute a diagnosis of DDH1, however, this information can be used in combination with other physical signs during assessment.
	 **Increase skin folds on thigh and also on the buttock. Asymmetricalbuttock crease*

Screening Tools

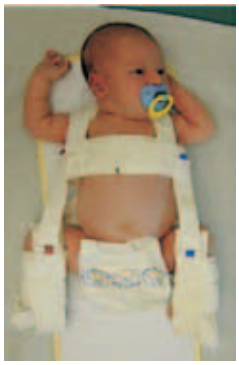


Above: measuring the length: Infant on his back on a firm flat surface, pelvis stabilized and hips flexed to 90 with knees in flexion. Vertical level of knees is assessed.

With Infant on a firm flat surface and hip and knees at 90°, turn the hip outwards for any restriction in the range of motion

In newborns and infants up to six months of age, closed reduction and immobilization in a Pavlik harness is the treatment of choice. The Pavlik harness, dynamically, positions the hips in flexion and abduction while allowing motion. Reduction of the hip should be confirmed by ultrasonography within three weeks of harness placement. Treatment usually is continued for at least six weeks full-time and 6 weeks partial time.

In children older than six months, closed reduction under general anesthesia and hip Spica casting is the treatment of choice.



80- 90% success if treatment started within 6 months

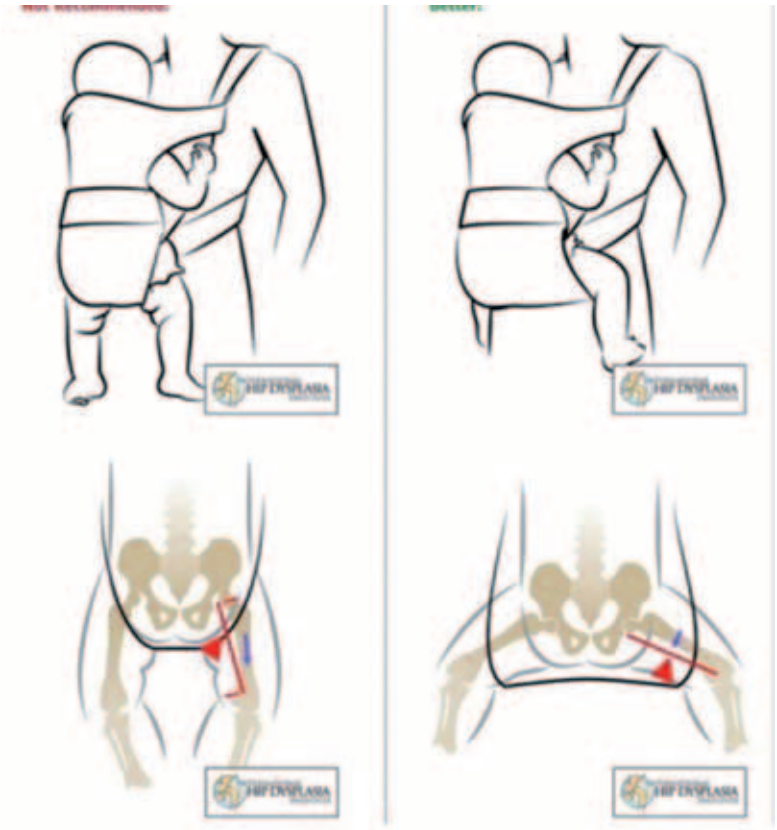
Explain the correct position: Swaddling infants with the hips and knees in an extended position increases the risk of hip Dysplasia and dislocation, so best is to carry the child as shown in the picture below.

Action: Refer for examination at CHC/DH.

Good practice

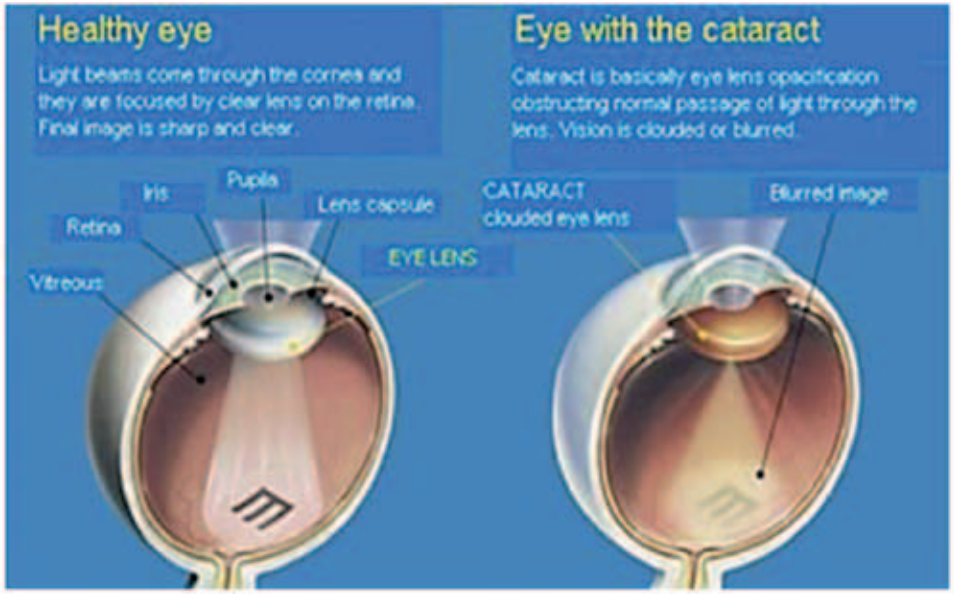
Baby Harness:

Not recommended **Better**



6. Congenital Cataract:

A congenital cataract is a clouding of the lens of the eye, that is present at birth. The lens of the eye is normally clear. It focuses light that comes into the eye onto the retina. It is also known as 'infantile cataract' if it develops in the first six months, after birth. It can affect one eye, which is known as 'unilateral cataract' or both eyes, which is known as 'bilateral cataracts'. Most children with cataract in only one eye usually have good vision in the other. About 3 children per 10,000 children have a cataract.



Question

Is there any difference in cataract of a new born and an old person?

Yes, In case of children, permanent loss of vision (amblyopia) may occur, if prompt treatment is not provided.

Look

Clinical-Perform

1. Congenital cataracts usually look different than other forms of cataract;
2. Grey or white cloudiness of the pupil (which is normally black);
3. Infant doesn't seem to be able to see (if cataracts are in both eyes);
4. "Red eye" glow of the pupil is missing in photos, or is different between the two eyes;

Tests

1. Examination by a Torch may reveal white pupil;
2. To diagnose congenital cataract, the infant should have a complete eye examination by an ophthalmologist (Eye Specialist);
3. The infant may also need to be examined by a pediatrician, who is experienced in treating inherited disorders;
4. Ophthalmoscopy is done, to confirm;

Action

1. Refer to District Hospital;
2. Removing a congenital cataract is usually a safe, effective procedure;
3. The child will need follow-up, for vision rehabilitation;

7. Congenital deafness

Congenital deafness refers to hearing loss which is believed to have been present, since birth. This is distinct from progressive impairment which is a problem noticed at birth but, which worsens with time.

Hearing loss is measured in decibels hearing loss (dB HL). Normal hearing can detect sounds at 0-20 dB. To be diagnosed with congenital deafness, the patient must have bilateral hearing impairment of at least 40 dB HL in the better ear - that is, not be able to hear sounds of less than 40 dB.

Overall 8-10 per 1,000 live births (ICMR study in rural south showed 8 per thousand live births);

Congenital hearing loss can be caused by genetic or non-genetic factors:

Genetic factors (hereditary) are thought to cause more than 50% of all hearing loss. Hearing loss from genetic defects can be present at birth or develop later on, in life. There are many genetic syndromes that include hearing loss as one of the symptoms. Examples include: Down syndrome

Genetic syndromes have a group of signs and symptoms that together indicate a specific disease. There are many genetic syndromes that include hearing loss as one of the symptoms. Examples include: Down syndrome

Non-genetic factors can account for about 25% of congenital hearing loss. Non-genetic factors that are known to cause congenital hearing loss include:

- Maternal infections, such as rubella (German measles), cytomegalovirus, or herpes simplex virus, usually present with a rash;
- Prematurity;
- Low birth weight;
- Birth injuries;
- Toxins, including drugs and alcohol, consumed by the mother, during pregnancy;
- Complications associated with jaundice;
- Maternal diabetes;
- Toxemia during pregnancy;
- Lack of oxygen (anoxia);

Impact of hearing loss

Functional impact

- One of the main impacts of hearing loss is on the individual's ability to communicate with others. Spoken language development is often delayed in children with deafness.
- Hearing loss and ear diseases such as Otitis media can have a significantly adverse effect on the academic performance of children. However, when opportunities are provided for people with hearing loss to communicate they can participate on an equal basis, with others. The communication may be through spoken/ written language or through sign language.

Social and Emotional impact

Limited access to services and exclusion from communication can have a significant impact on everyday life, causing feelings of loneliness, isolation and frustration, particularly among older people with hearing loss.

If a person with congenital deafness has not been given the opportunity to learn sign language, as a child, they may feel excluded from social interaction.

Economic impact

In developing countries, children with hearing loss and deafness, rarely receive any schooling. Adults with hearing loss also have a much higher unemployment rate. Among those who are employed, a higher percentage of people with hearing loss are in the lower grades of employment compared with the general workforce. Improving access to education and vocational rehabilitation services, and raising awareness, especially, among employers, would decrease unemployment rates among adults with hearing loss.

In addition to the economic impact of hearing loss at an individual level, hearing loss, substantially, affects social and economic development, in communities and countries.

Prevention

Half of all cases, of hearing loss, can be prevented through primary prevention. Some simple strategies for prevention include:

- Immunizing children against childhood diseases, including measles, meningitis, rubella and mumps;
- Immunizing adolescent girls and women of reproductive age against rubella before pregnancy;
- Screening for and treating syphilis and other infections in pregnant women;
- Improving antenatal and prenatal care, including promotion of safe childbirth;
- Avoiding the use of ototoxic drugs, unless prescribed and monitored by a qualified physician;

- Referring babies with high risk factors (such as those with a family history of deafness, those born with low birth weight, birth asphyxia, jaundice or meningitis) for early assessment of hearing, prompt diagnosis and appropriate management, as required; and
- Reducing exposure (both occupational and recreational) to loud noises by creating awareness, using personal protective devices, and developing and implementing suitable legislation;
- Hearing loss, due to Otitis media, can be prevented by healthy ear and hearing care practices. It can be suitably dealt with through early detection, followed by appropriate medical or surgical interventions;

Identification and management

Early detection and intervention is the most important factor in minimizing the impact, of hearing loss, on a child's development and educational achievements. In infants and young children, with hearing loss, early identification and management through infant hearing screening programs can improve the linguistic and educational outcomes, for the child. Children with deafness should be given the opportunity to learn sign language, along with their families.

Pre-school, school and occupational screening for ear diseases and hearing loss can also be effective for early identification and management of hearing loss.

People with hearing loss can benefit from the use of hearing devices, such as hearing aids, assistive listening devices and cochlear implants. They may also benefit from speech therapy, aural rehabilitation and other related services. However, current production of hearing aids meets less than 10% of global need. In developing countries, fewer than one out of 40 people who need a hearing aid have one. The lack of availability of services for fitting and maintaining hearing aids, and the lack of batteries are also barriers in many low-income settings. Making properly-fitted, affordable hearing aids and providing accessible follow-up services in all parts of the world will benefit many people, with hearing loss.

People who develop hearing loss can learn to communicate through development of lip-reading skills, use of written or printed text, and sign language. Teaching in sign language will benefit children with hearing loss, while provision of captioning and sign language interpretation on television will facilitate access to information.

Officially recognizing national sign languages and increasing the availability of sign language interpreters are important actions to improve access to sign language services. Human rights legislation and other protections can also help ensure better inclusion for people with hearing loss.

Screening program: Use of Oto-acoustic Emission (OAE) for universal screening program for newborns, at the District hospital/DEIC, is to be started.

8. Congenital Heart Disease

Introduction

A congenital heart defect refers to a problem in the development of the heart that usually presents at birth but might manifest later in life also. These problems can range from mild, i.e., a small hole between the chamber of the hearts and never requiring surgery to more severe ones, requiring major heart surgeries. The heart has four chambers separated by a wall or a septum. On one side of the septum is oxygen poor blood and on the other side is the oxygen rich blood. Congenital heart disease can have either a hole connecting the two chambers or an abnormal connection in the heart so that the oxygen poor blood and oxygen rich blood mix together. In some cases the problem may be of poor contraction of the heart.

Magnitude:

1. Every year 2 lakh children are born with congenital heart defects;
2. At least 60,000 of these need treatment in the 1st year of life;
3. Only 5000 get treatment because of lack of awareness amongst public in general and GP's leading to delayed diagnosis;
4. Poor socio-economic status of families often leads to delayed treatment;

What are the signs and symptoms in a baby with congenital heart defect?

Signs and symptoms for congenital heart defects depend on the type and severity of the particular defect. Some heart defects can be found at birth, because they can cause a baby to have bluish tinted nails or lips or troubled breathing. Others might have no signs at birth and are not found until later in life, that is during infancy, childhood or even adulthood. If a health care provider (a doctor or nurse) suspects that a congenital heart defect is present, the baby can have specific tests to diagnose the exact defect.

- A baby having cyanosis: This means the skin, lips and fingernails are blue and such a baby is called a - blue baby;
- Problems with breathing. Fast breathing when at rest or sleeping;
- Shortness of breath or tires easily during feedings (cannot suck, at the breast, for long);
- Sweating around the head, especially during feeding;
- Loss of healthy skin color i.e. pale or blue;
- Swelling or puffiness in the face, hands, feet, legs, or areas around the eyes;
- Irritable or difficult to console;
- Poor weight gain.

Signs & Symptoms of CHD:

Children aged 6 weeks to 6 years

Look	• Rapid or troubled breathing (shortness of breath); • Sweating around the head, especially during feeding; • Bluish discoloration of skin, nails, tongue, lips (cyanosis); • Pale extremities; • Swelling or puffiness in the face, hands, feet, legs, or areas around the eyes;
Ask	• History of a sibling with heart disease #; • Not able to suck mothers breast, due to breathlessness; • Sweating around the head, especially during feeding; • Recurrent chest infections; • Breathlessness on physical activity, like playing; • History of fainting; ***Chest pain * chest pains are not usually present in CHD. If child complains of chest pain he/she should be referred to CHC***
Perform	• On touching babies, cold extremities (hand and feet)may be felt; • Auscultation for any murmur or thrill; • See pitting edema present or not;

Actions:

Refer to the DEIC if any sign-symptoms are found positive.
If there is only a positive history of a sibling with CHD then refer to the CHC provided the child is not symptomatic i.e. does not have any of the clinical features stated above.

Children above age of 6 years

Look	• Usually asymptomatic except during acute condition; • Rapid or troubled breathing (shortness of breath) during exertion; • Poor growth as compared, to other students in his class; • Bluish discoloration of skin, nails, tongue, lips (cyanosis); • Pale extremities; • Swelling or puffiness in the face, hands, feet, legs, or areas around the eyes;
Ask	• History of any joint pain especially fleeting joint pain involving the larger joints; • History of any palpitations, breathlessness during brisk walking, climbing of stairs or running during sports; • History of a sibling with heart disease #; • Not able to suck mothers breast, due to breathlessness; • Sweating around the head, especially during feeding; • Recurrent chest infections; • Breathlessness on physical activity like playing; • History of fainting; • **Chest pain * chest pains are not usually present in CHD. If child complains of chest pain he/she should be referred to CHC**
Perform	• Auscultation for any murmur or thrill; • See Pitting edema or not;

Actions:

Refer to the DEIC if any sign-symptoms are found positive.

If there is only a positive history of a sibling with CHD then refer to the CHC provided the child is not symptomatic i.e. does not have any of the clinical features stated above.

This part of the chapter is meant for District Hospitals SNCU/DEIC and is not for screening by Mobile Health Teams

Screening of all newborns born, at the District Hospital, by pediatricians of SNCU:

- All children born, at the district hospital, should be screened for Critical Congenital Heart Disease, through Pulse Oximetry;
- Some cases may present immediately, at birth, and if not treated may die. Such cases are referred as Critical Congenital Heart Defects;
- Let us take an example of a healthy child born at term, was feeding normally and was discharged. Five days later the mother brought back the child to the hospital with severe breathing problems. Echo was ordered but it was too late and the child died with CCHD.

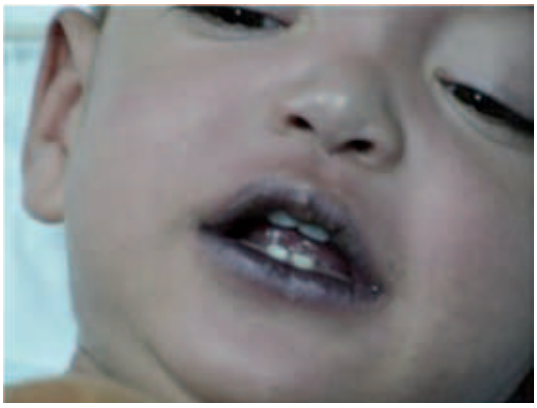
9. Critical Congenital Heart Defects (CCHD):

Critical congenital heart disease (CCHD) represents a group of heart defects that cause serious, life-threatening symptoms and requires intervention within the first few days of life. CCHD is often treatable, if detected early. It can encompass abnormalities in the rhythm of the heart, as well as a wide array of structural heart problems.

Some babies affected with CCHD can look and act healthy at first, but within hours or days after birth they can have serious complications. Pulse Oximetry newborn screening, is a non-invasive test that measures how much oxygen is in the blood and can help to identify babies that may be affected with CCHD before they leave, the newborn nursery. If detected early, infants affected with CCHD can often be treated and lead longer, healthier lives.

Signs of critical congenital heart disease in infants include:

- Loss of healthy skin color;
- Cyanosis (a bluish tint to the skin, lips, and fingernails);



- Rapid or troubled breathing (shortness of breath);
- Not able to suck, mothers breast, due to breathlessness;
- Swelling or puffiness in the face, hands, feet, legs, or areas around the eyes;
- Sweating around the head, especially during feeding;
- Poor weight gain;

Conditions which can be ruled out through pulse oximetry:

- Pulmonary atresia;
- Tetralogy of Fallot's;
- Total anomalous pulmonary venous return;
- Transposition of great arteries;

**Only for Doctors at District Hospital, SNCU.*

- Single ventricle;
- Tricuspid atresia;
- Hypoplastic left heart syndrome;

Screening at DH Level: Aim to screen all newborns to rule out CCHD before they are discharged.

Tool: Pulse Oximetry

Logistics required:

- Pulse oximeters;
- Disposable/Reusable Pulse Oxygen sensors;
- Disinfecting agent recommended by pulse oximetry equipment manufacturer;
- Data collection form;
- Blanket for warming the infant and block exterior lights;

Pre-requisites:

- Screening should be performed following 24 hours of birth and before discharge;
- Screening should be done in a quiet area with Parent by the side to comfort the infant;
- Conduct screening while infant is awake and quiet;
- Screening by pulse oximetry should not be attempted on an infant while he/she is crying;
- The probe should be protected from bright light;

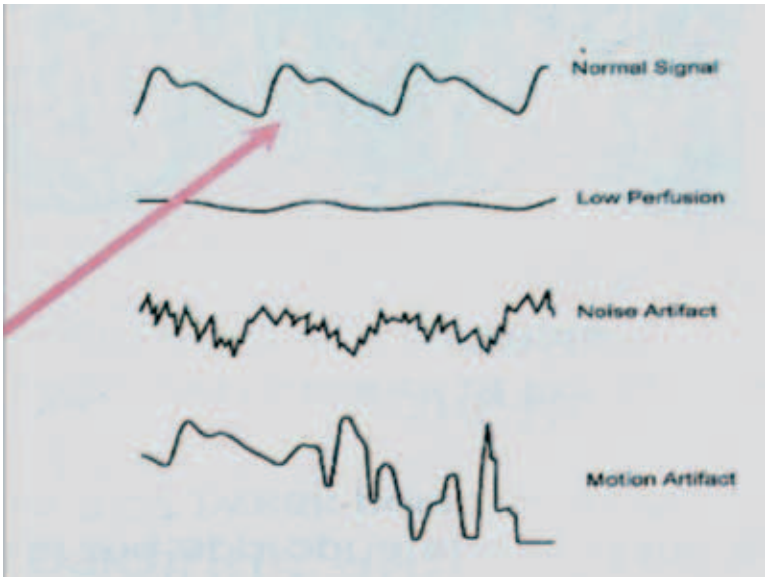
Prior to screening, Parents should be counseled about the importance and methodology of screening in simple messages, as under:

- Inform the parents/guardian that the purpose of screening is to screen for serious heart problems;
- Inform the parents/guardians that the baby will be screened through pulse oximetry on the baby's right hand and one foot, if possible;
- Inform the parents/guardian that the pulse oximetry test is not painful and that it takes a few minutes when the baby is quiet, warm and not moving;
- Inform the parent/guardian that it is possible that a baby with a heart problem may have a normal pulse or reading;
- Inform the parent/guardian that they have a right to decline for screening;
- Inform the parent that they may ask questions at any time before, during or following the screening;

Methodology:

Wrap the probe around the outside of the infant's right foot and right palm (as shown in the picture).

Inference:



When to refer for a proper Echocardiography and subsequent management?

- Before commenting one should see the wave form whether proper waves can be seen or not.
- If Oxygen saturation levels in both the right hand and foot is <95% or the difference of >3% exists between right hand and foot, repeat the test in one hour.
- If it fails, repeat the test again in another hour. If still it fails, go for further clinical assessment and investigations e.g. echocardiogram. Refer if there is no facility for ECHO.
- If Oxygen saturation levels in both the right hand and foot is >95% and
- There is a difference of <3% between right hand and foot, the child passes the test and may be discharged.

Points to remember: for Doctors from SNCU

1. Approximate 1% of the live newborns have congenital heart disease;
2. These babies may have good birth weight, and would have normally cried after birth, accepted few feeds, still their condition may worsen in matter of hours;
3. In the best of the centers, by doing fetal echo during pregnancy, not all CHD are picked up;
4. Approximately 5-10% of present infant mortality in India may be accounted for the CHD alone (Saxena, 2005); In regions with low IMR, this figure may be higher;
5. Babies with a critical congenital heart defect (CCHD) are at significant risk for death or Disability if their condition is not diagnosed, soon after birth;
6. Some babies born with a heart defect appear healthy, at first and can be sent home with their families before their heart defect is detected;
7. Thus, it is presumed that every year a lot of unrecognized CCHD are discharged each
    a. Year from SNCU in our country;
    b. These babies are at risk, for having serious complications within the first few days or weeks of life, and often require emergency care;
8. Not all congenital heart defects are fatal, during the early years of life. Few require urgent diagnosis and intervention, immediately. These are called as "**Critical Congenital Heart Defects".**

How to screen for congenital heart disease during newborn period before discharge at SNCU?

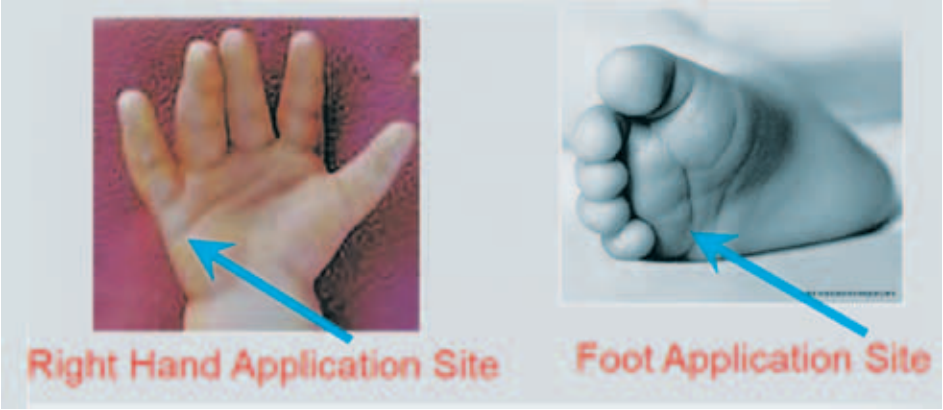
Ans. Simplest way is by Newborn screening using pulse oximetry, before the newborn is discharged.

Counselling

Prior to screening, parents should be counselled about the importance and methodology of screening in simple messages, as under:

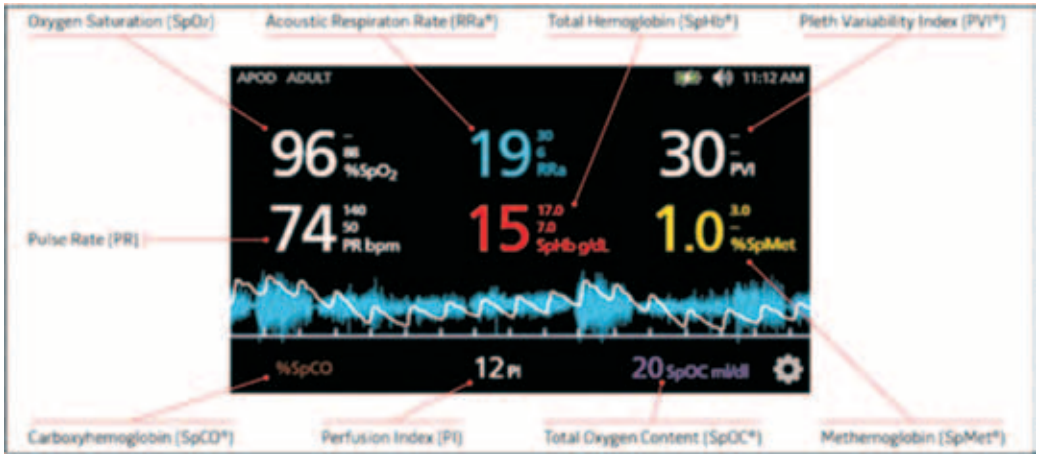
- Inform the parents/guardian that the purpose of screening is to screen for serious heart problems;
- Inform the parents/guardians that the baby will be screened through pulse oximetry on the baby's right hand and one foot, if possible;
- Inform the parents/guardian that the pulse oximetry test is not painful and that it takes a few minutes when the baby is quiet, warm and not moving;
- Inform the parent/guardian that it is possible that a baby with a heart problem may have a normal pulse or reading;
- Inform the parent/guardian that they have a right to decline for screening;
- the parent that they may ask questions at any time before, during or following the screening;

Pulse Ox Probe Placement Education



Learn to look at the equipment: shows pulse rate of 74 and SpO_2 of 96% and perfusion index of 12 and the normal pleth wave.

More Complete Picture of Your Patients' Physiological Status



Considerations for oximeters:

i. Heart rate displayed and correlates with what is expected for an infant (100-160 BPM)

ii. Ensure that pleth wave (arterial pulse) is stable, indicating perfusion to the site being monitored and with no motion artifact

iii. Peripheral Perfusion Index (PPI) – An assessment of the appropriateness of the application site through assessing pulse strength. Can range from 0.02 (weak pulse strength) -20 (strongpulse strength). Most newborns should have a PPI of >1.0.

Performing Pulse Oximetry (Pulse Ox) with the Infant Patient: Note for Providers

Pulse Ox – Dos

1. If you are using disposable pulse ox probes, use a new, clean probe for each infant. If you areusing reusable pulse ox probes, clean the probe with recommended disinfectant solution betweeneach infant. Dirty probes can decrease the accuracy of your reading and can transmit infection. Adisposable wrap should be used to secure the probe to the site.

2. The best sites for performing pulse ox on infants are around the palm and the foot. An infant pulse ox probe (not an adult pulse ox clip) should always be used for infants.

3. When placing the sensor on the infant's skin, there should not be gaps between the sensor and the infant's skin. The sides of the probe should be directly opposite of each other.

4. Nail polish dyes and substances with dark pigmentation (such as dried blood) can affect the pulse ox reading. Assure that the skin is clean and dry before placing the probe on the infant. Skin colorand jaundice do not affect the pulse ox reading.

5. Movement, shivering and crying can affect the accuracy of the pulse ox reading. Ensure that the infant is calm and warm during the reading. Swaddle the infant and encourage family involvement to promote comfort while obtaining the reading. If possible conduct screening while the infant is awake.

6. Pulse oximeters have different confidence indicators. To ensure that the pulse ox reading is accurate.Determine the confidence indicators for the pulse oximetry equipment that you are using.

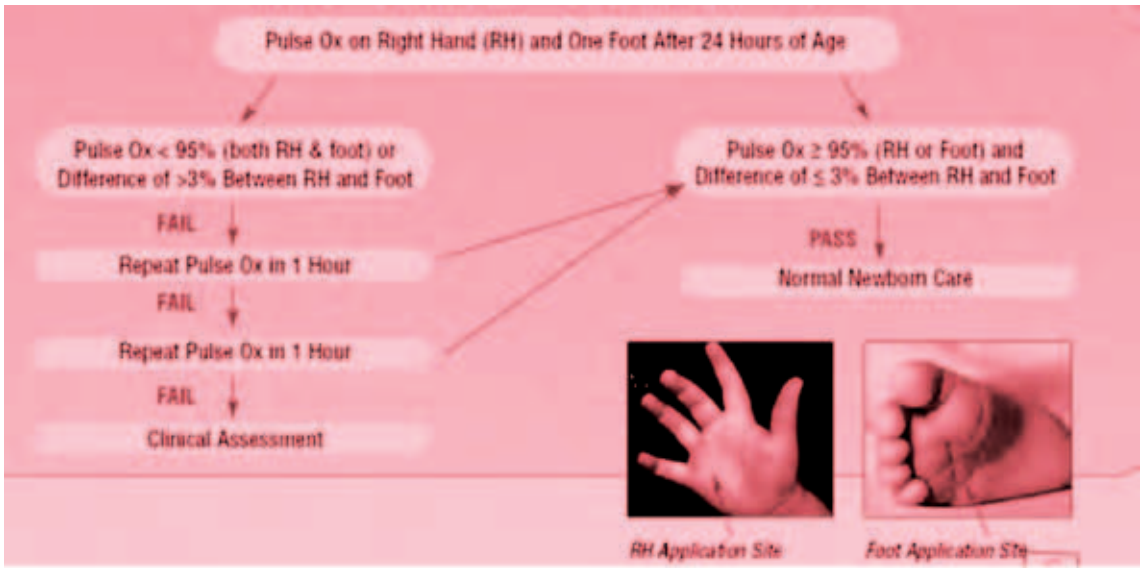
7. If an infant requires pulse ox monitoring for an extended amount of time, assess the site wherethe probe is placed at least every two hours. Monitor for signs of irritation and burning of the skin.

Pulse Ox - Caution!

1. The pulse is needed to determine the oximetry reading. Pulse ox is not accurate if the patient ishaving a cardiac arrhythmia. Remember: No pulse, no oximetry!

Screen Obtain pulse oximetry reading on right hand (RH) and either foot at 24-48 hours of age (infant should be on room air, warm and quiet, with screening sites clean and dry)

2. Pulse ox readings are not instantaneous. The oximetry reading that is displayed on the monitor is an average of readings over the past few seconds.



Deficiencies

Questionnaire on Deficiencies

1. Which of the following does not occur due to any deficiency
   (a) Anemia
   (b) Bitot's spot
   (c) Goiter
   (d) Otitis media

2. Which of the following are clinical features of anemia
   (a) Reduced appetite and shortness of breath
   (b) Weakness, fatigue and irritability
   (c) Pale skin color (pallor)
   (d) All of the above

3. How can anemia be prevented
   (a) Exclusive breastfeeding till six months of age
   (b) Regular intake of iron rich foods viz. Dark green leafy vegetables, beans, nuts, meat, dried fruit etc.
   (c) Both of the above
   (d) None of the above

4. Which, of the following, statement is not true:
   (a) Vitamin A helps in development of visual function of the eye and helps building up immunity in the body
   (b) Deficiency of Vitamin A can cause night blindness which if left untreated may progress to Bitot's spot
   (c) If untreated night blindness can lead to permanent blindness
   (d) None of the above

5. What is the earliest sign of Vitamin D deficiency (Rickets)
   (a) Pain in legs during walking
   (b) Delayed development, slow rate of growth or failure to thrive
   (c) Bent legs (Bow legs) and widening of the wrist and ankle bones
   (d) Nodules (bumps) at the end of ribs (Rachitic rosary)

*** The trainer should ask the participants to go through the questionnaire before the beginning of the session and note down their responses. The answers of these questions should be covered during the training session.**

Instructions for the trainer

The session has to be divided in, basically, three parts

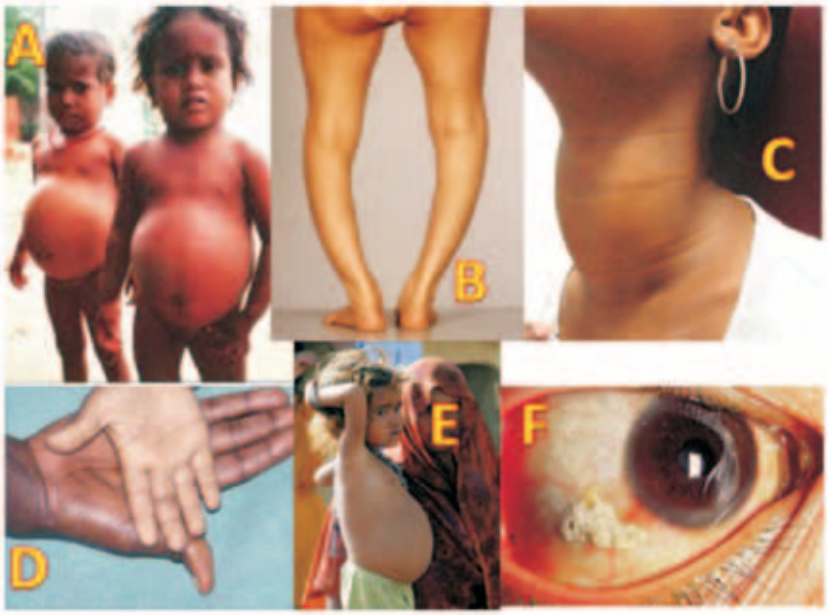
1. Introduction Session(15 mins)
2. Understanding the basics
3. Learning the tools

1. Introduction Session

- The trainer must show pictures to the trainees and gather their views about the understanding of what the picture is suggestive of;
- Response of the trainees has to be documented on the white board/chart paper;
- Later, while summing up the introduction session, the trainer must compile the views and give some key messages to the participants about the topic.

Session 1A

Do these pictures seem familiar to you?



Answers:

A. and E. PEM
B. Rickets
C. Goitre
D. Severe Anemia
F. Bitot Spots

Introduction

Nutrition to the body is not same as nutrition to the brain. However, certain practices and guidelines related to child feeding can enhance the development of the brain. It is essential to give proper food as well as adopt certain healthy practices to help the child in his/ her physical as well as mental development.

Nutrition, by definition, is the process which starts with the intake of food followed by digestion, absorption and utilization of food, by our body. A child's survival, growth and development depends upon the quality of care as well as child's health and nutritional status.

Appropriate feeding of infants and young children

1. Breastfeeding should start early, within one hour after birth. It should be promoted among mothers and other caregivers as the gold standard feeding option for babies.
2. Breastfeeding should be exclusive for six months, which means that water, honey, milk substitutes (tinned milk/powder) etc also should not be given to the child, in this period.
3. Appropriate complementary feeding should start from the age of six months with continued breastfeeding up to two years or beyond.

Table: Amount of Food to be Offered at Different ages

Age	Texture	Frequency	Average amount of each meal
6-8 month	Thick dalia, well mashed foods (banana, potato etc) Breastfeeding tablespoonfuls	2-3 meals per day plus frequent Breastfeeding	Start with 2-3 tablespoons
9-11 month	Finely chopped or mashed food	3-4 meals plus breastfeed. Depending on appetite offer 1-2 snacks	½ of a 125 ml cup/bowl
12-23 month	Family foods, chopped or mashed, if necessary	3-4 meals plus breastfeed, depending on appetite offer 1-2 snacks	3/4 to one 250 ml cup/ bowl

Source: Guidelines for Enhancing Optimal infant and Young Child Feeding Practices

It is essential to remember that the smaller the child, the more often he or she needs to be fed and should be done on demand.

Nutritional Deficiency is a state that occurs when a child is not given essential nutrients normally required by the body for its day today metabolism.

Prolonged deficiency may lead to non-reversible effects that could be dangerous for the body and may also affect physical and cognitive development, which in some cases leads to disability.

Deficiencies

1. Anemia especially severe anemia;
2. Vitamin A deficiency (Bitot spot);
3. Vitamin D deficiency (Rickets);
4. Severe Acute Malnutrition;
5. Goiter;

Diet plans and nutritional requirement of children aged 6-60 months

Dietary Goals

1. Maintenance of a state of positive health and optimal performance in population at large maintaining ideal body weight.
2. Ensuring adequate nutritional status for pregnant women and lactating mothers.
3. Improvement of birth weights and promotion of growth of infants, children and adolescents to achieve their full genetic potential.
4. Achievement of adequacy in all nutrients and prevention of deficiency diseases.
5. Prevention of chronic diet-related disorders.
6. Maintenance of the health of the elderly and increasing the life expectancy.

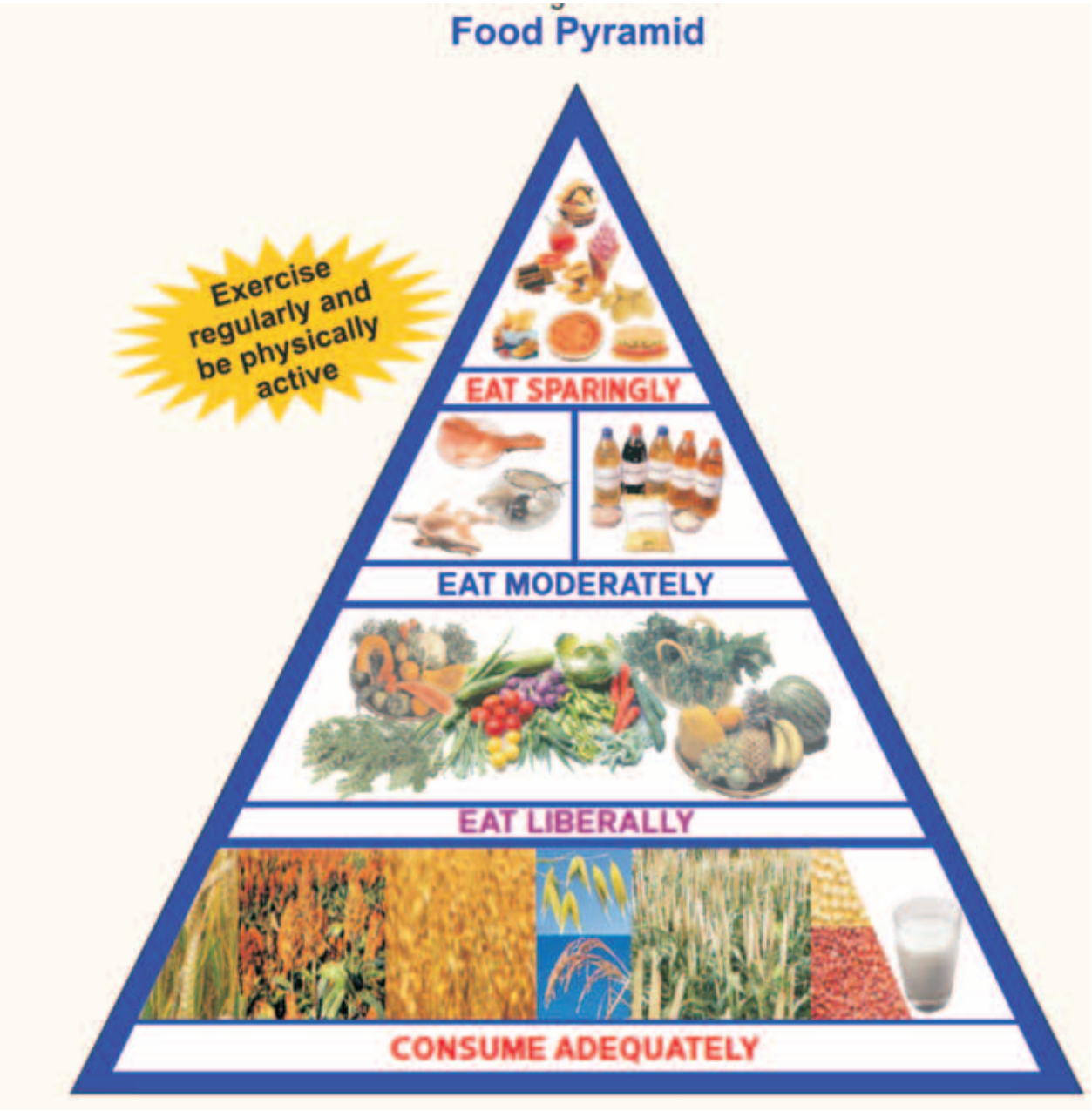
Courtesy: Dietary Guidelines for Indians: A Manual- National Institute of Nutrition, Indian Council of Medical Research, Hyderabad

Dietary Guidelines

Right nutritional behavior and dietary choices are needed to achieve dietary goals. The following 15 dietary guidelines provide a broad framework for appropriate action.

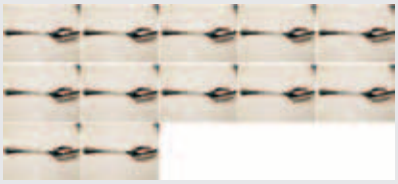
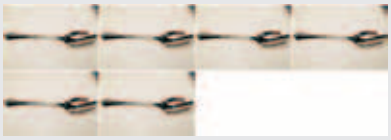
1. Eat variety of foods to ensure a balanced diet.
2. Ensure provision of extra food and healthcare to pregnant and lactating women.
3. Promote exclusive breastfeeding for six months and encourage breastfeeding till two years or as long as one can.
4. Feed home based semi solid foods to the infant after six months.
5. Ensure adequate and appropriate diets for children and adolescents, both in health and sickness.
6. Eat plenty of vegetables and fruits.
7. Ensure moderate use of edible oils and animal foods and very less use of ghee/butter/ vanaspati.
8. Avoid overeating to prevent overweight and obesity.
9. Exercise regularly and be physically active to maintain ideal body weight.
10. Restrict salt intake to minimum.
11. Ensure the use of safe and clean foods.
12. Adopt right pre-cooking processes and appropriate cooking methods.
13. Drink plenty of water and take beverages in moderation.
14. Minimize the use of processed foods rich in salt, sugar and fats.
15. Include micronutrient-rich foods in the diets of elderly people to enable them to be fit and active.

Courtesy: Dietary Guidelines for Indians: A Manual- National Institute of Nutrition, Indian Council of Medical Research, Hyderabad



Courtesy: Dietary Guidelines for Indians: A Manual- National Institute of Nutrition, Indian Council of Medical Research, Hyderabad

Basic recipes of the food items consumed:

Uncooked food	Measurement equivalent		Cooked amount
 RICE	 10 teaspoon raw rice (100gm)	+200 ml of water	 One Bowl cooked rice (200 ml each)
 WHEAT FLOUR	 4 teaspoon of wheat flour (20 gm)		 1 cooked chapatti/ roti
 PULSES	 6 teaspoon of pulses (50-60 gm)	+200 ml of water	 1 bowl of cooked dal

Kindly note:

- For preparation of rice cook the rice in nearly double the amount of water. For e.g. to cook I bowl of raw rice add 2 bowls of water. Never discard the additional water, utilised for cooking rice;
- Pulses should also be cooked in optimal amount of water (nearly 3-4 times the raw amount);
- Vegetables should be washed before cutting;
- Vegetables to be cooked in water (with gravy) must not contain excess of water. Consistency of the vegetable should be maintained;

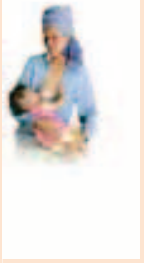
Standard measurements:

-

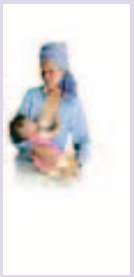
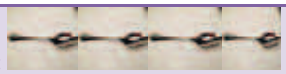
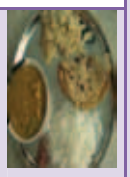
Diet plan for 6 months' old baby

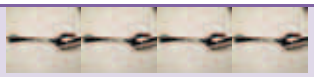
Meal timings	Food item	Ingredients	Cooked amount	+ Along with
Morning	Suji Porridge/Rice Porridge	Suji:  1 Tablespoon (15ml) OR Cooked rice:  2 Tablespoon Milk: ½ katori Sugar: 2 teaspoon (5ml)	 ½ katori (70 ml)	
Afternoon	Fruit Juice	½ Sweet lime/ ½ orange / 7-8 green grapes		
Evening	Suji Porridge/Rice Porridge	Suji:  1 Tablespoon **OR** Cooked rice:  2 Tablespoon Milk: ½ katori Sugar: 2 teaspoon (5 ml)	 ½ katori (70 ml)	Continue breastfeeding

Diet plan for 7-12 months old baby

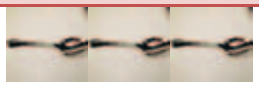
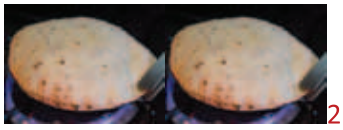
Meal timings	Food item	Ingredients	Cooked amount	+ Along with
Morning	Rice Khichri with or without vegetables	Cooked dal:  1 Tablespoon Cooked rice:  2 Tablespoon Seasonal cooked vegetable:  1 Tablespoon Oil/ghee/butter: 1 teaspoon	 ½ katori (70 ml)	
Afternoon	Mashed fruit	½ banana / 1 slice of papaya		
Evening	Suji Porridge/Rice Porridge	Suji:  1 Tablespoon **OR** Cooked rice:  2 Tablespoon Milk: ½ katori Sugar: 2 teaspoon	 ½ katori (70 ml)	Continue breastfeeding

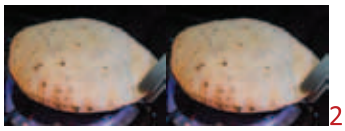
Diet plan for 12-36 months old baby

Meal timings	Food item	Ingredients	Cooked amount	+ Along with
Morning	Roti with milk OR Suji Kheer	½ roti  OR Suji  1 Tablespoon  ¾ cup milk Sugar: 1 teaspoon	 1 big katori (170 ml)	
Mid-morning	Mashed fruit	1 banana / 2 slice of papaya/ ½ grated apple / 1 small grated pear		
Afternoon	Rice/ Roti with dal & vegetables	Cooked rice:  4 Tablespoon **OR** Roti:  1 roti Cooked dal: ½ katori Seasonal vegetable:  2 Tablespoon		Continue breastfeeding

Evening	Atta/Suji Halwa	Suji/ wheat flour:  1 Tablespoon Sugar: I Tablespoon Ghee/Oil: 1 Tablespoon	 ½ katori (70 ml)	
Night	Stuff Patantha OR Vegetable Pulao	Wheat flour:  4 Teaspoon Cooked dal:  2 Tablespoon Green vegetable cooked:  2 Tablespoon Oil:  1 teaspoon **OR** Cooked Rice:  4 Tablespoon Cooked dal:  2 Tablespoon Cooked green vegetable:  2 Tablespoon Oil:  1 teaspoon	 1 Parantha  1 Bowl (100 ml)	

Diet plan for 36-60 months old baby

Meal timings	Food item	Ingredients	Cooked amount
Early Morning	Milk	 Milk Sugar/Gur: one teaspoon	1 cup milk (250 ml)
Morning	Stuff Parantha with curd OR Vegetable poha	Wheat Flour:  3 Tablespoon **OR** Rice Flakes:  2 Tablespoon Seasonal vegetable (raw):  Oil: 1 teaspoon Curd:  ½ katori (70 ml)	1 Stuff parantha OR 1 Katori poha (120 ml)
Mid-morning	Fruit and roasted groundnuts /Grams OR EGG	1 banana / 2 slice of papaya/ 1 grated / 1 small pear And Roasted groundnuts/Grams:  2 Tablespoon OR  1 egg	
Afternoon	Rice/ Roti with dal & vegetables	Cooked rice:  6 Tablespoon **OR** Roti:  2 roti Cooked dal: 1 katori (100 ml) Seasonalvegetable:  3 Tablespoon	

Evening	Milk and 1-2 slices of bread/rusk /1 roti	Milk  Sugar/Gur: one teaspoon	1 cup milk
Night	Rice/ Roti with dal & vegetables	Cooked rice:  6 Tablespoon **OR** Roti:  2 roti Cooked dal: ½ katori (50 ml) Green vegetable:  3 Tablespoon	
Bed time	Kheer/custard/pudding/icecream	 1 katori (100 ml)	

**for non-vegetarians: substitute dal from lunch/dinner with a piece of non-vegetarian food equivalent to size of adult palm.*

Special considerations for the SAM child:

Feed the child more frequently. As the appetite of the child is low, try giving small and frequent meals.

Include good quality protein in child's diet like milk, yoghurt, cheese etc. If consuming non-vegetarian food include egg, fowl and meat in the diet regularly.

Soyabean has the highest content of protein amongst pulses. While preparing chapatis for the children add soyabean flour with the wheat flour to increase the protein content of the flour.

Add extra ghee/butter/oil in the meal of the child.

Add extra sugar.

Make the meal attractive and appealing to the child by adding different colour, shapes and textures.

Make sure the child is regularly consuming seasonal fruits.

Incorporate seasonal vegetables as well as green leafy vegetables in the diet of the child.

- *Do not feed while the child (he or she) is watching a TV program or by bargaining with the child to give some gift or running after the child;
- Do not force feed;

Complementary food recipes:

I DALIA KHICHRI

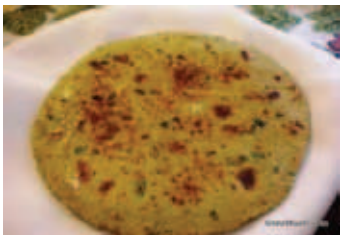
Ingredients (for 1 bowl): 300 ml

Dalia		6 Table spoon 100 g.
Masurdal		2 Table spoon 30 g.
Moongdal		1 Table spoon 15 g.
Potato		1 small.
Pumpkin		1 small piece.
Palak		3-4 big leaves
Onion		½ small
Oil		1 Tablespoon
Salt & Haldi to taste		
Water sufficient to cook		20 TSP water

Method of preparation:

1. Wash and peel the vegetables and cut into pieces (medium size);
2. Wash green leafy vegetables, thoroughly, and chop;
3. Wash dalia and dal;
4. Heat oil in a pan and add chopped onion and vegetables;
5. Fry for sometime;
6. Add dalia and dal, mix thoroughly;
7. Add salt, haldi powder and warm water and cook till dalia and vegetables become soft;

II PAUSHTIK ROTI



Ingredients (for one roti):

Wheat Flour  2 Table spoons .

Besan  1 Tablespoon

Bathua leaves  5-6 chopped leaves

Oil  1 Tablespoon

Salt to taste

Water as required

Method of preparation:

1. Wash and steam bathua leaves in a covered pan;
2. Mix besan and atta with mashed leaves, add water & salt to make a dough ,
3. Heat tawa, apply oil to grease and spread the rolled dough to form roti.
4. Cook from both sides.

III CHIDWA PULAO

Ingredients (for 1 bowl): 200 ml

Chidwa (Rice flakes)  6 Tablespoon

Ground nut  2 Tablespoon

Sprouted Moong  1 Tablespoon

Green Leafy Vegetables (Palak/Bathua/Chaulai)  chopped

Onion  1 small

Oil  1 Tablespoon

Salt and lemon juice to taste

Method of preparation:

1. Wash and soak chiwda;
2. Roast groundnut, remove the skin and grind coarsely;
2. Wash and fine chop green leafy vegetables and onion;
3. Heat oil in a pan, add chopped onion and green leafy vegetables, sprouted moong, and fry for sometime;
4. Add soaked chuda groundnut and salt;
5. Cook till done and
6. Squeeze ½ lemon and mix well.

IV. BANANA CARROT HALWA

Ingredients (for 1 bowl): 200 ml


Raw Banana 2 small banana.


Carrot 1 small carrot


Sugar 2 Tablespoon


Ghee/oil 1 Tablespoon

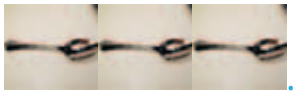
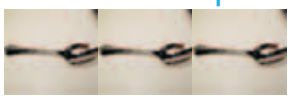
Water 200 ml.

Method of preparation:

1. Boil Bananas along with Peel;
2. Peel off when slightly cool and mash banana pulp;
3. Wash, scrap and grate carrots, cook till soft;
4. Mix carrots with mashed bananas & add ghee/oil and sugar;
5. Cook Halwa till it leaves the sides of the pan;

V. PAUSHTIK LADDOO

Ingredients for 4-5 ladoos:

Suji	 3 Tablespoon
Besan	 1 Tablespoon
Gingelly seeds (*Til*)	 1 Tablespoon
Milk	 1 Cup 250 ml.
Fat/Oil	 3 Tablespoon
Jaggery	 3 Tablespoon

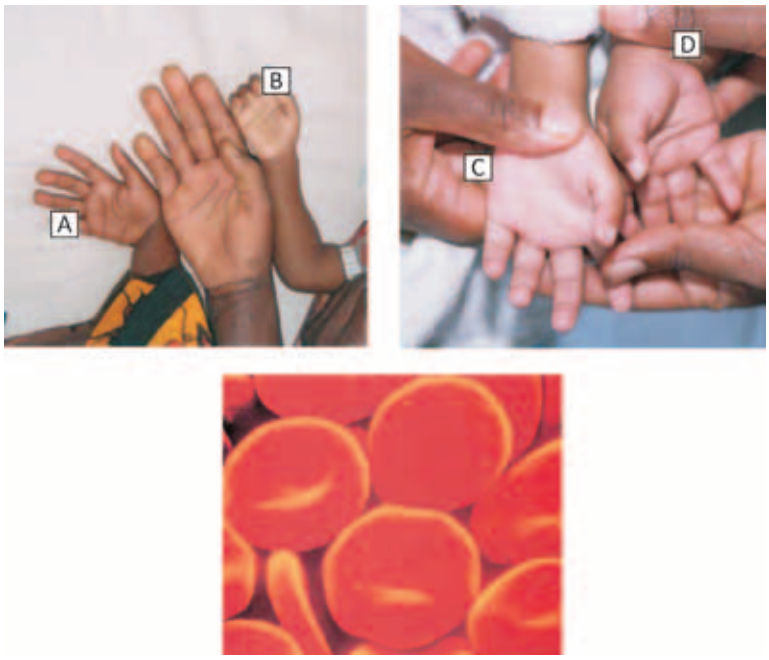
Method of preparation:

1. Roast gingelly seed on slow flame till light brown;
2. Grind them;
3. Heat fat/oil. Add suji and besan and fry till golden brown;
4. Mix milk, gingelly seed, and jaggery and remove from fire;
5. Allow it to cool and prepare equal sized laddoos;

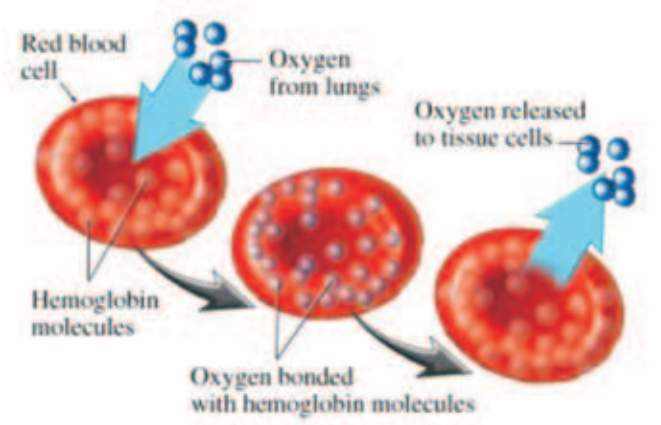
1 Anemia, especially, severe anemia

Exercise

Spot the difference



Blood cells are formed in the marrow of our bones. There are three types of cells in the blood- Red Blood Cells (RBCs), White Blood Cells (WBCs) and Platelets. All these cells are formed in the Bone Marrow and then released into circulation. Normally RBC is a cell which is round to slightly ovoid, biconcave disks. RBC is red as it contains hemoglobin which in turn contains Iron. But, it has no nucleus. Hemoglobin in the blood carries oxygen from the respiratory organs (LUNGS) to the rest of the body (i.e. the tissues) where it releases the oxygen to burn nutrients to provide energy to power the functions of the organism, and collects the resultant carbon dioxide to bring it back to the respiratory organs to be dispensed from the organism. Each gram of hemoglobin can carry 1.34ml of oxygen. In mammals, the protein i.e. hemoglobin makes up about 97% of the red blood cells' dry content (by weight).



- **Anaemia:** Decreased no. of healthy RBC. Either RBC is not produced or quickly destroyed. Normally life span of RBC is 120 days. Anemia is the condition of having lower, than the normal, number of healthy red blood cells
- Normally RBC cell count is:

Men:	4.5-5.5 million RBCs per microliter (mcL)
Women:	4.0-5.0 million RBCs per mcL
Children:	3.8-6.0 million RBCs per mcL
Newborn:	4.1-6.1 million RBCs per mcL

- **Anaemia:** A decrease in the Haemoglobin content of blood. RBC looks pale, especially in the centre.

Introduction

Anemia is a reduced number of red cells or a reduced amount of hemoglobin in each red cell. As per NFHS 3 survey (2005-06), 70% of children are anemic and 3% severely anemic.

Severe anemia may impair growth motor and mental development. Children may exhibit a reduced physical development (decreased work output and capacities), and reduced cognitive development (diminished concentration, disturbance in perception and poor learning abilities).

Impact on Maternal and Child Health: As mentioned earlier, anemia continues to be a major health problem, in India with a high prevalence in pregnant women, non- pregnant women of reproductive age group and children under 5 years. of age.

- 20% of all maternal deaths are attributed to Anemia during pregnancy;
- Another 20% of maternal deaths are caused indirectly by anemia:
- Complications during pregnancy due to bleeding, high blood pressure, infection are more severe in women with anemia;
- **Iron deficiency:** Anemia causes increased susceptibility of mother to infection leading to increased incidence of birth defects;
- Maternal Anemia due to low folic acid leads to increase incidence of structural birth defects like spina bifida, congenital heart disease and orofacial clefts;
- Anemia leads to intra-uterine growth retardation --decreased growth of the baby, within the uterus and premature birth of the baby. Both the factors lead to the birth of a baby with less than normal weight - Low Birth Weight (LBW). A LBW baby has a high risk of infection and all complications.
- Chronic Iron deficiency leads to cognition defects in children Affecting their intellectual ability and thus performance in school and studies. This effect does not revert with correction of iron deficiency. Thus many children are unable to attain their full potential in life.
- Children with anemia have a decreased capacity to perform mental and physical labour.

- Long term anemia leads to stunting of growth and there is a reduction in the height that a child attains at adulthood.

Signs and Symptoms of Anemia

- Dyspnoea – difficulty in breathing;
- Headache , Depression, Dizziness;
- Pallor, Brittle/broken nails;
- Peripheral oedema, cold, clammy skin;
- Fatigue , Reduced exercise tolerance;
- Menstrual irregularities;
- Loss of appetite;
- Impaired cognition;
- Tachycardia (increase in heart rate);
- Tachypnea (increase in rate of breathing);

It is important, to remember, that mostly there is no symptom of anemia unless the Hb is below 8g/dl or 6 g/dl. Sometimes even at still lower levels patient may not be aware of anemia.

Brain: a) Cognition (school performance);

b) Fainting, Dizziness;

c) Fatigue;

Eyes: Pallor in lower conjunctiva and Jaundice in sclera;

Skin: Pale, cold or yellow;

Respiratory: Shortness of birth;

Heart: Palpitation, Rapid heart rate, chest pain;

Blood vessel: low BP;

Muscle: weakness;

Spleen: enlarged

Basics of ANEMIA:

Blood cells are formed in the marrows of our bones. There are three types of cells in the blood- Red Blood Cells (RBCs), White Blood Cells (WBCs) and Platelets. All these cells are formed in the Bone Marrow and then released into circulation. WBCs help the body to fight infection while Platelets help prevent loss of blood from the blood vessels by plugging the site of injury. RBCs contain Hemoglobin.

During the process of maturation in the marrow, the cells are hemoglobinized i.e. filled with hemoglobin and the nucleus is removed. Hemoglobin can bind and release oxygen and hence acts as a carrier of oxygen. Thus the function of the mature RBC released into circulation is to deliver oxygen to all cells of the body. They have an average life of 120 days and then are destroyed in the spleen. The iron released by destruction of the RBCs is recycled to form new Hemoglobin for incorporation in the new RBCs.

Folic Acid and Vitamin B12 are important micronutrients required for maturation of the RBC and Iron is an important micronutrient required for formation of Hemoglobin. Globin chains are the protein component of the hemoglobin and they are essential for the formation of hemoglobin.

- A decrease in the Hemoglobin content of blood is called Anaemia;
- Hemoglobin is the red coloured element found in the Red Blood Cells (RBC) of the blood that takes up oxygen and delivers it to all parts of the body;
- Decrease in haemoglobin can be either due to a decrease a number of RBCs or less than normal quantity of haemoglobin in RBCs or both.
- Decrease in the number of red blood cells can be because of reduced life span: Normally it is 120 days but can become less, as RBC dies earlier than it was supposed to die;

Causes

A child can develop anemia as a result of:

1. Blood loss (decrease in the number of red blood cells and decreased amount of Hb) e.g. loss during menstrual cycle , if not replaced.
2. Failure to make enough RBC or Hemoglobin: Problem with factory i.e. Bone Marrow.
3. Destruction of RBC as in case of hemolytic anemia where the life span of RBC is 120 days normally but is reduced in hemolytic anaemia: Thalassemia, Sickle cell anemia, G6PD deficiency.
4. Inability to utilize : iron as in Anemia of chronic illness.

Common causes in India:

- **Poor Nutritional intake of Iron;**
- **Poor Nutritional intake of Folic acid and Vitamin12;**
- **Malaria:** Large spleen especially in chronic malaria: RBC is destroyed;
- **Thalassemia (In some parts):** large spleen especially in cases of disease rather than carriers: RBC is destroyed;
- **Sickle cell anemia(In some parts):** RBC is destroyed;
- **G6PD deficiency(In some parts):** RBC is destroyed;

Facts of Iron deficiency Anemia

- **Insufficient intake of iron in food or poor absorption of iron, by the body;**
- Iron in animal food is better absorbed compared to iron in cereals, pulses, vegetables and fruits;
- Absorption of iron from vegetables can be improved by taking extra Vitamin C which is available in oranges, lemon and amla;
- Use of tea or coffee within one hour of a meal reduces absorption of iron;
- Diseases like diarrhoea and worm infestation also reduces absorption of iron;

To break this vicious cycle of Iron Deficiency Anemia, it is important that anemia be treated, before pregnancy, by targeting adolescent girls and young non pregnant women.

Diagnosis and Treatment of Anemia:

Treatment of Anemia depends on the cause of anemia; As nutritional deficiency is the most common cause of anemia, mostly Iron& Folic Acid,

Tablets are prescribed initially; After a month, haemoglobin estimation should be repeated to see response to therapy;

An increase in Hb of 1g/dl in a month indicates response to therapy and the treatment be continued further;

Treatment of Iron Deficiency Anemia is:

- Correction of anemia – to restore Hb level;
- To replenish iron stores – treatment should be continued for 3 months after achieving normal Hb;
- Oral iron administration is advised;

****If there is no response to therapy, investigation to establish the cause of anemia should be done and treatment done according to it.*

The common investigations used for diagnosis of anaemia are:

1. **Haemoglobin:** It establishes the presence of anemia.

   It may be remembered, that, in case of Iron Deficiency Anemia, mostly latent iron deficiency that is deficiency of iron without decrease in haemoglobin levels below normal precedes the development of Anemia. Our body has iron stores sufficient for three months and anemia, usually, occurs when most or all of iron stores are depleted;

2. **Complete Blood Counts (CBC):** This is done by an automated instrument and is available, now, in most laboratories, at district level;

   An important test is to establish the degree of anemia and to give important parameters of RBCs- their size, shape , number, amount of haemoglobin in the cell – giving important clues regarding the cause of anemia. For example if the cell size and haemoglobin content of the RBC is reduced, the anemia is likely to be due to iron deficiency or thalassemia. Further, if

there is an increase in RBC numbers relative to the Hb level, it is likely that condition is due to thalassemia trait or carrier state. In thalassemia carriers the Hemoglobin level may be within normal range also. On the basis of a CBC the doctor can decide which further tests to do;

3. **GBP (General Blood Picture):** In this test the blood is spread on a glass slide and then stained and seen by the doctor. Very important information is gained by observing these smears;

4. **Ferritin:** Iron is stored in our body in the form of Ferritin. As we know that anaemia due to iron deficiency develops when our body stores of iron are depleted, low or absent stores indicated by Ferritin levels are a definite indication of anemia due to iron deficiency and also indicate that treatment for anemia should be taken long enough to replenish iron stores. If iron stores remain low, any stress or blood loss will lead to anemia as happens to most pregnant women, in India, and in girls achieving puberty;

If Ferritin levels are normal or increased, mostly other specialised tests are needed to diagnose the cause of anemia.

Points to remember:

1. Anaemia is highly prevalent in women of reproductive age and Children under 5 year of age;
2. Regular annual examination is recommended to detect anaemia, especially in girls and young non-pregnant women;
3. Iron Deficiency Anemia is the commonest and should be treated for 4-6 months if the diagnosis is established by Serum Ferritin or by response therapy;
4. In case there is no response to therapy, cause of anemia should be established by investigations and treatment should be done accordingly;
5. **Correction of anemia, before pregnancy, is vital to prevent the complications and risks to mother and child.**

Recommendations:

Hemoglobin levels to diagnose anemia at sea level (g/dl) ±

Population	Non -Anemia*	Mild Anemia*	Moderate Anemia*	Severe Anemia*
Children 6 - 59 months	**11.0 or higher**	10-10.9	7-9.9	< 7
Children: 5 - 11 years of age	**11.5 or higher**	11.0-11.4	8.0 – 10.9	<8
Children : 12 - 14 years of age	**12.0 or higher**	11.0 -11.9	8.0 – 10.9	<8
Girls : 15 years or above	**12.0 or higher**	11.0 -11.9	8.0 – 10.9	<8
Boys :15 years or above	**13.0 or higher**	11.0-12.9	8.0 – 10.9	<8

**** Hemoglobin in grams per deciliter***

"Mild" is a misnomer: iron deficiency is already advanced by the time anemia is detected. The deficiency has consequences even when no anemia is clinically apparent.

Altitude adjustments to measured hemoglobin concentrations

Altitude (metres above sea level)	Measured hemoglobin adjustment (g/dl)
< 1000	0
1000	-0.2 g/dl
1500	-0.5
2000	-0.8
2500	-1.3
3000	-1.9
3500	-2.7
4000	-3.5
4500	-4.5

Tools for screening: Under RBSK programme, the MHTs would screen children of 6 months to 18 years of age primarily, by evident clinical, easily identifiable signs and symptoms.

Ask	• **Does the child have reduced appetite, gets easily fatigued, has weakness?** • **Is the child irritable?** • **Does the child have shortness of breath?** • **Does the child have unusual food cravings, eats mud (pica)?** • **History of irregular /scanty periods amongst adolescent girls.**
Look: Pale skin color (pallor) as per pictorial tool	

PERFORM – Examine the palm

Ask if pallor seen	• Is the patient truly anemic? (Look for pallor signs) • Is the anemia acquired or inherited? (Look for Family History of Anemia with Jaundice with Splenomegaly, Recurrent Blood transfusion and Splenoctomy) • Is there evidence for blood loss? (Excessive menstrual bleeding) • Is there evidence for nutritional deficiency or mal-absorption? (Is the child taking iron containing foods) • Is there evidence for hemolysis? (History of Anemia with Jaundice with Splenomegaly or sudden fall of hemoglobin though no history of blood loss or rarely history of Cola coloured urine) • Is there evidence for toxic exposure to lead or drug ingestion that could cause bone marrow depression and anemia? • Is the child suffering from some prolong illness "anemia of chronic disease"

Actions: Refer the child he/she has severe pallor as shown above, it is essential to counsel for intake of iron and folic acid supplementation and intake of iron rich foods.

Severe palmar pallor	SEVERE ANAEMIA	Refer URGENTLY to hospital
Some palmor pallor	ANAEMIA	• Assess and counsel for feeding • Advise mother when to return immediately • Follow-up in 14 days.
No palmor pallor	NO ANAEMIA	Give prophylactic iron folic acid if child 6 months or order.

Look for other Physical Examination

- Skin and Conjunctiva: Jaundice
- Tongue: smooth or beefy tongue
- Spleen and liver: enlarged or big
- Cardiac Murmurs

Counselling

1. Active de-worming by tablet Albendazole;
2. Exclusive breastfeeding till 6 months;
3. Regular intake of Iron rich foods in the diet viz. dark green leafy vegetables such as spinach, beans, nuts, meat and dry fruit, jaggery etc.;

Preventive measures

The following practices should be adopted to prevent iron deficiency anemia:

1. Exclusive breastfeeding till six months of age;
2. Regular intake of iron rich food items;
3. Once a year, monitoring of Hemoglobin level;

Key messages

1. Anemia is easily preventable;
2. Anemia is easily treatable;
3. Tablets of Iron and folic acid are available, free of cost, under National Iron Plus Initiative at Anganwadi and Government and Government Aided Schools and should be consumed as per dosage, both for mother (pre and post delivery) and child after he/ she attains the age of 6 months;
4. All children, with anemia, should be immediately considered for IFA supplementation and referred to a health facility for further management;
5. Immediate hospitalization is required for a child with severe anemia;

THALASSEMIA

This condition is caused by genetic material known as genes. Genes are inherited from the biological parents. There are four alpha genes and two beta genes.

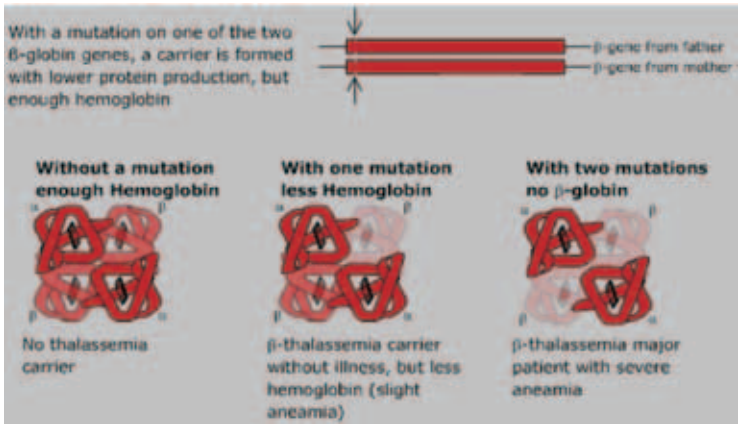
The disease can develop if only one parent has abnormal genes. If only one gene is inherited, the person will be a carrier of the disease. They will have mild or no symptoms.

Thalassemia is an inherited disorder. Hemoglobin is made of two separate amino acid chains. They are alpha and beta. Thalassemia is categorized by the specific chain and number of genes affected.

Thalassemia is an inherited blood disorder that causes the body to produce less haemoglobin and fewer RBC. Haemoglobin is a protein in red blood cells that helps them carry oxygen from the lungs to all parts of the body. By inherited blood disorder, we mean that this condition is caused by a defect in genetic material called genes which are responsible for formation of protein: hemoglobin. Genes are inherited from the biological parents. There are four alpha genes and two beta genes. The disease can develop if only one parent has abnormal genes. If only one gene is inherited, the person will be a carrier of the disease. They will have mild or no symptoms.

It leads to decreased production and increased destruction of red blood cells. Hemoglobin in the red blood cells carries oxygen for all organs, in the body. The loss of red blood cells results in low hemoglobin. This leads to anemia. The decreased oxygen will impair the ability to maintain normal functions.

Haemoglobin molecules are made up of four parts: two alpha proteins and two beta proteins. Thalassemia affects one or more of these genes. Since the RBC is destroyed before the usual life span of 120 days, hence fewer RBC.



There are two types of globin chains in the haemoglobin- alpha (α) and beta (β).

Defect in the β globin gene leads to decreased or absent production of beta globin chains and thus the marrow is unable to synthesise haemoglobin required, to fill the RBCs. The resultant disorder is called β thalassemia. This is the form of thalassemia that is mostly found in India and unless specified, 'thalassemia' means 'β thalassemia'.

a) Thalassemia major is the severe form of the disease where severe anemia of Hb <7g/dl develops in a child between 6 months to 2 years of age and if untreated it dies by the age of 5 years. For survival and growth the child is 'dependent' on blood transfusion.

b) Thalassemia Intermedia: It is the milder form of the disease, anemia may develop later and other symptoms are also less severe.

c) Thalassemia Minor: is the milder form referred to as 'carrier' or 'trait' occurs when the defect is only in one of the pair of genes.

Beta-thalassemia

Two genes are involved in making the beta hemoglobin chain. You get one from each of your parents. If you inherit one mutated gene, you'll have mild signs and symptoms. This condition is called beta-thalassemia minor or referred to as a beta-thalassemia trait. If you inherit two mutated genes, your signs and symptoms will be moderate to severe. This condition is called beta-thalassemia major or Cooley's anemia. Babies born with two defective beta hemoglobin genes usually are healthy at birth, but develop signs and symptoms within the first two years of life. Family history of thalassemia. Thalassemia is passed from parents to children through mutated hemoglobin genes. If you have a family history of thalassemia, you may have an increased risk of the condition.

Possible complications of thalassemia include:

Iron overload. People with thalassemia can get too much iron in their bodies, either from the disease itself or from frequent blood transfusions. Too much iron can result in damage to your heart, liver and endocrine system, which includes glands that produce hormones that regulate processes, throughout your body.

Infection. People with thalassemia have an increased risk of infection. This is especially true if, you've had your spleen removed.

In cases of severe thalassemia, the following complications can occur:

Bone deformities: Thalassemia can make your bone marrow expand, which causes your bones to widen. This can result in abnormal bone structure, especially in your face and skull. Bone marrow expansion also makes bones thin and brittle, increasing the chance of broken bones.

Enlarged spleen (splenomegaly): The spleen helps your body fight infection and filter unwanted material, such as old or damaged blood cells. Thalassemia is often accompanied by the destruction of a large number of red blood cells, making your spleen work harder than normal, causing it to enlarge. Splenomegaly can make anemia worse, and it can reduce the life of transfused red blood cells. If your spleen grows too big, it may need to be removed.

Slowed growth rates: Anemia can cause, a child's growth to slow. Puberty, also, may be delayed in children with thalassemia.

Heart problems: Heart problems, such as congestive heart failure and abnormal heart rhythms (arrhythmias), may be associated with severe thalassemia.

Symptoms of Thalassemia :

Symptoms most often begin within 3-6 months of birth. Symptoms may include:

- Anemia, which may be mild, moderate, or severe;
- Jaundice;
- Enlarged spleen;
- Fatigue (tiredness);
- Listlessness;

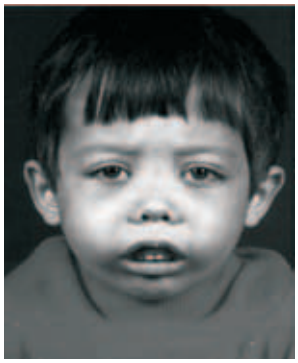
- Reduced appetite;
- Enlarged and fragile bones, including:

  Thickening and roughening of facial bones;

  Bones that break easily;

  Teeth that don't line up properly;
- Growth problems;
- Increased susceptibility to infection;
- Skin paler than usual;

  Hormonal problems such as:
- Delayed or absent puberty;
- Heart Failure;
- Shortness of breath;
- Liver problems and Gallstones;
- **Diagnosis-** Tests to detect disease and carrier state are as follows:
- CBC and GBP;
- Hemoglobin electrophoresis;



In an untreated thalassemia child the bones of the face get deformed and liver and spleen increase in size. Eventually death occurs due to anemia and iron overload

1. Hemoglobin HPLC;
2. Genetic mutation test;
3. For confirmatory diagnosis testing of parents and other family members may be required.

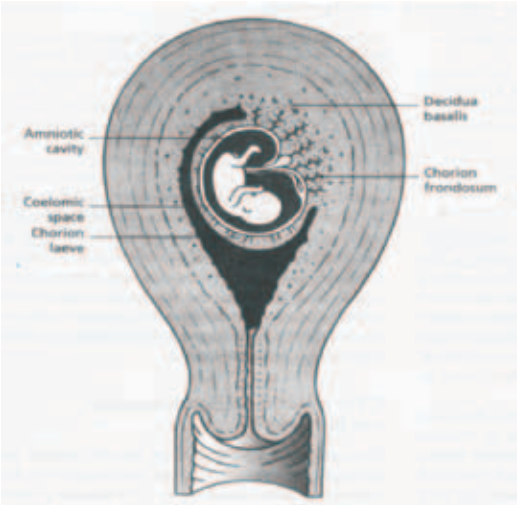
Treatment of Thalassemia:

- Regular transfusion of packed Red Blood Cells, at regular intervals of 2- 4 weeks;
- Iron chelation therapy- medicines to remove excessive iron from the body;
- Bone Marrow Transplant- BMT can completely cure the disease but, due to cost factor and complications, only a few number of patients can be treated;

Prevention of Thalassemia:

Thalassemia carriers are the reservoirs of the thalassemia trait and pass it on to the next generation. Detection of the carrier state of thalassemia, in an individual, is central to the strategies for prevention and control.

- Any healthy person can be a carrier of thalassemia trait;
- If you are a carrier and unmarried don't marry a carrier;
- If you are carrier and married to another carrier then genetic mutation test has to be done followed by prenatal diagnosis;



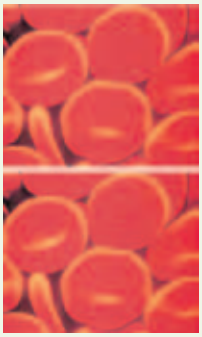
Prenatal Diagnosis

Between 8-12 weeks of pregnancy mutation test of fetus can be done, if both the mutations are found in the tissue of the fetus then knowing that the child will be suffering from beta thalassemia after birth, the couple has the choice of medical termination of pregnancy (abortion) before 20 weeks of gestation.

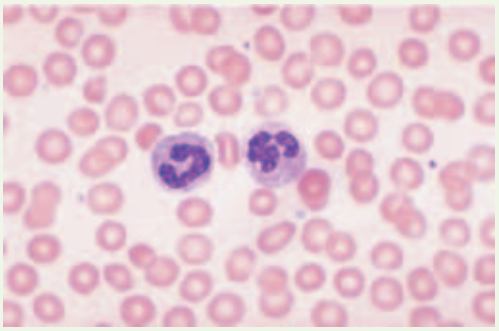
Thalassemia can be prevented. Advocate pre-marital or post-marital testing for thalassemia carrier status.

Sickle cell anemia is an inherited red blood cell (RBC) disorder that is caused by a hemoglobin defect. Hemoglobin is a substance that carries oxygen in the red blood cell.

Sickle cell anemia: One small deviation in these molecules can cause them to have a tendency to stick to one another, forming strands of hemoglobin within the RBC. The cells that contain these strands become stiff and elongated, or sickle shaped. Normally, due to the RBC's (normal erythrocyte) round shaped cell they move easily through blood vessels to deliver oxygen throughout the body. Sickle cells (sc) do not fit well through small blood vessels, and can become trapped. Trapped sickle cells form blockages that prevent oxygenated blood from reaching their target tissues and organs. Considerable pain results, as well as damage to the tissues and organs. This damage can lead to serious complications, including stroke and an impaired immune system. Further complications result due to the fact that sickle cells die much more rapidly than normal red blood cells, and the body cannot create replacements fast enough. Anemia develops due to the chronic shortage of red blood cells.



Round to slightly ovoid bi-concave disks: Normal RBC



Round to slightly ovoid bi-concave disks, approximately, 7 m in diameter. Less hemoglobin in center of cell (zone of pallor). Regular in size and shape.

RBC with Normal shape and Hemoglobin which is red because of Iron.

RBC is bi-concave discs and is 7.5 µm in diameter. Their center is thin and appears lighter stained in color compared to their edges. They are anucleate i.e. no nucleus

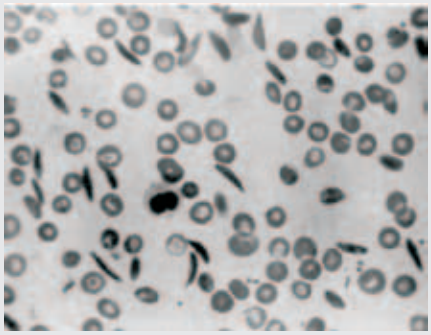
Haem (IRON) + Globin

Globin is a protein and has 2 chains

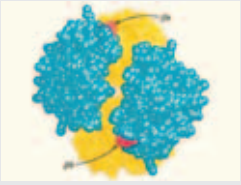
α chains: Yellow in color

β chains: Blue in color

Sickle shaped



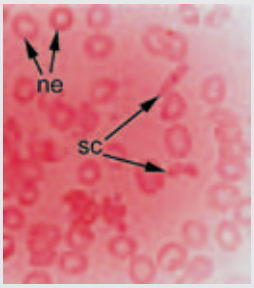
RBC with sickle shape as hemoglobin is defective. Sickle Cell Hemoglobin Aggregates under Low [O2]. Here in the blue chain i.e. β chain has a sticky surface (Red Patch), which makes it easier to aggregate.



Consequences of Red Blood Cell Sickling:

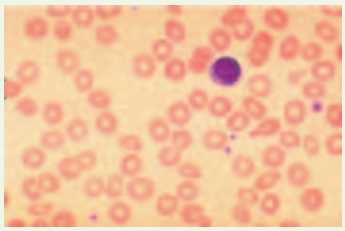
- Occlusion of small blood vessels, causing tissue damage;
- Red blood cell lifespan shortened from 120 to 20 days anemia as less no of RBC;

Sickle cell anemia



Inherited red blood cell (RBC) disorder that is caused by a hemoglobin defect.

The end result of decreased dietary iron, decreased iron absorption, or blood loss is iron deficiency anemia. Also, the serum iron store will also be decreased, while the serum iron binding capacity is somewhat increased



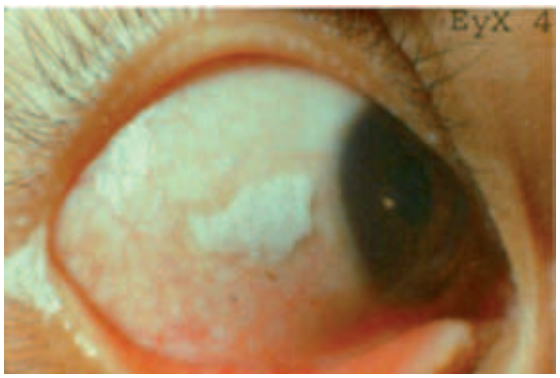
Iron deficiency anemia. Note the increased zone of central pallor and the more irregular shapes of the RBC's. This anemia is characterized by a decreased amount of hemoglobin per RBC, so the Mean Corpuscular Hemoglobin (MCH). There is reduced size of red blood cells, so that the mean corpuscular volume (MCV) is lower. Hence, this is a hypochromic microcytic anemia.

WBC	5.5		
	%		#
NE	54.7		3.0
LY	34.1		1.9
MO	7.5		0.4
EO	3.0		0.2
BA	0.7		0.0
RBC	4.28	L	
HGB	9.7	L	
HCT	29.9	L	
MCV	69.7	L	
MCH	22.6	L	
MCHC	32.4	L	
RDW	18.4	H	
PLT	331		
MPV	8.8		

2 Vitamin A deficiency (Bitot spot)

Exercise

Can you see any abnormality?



Introduction

Vitamin A helps in development of visual function of the eye. It also helps in building up immunity in the body. Its deficiency can cause Night blindness, which may further progress to Bitot's spot. If untreated, night blindness can lead to permanent blindness. Clinical prevalence of Vitamin A deficiency is less than 1% in India but biochemical prevalence is quite high. Prevalence of Bitot's spot is around 0.6 – 0.7% in children.

Tools for screening: Under RBSK programme, deficiency of Vitamin A would be identified by looking for Bitot's spot and some specific questions related to the disease.

Signs and symptoms

LOOK - For Bitot's spot in the eyes (examine both eyes);

ASK - Is the child able to see clearly in less light or during darkness? (Only if the child is more than 2 years of age);

PERFORM – Use a torch to examine the eye.

1. Check if the white part of the eye, irregular in shape?
2. Are there any triangular shaped white foamy lesions?
3. Does the eye appear dry?

Action Refer the child if there is a visible Bitot's spot or the child gives a history of reduced vision especially, during evening. If available, administer 2 lakh International Unit (IU) to a child with Bitot's spot and a similar dose after 1 to 4 weeks later.

Counselling

1. Regular Vitamin A supplementation is required for all children 1 lakh IU at the age of 9 months, thereafter 2 lakh IU at an interval of six months till the child reaches 5 years of age.
2. Vitamin A deficiency in a child may lead to reduced vision (night blindness) which may further progress to Bitot's spot. If left untreated, it may lead to permanent blindness.
3. Children should be encouraged to eat food rich in Vitamin A such as green leafy vegetables, dark yellow and orange vegetables, fruits such as carrot, papaya, and guava. Therefore, parents/ guardians should be adequately counselled to include these food items, according to their seasonal availability, in the daily diet of children.

Preventive measures

The following practices should be adopted to prevent Vitamin A deficiency:

1. Exclusive breastfeeding, till six months of age, and intake of Vitamin A rich foods as part of complementary food;
2. All parents should be informed that prolonged deficiency of Vitamin A may lead to permanent blindness;

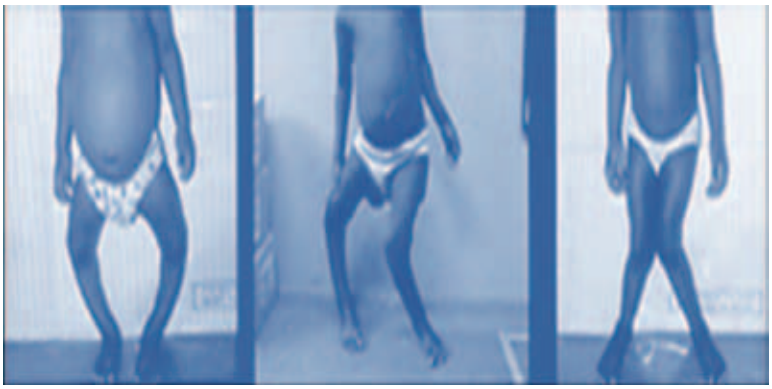
Key messages

1. Night blindness is easily preventable;
2. Night blindness is the earliest sign of Vitamin A deficiency and is easily treatable;
3. Untreated night blindness may lead to permanent blindness;
4. Syp. Vitamin A is available with ANMs and should be given to all children at 9 months of age and thence, every six monthly till the child attains the age of 5 years;
5. All children, with history of night blindness and/ or Bitot spot ,should be immediately given 2 lakh IU of Vitamin A followed by similar dose 1 to 4 weeks later;

3 Vitamin D deficiency

Exercise

What abnormality can you spot in the given picture?



Introduction

Vitamin D is naturally formed in the body by exposure to sunlight. Spending more time indoors, watching T.V. and computer while compromising on time spent outside, daytime could result in Vitamin D deficiency. Prolong deficiency of Vitamin D may be lead to Rickets, in children. It is estimated that around 80% of Indian population has lower levels of Vitamin D than normal level although visible deficiency states (rickets) may be quite less at 12.5% using biochemical and radiological analysis.

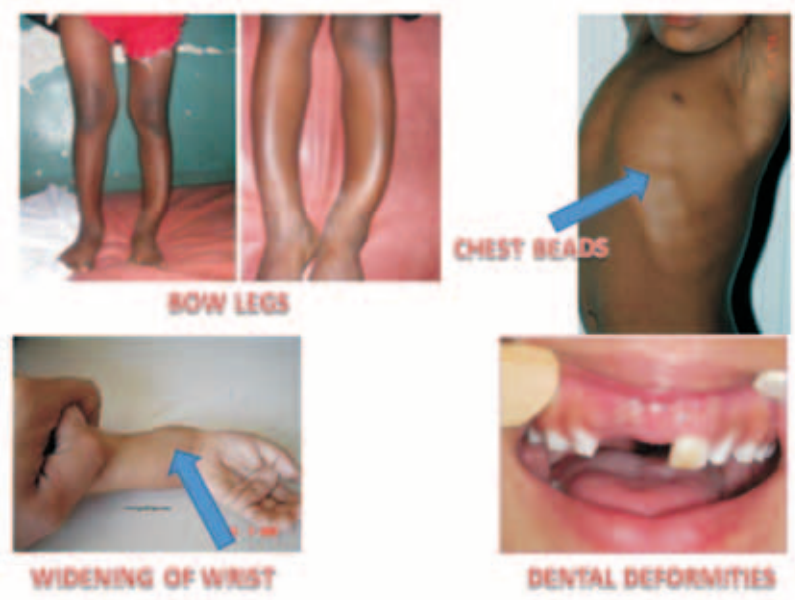
Tools for screening: Under the programme, MBHTs would ask some specific questions and identify visible signs of rickets.

Signs and symptoms

LOOK – Any visible deformities viz.

- Widening of the wrist and ankle bones;
- Nodular swelling;
- Dental deformities;
- Bent legs (Bow legs);
- Hunched posture;
- Chest and rib deformities (Nodules or bumps) at the end of ribs (rachitic rosary) and/ or chest beads;

Refer to pictures ahead.



ASK -

1. Does the child feel pain, in legs, during walking?
2. Does the child complain of tiredness (especially during daytime)?
3. Is the child unable to play?
4. Does the child show features of delayed development, slow rate of growth, or "failure to thrive"?

Actions

Refer the child, if there are visible signs of deficiency, for further management. This child would require Vitamin D supplementation.

Counselling

1. All children should be encouraged to eat foods, rich in Vitamin D such as fish, milk, eggs.
2. Infants should be, regularly, exposed to sunlight, for a brief period. Excess exposure to sunlight may lead to sunburns in the children.
3. Children should be encouraged to play, outdoors.

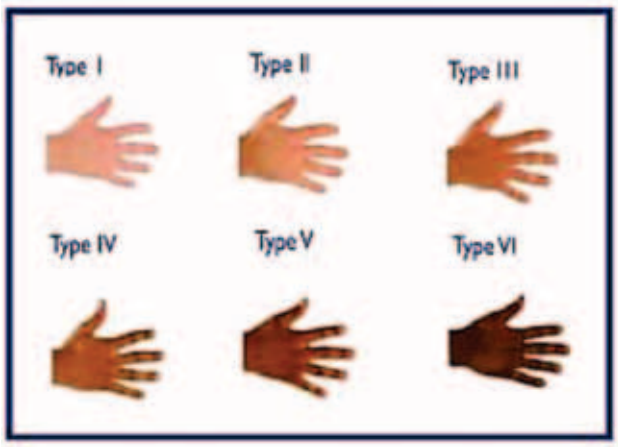
Preventive measures

The following practices should be adopted to prevent Vitamin D deficiency:

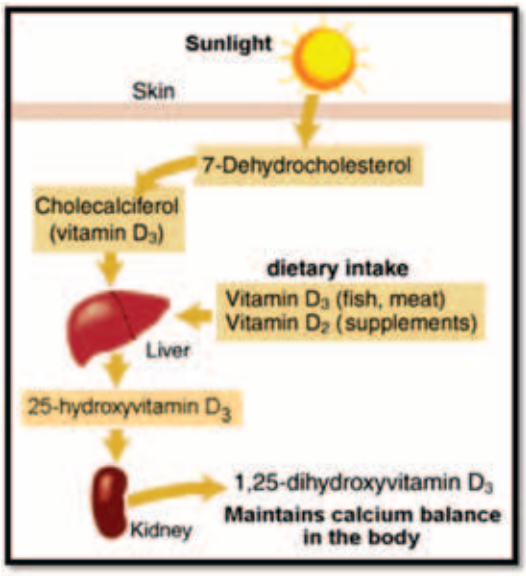
1. Exclusive breastfeeding till six months of age and intake of Vitamin D rich foods as part of complementary food.
2. All parents should be informed that prolong deficiency of Vitamin D may lead to rickets in children and would manifest, as pain, during walking.

3. Sunlight based on the color of the skin-The darker the skin, more is the requirement of sunlight to help in Vitamin D synthesis.

Sun-light: Ask the participants to match their skin color with a particular type.



- Type 1 may get 5 minutes per day.
- Type 2 can get 10 minutes per day.
- Type 3 may get 15 minutes per day.
- Type 4 should get 20 minutes per day.
- Type 5 should get 25 minutes per day.
- Type 6 should get 30 minutes per day.



Key messages

1. Vitamin D deficiency is easily preventable.
2. Pain during walking is the earliest sign of Vitamin D deficiency and is easily treatable.
3. Prolonged deficiency of Vitamin D may lead to rickets, bow legs, knock knee etc.
4. All children should be encouraged to eat foods rich in Vitamin D e.g. milk, fish, eggs etc.

4 Severe Acute Malnutrition

Exercise

Which of these children is malnourished?

Introduction

Nutrition: is the intake of food in relation to body's dietary needs.

Good Nutrition: is an adequate intake of food in relation tobody's dietary needs, but at the same time the diet should be balanced. Balanced in terms of quality and hence the diet should be a mixture of: a) ***Energy giving foods*** like cereals,oils, fat and sugar. b) ***Body building foods*** containing protein like pulse, fish, meat and egg. c) ***Protective foods*** containing vegetables and fruits. Balanced is also when food is combined with regular physical activity.

Finally nutrition is good only if:

a) Food is available adequately in relation to body's dietary needs

b) Diet should be balanced in terms of Energy giving foods,Body building foods and Protective foods.

c) Adequate digestion,absorptionand utilization of food

d) Adequate elimination of those that are not absorbed

Malnutrition: Commonly represents under-nutrition resulting from inadequate consumption, poor absorption or excessive loss of nutrients. The terms can also be usedto refer to over-nutrition resulting from excessive intake of specific nutrients. A child willexperience malnutrition if the child does not consume the appropriate amount or quality of nutrients, comprising a healthy dietover a period of time.

The child in the left picture issuffering from Kwashiorkor (has oedema and commonly seen as a round and plump child) whereas the child in the right picture is suffering from Marasmus (severely wasted, very thin and hasno fat looks like skin and bones).

Types of malnutrition

- **Underweight**
  - Low weight for age (Composite indicator measure of acute and chronic malnutrition)

- **Stunting**
  - Low height for age (chronic malnutrition)
- **Wasting**
  - Low weight for height (indicator of acute malnutrition) - age independent (6-59 month) - closely associated with death

As per NFHS 3 survey (2005-06), 43% of children below five are under weight (low weight forage), 48% stunted (low height for age) and 20% wasted (low weight for height) out of which6% are severely wasted. Since wasting refers to acute malnutrition, therefore these childrenare said to have as Severe Acute Malnutrition i.e. SAM.

Anthropometry is a commonly used, inexpensive and a non-invasive method of assessing achild's nutrition status. The three commonly used indices are as below:

1. To assess underweight using weight for age (Acute Malnutrition)
2. To assess stunting using height for age (Chronic Malnutrition)
3. To assess wasting using weight for height (Weight for length)

SAM is defined by very low weight for height (below -3 SD i.e. standarddeviation of the median, WHO growth standards), a mid-upperarm circumference (MUAC) ofless than 115mm, or by the presence of bilateral oedema. Children who are severely wastedare at nine times' higher risk of dying, than well-nourished children.

DIAGNOSTIC CRITERIA FOR SAM IN CHILDREN AGED 6–60 MONTHS		
Indicator	Measure	Cut-off
Severe wasting (2)	Weight-for-height (1)	-3 SD
Severe wasting (2)	MUAC	Less than 115mm
Bilateral edema (3)	Clinical sign	Edema

**1: Based on WHO Standards www.who.int/childgrowth/standards)*

***2,3: Independent indicators of SAM that require urgent action*

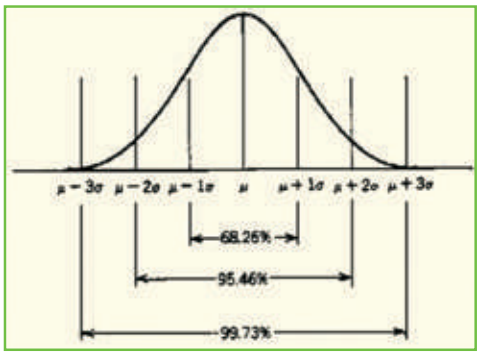
****When assessing weight-for-height, infants and childrenunder 24 months of age should have their lengthsmeasured lying down (supine). Children over 24 monthsof age should have their heights measured whilestanding. For simplicity, however, infants and childrenunder 87 cm can be measured lying down (or supine) andthose above 87 cm standing.*

What is Standard Deviation?

As a concept, tied to the idea of center

- A measure of the extent to which values deviate from center
- Standard deviation as average distance from center
- Coordination of ideas of deviation from the mean (distance) and density frequency)

Z-score is the number of standard deviations (SD) below or above the reference median value.



To explain concept of Standard Deviation: Make 7 participants stand in a line according to their height, with the smallest placed, as the first and tallest as being the last. Now ask them to turn towards you and you would find three people standing in decreasing order of height and three others in increasing order but there would be a person in the center. This person would be called the mean or center figure. On each side as you move away from the center each person represents one standard deviation i.e. distance from the center or mean.

Why the Cut off weight-for heightof below -3 standard deviations (SD)?

WHO and UNICEF recommend the use of a cut-off for weight-for height of below -3 standard deviations (SD) of the WHO standards to identify infants andchildren as having SAM.

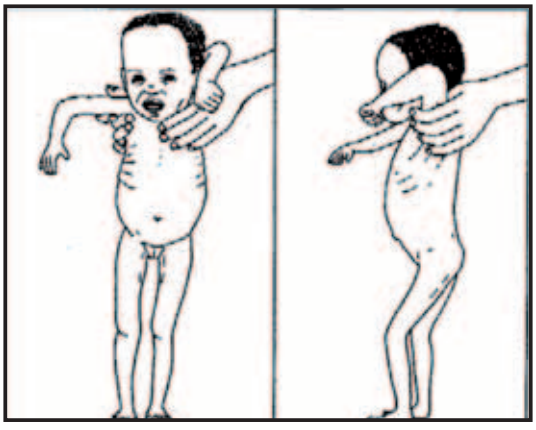
The reasons for the choice of this cut-off are as follows:

1) Children below this cut-off have a highly elevated risk of death compared to those who are above
2) These children have a higher weight gain when receiving a therapeutic diet compared to other diets, which results in faster recovery
3) In a well-nourished population there are virtually no children below -3 SD (<1%).
4) There are no known risks or negative effects associated with therapeutic feeding of these children applying recommended protocols and appropriate therapeutic foods.

Tools for screening: Under this programme, MHTs would look for visible severe wasting and oedema of both feet. They would also ask some specific questions suggestive of this condition.

Signs and symptoms

LOOK – Visible severe wasting of the muscles of the shoulders, arms, buttocks and legs (child looks like skin and bones, many folds of skin on the buttocks and thigh i.e. baggy pantsappearance);



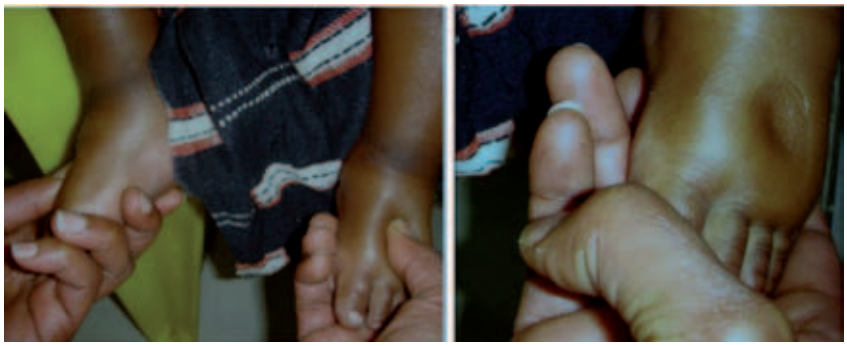
ASK –

1. Does the child eat well?
2. Does the child suffer from frequent episodes of illness?

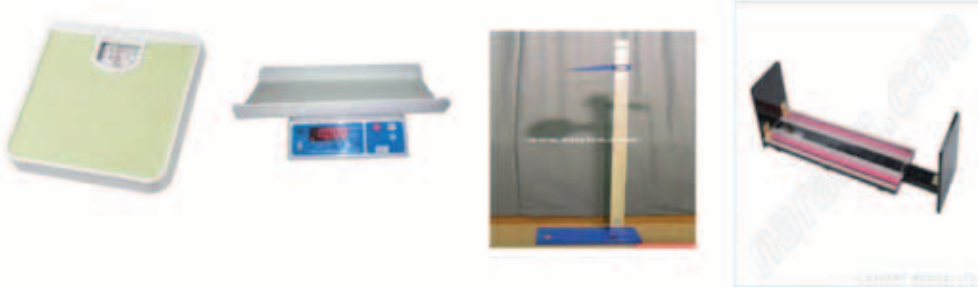
PERFORM –

1. Use MUAC tape: MUAC tape needs to be placed in the center of the arm and readingnoted through the open window. A child with MUAC < 115mm needs to be referred. Thistape could be used to measure mid arm circumference of any child above six monthsbut less than 5 years of age.

2. Oedema of both feet: use your thumb and press gently for a few seconds on the top sideof each foot. The child has edema, if a dent remains in the child's foot when you lift/ remove your thumb.



3. Additionally, weight for height could be calculated. Remove the zero error from the weighing machine (bring to zero) and ask the child to stand on the same after removingshoes/ slippers/ sandals. Note the weight of the child (in case of an infant, use babyweighing scale). Now, use a stadiometer to measure the height of the child (in case ofa child less than 2 years or height less than 87 cm measure the length in lying downposition using infantometer).



Do the following exercises:

1. Use Shakir's tape and try to measure mid arm circumference of a child.
2. Now, calculate weight for height for this child by taking both the weight and the height

Actions – Refer the child for further evaluation and management to NRC/ CHC/ DH. The child would require clinical evaluation by a Physician/ Medical Officer to rule out signs of complications and admission, for few days, to correct the nutrition status. Refer to Operational Guidelines on Facility based Management of SAM for further reading (MOHFW, 2011). While transporting, keep the child adequately covered to prevent hypothermia.

Counselling

i. Initiate breastfeeding within 1 hour of birth. The first milk of the mother (Colostrum) is richin immunoglobulins, vitamins and minerals and must be given to the baby.

ii. Mothers should be counseled for the correct technique of breastfeeding (signs of good attachment):
   a. Child's mouth should be wide open;
   b. Upper areola should be more visible than the lower areola;
   c. Child's chin should be touching the breast;
   d. Lower lip of the child should be turned upwards;

iii. All children should be encouraged to proper and timely weaning by complementary feedingafter six months of age. Breast-feeding should be continued, till 2 years or beyond.

iv. Preferably, start complementary feeding by preparing rice based food item using nicelycleaned utensils and clean hands

Preventive measures

The following practices should be adopted to prevent severe acute malnutrition in children.

1. Exclusive breastfeeding till six months of age.
2. Complementary feeding and weaning to start from six months of age onwards for, initially,4 meals and then increase to five meals, after 1 year of age.
3. Chronic deficiency may lead to stunting, that is irreversible.

Key messages

1. SAM is easily preventable
2. Malnutrition contributes to more than 50% as an underlying factor for child deaths. Children with SAM are especially vulnerable for common childhood diseases especially, diarrhea and pneumonia
3. Poor maternal nutrition is closely linked to development of severe acute malnutrition and/ or chronic malnutrition in a child besides anemia and other deficiency states.
4. Exclusive breastfeeding leads to lactation amenorrhea (natural method of family planning wherein exclusive breastfeeding has a secondary benefit of preventing conception for a successive pregnancy leading to gaining of essential nutrients and improved iron stores, in the mothers, thus leading to spacing)

Q.: What is the recommended food for children in their very early years?

A.: **Breast milk is the best food for the healthy growth and development of infants. Infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health.** After six months, they should be fed adequate and safe complementary foods **while continuing breastfeeding for up to two years or beyond.**

Complementary foods should be rich in nutrients and given in adequate amounts. At six months, caregivers should introduce foods in small amounts and gradually increase the quantity, as the child gets older. The safest is to give rice based preparation to start with. Infants can eat pureed, mashed and semi-solid foods beginning at 6 months, from 8 months, most infants can eat 'finger' foods, and from 12 months, most children can eat the same types of foods as consumed by the rest of the family. The consistency of foods should be appropriate for the child's age. Complementary foods should be given 2–3 times a day between 6–8 months, increasing to 3–4 times a day between 9–11 months. Between 12–23 months of age, 3–4 meals should be given. Also, depending on the child's appetite, 1–2 nutritious snacks can be offered between meals.

In addition to providing an adequate variety, amount and frequency of foods, it is important that caregivers practice responsive feeding. That is, they should feed infants directly and assist older children when they feed themselves; feed slowly and patiently and encourage children to eat, but not force them; and when children refuse to eat, experiment with different combinations of foods. Feeding times are periods of learning and love - they are a time for caregivers to talk to the child, making eye-to-eye contact.

The strategy is a guide for countries to develop policies and implement activities addressing feeding practices and the nutritional status, growth and health of infants and children. It is based both on the evidence that nutrition plays a crucial role in the early months and years of life, and on the importance of appropriate feeding practices in achieving optimal health.

Lack of appropriate feeding in early childhood is a major risk factor for ill health throughout the course of life. The life-long impact may include poor school performance, reduced productivity, impaired intellectual and social development, or chronic diseases.

5 Goitre

Exercise

Do you find any abnormality with this child?

Introduction

Iodine is an important trace element. It is required for synthesis of thyroid hormone (thyroxine) which controls normal heart function, nerve impulse and rate of body growth and metabolism. Adult body contains 50 mg of iodine out of which about 8mg is concentrated in thyroid gland. Since, thyroid gland weighs 0.05% of body weight, it is evident that concentration is intense.

The requirement of Iodine is met through food (cereals and grains). If, enough Iodine is not available it directly affects the thyroid gland function. Deficiency of iodine leads to goitre (enlargement of thyroid gland).

Effects of deficiency

The iodine Deficiency disorders form spectrum of abnormalities which include goiter, mental retardation, deaf mutism, squint, difficulties in standing and walking normally and stunting of limbs.

The cases of severe and prolonged deficiency however, may result into deficient thyroid hormone resulting in Myxoedema – a condition characterized by dry skin, loss of hair, swelling of face, weakness of muscles, diminished vigour and mental sluggishness.

It is estimated that in India alone, more than 6.1 crore people are suffering from endemic goiter. A national level survey has been carried out in 25 states and 5 union territories in the country and found that out of 282 districts surveyed, in 241 districts it is a major public health problem where the prevalence rate is more than 10%. In 1983-86, a survey carried out by ICMR in 14 districts recorded goiter at 21%.

Distribution:

Certain hilly regions of Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar, Bengal, Sikkim, certain parts in Aurangabad, Madhya Pradesh, and Kerala are goiterogenic region. In

fact, surveys over past three decades have shown that there is not even a single state, in the country, which is free from Iodine deficiency.

But sporadic goiter is a mystery because it occurs in areas where iodine is adequate. Food such as cabbage, cauliflower, raddish, turnip contains potentially dangerous progoitrin substance believed to inhibit normal uptake of iodine by tissues. During cooking, however, offending enzyme is destroyed.

A lack of Iodine during early pregnancy can lead to Nervous cretinism as Iodine is required for early development of nervous system of the baby in the third month of gestation. The Iodine –deficient women frequently suffer abortions and even still birth and their children may be born mentally deficient or cretins. Additionally, Iodine plays an important role in prevention of mental retardation, in children. A lack of Iodine during infancy causes condition called cretinism in which mental and physical development is, severely, impaired.

In India, a population of over 167 million people are at a risk of Iodine deficiency disorders. 44 million actually have goiter and 2.2 million suffer from cretinism. With every passing hour 10 children are born who will not attain their optimal mental and physical growth, due to iodine deficiency.

Prevention

Iodized salt is widely used, for prevention of goiter. Level of iodinization has been fixed not less than 30ppm at production point and not less than 15 ppm at consumer level, under PFA.

Sources of Iodine:

- Abundantly in seafood (e.g. sea fish, sea salt);
- Milk, meat and cereals are common source;
- Some green leafy vegetables especially spinach are good source of iodine;

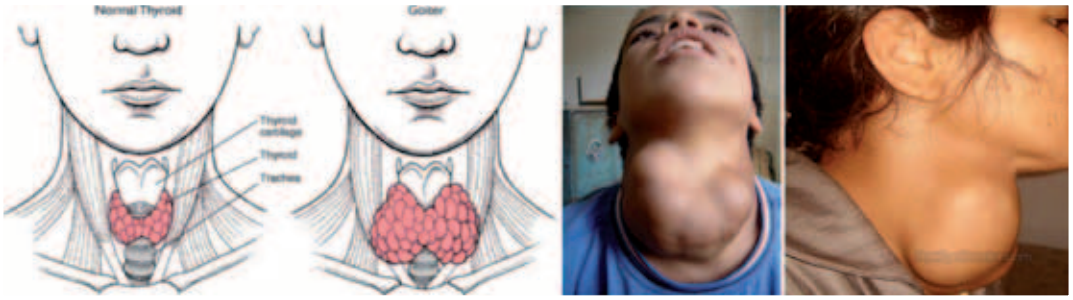
Daily intake of Iodine is met by well-balanced diet and drinking water (normal requirement 0.10 mg to 0.14 mg).

Universal Iodization of salt (30ppm at manufacture level and 15 ppm at consumer level) has led to significant reduction of Goiter, in children. More than 90% cases with Goiter are due to Iodine deficiency. In India, National Goiter Control Programme (NGCP was launched in the year in 1962) later renamed as National Iodine Deficiency Disorders Control Programme (NIDDCP) in 1992. In 1983, universal iodization of salt was recommended for human consumption, in the country.

Tools for screening:

Under the programme, MHTs would look for visible swelling in the neck region, in children suggestive of swelling of the thyroid gland. They would also ask some specific questions suggestive of this deficiency.

Pictorial



Signs and symptoms

LOOK – Increased size or Presence of visible swelling in the neck (In a normal child, the gland is non palpable)

ASK –

1. Is the swelling painless (usually Goiter is painless)?
2. Is there problem during swallowing?
3. Does the child have cough?

Actions – Refer the child for further management. The child would require clinical evaluation by a Physician/ Pediatrician and will be advised adequate intake of Iodine, for correction of this deficiency.

Counselling

1. All children should be encouraged to eat foods rich in Iodine, such as cereals and grains, fish, sea foods etc.;
2. It should be ensured that salt used, in cooking, should be iodized;
3. Salt testing Kit, if available, should be used to check availability of Iodine;

Preventive measures

The following practices should be adopted to prevent deficiency of Iodine:

1. Exclusive breastfeeding till six months of age and use of Iodine rich foods (cereals and grains), fish sea foods etc and use of Iodized salt for cooking food items as part of complementary food;
2. All parents should be informed that prolong deficiency of Iodine may lead to Goiter in children and would manifest as a visible neck swelling;

Key messages

1. Goiter is easily preventable;
2. Goiter occurs due to deficiency of Iodine, in the body, which is required for normal functioning of the thyroid gland;
3. Goiter can be easily identified as a visible swelling in the neck region;
4. All children should be encouraged to eat foods rich in Iodine such as cereals and grains, fish seafood etc.;
5. Use of Iodized salt, for cooking, prevents deficiency of Iodine;

Diseases of Child hood

Questionnaire on Diseases

1. A child is having cold (fever), ear pain, ear discharge for last five days, keeps on rubbing the ear and complains of reduced hearing, pain behind the ears. What disease is the child suffering from

   (a) Otitis media

   (b) Rheumatic heart disease

   (c) Reactive airway disease

   (d) Scabies

2. The following can be examined, clinically, for a child suspected of suffering from dental caries

   (a) Redness of gums

   (b) Swelling and easy bleeding of the gums

   (c) Cavities, discoloration (or stains) and irregular positioning of teeth

   (d) All of the above

3. Reactive airway disease may refer to

   (a) Coughing

   (b) Wheezing

   (c) Shortness of breath and allergy

   (d) All of the above

4. What action should be taken for a child diagnosed with scabies

   (a) Anti-scabies cream (permethrin or benzyl benzoate) should be applied all over the body for three consecutive days and repeated after 1 week

   (b) Whole family and close contacts should be treated at the same time

   (c) Clothes must be washed in hot water and adequately exposed to sunlight for drying and mattresses should also be kept in sunlight

   (d) All of the above

5. A child experienced seizures, what all should be asked, in history, of the child

   (a) Has the child bit his/ her tongue and experienced aura

   (b) Did the child turn blue, experienced loss of urine and experienced rhythmic/ jerky movements of the hands

   (c) Was it followed by deep or noisy breathing

   (d) All of the above

*** The trainer should ask the participants to go through the questionnaire, before the beginning of session and note down their responses. The answers of these questions should be covered during the training session.**

Instructions for the trainer

The session has to be divided in basically three parts

I. Introduction Session(15 mins)

II. Understanding the basics

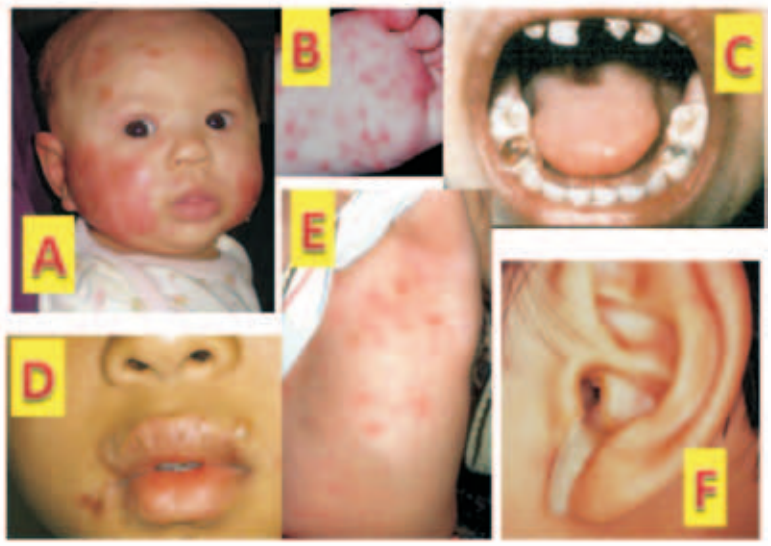
III. Learning the tools

Introduction Session

- The trainer must show pictures to the trainees and gather their views about the understanding of what the picture is suggestive of;
- Response of the trainees has to be documented on the white board/chart paper;
- Later while summing up, the introduction session, the trainer must compile the views and give some key messages to the participants about the topic.

Session 1A

Do these pictures seem familiar to you?



Answers:

A. and D. Eczema

B. and E. Scabies

C. Dental Caries

F. Otitis media

Selected Conditions:

1. Skin conditions (Scabies, Fungal infection and Eczema)
2. Otitis Media
3. Rheumatic heart disease
4. Reactive airway disease
5. Dental conditions
6. Convulsive disorders

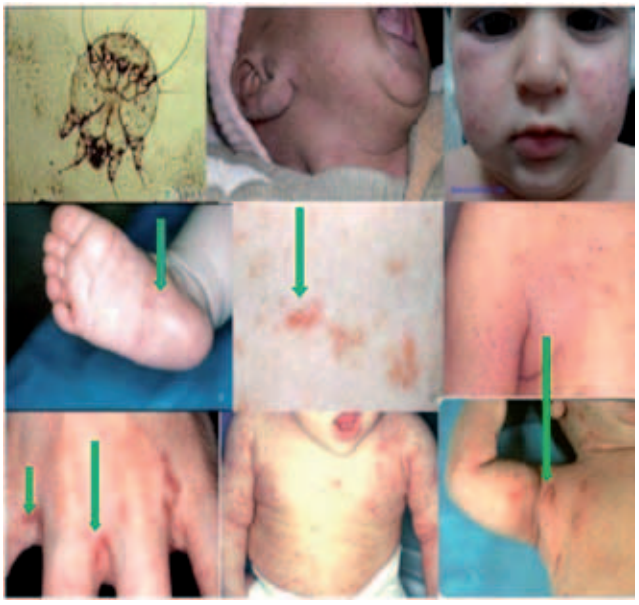
1 Skin conditions - Scabies, Fungal infection and Eczema

Scabies:

Introduction

Scabies is an infestation of the skin by the human itch mite. The microscopic scabies mite burrows into the upper layer of the skin where it lives and lays its eggs.

- The most common symptoms of scabies are intense itching and a pimple-like skin rash.



Tools for screening Torch

Sign & Symptoms- Ask, Look, Perform	
Ask	1. Is there Itching on the skin (especially at night)? 2. Does the child have pain from skin problem? 3. Are there rashes (especially between the fingers)? 4. Are there sores (abrasions) on the skin from scratching and digging? 5. Are there any thin, pencil-mark lines on the skin?
Look	1. Extensive warm, redness and swelling; 2. Localized warm, tender swelling or redness ; 3. Swelling or redness around the eyes; 4. Obvious lesions with pus or crusts; 5. Small swellings on the skin of the hands, knees, elbows, feet, trunk; 6. Round or oval scaly patches: a) In young children, the head, neck, shoulders, palms, and soles are involved; b) In older children, the hands, wrists, genitals, and abdomen are involved;
Perform	Examine the skin, through torch, for burrows.

Actions

Refer the child to PHC/CHC.

Counselling

- Close contact with the affected child should be avoided;
- Clothes must be washed in hot water and sundried;
- Whole family and close contacts should be treated, at the same time;
- Mattress should be kept in sunlight;
- Towels and other clothes, of the child, should not be used by others, in the family and daily;

Preventive measures

- Avoid close contact with the affected person;
- Maintain health & hygiene, by regular bathing and exposure to sunlight;

FAQs

- Does Scabies spread from one person to another? Yes
- Can Scabies be transmitted through pets? No
- Can Scabies be spread while swimming in a lake, river or public pool? No
- Can Scabies be spread through sharing of clothes/objects? Yes
- Can Scabies spread through mosquitoes? No
- Can Scabies be treated? Yes

Eczema

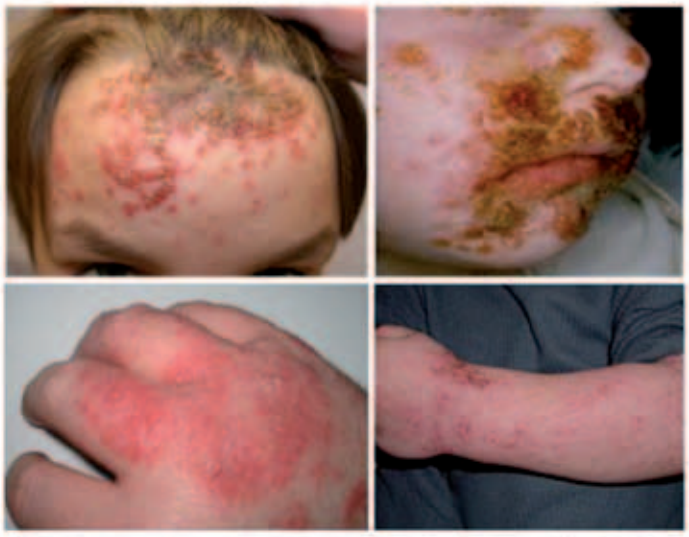
Introduction

Eczema refers to a range of skin conditions which includes dryness and recurring skin rashes that are characterized by one or more of these symptoms: redness, skin edema (swelling), itching and dryness, crusting, flaking, blistering, cracking, oozing or bleeding. Scratching open a healing lesion may result in scarring and may enlarge the rash. The most common cause of eczema is atopic dermatitis, sometimes called infantile eczema although, it occurs in infants and older children.

The word "atopic" describes conditions that occur when someone is overly sensitive to allergens in their environment such as pollens, molds, dust, animal dander, and certain foods. "Dermatitis" means that the skin is inflamed, or red and sore.

Signs & Symptoms – Ask, Look, Perform

Ask	Ask for any discharge from skin, itching, bleeding;
Look	• Redness, skin edema (swelling); • Itching and dryness; • Crusting, flaking, blistering; • Cracking, oozing or bleeding;



Actions

Refer to PHC/CHC.

Counselling

- Although, there is no permanent cure, this could be controlled by changing the food habits, environmental advice and medicines. Many children either outgrow their eczema, or it at least it gets better as they get older;
- Take bath daily and tap dry the skin;
- Keep your nails trimmed and avoid scratching the lesion;
- Wear cotton clothes;
- Avoid using scented soaps;
- Child should drink plenty of water, which adds moisture to the skin;

Preventive Measures

- Avoidance of any known irritant/triggers, such as harsh soaps, dust mites, food allergies, overheating and sweating, wool and polyester clothing;
- Keep skin well-moisturized through moisturizer/oil;

FAQs

- Does Eczema spread from one person to another? No, eczema is not contagious.
- How long does it last? For many kids, it begins to improve by the age of 5 or 6; others may experience flare-ups throughout adolescence and early adulthood.

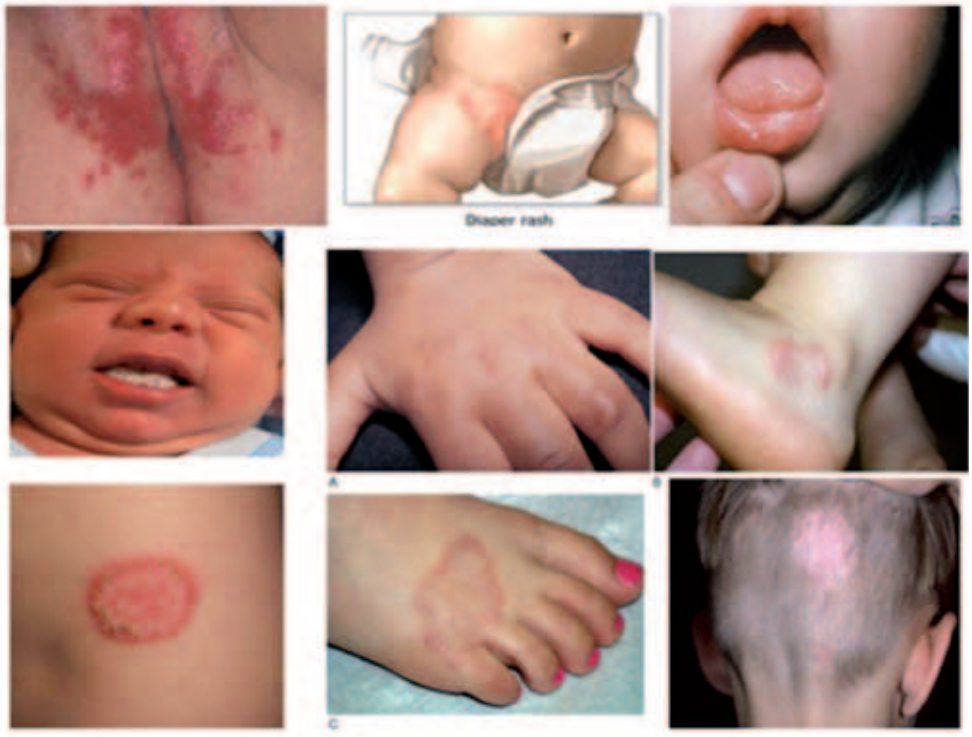
Fungal infections

Some common fungal infections in the children include:

- Oral thrush (Candidiasis);
- Athlete's foot (Tinea pedis);
- Diaper rash;
- Ringworm of the groin (Tinea cruris);
- Ringworm of the body (Tinea corporis);
- Ringworm of the scalp (Tinea capitis);

Signs & symptoms: Ask, Look, Perform

Ask	Location: Fungal infections are debilitating and symptoms and appearance of a fungal skin infection depends on the type of fungus causing it and the part of body affected. • Itching; • Discharge; • Burning sensation; • Any hair loss, as fungal infections of scalp can lead to hair loss; • Whether painful or not,as usually fungal infections are painless;
Look	Fungal skin infections can cause rashes with a variety of different appearances. Some are red, scaly and itchy. Others may produce a fine scale, similar to dry skin. The fungus can affect just one area or several areas of body. • Redness of skin; • Rashes; • Discharge; • Crusting/scaling/flaking; • Creamy white lesions on tongue, inner cheeks and sometimes on the roof of mouth, gums and tonsils; • Lesions with a cottage cheese-like appearance;



Actions: Refer for Management at PHC/CHC.

Counselling

- Avoid close contact with other children and family members;
- Wear lose cotton clothing;
- Keep the affected area dry;
- Trim the nails;
- Avoid scratching;
- Change diaper on regular basis;
- Do not share towels, hair brushes and combs that could be carrying any fungi;

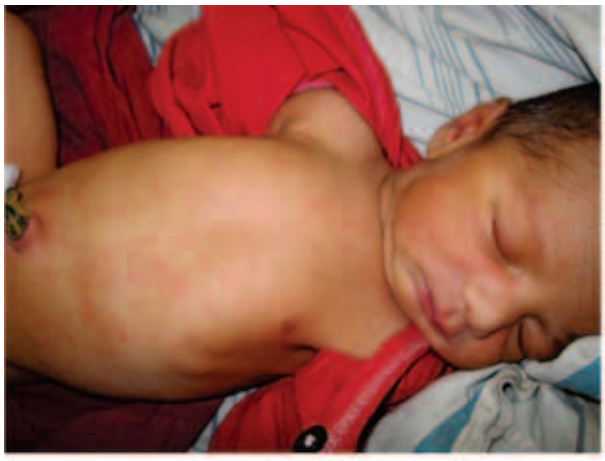
Preventive Measures:

- Keep the skin dry and dry skin, thoroughly, after bathing and sweating;
- Wash clothes and bed linen, frequently, to remove any fungi;
- Do not share towels, hair brushes and combs that could be carrying any fungi;
- Boil nipple of milk bottle, properly;
- Wear lose cotton clothing;
- Regular bathing;
- Avoid close contact with affected children;

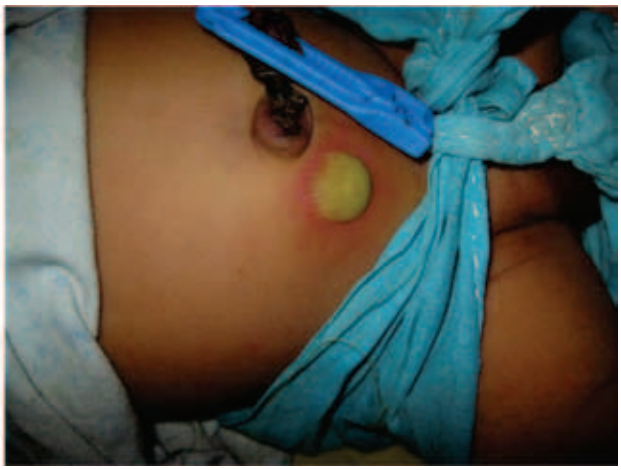
FAQs

- Does fungal infection spread, from one person to another? Yes
- Can fungal infection spread, while swimming in a lake, river or public pool? Yes
- Can fungal infection spread, through sharing of clothes/objects? Yes

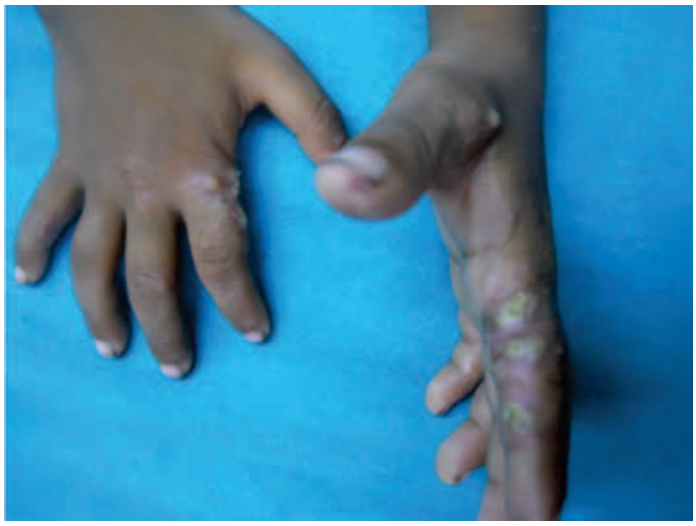
Some Photographs of the Common Skin Conditions in children



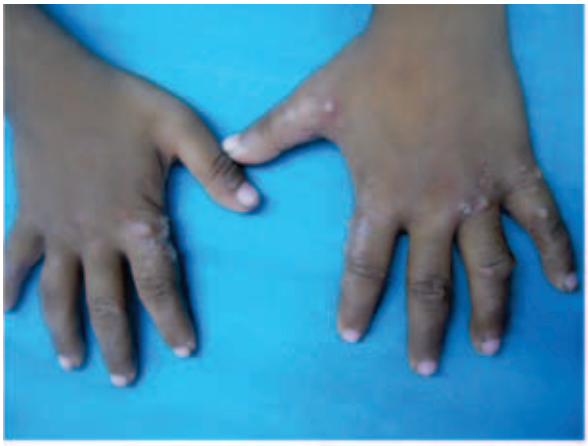
Erythema Neonatorum

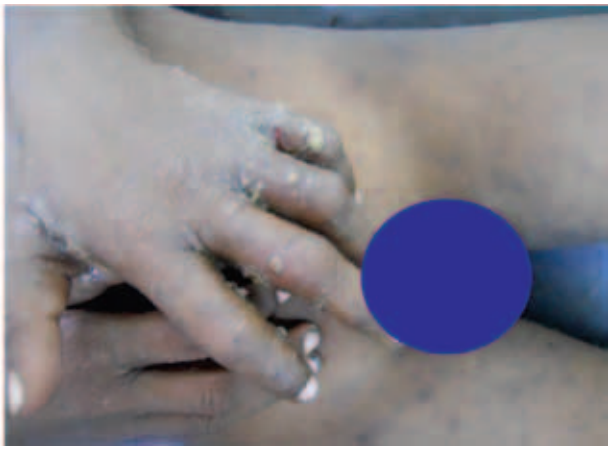


Pyoderma neonate



Scabies with Pyoderma





Scabies with secondary infection

2 Otitis Media

Otitis Media refers to the infection of the middle ear. It happens when the ear canal gets blocked with fluid and gets infected.

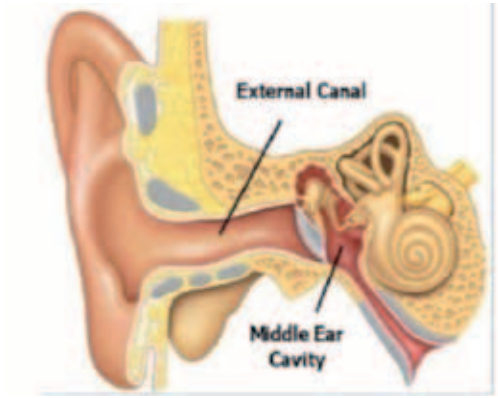
Tools for screening: Torch

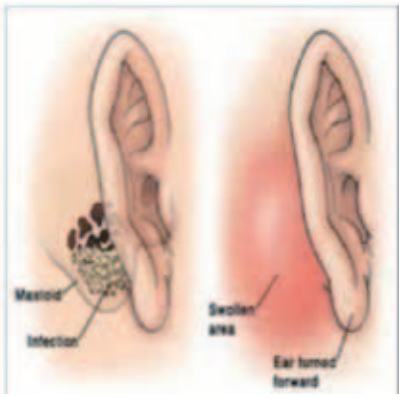
Sign & Symptoms- Ask, Look, Perform

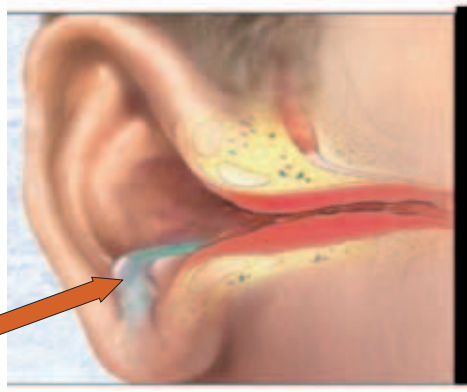
Ask	• Is the child having cold or fever? • Is there ear pain? • Is there discharge from ear (or pus)? If yes, for how many days? • Does the child keeps on rubbing the ear? • Is there a feeling of blocked ear? • Does the child complain of reduced hearing? • Is there pain behind the ears (tender)? • In an infant, if there are no visible signs of ear discharge, ask parents is the child irritable or keeps on rubbing his/her ear? • Does the child have throat infections?

Look

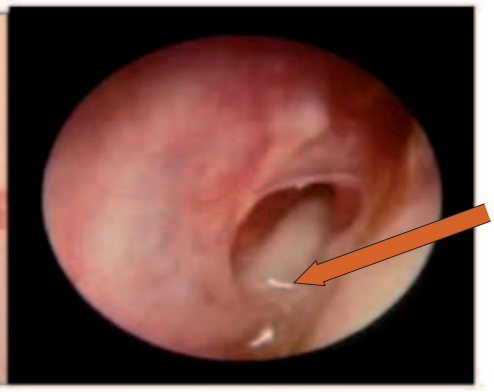
Normal Ear-Schematic diagram







Schematic Diagram of discharging ear



Watery discharge from ear

Perform

Examine the ear with a torch, for:

Redness, discharge in the ear;

Perforation (hole) in the tympanic membrane;

Action

Refer the child to CHC for further management;

General instructions:

1. The discharge from the ear should be wiped out with a cotton wick or a tissue paper roll;
2. Don't use any sharp objects;
3. Dry ear heals fast;
4. Never put oil in the ears;
5. Consult a doctor;

Exercise

Examination of a subject suffering from Otitis Media/Ear perforation (if available) or normal subject through ear speculum, by each participant;

Counselling

- Prevent entry of water, in the ear, during bathing;
- Do not put oil in the ear;
- Avoid exposing the child to cigarette smoke, it can increase the severity of ear infections;

Preventive measures

- Do not attempt to dig out excess or hardened earwax with items such as a cotton swab, paper clip or hairpin;
- Avoid exposing the child to cigarette smoke, it can increase the chance of ear infections;
- Do not bottle feed, the child, in lying down position;

3 Rheumatic heart disease

Introduction:

Rheumatic fever is an inflammatory disease that may affect many connective tissues of the body, especially, those of the heart, joints, brain or skin. It usually starts out as a strep throat (streptococcal) infection. Anyone can get acute rheumatic fever, but it usually occurs in children between the ages of 5 and 15 years. About 60% of people with rheumatic fever develop some degree of subsequent heart disease.

Rheumatic heart disease describes a group of short-term (acute) and long-term (chronic) heart disorders that can occur after an episode of acute rheumatic fever. One common result of rheumatic fever is heart valve damage. This damage to the heart valves may lead to a valve disorders and also heart failure. RHD is the most serious complication of rheumatic fever.

Acute Rheumatic fever and Rheumatic heart disease:

Case scenario: An 11-year-old child presents with fever up to 102 degrees F, joint pain and swelling, along with shortness of breath. The fever comes and goes at random times of the day. The symptoms have been present, now, for 4 days. Two days ago, his right knee was painful and swollen, but today it has improved. The joints involved today, include the right ankle and left knee. They are quite tender, painful and also swollen. The shortness of breath occurs with walking, but he is now unable to walk because of the joint pain. He also, has some shortness of breath with lying down flat when he is trying to sleep.

Exam: He is appearing tired, with rapid pulse and fast breathing. Throat: Enlarged, red tonsils. Lungs are clear but with an increase in breathing rate. Heart sounds: rate is increased, with a murmur. His left knee is swollen and extremely tender with warmth. He has difficulty with the movement of the left knee. No abnormal movements of arms, hands, or tongue are noted. He is unable to walk, due to pain.

Clinical course: The child is admitted to the hospital. Initial laboratory work includes an Erythrocyte Sedimentation Rate (ESR) of 110, and a chest X-ray with cardiomegaly and a large cardiac shadow is present. ASO titer is high. The diagnosis of acute rheumatic fever (ARF) is made and he is initially started on salicylate therapy, and his arthritis improves dramatically. However, the next day an echocardiogram confirms severe valve problem. Due to the significant cardiac disease with elements of congestive heart failure he is switched to corticosteroids and improves. His heart size decreases over the next 2 weeks, and when it normalizes he is switched back to salicylates for total treatment duration of 8 weeks. He does have a persistent murmur after this time, however. He is started on intramuscular benzathine penicillin, which is given every 4 weeks for streptococcal prophylaxis.

But when the mobile team would go for screening in the school you will find:

a) Asymptomatic child but, with a murmur when you place a stethoscope;

b) A child who gets tired on playing, in form of increased respiratory rate Palpitation (feeling that my heart is beating very fast), gets problem climbing the stairs;

c) Signs of "b" plus past history of episode of fever, sore throat and with joint pain of the larger joints which improved, with treatment. The joint pain was not accompanied with morning stiffness of joints which improves over the day;

d) All the three;

You should refer as a suspected case of rheumatic heart disease, for further evaluation

The terms of Acute Rheumatic Fever and Rheumatic Heart Disease are sometimes confused. Proper use of these terms requires some knowledge of the disease entities, even though their pathogenesis and relation to streptococcal infection is nearly identical. **Acute Rheumatic Fever** is usually used to describe the initial or acute onset of the disease. In our case, this being the first initial presentation of the disease, it would be correct to call this **Acute Rheumatic Fever**. He also had severe carditis, which caused acute congestive heart failure, as manifestations of ARF, but he subsequently develops chronic heart disease as sequelae of the carditis and thus it would also be correct to describe him in terms of a more chronic form of the disease, namely **Rheumatic Heart disease (RHD)**. This term implies there has been significant valvulitis, enough to cause valvular scarring. This child is at an increased risk of requiring a valve replacement in the future, especially, if he develops another episode of the disease, which puts great emphasis on him receiving long-term penicillin prophylaxis, to prevent him from getting streptococcal disease and possible reoccurrence of **Acute Rheumatic Fever with** worsening RHD.

** When a child has throat pain it may be due to viral disease mainly, but at times due to bacterial disease. One of the bacteria is of streptococcal infection, hence in throat pain a throat culture has to be taken to show, positive streptococcal throat culture. Other evidence of streptococcal infection is positive ASO titer.*

Characteristics of Joint involvement in acute rheumatic fever:

- The polyarthritis is migratory. Usually one joint becomes involved and over a few days resolves, then another joint(s) becomes involved as demonstrated in our case. Occasionally, the first joint does not resolve completely by the time the second joint becomes involved, and this is termed "additive arthritis", and also fulfills a diagnosis of migrating polyarthritis;
- In Acute Rheumatic Fever, two or more joints are considered polyarthritis;
- The most common joints involved are large joints, usually those that bear weight. Knees and ankles are, most often, involved, although elbows and wrists can also be involved;
- The joint pain is, typically, very severe even if the visual findings are not very impressive. Merely touching the joint often elicits severe pain;

- Lower extremity joint involvement renders these patients non-ambulatory;
- If the joints are swollen and without much tenderness, and again stiff in the morning, it is usually not due to Acute Rheumatic fever;
- The joints are very painful in Acute Rheumatic fever, even the weight of the bed-sheet can cause pain, and this finding is sometimes called the "bed-sheet sign";
- If the child sits without movement of the joints, the pain usually disappears unlike in some other diseases where there is a pain on rest also;

Rheumatic Heart Disease:

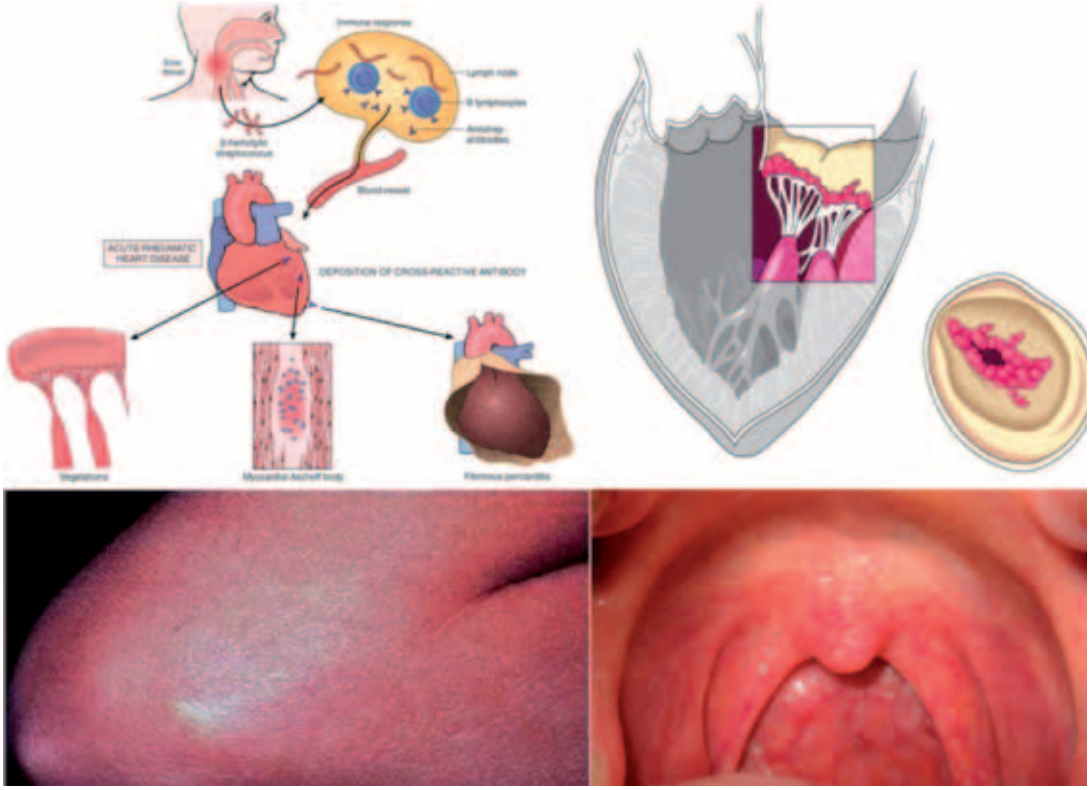
1) This is usually a late feature of Acute Rheumatic Fever in which, due to inflammation of the heart valves, especially the valve leaflets of the mitral valve may leave the leaflets with a scar and become adherent to each other, resulting in mitral stenosis (usually, seen late in the patient's course, sometimes after repeated episodes of acute rheumatic fever).
2) There may be no past history of acute rheumatic fever, yet there is involvement of the heart. They never had history of fever or arthritis, but just present with worsening cardiac disease. They may present for the first time in a woman when she gives birth to a child.
3) There may be history of an episode in which the child suddenly, developed purposeless and involuntary movements especially of the hands and tongue. As if the child is dancing but it improves when the child sleeps. Parents may also notice that during this episode the child is having mood swings or just "not acting right" but the entire episode resolves with time, completely.
4) There may be history of nodular swelling, the size of less than 0.5 cm, seen at the tip of elbows, around the joints or near the bony prominences of the spinal column, at the back.
5) There may be history of a rash presenting over the trunk, but never at the face. The rash looks pink with irregular but well demarcated borders. It may last for few hours and then may disappear.

To sum up:

1. Child suffers from Pharyngitis (Throat infection);
2. Fever, headache, abdominal pain, nausea and vomiting;
3. Child may have pain and swelling in the joints;
4. Child may have trembling/ flinging movements, in the hands?

Signs/symptoms:

Ask	Is there history of rheumatic fever (pharyngitis)? Ask for pain in chest, pain on swallowing, fever, headache, abdominal pain, nausea and vomiting? Is there pain and swelling in the joints (especially large joints, fleeting joint pain)? Are there any trembling/ flinging movements in the hands? Ask for any Heart palpitations, Breathlessness on exertion, Swelling (oedema), Fainting spells (syncope);
Look	• Redness at the back of throat (Oral mucosa); • Red, raised, lattice-like rash, usually on the chest, back, and abdomen; • Uncontrolled movements of arms, legs, or facial muscles; • Swollen, tender, red and extremely painful joints; • Weakness and shortness of breath; • Nodules over swollen joints; • Fever;
Perform	Auscultate to hear abnormal heart sounds (or murmurs);



Tools for screening:

Stethoscope

Action

1. Counsel and refer the case to DH;
2. Diagnosis needs to be confirmed, using echocardiography;

Counseling:

- Get regular check-ups at local health PHC/CHC;
- Do not ignore a sore throat. Proper treatment of sore throat can go a long way in preventing the first attack of rheumatic fever;
- Keep sores clean and covered;
- Wash hands, regularly;
- Eat a healthy diet;

Prevention:

- Never neglect a throat pain and take care of oral hygiene;
- If diagnosed as a case of rheumatic fever, long term prophylaxis needs to be given with penicillin injection and the significance has to be explained to both the parent and the child. Many of the families do not understand why the child needs penicillin injections when he or she feels fine, following the episode of ARF. Many mistakenly think the injections are for the arthritis and therefore do not comply with this regiment once the arthritis has resolved;
- Dental care need to be taken;
- Avoid sleeping, on the floors, in damp houses;

Key Messages

FAQs

Is there any vaccine available for Rheumatic Heart Disease?

- No vaccines are currently available to protect against S. pyogenes infection, although there has been research into the development of one.
- Can Rheumatic fever recur? Yes

4 Reactive Airway Disease

Introduction

Reactive airway disease in children, is a general term which is used to describe a history of coughing, wheezing or shortness of breath triggered by infection. These signs and symptoms may or may not be caused by asthma.

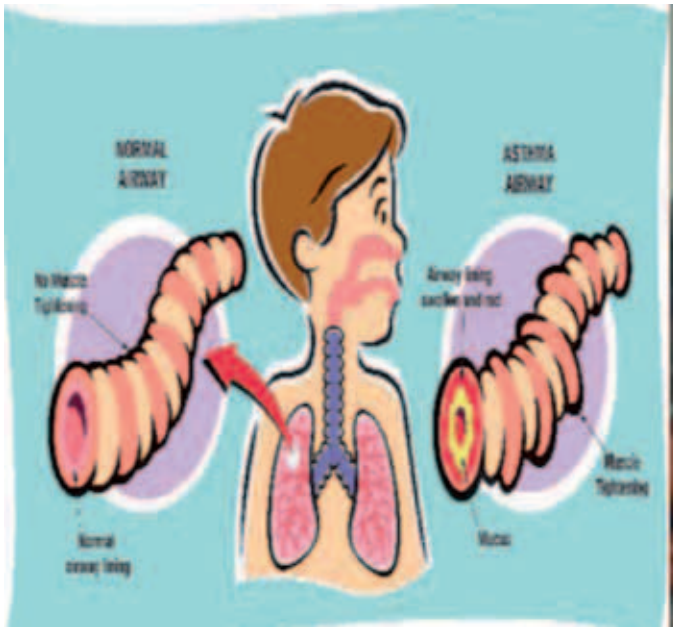
Estimated prevalence is 5% among children aged 1month to 14 years.

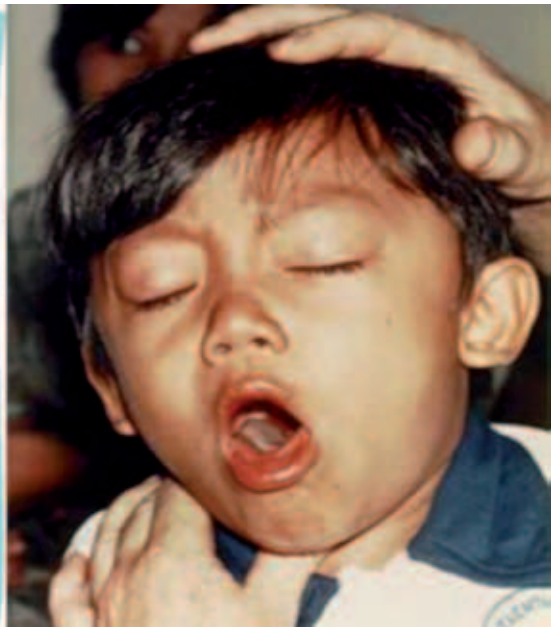
Tools for screening

Torch, Stethoscope

Signs & Symptoms – Ask, Look, Perform

Ask	• Is child suffering from cough, cold and/or difficulty in breathing? If yes, then for how long; • Does the episode of cough, cold start after exposure to a triggering factor like dust, smoke, strong odor or perfume, stress, physical activity etc? • Is there a family history of allergies? • Decreased appetite/weight loss;
Look	• Running nose; • Wheezing: It is a high pitched whistling like sound, during expiration; • Difficulty in breathing; • Retraction of ribs;





Actions

Refer to PHC/CHC

Counseling and Preventive Measures

- Avoid exposure to triggering factors;
- Avoid exposure to cigarette smoke;

FAQs

- Are Reactive Airway Disease (RAD) and Asthma same? No, Asthma is always RAD but RAD is not always Asthma.It is a general term which, does not indicate a specific diagnosis;
- How to minimize Asthma attacks? Avoid triggering factors and take medications for Asthma, regularly, as per doctor's advice;

5 Dental Conditions

Oral health is a window to your overall health. Teeth and gums (gingiva) are important pillars of oral cavity and hence it is important to maintain their health. Two main dental diseases, caries and gum diseases, begin in childhood and are preventable by early diagnosis.

DENTAL CARIES (decayed/rotten tooth)

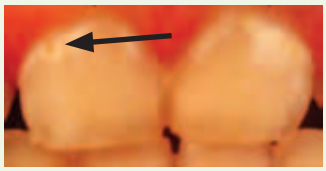
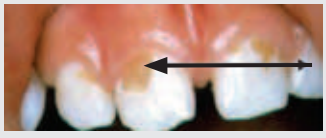
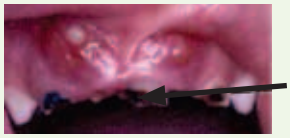
There are two sets of teeth, milk teeth and permanent teeth. The first milk tooth erupts at the age of 6-7months and first permanent tooth erupts at age of 6-7 years. Caries is a chronic disease affecting both milk teeth and permanent teeth, leading to their breakdown. Caries is further divided in to Early Childhood Caries (ECC) and Adolescent Caries and, Adult Caries. Let's understand them

Early Childhood Caries (ECC):

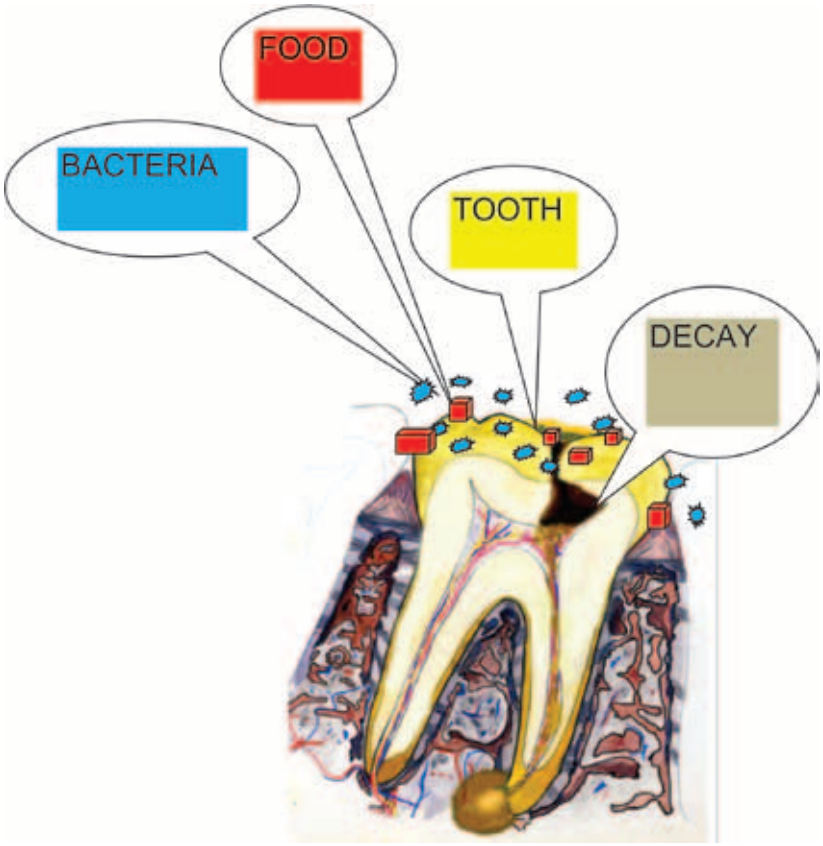
What is ECC?

- A severe, rapidly progressing form of tooth decay, seen in infants and young children

ECC is defined as "the presence of one or more decayed (non-cavitated or cavitated lesions), missing teeth (due to caries), or filled tooth surfaces, in any primary tooth, in a child 6 year of age or younger

	White, opaque, dull, white band (non-cavitated)
	Cavitations can be seen by a break in the continuity. (Cavitated lesions)
	Root stump of the teeth : remains of, once a healthy teeth

How It All Starts



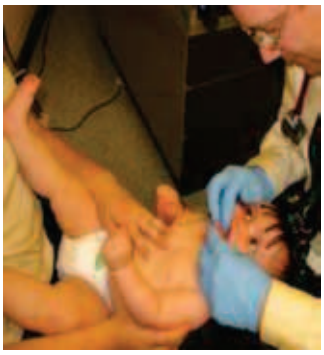
How to Identify ECC?

Before identification: check for the instruments and the position of the child, during examination.

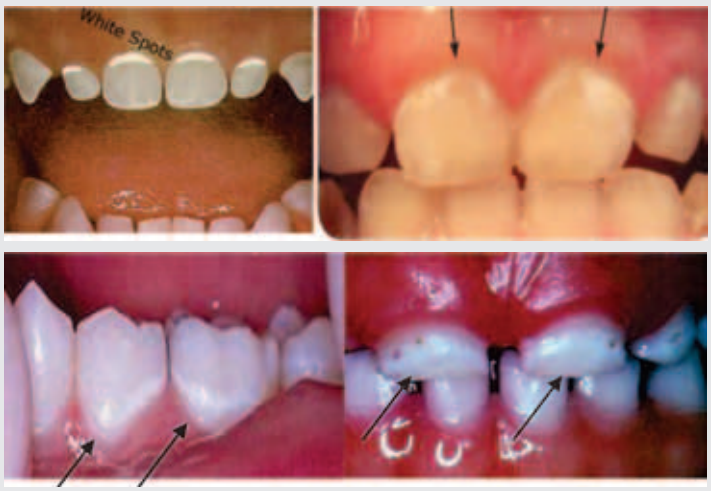
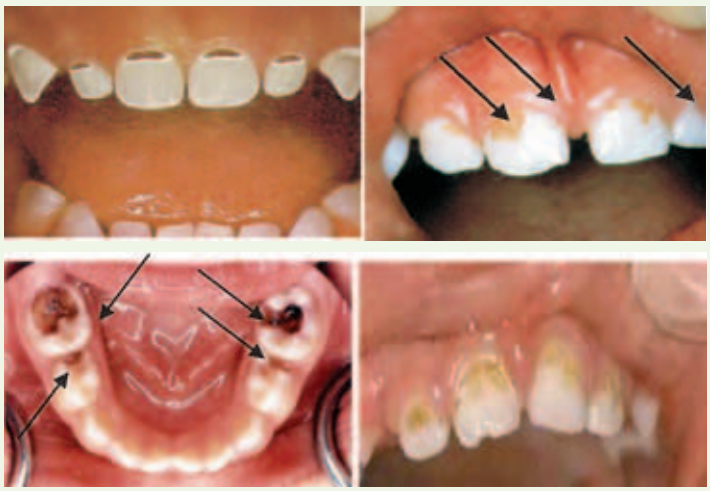
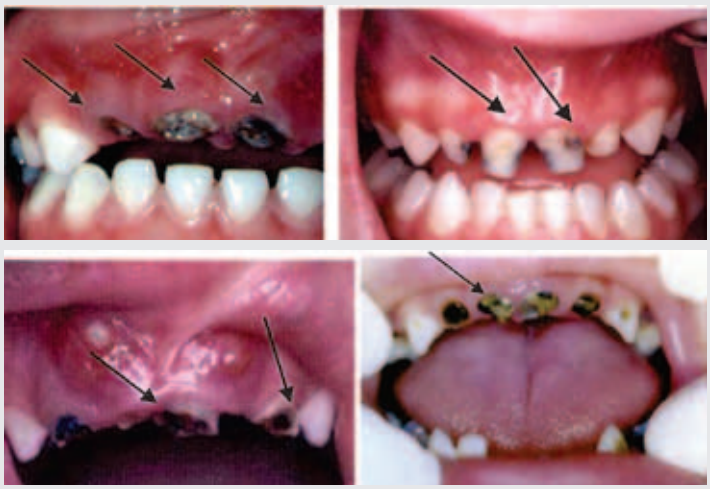
A. Instrumentation required to diagnose ECC in the periphery : Mouth Mirror, cotton, light source (torch)

B. Position of the child during examination :

- Position child in caregiver's lap, facing caregiver;
- Sit with knees touching knees of caregiver;
- Lower the child's head onto your lap. Use gentle downward finger pressure behind lower lip, on lower incisors, to open the child's mouth



Signs and symptoms

ASK	- Parents, if the child complains of sensitivity to hot/ cold/sweet/food lodgment/pain	
LOOK	White, opaque, dull, white band of, de-mineralized, enamel especially, neck of maxillary anterior (upper front teeth)	
	Yellow or brown discolored area, break in continuity of tooth	
	Break down of teeth	
Perform	Oral hygiene education to care giver, refer for treatment to CHC/ DEIC	

If Not Identified

ECC is consequential leading to:

- Extreme Pain, Spread of Infection;
- Difficulty chewing, poor nutrition, below average weight;
- Distraction from normal activities including learning, missing school;
- Speech and eating dysfunction;
- Growth delay;
- High risk of dental decay and crooked bite in adult teeth;
- Extensive and costly dental treatment;

Prevention

A) Mother Oral Health = Child Oral Health

B) Proper Parenting

1. Infant feeding habits

2. Healthy dietary Habits - Avoid in between-meal snacks ,juices;

- Drink water after eating sweets;

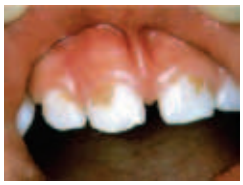
Sugar Discipline- Donot eliminate sugar; eat intelligently

3. **Avoid saliva-sharing**

4. **Sweet Bank** - collect all sweets and eat on one designated day, of the week.

C) Oral Health Education

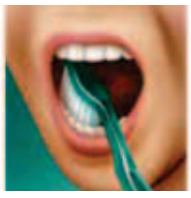
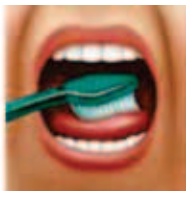
1. Start cleaning with wet cotton when **first tooth** erupts;
2. **"LIFT the LIP"**, once a month, at home, to check for white/brown spots;



3. Parents brush teeth using soft brush & fluoridated tooth paste

Swipe, less than 2 year Pea size 2-5 year age;

4. Vigorous rinsing, after meals;
5. Proper Brushing, using soft brush, – place the brush at 45 degree angle with bristle resting on teeth and gums, brushing with short sweeping, vertical motion.

D) Specific measures

1. Drinking fluoridated water,
2. Fluoride tablets (1mg F/day) for high risk patients;
3. **Fluoride Varnish** every 4-6 months for high risk patients (22,600 ppm Fluoride);

Instruments required: Micro brush applicators

2 x 2 gauze squares

Gloves

Mouth mirror

Direct light source

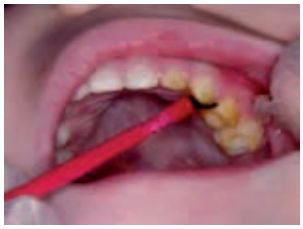
Fluoride varnish

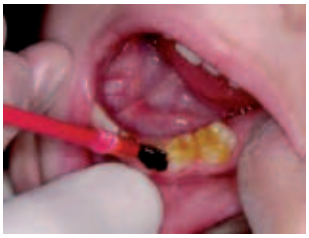
Procedure: Using gentle finger pressure, open the child's mouth;

Remove excess saliva from the teeth with a gauze sponge;

Apply a thin layer of varnish to all surfaces, of the teeth;

Varnish will harden immediately, once it comes in contact with saliva;





Instructions for Parent

Do not brush the child's teeth until the next day;

The child's teeth may be slightly yellow until they are brushed;

The child can eat and drink right away but should avoid hot liquids;

4. Pit and fissure sealants;

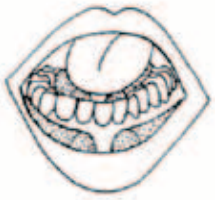
5. ART- Atraumatic Restorative Treatment

Instruments required: 2 x 2 gauze squares

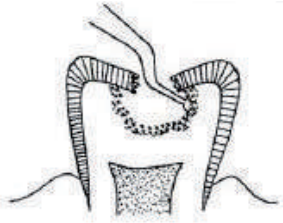
Gloves
Mouth mirror
Direct light source
Spoon Excavator
Cement carrier
Dental Cement

Procedure:

- Isolate using cotton rolls;

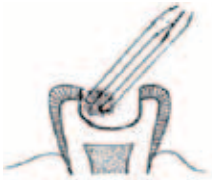


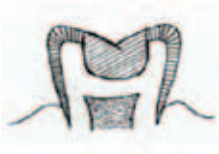
- Hand excavation to remove overhangs/Debreid softened tooth structure;



The spoon excavator is used to remove soft caries from the decayed area until all softness is gone.

- Place fluoride leaching material;





6. **Restorative rehabilitation done by dentist**

Are you passing germs to your baby?

Take this quiz to find out.

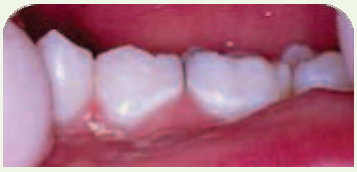
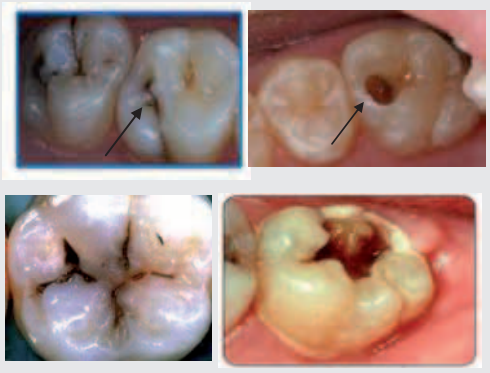
1. Do you pre-chew your baby's food? ¨ Yes ¨ No
2. Do you test the temperature of your baby's bottle with your mouth? ¨ Yes ¨ No
3. Do you lick your baby's pacifier or bottle nipple to clean it? ¨ Yes ¨ No
4. Do you share cups, forks or spoons with your baby? ¨ Yes ¨ No
5. Do you let baby put his hands in your mouth or others' mouths? ¨ Yes ¨ No

If you answered YES to any of these questions, your baby may be at risk for ECC!

Caries (6-18yrs)

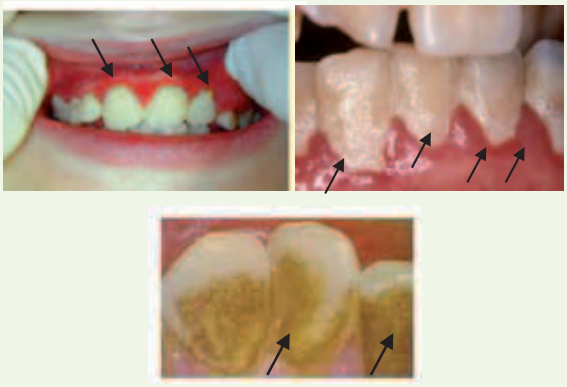
Chewing (occlusal) surface of teeth is more prone to caries because of the presence of grooves (pit and fissures) on it.

ASK	Any food lodgment/sensitivity to sweets/hot /cold? Is cleaning teeth with brush/tooth powder/paste/Datun?

LOOK	White, spots	
	Yellow or brown discolored area, cavity	
PERFORM	Oral hygiene education, refer for treatment to CHC/DEIC	

GUMS (Gingiva)

Gums surround the neck of the teeth like a collar. Along with anchoring the teeth, the gingiva also creates a seal around the tooth, preventing bacteria, plaque etc to cause infection. Healthy gums are pink, firm, resilient and sharp edged.

LOOK	red, swollen gums, bleeding gums and plaque	
PERFORM	Oral hygiene education , refer for treatment to CHC/ DEIC	

6 Convulsive disorders (Epilepsy)

Convulsive disorders (Epilepsy) are a group of brain disorders characterized by a tendency for recurrent seizures (convulsions), over time. Seizures are episodes of disturbed brain activity that cause changes in attention or behavior.When a person has two or more unprovoked seizures, they are considered to have epilepsy. A single seizure that does not happen again is not epilepsy.

Questionnaire-Ask

1. Has the child experienced seizures?
2. If yes:
    a) Did the child bit his/her tongue?
    b) Did the child turn blue?
    c) Was it followed by a period of deep or noisy breathing?
    d) Did he/ she experienced loss of urine?
    e) Did the child experience rhythmic/ jerky movements of the hands?
3. Does the child experience 'aura'? Some people with epilepsy have a strange sensation (such as tingling, smelling an odor that isn't actually there, or emotional changes), before each seizure.
4. Was the seizure caused by a short-term problem (like fever or infection) that can be corrected?

Action

1. Counsel and refer the child;
2. Treatment is anticonvulsants;

How can epilepsy be prevented?

Although there is no known way to prevent epilepsy,but proper diet and sleep, and staying away from illegal drugs and alcohol, may decrease the likelihood of triggering seizures in people with epilepsy.

Reduce the risk of head injury by wearing helmets during risky activities; this can help lessen the chance of developing epilepsy.Persons with uncontrolled seizures should not drive. If you have uncontrolled seizures, you should also avoid activities where loss of awareness would cause great danger, such as climbing high places, biking, and swimming alone.