सत्यमेव जयते

NATIONAL RURAL HEALTH MISSION
राष्ट्रीय ग्रामीण स्वास्थ्य मिशन

RESOURCE MATERIAL

Rashtriya Bal Swasthya Karyakram (RBSK)

Child Health Screening and Early Intervention Services under NRHM

Ministry of Health & Family Welfare
Government of India

OCTOBER, 2013

Rashtriya Bal Swasthya Karyakram (RBSK)

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Preface

Children are central to sustainable development. As a country, we owe it to them to protect and promote their health equitably. It is well known that millions of children under five years of age in the country still do not receive the appropriate care and support to become physically healthy, mentally alert and emotionally secure. Till now there was no structured approach to child health screening and Early Intervention Services as a public health approach in the country.

Rasthriya Bal Swasthya Karyakram will reach out to new-born, preschool children and school children, a wide range of age group from 0-18 years. It will ensure not only screening but extend itself to ensure treatment and management of four D's namely Defect at birth, Disease, Deficiency and Development Delays including disabilities.

The successful implementation of this initiative has both short-term and long-term dividends. The programme would prove economical for the poor and marginalized through reduction of out-of-pocket expenditure and reduce undue pressure on health system.

The current publication is a compilation of rich technical information in form of a Resource Book. It will be valuable for trainers, block mobile teams and all personnel involved in RBSK who seek to inform themselves better on these thirty conditions under the programme.

I am confident that RBSK would turn out to be a milestone in our quest for child health and hope that States/UTs would ensure its effective implementation.

Anuradha Gupta
Additional Secretary and Mission Director
National Rural Health Mission
Ministry of Health and Family Welfare
Government of India
New Delhi

Prologue

Out of our country's annual birth cohort of about 26 million, it is estimated that about 1.7 million children are born with Defects at birth, accounting for almost 10% of the total new-born deaths and 4% of the under-five mortality in the country. Children also suffer from a variety of Deficiencies. Nearly 47% of all children are malnourished, 43% underweight, and 20% wasted including eight million severely acute malnourished children. Besides Defects at birth, Deficiencies and Diseases, Developmental Delays including disabilities afflict as many as 10% of our child population which ultimately impacts the pace of economic growth of the country. However, if detected in time, such disabilities can be managed and the children can be groomed with adequate medical support to lead a normal life. Such a scenario is a matter of concern with the need for urgent and effective action.

This calls for an effective programme of action which recognises that Defects at birth, Deficiencies, Diseases and Development Delays are interlinked through many complex pathways. Their management can be best secured through the concerted efforts of experts working as a team.

It is in this context that Government of India, Ministry of Health and Family Welfare has launched Rasthtriya Bal Swasthya Karyakram. The programme envisages screening of new-borns for Defects at birth at public health facilities at the time of delivery and by ASHAs during post-natal visits in the community. The block health team will then cover the spectrum of children ranging from 6 weeks to 18 years of age at Anganwadi centres and in Government and Government – aided schools. Screening and referral will mark the beginning of appropriate management of 30 identified health problems through District Early Intervention Centres (DEIC) and recognised higher centres.

Efficient implementation of this programme is the joint responsibility of the Centre and State Governments. I am sure that the resource material compiled here will be utilised appropriately by key resource persons and trainers to enhance the capacities of the block level teams.

I wish them all great success in their endeavour of securing better health-care of our children. I also pledge my wholehearted support to the implementation of this key initiative.

Dr. Rakesh Kumar
Joint Secretary, RCH
Ministry of Health & Family Welfare
Government of India
New Delhi

List of Contributors

Ministry of Health and Family Welfare

- Ms. Anuradha Gupta (AS &MD, NHM)
- Dr. Rakesh Kumar (Joint Secretary, RCH)
- Dr. Ajay Khera (Deputy Commissioner, CH &I)
- Dr. Subha Sankar Das, (Consultant)
- Dr. Anubhav Srivastava, (Consultant)

Experts

- ***Compiled and Edited:*** Dr. Arun Kumar Singh (Senior Advisor, RBSK)
- Dr. Anuradha Jain, RMNCH+A Coalition, Save the Children, India
- Dr. Manpreet Khurmi, (Consultant)
- Dr. Harish Kumar, Program Officer Technical ,Child Health, NIPI
- Dr. Amar Jyoti Persha, Ex HOD,NIMH
- Dr Vikas Kohli, Apollo Hospital, New Delhi
- Dr. Shefali Gulati, AIIMS
- Dr. Savita Sapra, AIIMS, New Delhi
- Dr. Sujata Sinha Pathologist and Project Head, Action on Birth Defects
- Dr. Krishna Kumar, AIMS, Kochin
- Dr. Vrisha Madhuri, CMC Vellore
- Dr. Kishore Mulpuri, University of British Columbia, Canada
- Dr. Benjamin Joseph, Kasturba Medical College (Pediatric Orthopedic Society of India)
- Dr. Ashok Johari, Senior Consultant, Pediatric Orthopedic and Spine Surgeon, Mumbai
- Dr. A.S. Karthikeyan and Paediatric Ophthalmology Team, Aravind Eye Hospital, Madurai
- Dr. Pranab Das, Calcutta Medical Research Institute
- Dr. Anand Vinekar, Narayana Nethralaya, Bangalore
- Dr. Archisman Mohapatra, INCLEN
- Ms. Vaishali Deshmukh, INCLEN

- Dr. Abha Mehndiratta, Access Health International
- Dr. Chandrakala Jaisawal, UNICEF, Maharashtra
- Dr. Simi Irani, Ex HOD ,Department of Paediatrics,KEM Mumbai
- Dr. Suchandra Mukherjee,Head, Department of Neonatology,IPGMER,Kolkata
- Dr. Debdutta Chatterjee,Bankura Medical College
- Dr. Deepti Khanna, (Consultant RBSK)
- Mr. Asis Ghosh,(Consultant, RBSK)
- Dr. Avinash Jaiswal, NIPI
- Ms. Vimla Srinivasan, Development Therapist
- Ms. Madhumati Bose, Early Interventionist
- Ms. Vibha Krishnamurthy, Paediatrician, Director of Umeed Child Development Center
- Dr. Supreet Kaur, PHFI
- Dr. Shiv Kumar, NIPI
- Dr. Sumit Sen, Prof. Dept. of Dermatology, IPGMER, Kolkata
- Dr. Sanchita Bala, Dept of Dermatology, IPGMER, Kolkata

List of Abbreviations

AWC	Anganwadi Center
AWW	Anganwadi Worker
ANM	Auxillary Nurse Midwife
ASHA	Accredited Social Health Activist
ASO	Anti-Streptolysin O titre
CHC	Community Health Center
CHD	Congenital Heart Disease
CTEV	Congenital Talipes EquinoVarus
DDH	Developmental Dysplasia of the Hip
DEIC	District Early Intervention Center
DH	District Hospital
DLHS	District Level Household Survey
ESR	Erythrocyte Sedimentation Rate
FBNC	Facility Based Newborn Care
F-IMNCI	Facility Based Integrated Management of Neonatal and Childhood Illness
FRU	First Referral Unit
G6PD	Glucose 6 Phosphate Dehydrogenase
HBNC	Home Based Newborn Care
IAP	India Academy of Pediatrics
IEC	Information Education and Communication
IFA	Iron Folic Acid
IMNCI	Integrated Management of Neonatal and Childhood Illnesses
IMR	Infant Mortality Rate
JSSK	Janani Shishu Suraksha Karyakram
JSY	Janani SurakshaYojana
LBW	Low Birth Weight
MHT	Mobile Health Team
MDG	Millennium Development Goal
MOHFW	Ministry of Health and Family Welfare

NBCC	Newborn Care Corner
NBSU	Newborn Stabilization Unit
RBSK	RashtriyaBal Swasthya Karyakram
NFHS	National Family Health Survey
NIPI	Norway India Partnership Initiative
NMR	Neonatal Mortality Rate
NNF	National Neonatology Forum
NRC	Nutrition Rehabilitation Center
NRHM	National Rural Health Mission
NSSK	Navjaat Shishu Suraksha Karyakram
OPD	Out Patient Department
ORS	Oral Rehydration Solution
PHC	Primary Health Center
PIP	Programme Implementation Plan
PNC	Post Natal Check-up
RCH II	Reproductive and Child Health Programme Phase II
RF	Rheumatic Fever
RHD	Rheumatic Heart Disease
ROP	Retinopathy of Prematurity
RSBY	Rashtriya Swasthya Bima Yojana
SAM	Severe Acute Malnutrition
SDH	Sub District Hospital
SNCU	Special Newborn Care Unit
SRS	Sample Registration System
TOT	Training of Trainers
UNICEF	United Nations Children Fund
VHND	Village Health and Nutrition Day
VHSNC	Village Health Sanitation and Nutrition Committee
WHO	World Health Organization

Table of Contents

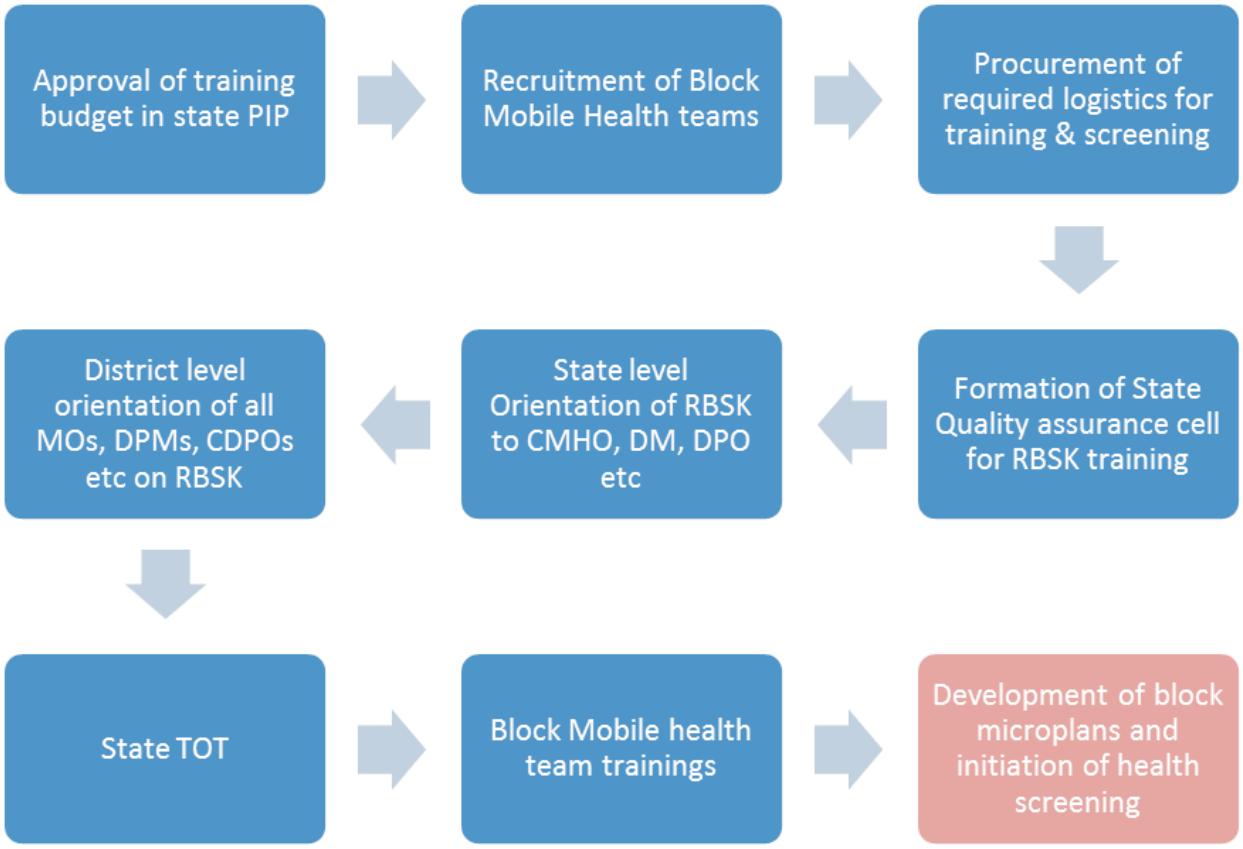
Preparation for Training Programme under Rashtriya Bal Swasthya Karyakram (RBSK)

A cascade training programme under RBSK with State/ District and Block level training is envisaged. Objective of the training programme is to build capacity of the Trainers with the goal of training Mobile Health Teams (MHT). The aim is to standardize the training of MHTs across States and Districts.

Duration: 38 hours (5 days) training (Estimated)

Type: Residential training – This training is to be made a residential training whereby, the trainees should be staying at night in the same city/town selected as the training venue for the entire duration of the training. Accommodation for the participants should be arranged by the State Nodal Officer-RBSK.

Schematic Diagram for step wise roll out of RBSK training process



Trainees: 30 per batch

Venue: preferably located at State/Division/District headquarter with:

- Adequate & comfortable seating capacity
- Arrangements for LCD projection
- Adequate space for role plays & demonstrations
- Power backup facility (by generator)

Training methodology: Participatory, with trainees given opportunity of discussion, sharing ideas & experiences.

The key modes of training used will be:

Method	Approach
Lecture & Discussion	Participatory, using PowerPoint presentation & Training guidelines of RBSK. Each day will begin with the recapitulation of the previous day/days and will end with summary of the current day
Skill practice	Relevant skill demonstration by the facilitator followed by practice on mannequin/real subject by each trainee
Role play	To be done by the participants to simulate an actual scenario decided by the facilitator/suggested in the training agenda, which will be followed by discussions on Strengths & Weaknesses
Field visit	Participants to be divided into two groups, each group led by a facilitator will visit an Anganwadi center to learn how to organize the screening camp and practice skills required for child health screening

Session Plan

Topic	Methodology	Time
Day 1		
Registration, Welcome remarks, Introduction of participants		60 Min
Introduction to RBSK, Mobile Health Teams- Roles and Responsibilities	• Power-point presentation • Discussion	45 min
Tea Break		
Methodology of screening: Look (pictorial tools), Ask (questionnaire) and Perform (clinical exam), Age specific health conditions	• Discussion	20 min
Anthropometry exercises: Head circumference, Weight & Height/Length, Identification of SAM	• Demonstration of skills by facilitators • Practice of skills by trainees	60 min
Lunch		
Basic Genetics	• Presentation	20 min
Neural tube defect	• Photographs • Discussion	15 min
Down syndrome	• Photographs • Discussion	15 min
Cleft lip and palate	• Photographs • Discussion	10 min
Club foot	• Photographs • Discussion	10 min
Tea break		
Developmental Dysplasia of Hip	• Photographs • Demonstration of testing technique • Discussion	15 min
Congenital Cataract	• Photographs • Demonstration of testing technique • Discussion	15 min
Congenital Heart Diseases	• Photographs • Demonstration of testing technique • Discussion	20 min
Summarize what to look, what to ask, what to perform	Discussion	40 min
Wrap up of day one	Discussion	15 min

Day 2		
Topic	**Methodology**	**Time**
Recap of day one	Discussion	15 min
Questionnaire on deficiencies		10 min
Anaemia especially Severe anaemia	• Photographs • Demonstration of testing technique • Discussion	20 min
Vitamin A deficiency (Bitot spot)	• Photographs • Demonstration of testing technique • Discussion	10 min
Tea Break		
Vitamin D Deficiency (Rickets)	• Photographs • Discussion	10 min
Goitre	• Photographs • Discussion	15 min
Questionnaire on Childhood diseases		10 min
Skin infections	• Photographs • Discussion	20 min
Otitis Media	• Demonstration of testing technique • Discussion	20min
Rheumatic Heart Disease	• Photographs • Demonstration of testing technique • Discussion	20 min
Reactive Airway Disease	• Photographs • Demonstration of testing technique • Discussion	20 min
Dental Conditions	• Photographs • Discussion	20 min
Convulsive disorders	• Discussion	20 min
Summarize what has been learnt	• Discussion	45 min
Lunch		
Questionnaire on Developmental delays and Disabilities & Discussion on True and False		20 min
Child Development		
– Definition, Process and Characteristics:	• Participants/ Self Reading one following the other	20 min
– Stages of child hood	• Facilitator/Power point only picture ask participants to contribute in labeling and then conclude	10 min

– Areas of brain and function	• Facilitator/Power point, only picture Ask participants to contribute in labeling. At the end discuss on the practical utility of this information	10 min
Tea Break		
Pattern of child development and characteristics	• Participants/ Self Reading Facilitator/Demonstration with doll by the facilitator :	30 minutes
Introduction to Developmental mile stones	• Power point	10 minutes
Domains of mile stones	• Power point	15 minutes
Wrap up of Day 2		

Day 3

Topic	Methodology	Time
Recap of Day two	Discussion	15 min
Normal mile stones	• Chart and Description	20 min
Developmental delay: Transient, persistent, focal and global delay	• Discussion	15 min
Gross Motor and Fine Motor Delay	• Discussion	15 min
Neuro-Motor Impairment	• Discussion	15 min
Vision Impairment	• Discussion	15 min
Hearing impairment and language delay	• Discussion	15 min
Cognition Delay	• Discussion	15 min
Tea Break		
Autism (More than 18 month)	• Discussion and Video	15 min
Learning Disability(6yrs-9yrs in school)	• Discussion	15 min
Attention deficit Disorder(ADD)/ Attention deficit Hyperactivity Disorder (ADHD)	• Discussion	15 min
Activity	Divide Participants in 4 groups, ask them to call out - 1,2,3,4. Ask participants to assemble according to number and assign age groups 1) birth to 6 months, 2) 6 months to 12 months 3) 12-18 months and 4) 18-24 months. Ask participants to discuss within group and present to the group, with the doll Facilitator / conclusion with video clippings	45 min
How common is disability in childhood?	• Ask participants to open the Hand out (page #) / power point	10 minutes
Lunch		
Practise on Checklist and Job Aid (0 to 6 years of age)	Exercise	90 min

Tea break		
Planning and conducting screening camp	Role Play	30 min
Planning & Orientation for field visit	Discussion	30 min
Summarize and wrap up day three	Discussion	15 min

Day 4

Topic	Methodology	Time
Field Visit to AWC	Field Visit	270 min
Lunch		
Feedback from Field Visit	Discussion	60 min
Discussion on Checklist and Job Aid (0 to 6 years)	Discussion	60 min
Tea break		
Discussion on Questionnaire on 4Ds and Spotting Exercise		20 min
Wrap Up day four	Discussion	15 min

Day 5

Topic	Methodology	Time
Recap of day four	Discussion	15 min
Adolescent Health	Discussion and Activity	90 min
Tea break		
Practice on Checklist 6 to 18 years of age	• Activity	45 min
Micro-planning for organization of screening camp	• Power-point presentation • Discussion	30 min
Reporting formats	• Power-point presentation • Discussion	60 min
Lunch		
Review mechanism/MIS	Data Entry, Validation, Format Filling Exercise	120 min
Tea Break		
Feedback of the Training Program		20 min
Concluding Remarks		

Logistics required for Training programme

(To be arranged before training is started)

Item	Quantity
Technical materials	
Printed copies of Operational Guidelines and Training Manual	One set for each participant and the respective facilitators
Formats for exercise: Child Health Screening Card, Mobile Health Team register, Monthly reporting format, Micro-planning format	Adequate numbers
Tools & Equipment's for demonstration	
Head circumference tape	2
MUAC tape	2
Ear Speculum	2
Hammer	2
Stethoscope	2
Weighing scale (for adult & infant)	1 for adult & 1 for infant
Infantometer	1
Stadiometer	1
Mannequin (newborn/ infant)	1
Torch (appropriate size for eye examination)	2
Surgical Gloves	At least 5 pairs
Red ring (diameter 2"-3")	2
Rattle	2
Picture book (with 1 picture per page)	2
Bell (Pooja bell)	2
Crayons (wax)	1 packet
1 inch cubes	10 pieces
Tea Cup	2
Pencil	2
Beads or Raisins (Kismis)	Few
Bowl and lawn tennis ball	2 sets
Training logistics	
Pen, Writing pad	1 set per participant
LCD Projector	1
Laptop or PC	1
White board	1
Markers	3of different colors
Flipchart	1
Posters, Banners	At least 1 set
Travel	
Vehicles for field visit to Anganwadi center	As per batch size

Micro planning for RBSK mobile team visits

"If you are failing to plan…you are planning to fail"

Need: To make a comprehensive micro plan for visits by RBSK mobile team

Outline/ objectives;

1. Ensure all stakeholders and team members are identified.
2. Ensure all villages and public/ public aided schools are covered for visits by mobile teams.
3. Prepare mobile team visit plan with route charts for day-wise visits.
4. Prepare a Block plan/Urban area Plan to help logistics management and reporting system.
5. Share micro plan with other departments to ensure coordination and timely communication.

Unit of micro planning:

The block will be the unit of micro planning for the RBSK mobile team.

The in charge MO of the Block will take lead in the micro planning process for RBSK mobile team visits. He will be supported by members of the mobile team and local health staff (including those in the PHCs) in making the micro plan.

In case of urban area, the district chief Medical officer will designate a nodal hospital/ dispensary with a key-in-charge staff for overseeing the activities and preparing micro plans related to RBSK.

Steps in micro plan preparation

1. Ensure all stakeholders, team members and local volunteers/ mobilizers are identified.

This is the first step in the micro planning process is to identify the local stakeholders related to the RBSK program. While the health department is the lead agency, it will also have to take the help of the Education department, ICDS department and local Panchayati raj institutions.

Procure the names and contact details of the following persons in the local area:

a. **Education department:** Name of Block education Officer and his contact details (address, mobile number, office landline number). If a regular block education officer is not posted, procure the name and contact details of the person-in-charge of the public schools and education activity in the block/ urban area.

b. **ICDS department:** Name of local ICDS officer with contact details (address, mobile number, office landline number).

c. In each block three or more mobile RBSK teams must be constituted.

d. All members of the RBSK m obile team must be identified and their names will feature in the micro plan. Their designation and contact details must also be written.

e. Each team will have a separate micro plan.

f. The prescribed micro plan format is to be used to enter all relevant information related to the mobile team constitution and visits.

2. Ensure all villages, hamlets, urban areas are included in the comprehensive planning for RBSK team visit

This is the next step in the micro planning process is to identify all villages/ urban areas to be visited as well as the schools and Anganwadi centers situated in the village/ urban area.

The following activities are to be undertaken:

a. List out all villages within a PHC/ Block using multiple sources (e.g Routine Immunization micro plan, block panchayat and village list, urban municipality list)

b. Collect information about public/ public aided schools from the local office/ officer of the Education department and Aganwadi centers (ICDS centers) from the ICDS department.

c. List out all the schools and ICDS centers

d. Procure a map of the block/ urban area, mark out the ICDS centers and schools in the map (use different symbols or colours)

e. For small hamlets/ areas of residence of migratory populations (like brick kilns, mines, construction sites etc.) tag these to the larger close by villages which have ICDS Kendra / public school. In case of tagging, ensure a specific social mobilizer is allocated these villages/ areas, and is responsible for ensuring that all beneficiaries are identified contacted before the RBSK team's scheduled visit.

f. For each village, ICDS Kendra and school prepare a list of contact persons, volunteers and social mobilizers who will assist the team in informing the public and helping during the mobile team visit.

   i. For schools it will be important to have the name and contact details of the principal or headmaster as well as a nodal teacher for assisting in RBSK activities.

   ii. For Aganwadi centers the name and contact details of all ICDS workers must be compiled.

   iii. For all villages, the names and contact of ASHA workers and local ANMs must also be compiled.

   iv. Names and contact details of PRI members are also important and need to be compiled.

g. For each school and ICDS Kendra, the information about the number of children who are to be screened must also be collected. The number of boys, girls and total number of children must be separately collected and compiled.

h. The ICDS code for the Aganwadi centers also needs to be noted.

i. For the school the details of school code, category, and standards in the school involved in RBSK screening as well as the school contact number needs to be noted in the micro plan.

3. Prepare mobile team visit plan with route charts for day-wise visits.

a. Each mobile RBSK team needs to make their own micro plan for the visit schedules to Aganwadi centers and schools.

b. The route chart is to be made in the prescribed format used for micro planning.

c. Route charts for visit by the mobile team needs to be made for 6 working days in a week.

d. Holidays, Sundays and important public festivals are to be earmarked so that mobile team visits are not planned on these days.

e. Depending on the number of mobile teams constituted in a block, the block area is to be divided amongst them. E.g. if there are three mobile teams then the block area must be divided into three areas. The area among the teams must be rationally divided considering factors like terrain, travel time and distance to be covered.

f. For each team the allotted villages and areas allotted must be covered at least once in every six months for Aganwadi centers and once a year for the schools.

g. The teams must make a day wise visit schedule to cover all the Aganwadi centers and schools in their areas.

h. Care must be taken to get local information about condition of roads, accessibility to villages on certain seasons and the need for use of other means of transport for difficult areas (like hilly terrain, river crossings etc.) while making a six monthly or annual visit schedule.

i. The advance plan needs to be prepared for an entire year for each RBSK mobile team.

4. Prepare a Block plan/ Urban area Plan to help logistics management and reporting system.

a. As the block/ designated nodal hospital for urban areas is the focal point for planning and managing of RBSK activities; the block must also have its own plan.

b. The block plan will have a plan with information related to various management aspects like:

i. Allocation of vehicles and POL needed for each RBSK mobile team

ii. Logistics and supplies for each mobile team

iii. Reporting formats, screening tools

iv. Communication and coordination activities and

v. Supervision and monitoring activities.

c. The block should also have a system in place to compile all the reports submitted by the mobile teams.

d. The block should also have an emergency or alternate plan in case there are any last moment problems and emergencies. The contact number of key persons (such as the Block Medical officer and the Block Program manager) who will manage the problems should they arise should be made available to all mobile teams.

5. Share micro plan with other departments to ensure coordination and timely communication.

a. Once the micro plan is prepared in the set format, it needs to be shared with all stakeholders like the mobile team members, Education department, ICDS department and also the ASHAs, Health workers and PRI members of the block/ urban area.

b. As the micro plan is prepared once a year, it will be helpful to remind the concerned teams, ASHAs, Health workers and community representatives about the scheduled visits at the beginning of each month and if possible each week.

c. The team leader of each mobile team should personally call the concerned school authorities, Anganwadi worker and ASHA of the village which is scheduled to be visited at least a week before and two days before the actual visit. This will help in ensuring that all preparations are made and the children are informed about the mobile teams visit.

d. In case of any changes in the micro plan or rescheduling of visits, all concerned persons must be notified.

Field Visit to Anganwadi Center (AWC)

Planning

Field visit to Anganwadi Centre is integral to the training programme. This is to put in practice the skills, in the field, which are acquired in the class room training sessions. It will also help in further clarification of doubts of the participants and give them a feel of the actual field scenario. Planning of the field visit to the AWC should be done prior to start of the training. Preparatory steps include:

Selection of AWC

The number of AWC to be visited will depend upon the batch size. The group size for field visit to an AWC should not be more than 15/AWC. The distance from training venue to AWC should be considered keeping in mind the travel time and training schedule of day 4.

Meeting with DPO and CDPO:

A meeting of BMHO & CDPO of the concerned block should be organized at least 10 days before the start of the training and include briefing about the training plans. AWW of the concerned AWC is to be intimated, well in advance, to facilitate the process by inviting mothers' children to attend the AWC on the scheduled day.

Visit to oversee preparation at selected AWCs

Selected AWCs are to be visited by the Nodal Officer RBSK/Programme Officer along with concerned CDPO, two days prior to the start of the training to :

- Familiarize with the center, concerned AWW, ASHA. Village Pramukh/Sarpanch may be contacted, if required;
- Ensure logistic arrangement;
- Discuss activities for, the day of, field visit planned with AWW & ASHA, like purpose of the field visit, time schedule of the visit, roles & responsibilities of AWW/ASHA during the field visit, mobilization of at least 10 children from 6 weeks to 6 years of age etc.

Logistic arrangement, for Vehicles, for trainees movement, are to be facilitated, accordingly.

Orientation of trainees

The orientation on the field visit is scheduled on the 3rd Day. Discussion would include time of starting the visit; place of gathering, objectives of the visit, activities during the visit etc Facilitators to ensure that each group is carrying required equipment and adequate number of formats.

Starting the field visit

All participants should gather at the preagreed place and time. The facilitators should visit along with the trainees, as guides and observers.

Demonstration of child health screening camp

At the AWC, the facilitator should divide the group into four sub groups: for ex: if there are 15 trainees, four sub groups A, B, C, D. All 4 subgroups will be seated separately in the AWC. First A & B will do anthropometric measurements and C & D to screen children and record observations in the appropriate questionnaire. The teams should reverse tasks after examination of 2-3 children. The facilitator will supervise all the groups, without any bias . If a child is identified with any of the 4Ds the facilitator will advise appropriate management or referral.

Completing the demonstration

After all the children assembled in the AWC have been examined, it is important to thank the families of the children, AWW & ASHA. The facilitator will ensure the demonstration is completed timely so that the team/s could reach back, to the venue, before lunch.

Discussion of the field visit

During the post lunch, feedback session, the participants should share their experience/s of the field visit and discuss the learning's made. Observations by the trainers and trainees self-observation, along with the filled in questionnaire are to be used during discussion. The facilitator should resolve all related queries and also request the trainees for any suggestions to improve the quality of field visit for future trainings.

Steps to be followed to ensure quality of trainings for RBSK

1. Before the State level training is initiated, team members from National RBSK team would conduct a one day orientation/ briefing at the State level. This has been found to be effective and made training 'meaningful'. The audience should be the Mission Director NRHM, Principal Secretary, Health (if available) and State Nodal Officer – RBSK, describing the components of the programme, roll out steps of RBSK and more importantly they should be regarding training participants, venue and logistics arrangements.
2. It is imperative to recruit of the block MHTs before commencement of the training.
3. The following steps are important to ensure that only committed trainees attend the training in full strength and spirit so as to achieve the aim of imparting quality training through a standardized process . This would then ensure uniform quality of screening across State/ District.
    - Develop a list of Master Trainers, well in advance (at least 4 weeks). Experience as trainers in other trainings may be one criterion for selection.

- Maintain a pool of trained Master Trainers at State/Divisional/District level for cascade training under RBSK, re-training reinforcement and follow-up capacity maintenance. Involvement in training process involves an opportunity cost for the institution of trainees. This is specifically important for selecting the State level master-trainers. The period in which the mastertrainers are involved in training, they should be relieved from his/her regular duties. MasterTrainers have to ensure that their line supervisor(s) are informed about the same. It is thus important to get commitment of the master-trainers to devote time for further training.
- Involve trainers from training institutions (SIHFW and SHSRC) to bring additional training methodology to encourage improved participations and learning methods.
- Inappropriate selection of MasterTrainers would lead to a wastage of resources on training of such Master-Ttrainers who may not be available for future training programs. Partial and inadequate training of mobile health team and or complete absence of trained trainers would delay the training of mobile health teams.
- The following matrix is to be used to collate the information to maintain a matrix of trained people. A line list of Master-Trainers is to be maintained. This may also be required to select trainees, to begin with a web enabled system may keep the information for future reference.

S. no.	Name	Total no. of Years of experience	Place of posting	Previous trainings received/ imparted (Type of training, Year)	Remarks (Date of training), Interested to become State/ District Facilitator (Y/ N)	No of District TOT conducted	No of training sessions attended as observer	Contact details (Mobile, Email, Address)
1								
2								

- Ensure that the trainees are communicated (at least a week) in advance to attend the training (for logistic arrangement, approval to leave station etc.). For this residential training, training venue or nearby lodging facility is to be arranged

4. Training venue:

- Identify appropriate training facility with required logistic arrangements of training. Formal training venues may draw more attention of the trainees.
- This is a residential training of five days thus, lodging arrangement for trainees for a period of 6-7 days (as required) is part of the training arrangement.
- Existing training venues SIHFW, SHSRC, ANMTCs or other centers already identified to conduct trainings may be identified. However environmental conditions and logistic requirements may also be kept in mind.

- Training logistics such as LCD projector, power backup with proper sound system, to be arranged.

5. A checklist for preparedness of training is to be filled, before the commencement of the training. Training calendar, is to be prepared accordingly and shared with national RBSK unit. States/UTs need to share monthly, physical progress of trainings (planned/ held) and line list of facilitators and also maintain the line list of MHTs trained during the process. This update is to be shared with National RBSK unit.

6. National RBSK Unit would maintain a States/UT wise database for training against the State-wise list of facilitators trained, to conduct such trainings.

7. Capacity building is a continuous process to ensure quality of the output of RBSK programme. State/ UTs to plan for the following:

    - Feedback & observations of supervisor and/or facilitators visits to MHTs for quality of screening. Observations to be used for handholding and on site capacity building;
    - Plan for re-orientation, especially based on monthly reports and comparison with estimated number of cases to re-in-force screening questions;
    - Quarterly progress of trainings (physical/ financial achievement);
    - Concurrent training evaluation and follow-up evaluations of skills imparted in the training and re-training;

Quality Assurance - Block Mobile Health Teams Training

State RBSK cell or task force should constitute a Quality Assurance team at State/Divisional/ District level or direct, already existing, State Quality Assurance team to ensure quality of trainings. This team will be responsible for hand holding and monitoring of Mobile Health team trainings and sharing training report/s with the state & district team/s for prompt mid-course correction, to ensure quality. The formation of the quality assurance team should be undertaken before the start of State TOT on RBSK and efforts should be made to monitor training of each batch.

It is important for the quality assurance teams to be oriented on identification of issues in Block Mobile Health team trainings through the monitoring checklist. It is also recommended that state quality assurance team attend the 5 day TOT at State/Divisional level, to familiarize themselves with the training process.

State RBSK cell/task force should also ensure that there is minimum gap between Master-trainer TOT and conducting training of MHT as the concepts are fresh and will help to apply the teaching methodologies and concepts more efficiently, in the training. This is specifically important for large States.

Training schedule of MHTs is to be prepared, well in advance, at the State level and is to be shared with the Divisions/District so that concerned Programme officers and Master-trainers can ensure necessary arrangements and provide information to the concerned participants.

Key practices to ensure quality during the training:

- Ensure adherence to the training agenda;
- Adherence to the methodologies mentioned for each session;
- Field visit to AWC, as envisaged in the training session plan;
- CMHO visit to the training venue to assess the quality, motivate the trainers and take the feedback from trainees;
- Visit of Quality Assurance team and feedback on trainings for mid-course correction, if any;
- Major Issues and Corrective Measures undertaken need to be shared with National RBSK Unit;

Introduction-Rashtriya Bal Swasthya Karyakram:

Comprehensive child health care implies assurance of extensive health services for all children, from birth to 18 years of age, for a set of health conditions. These conditions are Diseases, Deficiencies, Disability and Developmental delays - 4 Ds. Universal screening would lead to early detection of medical conditions, timely intervention, ultimately leading to a reduction in mortality, morbidity and life-long disability.

Under National Rural Health Mission, significant progress has been made in reducing, mortality in children over the last seven years (2005-12). Whereas, there is an escalation of reducing child mortality there is also a dire need to improve survival outcome. This would be reached by early detection and management of conditions that were not addressed, comprehensively, in the past.

1.1 Why screening of 0 to 18 years age group:

According to March of Dimes (2006), out of every 100 babies born in this country, annually, 6 to 7 have a birth defect. This would translate to around 17 lakh birth defects, annually, in the country and accounts for 9.6% of all the newborn deaths. Various nutritional deficiencies affecting the pre-school children range from 4 per cent to 70 per cent. Developmental delays are common in early childhood affecting at least 10 percent of the children. These delays, if not intervened timely, may lead to permanent disabilities including cognitive, hearing or vision impairment. Also, there are a group of diseases common in children viz. dental caries, rheumatic heart disease, reactive airways diseases etc. Early detection and management of diseases including, deficiencies bring added value in preventing these conditions, to progress to their more severe and debilitating form and thereby reducing hospitalization and improving implementation of Right to Education.

Rashtriya Bal Swasthya Karyakram (RBSK) is a screening program aiming at early identification and early intervention for children, from birth to 18 years. It is important to note that the 0-6 years age group will be specifically managed at DEIC level while for 6-18 years age group, management of conditions will be done through existing public health facilities. DEIC will act as referral linkages for both the age groups.

First level of screening is to be done at all delivery points through existing Medical Officers, Staff Nurses and ANMs. After 48 hours of birth and till 6 weeks, the screening of newborns will be done by ASHA, at home, as a part of HBNC package.

Outreach screening will be done by dedicated mobile block level teams for the period of 6 weeks to 6 years at anganwadi centres and for children in the age group of 6-18 years, at school.

Once the child is screened and referred, from any of these points of identification, it would be ensured that the necessary treatment/intervention is delivered at zero cost to the family.

The action points with respect to primary screening levels for the select health condition under RBSK is shown at Annexure I.

1.2 Target age group

The services aim to cover children of 0-6 years of age, in rural areas and urban slums, in addition, to children enrolled in classes 1st to 12th in Government and Government aided Schools. It is expected that these services will reach about 27 crore children, in a phased manner. The broad category of age group and estimated beneficiary is, as shown, below in the table. The children have been grouped into three categories owing to the fact that different sets of tools would be used and also different sets of conditions could be prioritized.

Target-group under Child Health Screening and Intervention Service Categories

Categories	Age Group	Estimated Coverage
Babies born at public health facilities and home	Birth to 6 weeks	2 crore
Pre-school children in rural areas and urban slum[1]	6 weeks to 6 years	8 crore
School children enrolled in class 1st to 12th in government and government aided schools[2]	6 yrs to 18 yrs	17 crore

1.3 Magnitude of select health conditions and select health centres

Table: Disease Prevalence based on existing evidence

Disease	Prevalence in country	Source of the data
Anaemia	70% in children, less than 5 years in age	National Family Health Survey – 3 (NFHS-3), 2005-06
Iodine Deficiency Disorder	12-20 %	Pandav CS, Malik A, Anand K and Kamarkar MG: Prevalence of Iodine deficiency disorders among school children of Delhi. Natll Med J India 1997 10(3):112-4.
Vitamin D deficiency	3-4 % for clinical rickets	Kochupillai N. Prevalence and Potential significance of Vitamin deficiency in Asian Indians. Indian J Med Res; 2008: 229-238
Protein energy malnutrition	30- 40 %	National Family Health Survey – 3 (NFHS-3), 2005-06
Clinical Vitamin A deficiency	Prevalence of Bitot's spot is 0.7 % in preschool	National Nutrition Monitoring Bureau (NNMB). 1979-2006. NNMB Reports. National Institute of Nutrition, Hyderabad
Rheumatic Heart Diseases	1.5 per 1000 in school children in the age group 5 to 9 years and 0.13 to 1.1 per 1000 in the age group of 10 to 14 years	Tandon R., Krishna Kumar R. Rheumatic fever & rheumatic heart disease: The last 50 years. Indian J Med Res. 2013 April; 137(4): 643–658

[1]Source: CEA released Sep 2012

[2](Data Sources: Elementary education in India, 2012, DISE 2010-11: Flash Statistics, NUEPA & DSEL, MoHRD, GOI. and State Report Cards: 2010-11 Secondary education in India, NUEPA)

Disease	Prevalence in country	Source of the data
Reactive airway disease	The mean prevalence was 7.24 ± SD 5.42. The median prevalence was 4.75%	Pal S: Prevalence of Bronchial asthma In Indian children. Indian Journal of community medicine ;2009 (6) :310-315
Reactive airway disease	*Urban 16.6 % and *rural 5.7 %	*Paramesh H. Epidemiology of bronchial asthma in India. Indian J Pediatric 2002; 69: 309-12.
Dental carries	50-60 % among pre-school	T S, Kumar B S, .Prevalence, Severity and Associated Factors of Dental Caries in 3-6 Year Old Children. J Clin Diagn Res. 2013 Aug; 7(8): 1789-1792.
Scabies	Point prevalence in India is about 5%	Kanwar A.J. Three Common Dermatological Disorders in children (Scabies,Pediculosis and Dermatophytoses). Indian Paedatics 2001; 38:995-1008
Pyoderma	Overall frequency of Pyoderma in children is 25.5 %	Kharel C.Pandey SS. Socioecnomic and Nutritional status of children with Pyodermas. Nepal Journal of Dermatology, Venereology & Leprology; 2012; 10: 11-15
Otitis media	8.60%	Sophia A, Isaac R, Rebekah G, Brahmadathan K, Risk factors for otitis media among preschool, rural Indian children.Int J Pediatr Otorhinolaryngol. 2010 Jun; 74(6): 677-83.
Convulsions	Prevalence of Pediatric epilepsy from 0.8 % to 0.35%. However 4% to 10% of children suffering at least one seizure in the first 16 years of life. The incidence is highest in children younger than 3 years of age, with a decreasing frequency in older children	Gadgil P, Vrajesh U. Pediatric epilepsy: The Indian experience. Pediatr Neurosci. 2011 October; 6(Suppl1): S126–S129. Ghazala Q:Seizures in Children. Pediatr Clin N Am 53 (2006) 257– 277
Defects at Birth rate per 10,000 Live Births: 64.3 infants per 1000 live births are born annually with birth defects. Of these 7.9 have Cardiovascular defect, 4.7 have NTD, 1.2 some form of Haemoglobinopathies, 1.6 have Down Syndrome and 2.4 has G6PD deficiency:March of Dimes Report, 2006		
Neural tube defect	Overall birth prevalence of 4.1 per 1000 (41/10,000). Pockets of high prevalence in South, 11.4/1000 births	Burton H, Kar A. Systematic review of birth prevalence of neural tube defects in India.Birth Defects Res A Clin Mol Teratol. 2013 Jul; 97(7): 437-43. Kukarni M L, Mathew M .The range of neural tube defects in southern India. Archives of Disease in Childhood, 1989, 64, 201-204
Down syndrome	1.09 per 1000 live births	Verma et al. Cytogenetic studies in Down Syndrome. Indian Pediatrics .1998, (28) 991-995.

Disease	Prevalence in country	Source of the data
Cleft Lip +CP	Cleft lip ± Cleft palate 0.93 for every 1000 live births. Cleft palate alone 0.17 for every 1000 live births.	Mossey P, Julian L. Addressing the challenges of cleft lip and palate research in India. Indian J Plast Surg. 2009 October; 42(Suppl): S9–S18. Reddy G Srinivas. Incidence of cleft Lip and palate in the state of Andhra Pradesh, Indian J Plast Surg.2010 Jul-Dec;43(2): 184–189.
Talipes (club foot)	The incidence of clubfoot is 1-2 in every 1000 live birth.	Communication from CURE International India Trust (CIIT)
Developmental dysplasia of the hip	One in 1,000 children is born with a dislocated hip, and 10 in 1,000 may have hip subluxation. (No Indian data)	Tredwell SJ. Neonatal screening for hip joint instability. Its clinical and economic relevance. Clin Orthop Relat Res. 1992; 63–8
Congenital heart diseases	Incidence is 8-10 per 1000 live births	Saxena A. Congenital Heart disease in India: A Status Report. Indian J Pediatr 2005; 72 (7): 595-598
Congenital Deafness	Incidence of congenital hearing loss in India reported 5.6 to 10 per 1000 live birth.	Report of the collaborative study on prevalence and etiology of hearing impairment. New Delhi. ICMR department of Science, 1983.16. Nagapoornima P, Rames A, Srilakshmi, Rao S, Patricia PL, Gore M et al. universal hearing screening. Indian J Pediatr 2007; 74: 545-549
Congenital cataract	The prevalence of cataract in children has been estimated between 1-15/10,000 children	Johar SR, Savalia NK, Vasavada AR, Gupta PD. Epidemiology based etiological study of pediatric cataract in western India. Indian J Med Sci. 2004 Mar; 58(3): 115-21.
Retinopathy of maturity	The incidence of ROP in neonatal intensive care is around 20-22%, and one third of them required Laser to prevent vision loss	Chaudhuri S, Patwardhan V. Retinopathy of Prematurity in a Tertiary Care Center –Incidence, Risk Factors and Outcome. INDIAN PEDIATRICS 219 VOLUME 46,MARCH 17, 2009
Congenital Hypothyroidism	Incidence at 1: 2500 to 1: 2800	Desai M P. Disorders of thyroid gland in India. Indian J Pediatr. 1997; 64: 11-20
Sickle cell anemia	Sickle cell gene is found amongst different tribal groups of India from 5-34 %	Prevalence of HbS In India ICMR 2002
Beta Thalassemia	Trait is 3 to 4 % in various parts of India	Madan et al, 2010

Disease	Prevalence in country	Source of the data
*__Developmental disabilities:__ 10 % of children below the age of 6 have developmental delay and **2.5% have developmental disability. As per the survey done by Inclen trust: Neurodevelopmental disorders for 2-9 years in India are 14.79% (Rural 18.11%, Urban 12,75%, Tribal 4.965, Hills 4.96%) **Nair MKC. An Anganwadi based survey, 1998 *Nair MKC. Simplified developmental assessment. Indian Pediatr 1991; 28: 837-840. *C. A. Boyle, P. Decoufle, and M. Yeargin-Allsopp, "Prevalence and Health Impact of Developmental Disabilities in 2000 cases annually at every block U.S. Children," Pediatrics, Mar. 1994 93(3): 399–403.		
Hearing Impairment	5.4 % in children less than 10 years	**As per the survey done by Inclen trust**
Vision Impairment	*Prevalence of undetected vision problems in preschool children is estimated to be 5-10 % *3% have amblyopia (Developed between infancy – 7 years) *2-4% have strabismus	As per American Academy of Pediatrics: Recommendation for preventive pediatric health care. Pediatrics 2000; 105:645-646
Neuro-motor Impairment	2 %	**As per the survey done by Inclen trust**
Speech and language delay	Combined speech and language delay reported prevalence rates ranging from 5% to 8%, and studies of language delay from 2.3 to 19 %.	*Cochrane review summarized prevalence data on speech delay, language delay, and combined delay in preschool and school-aged children*
Autism	1.41%	**As per the survey done by Inclen trust**
Cognitive impairment	4.79 %	**As per the survey done by Inclen trust**
Convulsion	Prevalence of Pediatric epilepsy from 0.8 % to 0.35%. However 4% to 10% of children suffering at least one seizure in the first 16 years of life. The incidence is highest in children younger than 3 years of age, with a decreasing frequency in older children	Gadgil P, Vrajesh U. Pediatric epilepsy: The Indian experience. Pediatr Neurosci. 2011 October; 6(Suppl1): S126–S129. Ghazala Q: Seizures in Children.Pediatr Clin N Am 53 (2006) 257– 277

1.4 Health conditions to be screened

Child Health Screening and Early Intervention Services under RBSK envisages to cover 30 selected health conditions for screening, early detection and free management. States and UTs may also include diseases namely Hypothyroidism, Sickle cell anaemia and Beta Thalassemia based on epidemiological situation and availability of testing and specialized support facilities within State and UTs.

Selected Health Conditions for Child Health Screening and Early Intervention Services	
Defects at Birth 1. Neural tube defect 2. Down's Syndrome 3. Cleft Lip & Palate / Cleft palate alone# 4. Talipes (club foot) 5. Developmental dysplasia of the hip 6. Congenital cataract 7. Congenital deafness 8. Congenital heart diseases 9. Retinopathy of Prematurity	**Deficiencies** 10. Anaemia especially Severe anaemia 11. Vitamin A deficiency (Bitot spot) 12. Vitamin D Deficiency, (Rickets) 13. Severe Acute Malnutrition 14. Goitre
Child hood Diseases 15. Skin conditions (Scabies, fungal infection and Eczema) 16. Otitis Media 17. Rheumatic heart disease 18. Reactive airway disease 19. Dental conditions 20. Convulsive disorders	**Developmental delays and Disabilities** 21. Vision Impairment 22. Hearing Impairment 23. Neuro-motor Impairment 24. Motor delay 25. Cognitive delay 26. Language delay 27. Behavior disorder (Autism) 28. Learning disorder 29. Attention deficit hyperactivity disorder
30. Congenital Hypothyroidism, Sickle cell anemia, Beta thalassemia (Optional)	

Mechanisms for screening at Community & Facility level:

Child screening under RBSK is at two levels -- community level and facility level. While facility based new born screening,at public health facilities like PHCs / CHCs/ DH, will be by existing health manpower like Medical Officers, Staff Nurses & ANMs, the community level screening will be conducted by the Mobile health teams at Anganwadi Centres and Government and Government aided Schools.

Screening at Community level:
Screening at Anganwadi Centre:

All pre-school children below 6 years of age would be screened by Mobile Block Health teams for deficiencies, diseases, developmental delays including disability at the Anganwadi centre at least twice a year. The tool for screening for 0-6 years is supported by pictorial, job aids specifically for developmental delays. For developmental delays children would be screened

using age specific tools specific and those suspected would be referred to DEIC for further management.

Screening at Schools-Government and Government aided:

School children age 6 to 18 years would be screened by Mobile Health teams for deficiencies, diseases, developmental delays including disability, adolescent health at the local schools at least once a year. The tool used is questionnaire(preferably translated to local or regional language)and clinical examination.

Composition of mobile health team:

The mobile health team will consist of four members- two Doctors (AYUSH) one male and onefemale, at least with a bachelor degree from an approved institution, one ANM/Staff Nurse and one Pharmacist with proficiency in computer for data management.

Suggested Composition of Mobile Health Team		
S.No.	**Member**	**Number**
1	Medical officers (AYUSH) -1male and 1 female at least with a Bachelor degree from an approved institution	2
2	ANM/Staff Nurse	1
3	Pharmacist* with proficiency in computer for data management	1
**In case a Pharmacist is not available, other paramedics –LabTechnician or Ophthalmic Assistant Assistantwith proficiencyin computerfordata managementmaybe considered.*		

Steps in Planning RBSK screening at Anganwadi centers and Schools:

1. The teams are required to develop sub-block level plan for the villages assigned to each team. The plan is to be based on the mapping of institutions (School and Anganwadis) and enrolment in them. The planning will be day-wise & month-wise considering local, public holidays, exams and vacations in the school. On an average approximately125children will be screened in a day.

2. Nodal persons from both education and ICDS should be involved in planning.

3. The schedule of visits would be communicated to the school, Anganwadi Centres, ASHAs, relevant authorities, students, parents and PRIs well in advance so that required preparations can be made. Anganwadi Centres and school authorities should arrange for prior communication with parents and motivate them to participate in the process.

4. To facilitate this process, MHTs may follow the planning framework, movement plan, logistic support received from state or district and necessary supplies. These planning frame works are to be used by local teams to develop the monthly plans under supervision of the Block MO. Advance information of visit schedule would be shared with School and Anganwadi system.

Roles and responsibilities of Mobile Health Team: As a collective effort:

1. Prepare a calendar of visit schedule in consultation with other team members and by involving representatives from WCD and Education departments.
2. Conduct screening at the level of Anganwadi centre and at Government and Government aided schools.
3. Conduct anthropometry measurements of children and help in filling health card and entry in registers.
4. Keep inventory of drugs.
5. Quality referrals and emphasizing the importance of early screening and timely intervention to the parents.
6. Generate monthly reports and update Mobile Health Team registers.

Preparation of Anganwadi centers and Schools for Health checkups:

1. As per action plan the team should reach the site well before time.
2. There should be a display board outside the Anganwadi center and Schools mentioning the time and date of checkup.
3. For Anganwadi centre a checkup list of beneficiaries between 0 to 3 years and 3 to 6 years age group should be available with Anganwadi Workers and ASHAs.
4. Necessary instrument and equipment should be present as per the prescribed list .

Methodology to be used for screening process: The following methodology is to be used:

1. **LOOK- Pictorial Job Aid** - A simple photograph of a newborn born/child with any visible birth defect/abnormality is to be shown. Such tools will be used by MHT and ASHA for easy identification of health conditions.
2. **ASK- Questionnaire tool in the form of Checklist for 0-6 and 6-18 years age group**-A simple questionnaire tool is to be used for identification of deficiencies, diseases, developmental delays including disability. These are age-specific and disease appropriate, for easy identification of the selected health conditions.
3. **PERFORM- Clinical examination/ Simple tests to confirm the condition**-Basic tests can be used for identification of deficiencies and diseases e.g. swelling in the neck for goitre, prick test etc

Anthropometry Procedures

All children will be weighed and measured according to protocol of measurement.

PROCEDURES AND PRECAUTIONS BEFORE MEASURING

1. **Trained People required** – ensure that only people trained in anthropometric measurement take and note measurement.

2. **Age Assessment**

   Before you measure, determine the child's age. If the child is less than two years, measure length (that is, with the child lying down). If the child is two years of age or older, measure height(that is, with the child standing up). If accurate age is not possible to obtain, measure length if the child is less than 85cm or is unable to stand.

3. **Weigh and Measure One Child at a Time**. Then proceed with the next child. DO NOT weigh and measure all the children together. Otherwise, measurements may get recorded in the wrong columns and questionnaire.

4. **Control the Child**

   Youmust hold and control the child so the child will not trip or fall. Never leave a child alone with a piece of equipment.

5. **Explaining the process to caregiver and** to a limited extent, the child, to help minimize possible resistance, fears or discomfort they may feel. Remember, young children are often un-cooperative; they tend to cry, scream, kick and sometimes bite. If a child is under severe stress and is crying excessively, try to calm the child or handover the child to the parent before proceeding with the measuring.

Do not weigh or measure a child if:

1. The parent refuses.
2. The child is too sick or distressed.
3. The child is physically deformed which will interfere with or give an incorrect measurement.

6. **Recording Measurements and Being Careful**

   When you are not using a pen, place it in your equipment pack or on the questionnaire so that neither the child nor you will get hurt due to carelessness. Make sure you do not have long fingernails. Remove interfering rings and watches before you weigh and measure.

7. **Strive for Improvement**

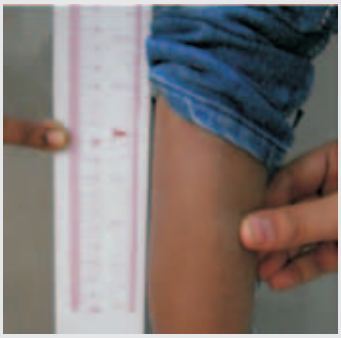
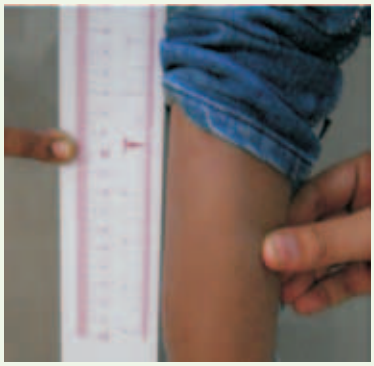
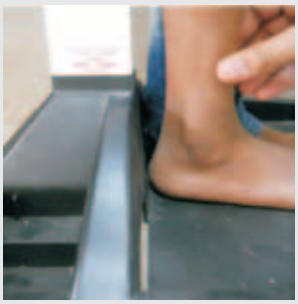
   One can be an expert measurer if one strives for improvement and follows every step of every procedure the same way everytime.The quality and speed of measurements will

improve with practice. Do not take these procedures for granted even though they may seem simple and repetitious. It is easy to make errors when one is not careful. Do not omit any steps.

Illustrating CHILD Standing measurement procedure

- Place the measuring board on a hard, flat surface against a wall, table, tree or staircase. Make sure the measuring board is stable. Many walls and floors are not at perfect right angles; if necessary, place small rocks underneath the height board to stabilize it during the measurement.
- Ask the parent or the child to take off the child's shoes and to unbraid or push aside any hair that would interfere with the height measurement. Ask the parent to bring the child to the measuring board and to kneel in front of the child so that the child look forward at the parent.
- Place the questionnaire and pen on the ground (Arrow1) and kneel on the right side of the child (Arrow2).
- Place the child's knees and feet in the correct position

<table>
<tr><th>Step 1</th><th>Step 2</th></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Check that the Stadiometer on Flat horizontal surface</td><td>Counsel the Mother & Child giving complete information for what is to be done.
Greet the child.</td></tr>
<tr><th colspan="2">Step 3</th></tr>
<tr><td colspan="2">Remove from Head to Toe.
1. Hair Band, Hair Clip, Head Caps, Scarfs and Ornaments
2. Set Curly Hairs in Special cases.
3. Shoes/Footwear</td></tr>
<tr><th colspan="2">Step 4</th></tr>
<tr><td>Ensure</td><td>Don't</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Back of head touching to vertical surface of stadiometer</td><td>Confirm the Frankfurt Horizontal plane and make sure that head touches the stadiometer</td></tr>
</table>

Step 5	
	
Ensure for **Shoulder Blades** Touching Stadiometer	Reconfirm that **SHOULDER** touches the stadiometer after confirming the Frankfurt plane
Step 6	
	
Ensure **Buttocks** touching stadiometer	Reconfirm that buttocks touching the stadiometer after confirming the Frankfurt plane.
Step 7	
	
Ensure **Calves** touching the stadiometer	
Step 8	
	
Heels touching the vertical base of Flat base board	Reconfirm that **heels** touches the stadiometer after confirming the Frankfurt Horizontal plane

Step 9

Frankfurt's Horizontal plane - Eye **outer canthus** to upper border of **ear**. (Imaginary line)

Confirm the **Frankfurt plane** and make sure that **head touches** the stadiometer

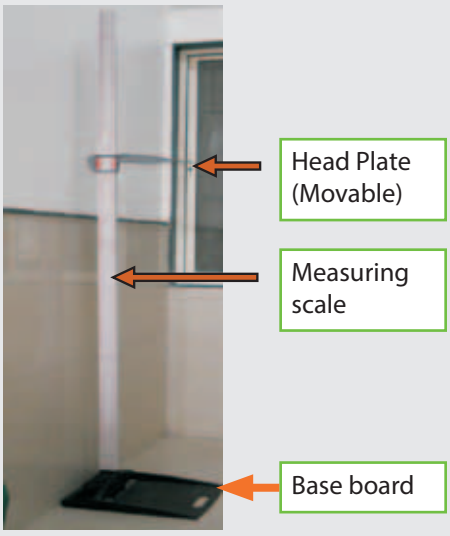
Step 10

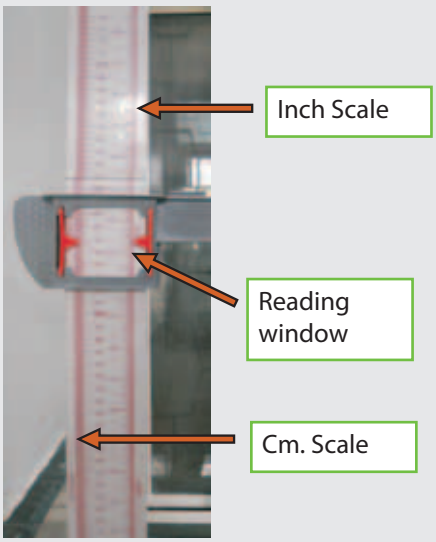
Angle of 45 degree

Position of feet

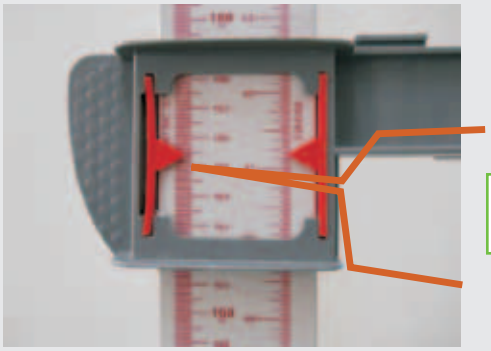
Correct procedure of both Partners in Measurement

Scale of Measurement



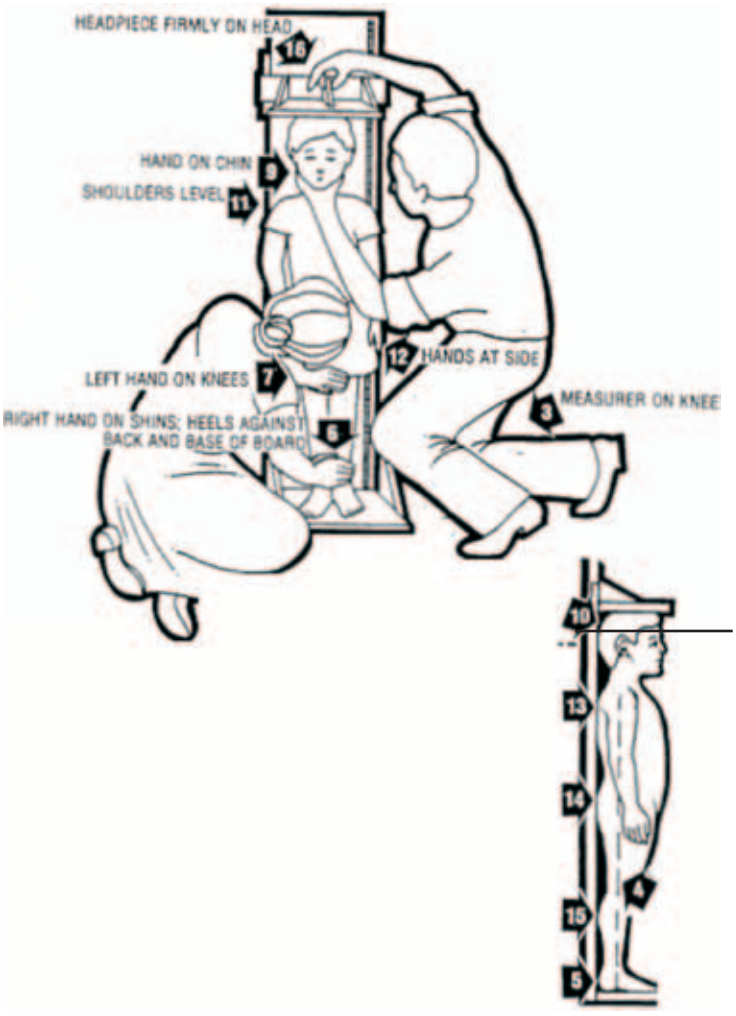


Movable Window on both sides of vertical scale



- Ask the child to look straight ahead. Make sure the child's line of sight is parallel to the ground (Arrow8). Note that with most pre-school-age children who are not heavy or obese, the back of the head will touch the back of the height scale(Arrow10). Make sure the child's shoulders are level (Arrow11), the hands are at the child's side(Arrow12), and the child's buttocks touch the back of the measuring scale. Note that with most preschool-age children who are not heavy or obese, the back of the head, the shoulder blades, the buttocks, the calves and heels will touch the back of the measuring board (Arrows10, 13, 14, 15 & 5).
- Check the position of the child (Arrows1-15). Repeat any steps as necessary.
- When the child's position is correct, lower the head piece on top of the child's head (Arrow16) making sure to push through the child's hair.
- Read and call out the measurement to the nearest 0.1 cm. Remove the head piece from the child's head, your left hand from the child's chin, and allow the child to return to the parent.
- Immediately record the measurement on the questionnaire. Check the recorded measurement on the questionnaire for accuracy and legibility. Correct any errors.

Illustration child Height Measurement

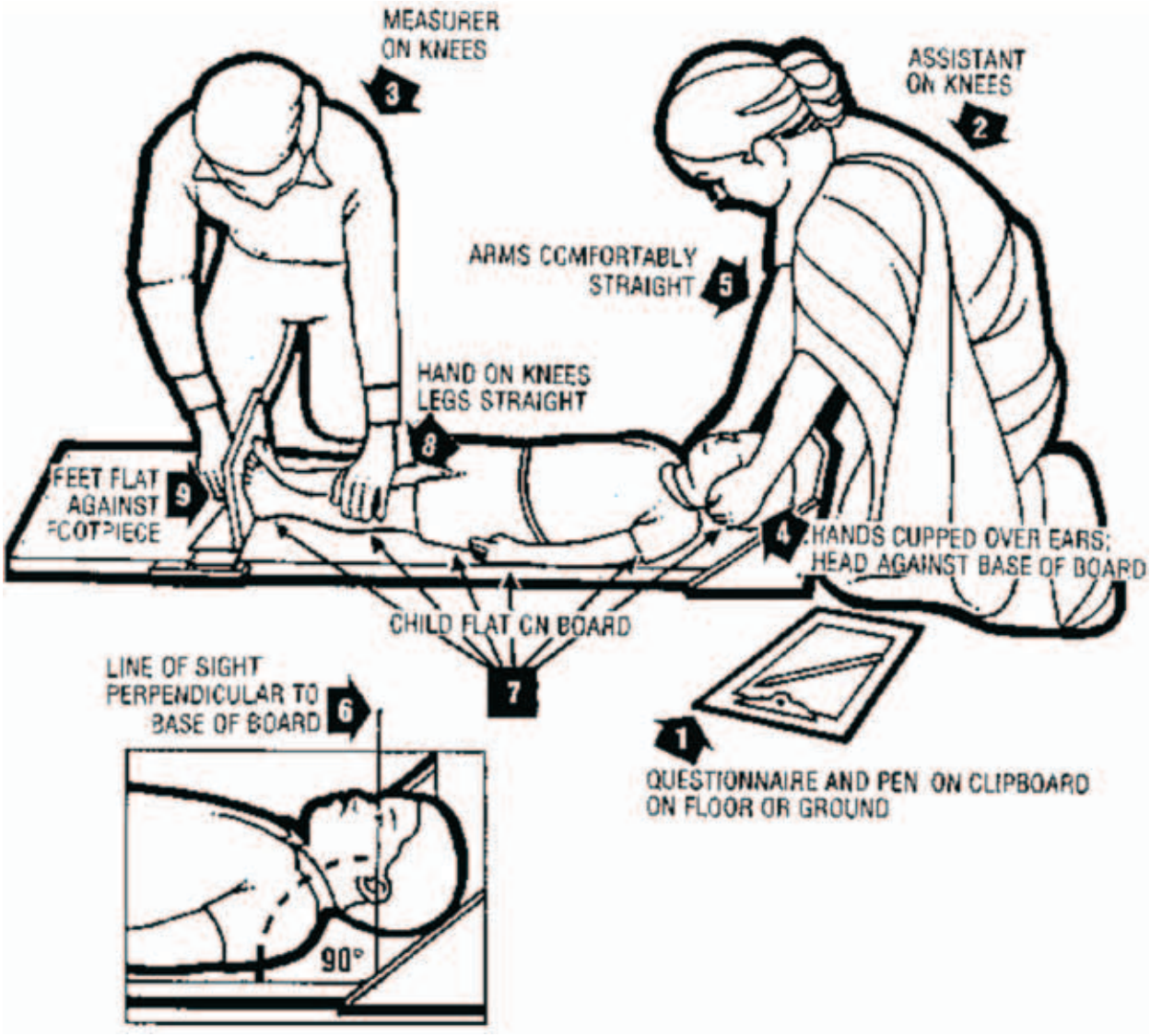


CHILD LENGTH MEASUREMENT PROCEDURE (ILLUSTRATION)

- Place the length board on a hard, flat surface, such as the ground, floor or a solid table. Make sure the measuring board is stable.
- Kneel at the right side of the child (at the child's feet) so that you can move the foot piece with your right hand (Arrow3).
- With the help of the parent, gently lower the child on to the measuring board, making sure child is supported at the trunk of the body and head.
- Cup your hands over the child's ears (Arrow4). With your arms straight (Arrow5), place the child's head against the base of the board. The child should be looking straight up (Arrow6) so that the line of sight is perpendicular to the board. Your head should be directly over the child's head. Watch the child's head to make sure it is in the correct position against the base of the board.
- Make sure the child is lying flat in the centre of the board (Arrow7). Place the child's knees and feet in the correct position
- With your thumb against your index finger, place your left hand on the child's knees (Arrow 8) and press them gently, but firmly against the board. Do not wrap your hand around the knees or squeeze them together. Make sure the child's legs are straight.

- Check the position of the child (Arrows1-8). Repeat any steps as necessary.
- When the child's position is correct, move the foot piece with your right hand until it is firmly against the child's heels (Arrow9).
- Read the measurement to the nearest 0.1 cm and record the measurement
- Check the recorded measurement on the questionnaire for accuracy and legibility. Instruct the assistant to correct any errors.

Illustration Child Length Measurement



TAKING WEIGHT

- Preparing the Adult and Children to Take Their Weight

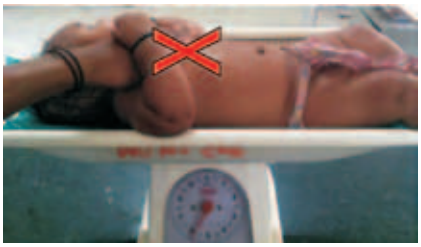
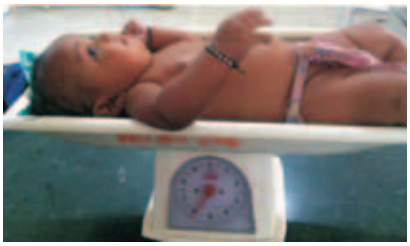
  Show the scale to the adult and explain that you will weigh her/him and their children on the scale. Counsel the mother and explain the procedure

  Ask the care giver to remove clothing as according to the weather conditions just before taking his/her weight and to remove any heavy clothing, sandals, shoes, etc.

- **Preparing the weighing**

Place the scale on a hard, level surface. Soft or uneven surfaces may cause the scale to malfunction.	

Calibrate the scale to zero by rotating the knob. **Check if the calibration of the scale is correct** press the pan 2-3 times and confirm that it comes back to zero.	
Count the lines between two numbers.(x) Divide 1000 gm by x. You will get the least count of that machine 1000/20=50g	
Ensure exact zero. See from same eye level and not from side view.	
Apply thin cloth or a sheet of newspaper on the scale pan to avoid hypothermia and then calibrate the scale to zero. Discard the news paper after every use	
Do not use plastic sheet, that will stick to infant's body…	
Place the child on the machine horizontally Or if the Child can sit in center so that s/he will remain stable and calm.	
Take help of mother to calm the child	

Ask mother to hold the child and make sure that no extra pressure is added by mother.	
Take reading only when child is still	

Measuring Older children

With the subject standing straight in the middle of the scale platform with hands hanging laterally feet slightly a part (on the footprints, if marked), and to remain still. It has to be recorded to the nearest 1/10 kg.	
When the number 0.0 appears, the scale is ready. Take care that the subject is standing properly on the scale and looking at the horizon. Handle the scale carefully: Do not drop or bump the scale.	

Identifying SAM children (Note gender differences)

Boy's Weight (kg)				Length (cm)	Girl's Weight (kg)			
Length (cm)	-3 SD	-2 SD	Median		Median	-2 SD	- 3 SD	Length (cm)
45	1.9	2.0	2.4	45	2.5	2.1	1.9	45
46	2.0	2.2	2.6	46	2.6	2.2	2.0	46
47	2.1	2.3	2.8	47	2.8	2.4	2.2	47
48	2.3	2.5	2.9	48	3.0	2.5	2.3	48
49	2.4	2.6	3.1	49	3.2	2.6	2.4	49
50	2.6	2.8	3.3	50	3.4	2.8	2.6	50
51	2.7	3.0	3.5	51	3.6	3.0	2.8	51
52	2.9	3.2	3.8	52	3.8	3.2	2.9	52
53	3.1	3.4	4.0	53	4.0	3.4	3.1	53
54	3.3	3.6	4.3	54	4.3	3.6	3.3	54
55	3.6	3.8	4.5	55	4.5	3.8	3.5	55
56	3.8	4.1	4.8	56	4.8	4.0	3.7	56
57	4.0	4.3	5.1	57	5.1	4.3	3.9	57
58	4.3	4.6	5.4	58	5.4	4.5	4.1	58
59	4.5	4.8	5.7	59	5.6	4.7	4.3	59
60	4.7	5.1	6.0	60	5.9	4.9	4.5	60
61	4.9	5.3	6.3	61	6.1	5.1	4.7	61
62	5.1	5.6	6.5	62	6.4	5.3	4.9	62
63	5.3	5.8	6.8	63	6.6	5.5	5.1	63
64	5.5	6.0	7.0	64	6.9	5.7	5.3	64
65	5.7	6.2	7.3	65	7.1	5.9	5.5	65
66	5.9	6.4	7.5	66	7.3	6.1	5.6	66
67	6.1	6.6	7.7	67	7.5	6.3	5.8	67
68	6.3	6.8	8.0	68	7.7	6.5	6.0	68
69	6.5	7.0	8.2	69	8.0	6.7	6.1	69
70	6.6	7.2	8.4	70	8.2	6.9	6.3	70
71	6.8	7.4	8.6	71	8.4	7.0	6.5	71
72	7.0	7.6	8.9	72	8.6	7.2	6.6	72
73	7.2	7.7	9.1	73	8.8	7.4	6.8	73
74	7.3	7.9	9.3	74	9.0	7.5	6.9	74
75	7.5	8.1	9.5	75	9.1	7.7	7.1	75
76	7.6	8.3	9.7	76	9.3	7.8	7.2	76
77	7.8	8.4	9.9	77	9.5	8.0	7.4	77
78	7.9	8.6	10.1	78	9.7	8.2	7.5	78
79	8.1	8.7	10.3	79	9.9	8.3	7.7	79
80	8.2	8.9	10.4	80	10.1	8.5	7.8	80
81	8.4	9.1	10.6	81	10.3	8.7	8.0	81
82	8.5	9.2	10.8	82	10.5	8.8	8.1	82
83	8.7	9.4	11.0	83	10.7	9.0	8.3	83
84	8.9	9.6	11.3	84	11.0	9.2	8.5	84
85	9.1	9.8	11.5	85	11.2	9.4	8.7	85
86	9.3	10.0	11.7	86	11.5	9.7	8.9	86

Using BMI in Children

Unlike for adults, the BMI values vary with the age and sex of the child. The BMI in children is called: BMI-for-age. In children, instead of looking at the actual BMI value itself, we focus on the specific variation of BMI according to age and gender. GoI is following the WHO BMI for age standards, 2007 release. Refer to the Z score simplified field tables for Girls and Boys.

Why is the BMI-for-age important?

The Hungama survey and also the NFHS 3 indicate that a large proportion of school age children are under nourished.

Recent studies have also shown that cardiac disease risk factors are associated with the BMI for age. 60% of children aged 5-10 years with a BMI-for-age greater than the 95%, had at least one obesity-related condition such as high blood pressure, high cholesterol had 2 or more such abnormalities. The BMI for age is now recommended method for screening overweight and underweight in all children.

Why do we use BMI?

- BMI provides a good indicator for levels of body fat, and it is known that having a BMI that is either too low or too high is associated with an increased risk of ill health during childhood as well as later in life.
- BMI is relatively quick and easy to calculate and as a result, is used for population surveys and by health professionals when assessing individual patients.
- BMI is therefore the most frequently used measure for assessing whether adults or children are obese, overweight, underweight, or a healthy weight.

Assessing the BMI of children is more complicated than for adults because a child's BMI changes as they mature. Also, these patterns of growth differ between boys and girls. Therefore, to work out whether a child's BMI is too high or too low, both the age and sex of the child need to be taken into account.

- Because children's BMI changes considerably between birth and adulthood, fixed thresholds such as those used for adults should not be applied to children as they would provide misleading findings.

How is child BMI classified?

•Instead of using fixed BMI values to classify individuals (as used for adults) children's BMI is classified using thresholds that vary to take into account the child's age and sex.

•These thresholds are usually derived from a reference population, known as a child growth reference. They are calculated by weighing and measuring a large sample of children and they illustrate how BMI varies in children of different ages and sex. As well as showing the pattern of growth, these data also provide an average BMI for a boy or girl at a particular age, and the distribution of measurements above and below this value. This means that individual children can be compared to the reference population and the degree of variation from the expected value can be calculated.

What BMI cut-offs are used?

WHO suggest a set of thresholds based on single standard deviation spacing.

- Thinness: <-2SD
- Overweight: between +1SD and <+2SD
- Obese: >+2SD

de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. Bulletin of the World Health Organization, 2007;85(9): 649-732.

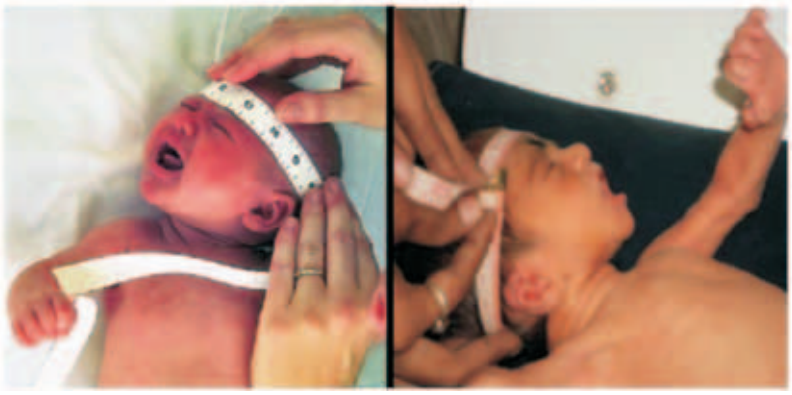
Refer any child whose BMI for age and sex is ><3 SD.

Measuring head circumference

- Head circumference-measurement of a child's head around its widest area, or the distance from above the Eye brows and ears and around the back of the head, on the lower part of the forehead; also referred to as the Occipital-frontal circumference [OFC].
- This measurement is mainly to show brain growth. The size of the skull serves as an approximate index of the volume of its contents (normally brain and cerebrospinal fluid [CSF]). Brain growth slows down once the child is 12 months old and, for all practical purposes, stabilizes by age 5.
- Any increase in head circumference (larger than +2 SDs) is called macrocephaly; and any reduction in head circumference (smaller than -2 SDs), microcephaly. Both conditions force us to rule out any diseases that need treatment or can be associated with developmental disorders.

Technique:

- Use a non –stretchable tape. Place it on the most prominent point at the back of the skull (the occiput) and just above the eyebrows (on the superciliary ridge).
- The measuring tape passes just above the eyebrows and around the prominent posterior aspect of the head.



- If the child has any protuberance on his or her forehead that makes it asymmetrical, put the tape over the most prominent part.
- Measure head circumference in cm and refer to the growth chart
- After taking the measurement, confirm the percentile according to the WHO head circumference growth charts for girls or boys.

See WHO Head Circumference Referrance Chart in the Job Aids

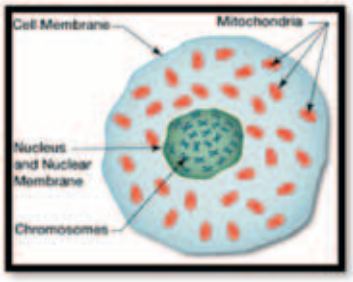
Refer if above or below 2 SD.

Basics of Genetics:

Genetics is nothing but a communication from the parents to their offsprings. Our body contains 50 trillion cells performing different functions. Again the genetic material stored in the nucleus is also to be communicated to the factory manufacturing the protein for that cell. This communication is a written communication and not a verbal communication. For any communication, one requires a language, the language again has sentences and they in turn are made of words and each word is a collection of letters from the alphabets. Again the communication has to be in a language where the messenger will take the message and should be understood by the person for whom the communication has been made. In genetics, the DNA from the nucleus has to send the message to the ribosome (factory) in the cytoplasm to translate the language into action i.e. manufacture of proteins. Here the alphabet has only four letters A, C, T, G (base pairs), the words have 3 letters (ATG, CTA) and the sentences are meaningful use of words . In genetics the sentences are meaningful only if they can help in formation of protein, and are known as the genes.

1) Our body contains 50 trillion tiny cells, (50 Trillion =50,000,000,000,000. Fifty followed by twelve zero). Some cells are heart cells and some are brain cells.

2) But each of these cells contain the complete set of instructions for making us as we are i.e. the same genetic material which we have inherited from both our parents are carried in the same way mainly inside the nucleus in all of the 50 trillion cells of our body.



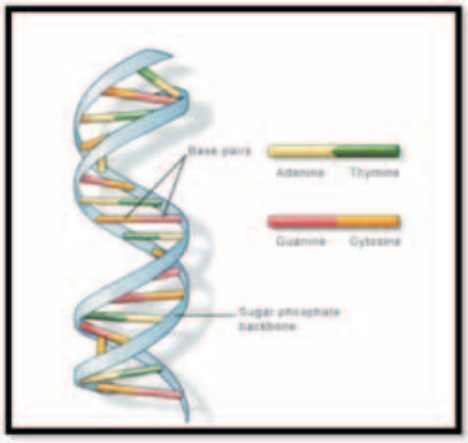
3) Children resemble their parents : This is because of the genetic material they inherit from both of their parents.

4) The smallest unit of this genetic material is DNA, which is kept in the nucleus of the cell (like a fort within a town). Deoxyribonucleic acid. DNA encodes a detailed set of plans and is the blue print for building different types of function of the cell. DNA cannot be seen through a microscope. Nearly every cell in a person's body has the same DNA. Most DNA is located in the cell nucleus (where it is called nuclear DNA), but a small amount of DNA can also be found in the mitochondria (where it is called mitochondrial DNA).

5) **The Basics of DNA:** we have already discussed that our body contains 50 trillion tiny cells, and almost every one of them contains the complete set of instructions for making us. These instructions are encoded in our DNA. DNA is a long, ladder-shaped molecule. Each rung on the ladder is made up of a pair of interlocking units, called bases, that are designated by the four letters in the DNA alphabet - A, T, G and C. 'A' always pairs with 'T', and 'G' always pairs with 'C'.

N.B. It is not necessary that this chapter be totally understood by the Mobile Health team members. But an attempt has been made that they understand the chromosomal defects, the single gene defects and finally the inheritance of Autosomal recessive or Autosomal-dominant.

The information in DNA is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T). Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people.



The order, or sequence, of these bases determines the information available for building and maintaining an organism, similar to the way in which letters of the alphabet appear in a certain order to form words and sentences.

DNA bases pair up with each other, A with T and C with G, to form units called base pairs. Each base is also attached to a sugar molecule and a phosphate molecule. Together, a base, sugar, and phosphate are called a nucleotide. The structure of the double helix is somewhat like a ladder, with the base pairs forming the ladder's rungs and the sugar and phosphate molecules forming the vertical sidepieces of the ladder.

An important property of DNA is that it can replicate, or make copies of itself. Each strand of DNA in the double helix can serve as a pattern for duplicating the sequence of bases. This is critical when cells divide because each new cell needs to have an exact copy of the DNA present in the old cell.

e.g.

DNA strand is made of letters (only 4 letters in this alphabet) (ATCG)

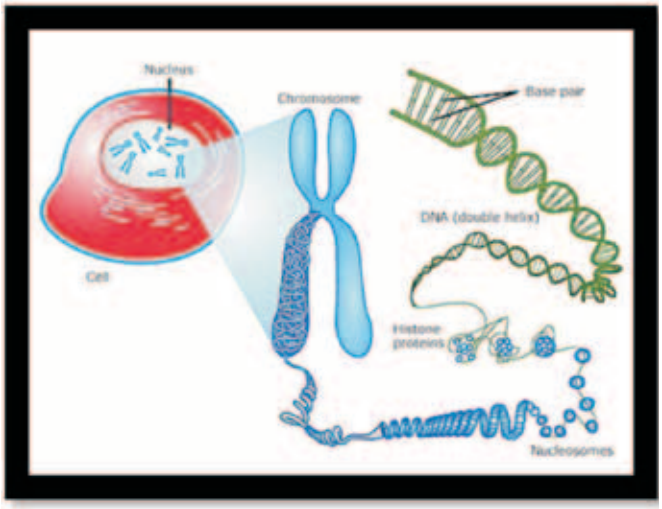
- ATGCTCGAATAAATGTCAATTTGA

The letters make words:

- ATG, CTC, GAA, TAA, ATG, TCA, ATT, TGA

The words make sentences:

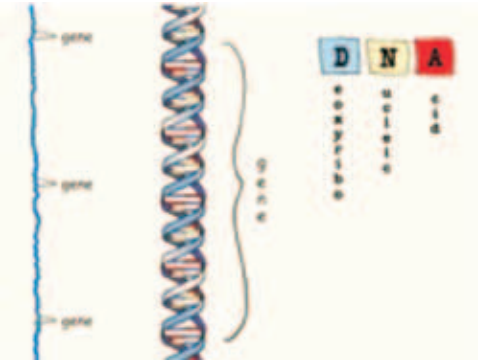
< ATG CTC GAA TAA > this sequence codes for a particular amino acids, which then helps in synthesis of protein. Since this part of DNA (or the sentence) is helping in protein synthesis, it is called a gene.

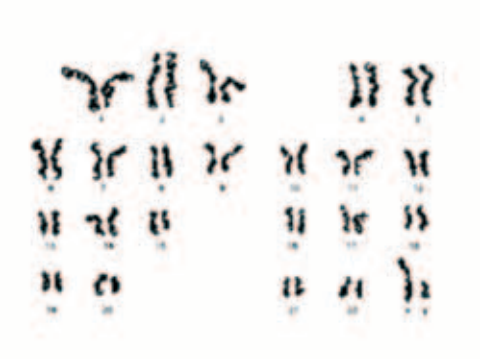


Similarly:

< ATG TCA ATT TGA > this sequence codes for a particular amino acids, which then helps in synthesis of protein. Since this part of DNA (or the sentence) is helping in protein synthesis, it is also called a gene

DNA is Organized Into Chromosomes: The long molecules of DNA in your cells are organized into pieces called chromosomes. Chromosomes can be stained and seen under the microscope. Humans have 23 pairs of chromosomes. Onefrom each parent. Other organisms have different numbers of pairs - for example, chimpanzees have 24 pairs. The number of chromosomes doesn't determine how complex an organism is - bananas have 11 pairs of chromosomes, while fruit flies have only 4.

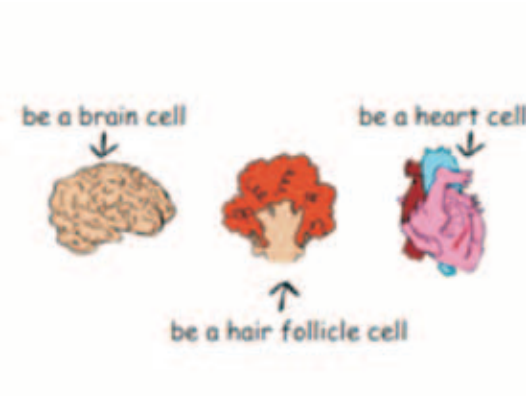




Chromosomes are organized into Genes:

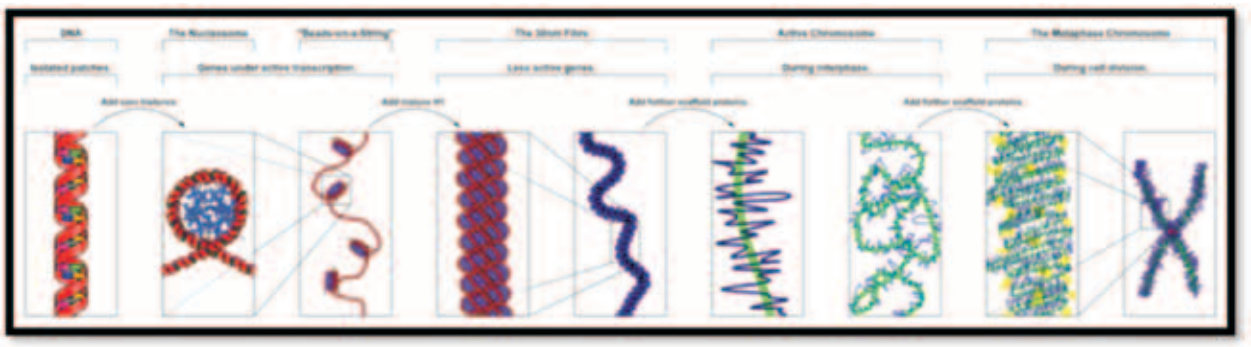
Chromosomes are further organized into short segments of DNA called genes. If you imagineyour DNA as a cookbook, then your genes are the recipes. Written in the DNA alphabet - A, T, C, and G - the recipes tell your cells how to function and what traits to express. For example, if you have curly hair, it is because the genes you inherited from your parents are instructing your hair follicle cells to make curly strands.

Genes Make Proteins:



Cells use the recipes written in your genes to make proteins - just like you use recipes from a cookbook to make dinner. Proteins do much of the work in your cells and your body as a whole. Some proteins give cells their shape and structure. Others help cells carry out biological processes like digesting food or carrying oxygen in the blood. Using different combinations of the A, C, T and G, DNA creates the different proteins - just as you use different combinations of the same ingredients to make different meals.

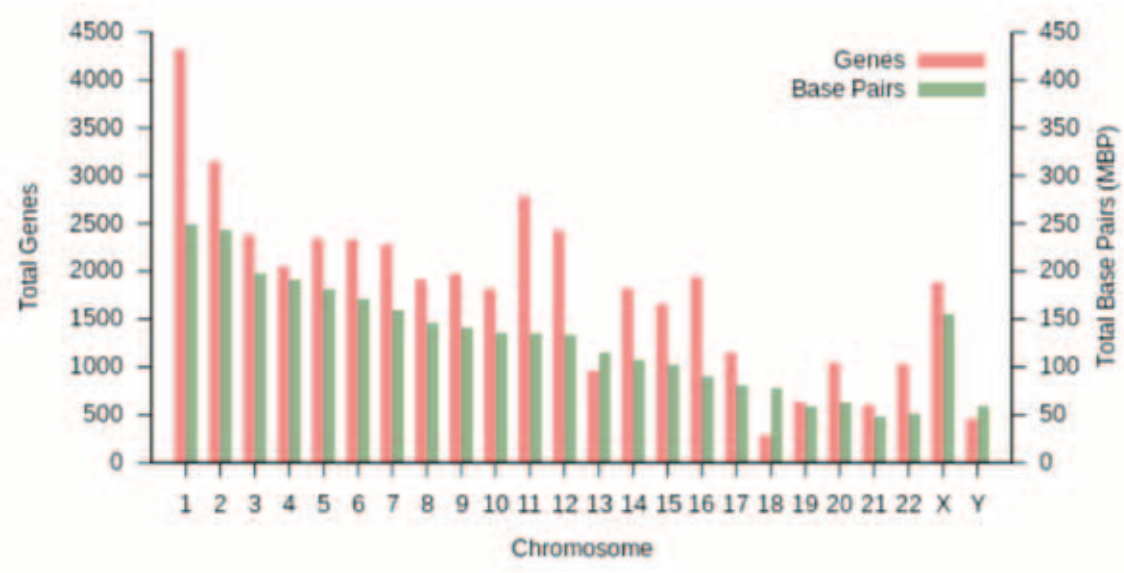
****How DNA, which is almost 3 meter, is super coiled and kept in form of 23 pairs of pieces or parts inside the nucleus of the cell. What looks like a chromosome?*



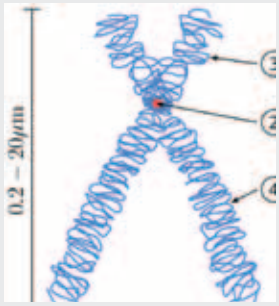
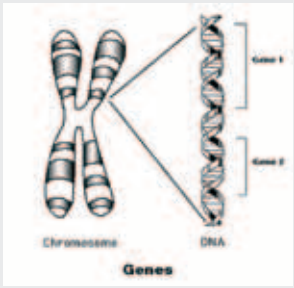
Chromosomes: It is a single piece of coiled DNA containing many genes, Chromosomes in humans can be divided into two types: autosomes and sex chromosomes. Certain genetic traits are linked to a person's sex and are passed on through the sex chromosomes. The autosomes contain the rest of the genetic hereditary information. All act in the same way during cell division. Human cells have 23 pairs of chromosomes (22 pairs of autosomes and one pair of sex chromosomes), giving a total of 46 per cell.

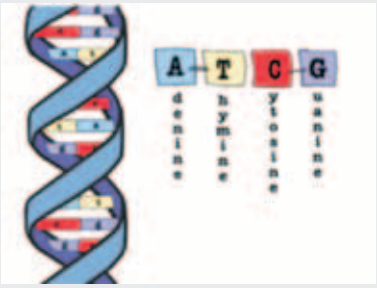
Genetic Switches Control the Traits Cells Express:

Cells come in a dizzying array of types; there are brain cells and blood cells, skin cells and liver cells and bone cells. But every cell contains the same instructions in the form of DNA. So how do cells know whether to make an eye or a foot? The answer lies in intricate systems of genetic switches. Master genes turn other genes on and off, making sure that the right proteins are made at the right time in the right cells.



Estimated number of genes and base pairs (in mega base pairs) on each human chromosome

Chromosome: Coiled DNA kept in Nucleus tightly packed. (This allows the very long DNA molecules to fit into the cell nucleus.)	**Genes:** Genes are that part of DNA which works for a particular Protein synthesis. Each gene contains a particular set of instructions, usually coding for a particular protein or for a particular function.	**Sequenced base pairs** 
		
1	4,220	224,999,719
2	1,491	237,712,649
3	1,550	194,704,827
4	446	187,297,063
5	609	177,702,766
6	2,281	167,273,993
7	2,135	154,952,424
8	1,106	142,612,826
9	1,920	120,312,298
10	1,793	131,624,737
11	379	131,130,853
12	1,430	130,303,534
13	924	95,559,980
14	1,347	88,290,585
15	921	81,341,915
16	909	78,884,754
17	1,672	77,800,220
18	519	74,656,155
19	1,555	55,785,651
20	1,008	59,505,254
21	578	34,171,998
22	1,092	34,893,953
X (sex chromosome)	1,846	151,058,754

Y (sex chromosome)	454	25,121,652
Total : 23 pair of chromosomes	**Total genes: 32,185**	**Total base pairs: 2,857,698,560**
Chromosomal aberrations are disruptions in the normal chromosomal content of a cell and are a major cause of genetic conditions in humans, such as Down syndrome	**Single gene defect like Sickle cell anemia**	

Summary:

- Children resemble their parents;
- This is because the genetic material they inherit from both their parents;
- The smallest unit of this genetic material is DNA, which is kept in the nucleus of the cell like a fort within a city. Deoxyribonucleic acid. DNA encodes a detailed set of plans and is the blue print for building different types of function of the cell;
- DNA looks like a twisted ladder where there is a turn after every few rungs or steps;
- The sides have a sugar and a phosphate and the rungs are made of 4 letters of the alphabet: A, T, C, and G. These letters join together according to a special rule: A will always pair with T and C with G; attached to either of the sidewalls;
- Order of sequences of these base pairs or the letters in the alphabet provides the information needed for growth and development;
- This is because the sequence of the 4 letters gives rise to the sequence of words: 64 such (3 letter word: codon). The meaningful assimilation of words is sentence. The sentence helps in formation of protein. The meaningful part of DNA is gene, which helps in protein synthesis;
- The sequence of the codons helps in formation of sequential amino acids: 20 such. The sequence of the amino acids helps in the formation of protein: 1000 such proteins;
- The steps or rungs are formed by the bonding of A with T and C with G. Thus A on one side of the ladder joins T on the other side and cemented together by the Hydrogen bonding;
- The size of the DNA within the cell can be as long as 3 meters, the size of a car but still it cannot be seen under a microscope but can be studied through help of X-ray;
- Hence this has to be packed in an efficient way to keep it inside the Nucleus. So it is highly coiled along with packing material histones and looks like a coiled thread under a microscope with a shape of X during cell division known as the chromosomes. Thus chromosomes consist of a long single piece of DNA, containing many genes kept in the nucleus by coiling

many times with help of proteins like histones. Human cells have 23 pairs of chromosome (22 pairs of autosomes and one pair of sex chromosomes);

- Certain genetic traits are linked to the autosomes so are called autosomal recessive or autosomal dominant depending upon the gene and certain traits are linked with the sex chromosomes;
- Genes come in pairs;
- Genes don't blend. For example, one might expect that a cross between purebred green-seeded and purebred yellow-seeded pea plant to produce offspring with seeds of an intermediate green-yellow colour. After all, color blending happens when paint is mixed together. However, Mendel found that this cross-produced offspring with only one colour yellow. No intermediate blends were seen, and the green colour seemed to have disappeared. So conclusion that genes do not blend and that Some genes are dominant;
- **Genetic inheritance follows rules;**

*******Johann Gregor Mendel (1822-1884) was known as Father of Genetics***

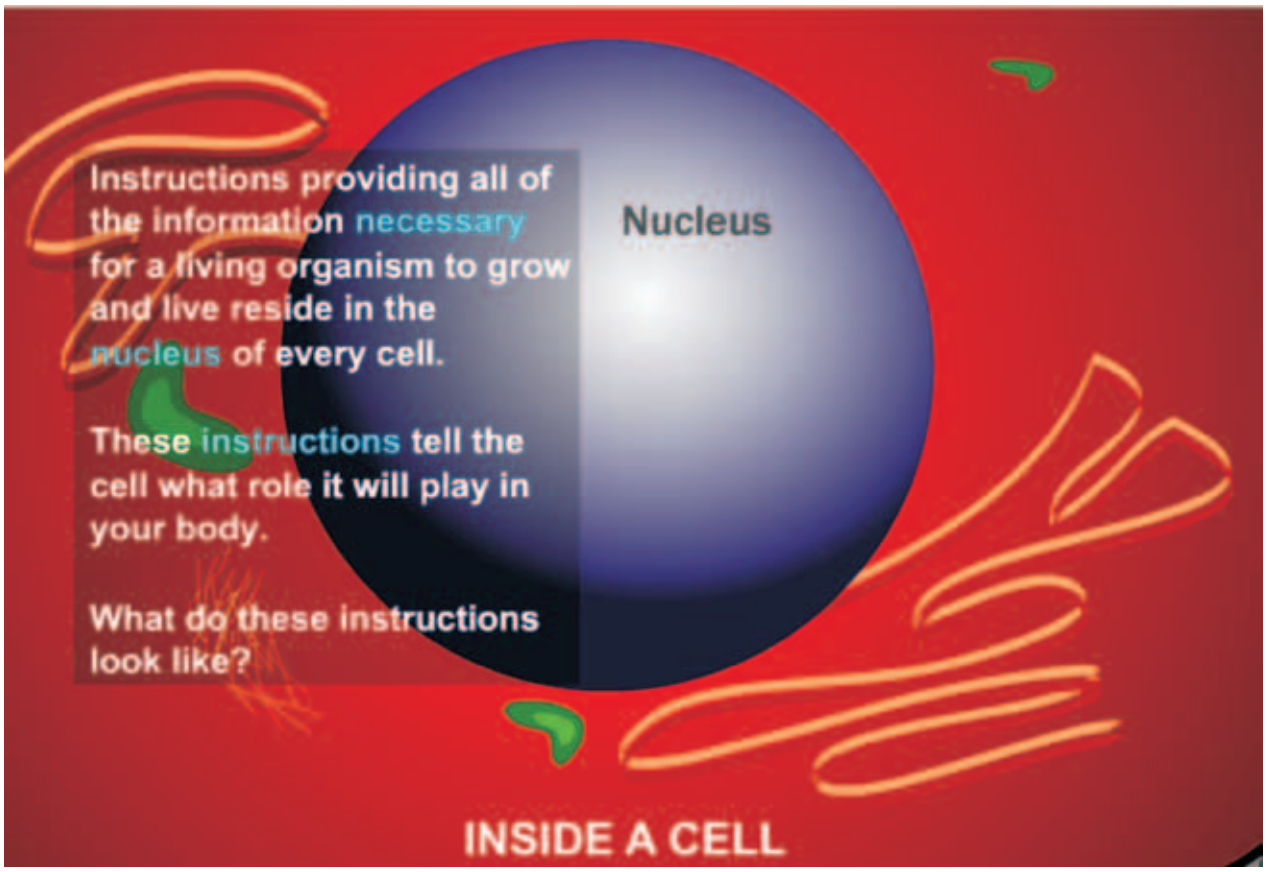
- Gregor Mendel deduced that genes come in pairs and are inherited as distinct units, one from each parent. Mendel tracked the segregation of parental genes and their appearance in the offspring as dominant or recessive traits.

Did you Know? After his death, the monks burned Mendel's personal papers. Luckily, some of the letters and documents generated by Mendel were kept in the monastery archives.

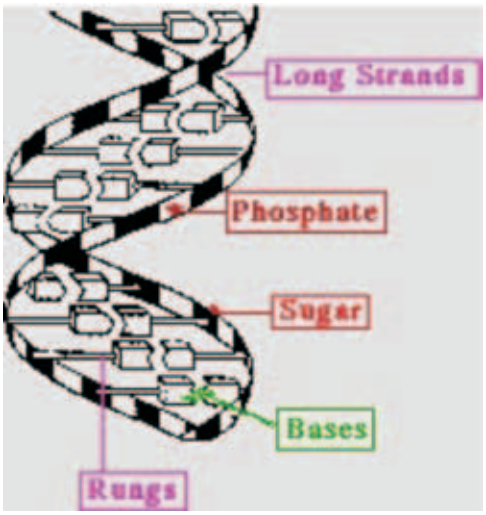
Basic Genetics:

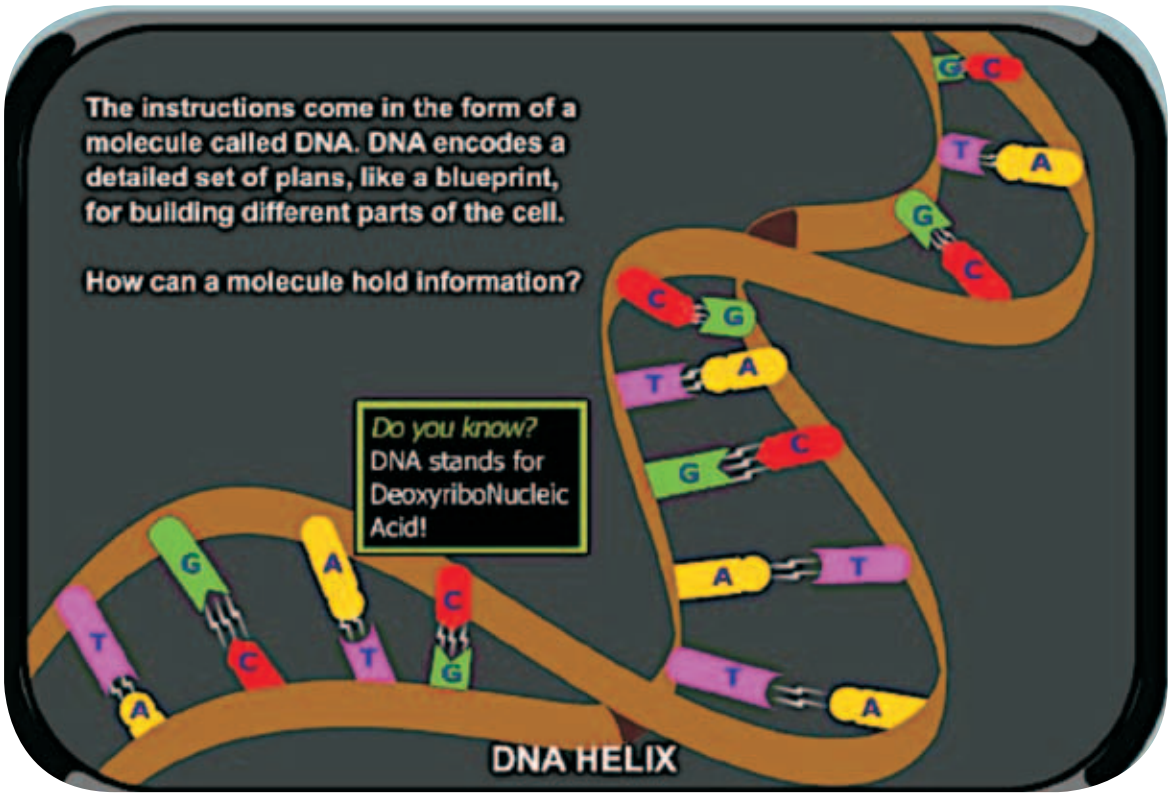
What is DNA?

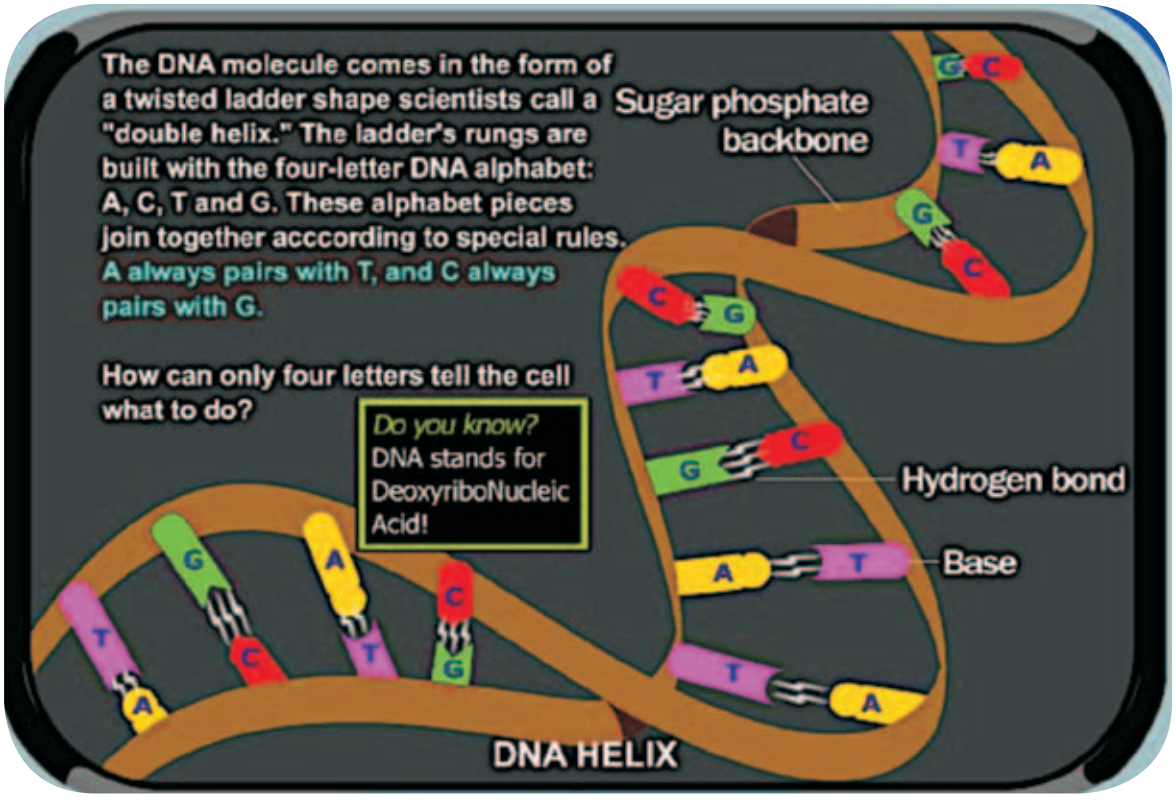
Let us examine a group of cells in your inner Ear. They help in Hearing. How do thesecell "know" that their function is to support Hearing instead of making the heartbeat. Instructions providing all the information necessary for a living organism to function, reside in the nucleus of every cell. These instructions will tell what role it will play in your body.

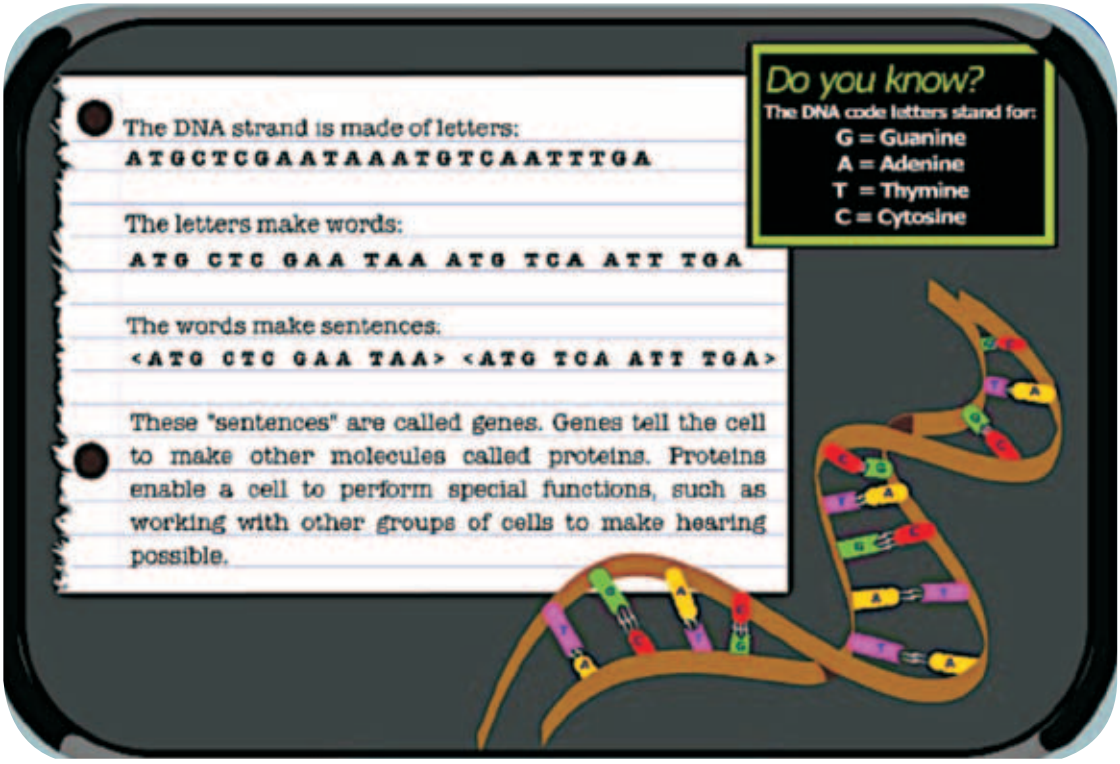


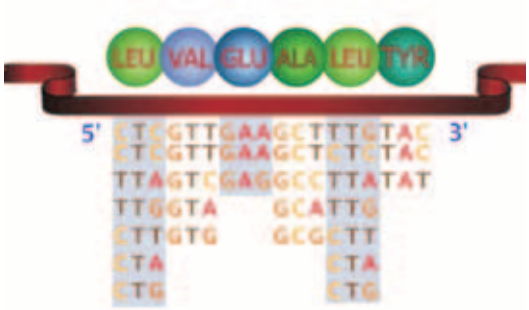
These instructions come in the form of a molecule called DNA Deoxyribonucleic acid. DNA encodes a detailed set of plans and is the blue print for building different types of function of cell.



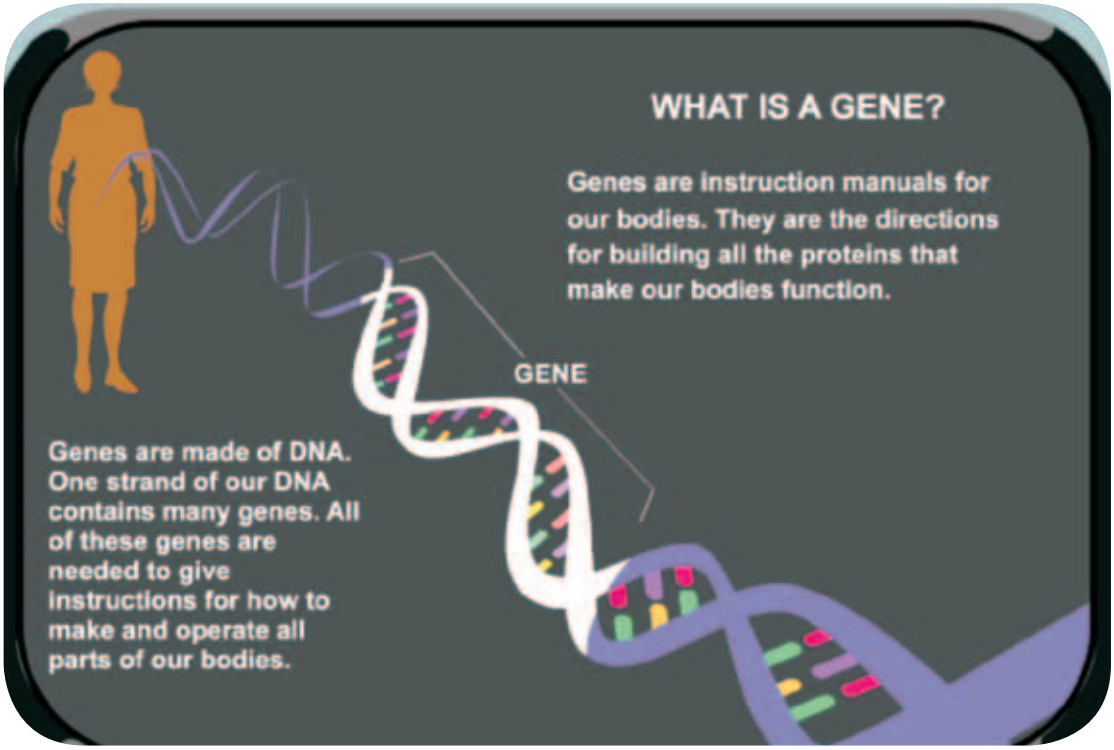

The instructions come in the form of a molecule called DNA. DNA encodes a detailed set of plans, like a blueprint, for building different parts of the cell.
How can a molecule hold information?
Do you know?
DNA stands for DeoxyriboNucleic Acid!
DNA HELIX

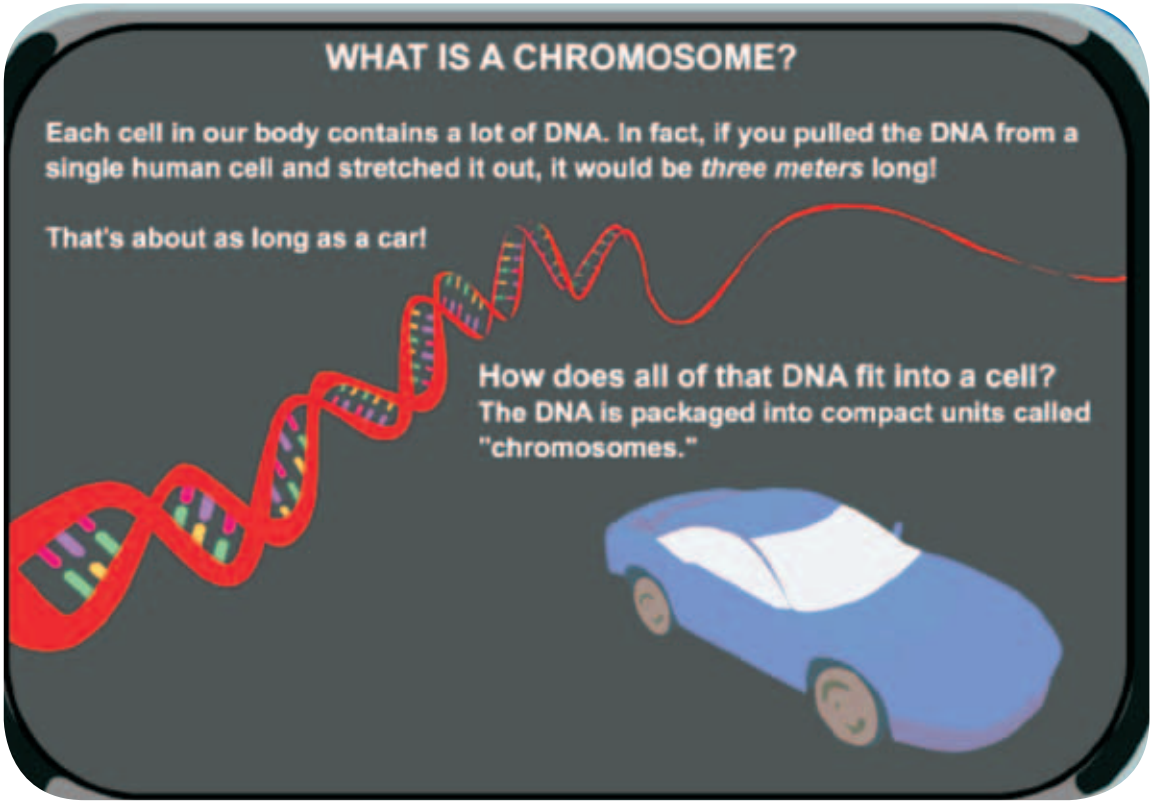

The DNA molecule comes in the form of a twisted ladder shape scientists call a "double helix." The ladder's rungs are built with the four-letter DNA alphabet: A, C, T and G. These alphabet pieces join together acccording to special rules. A always pairs with T, and C always pairs with G.
How can only four letters tell the cell what to do?
Sugar phosphate backbone
Hydrogen bond
Base
Do you know?
DNA stands for DeoxyriboNucleic Acid!
DNA HELIX

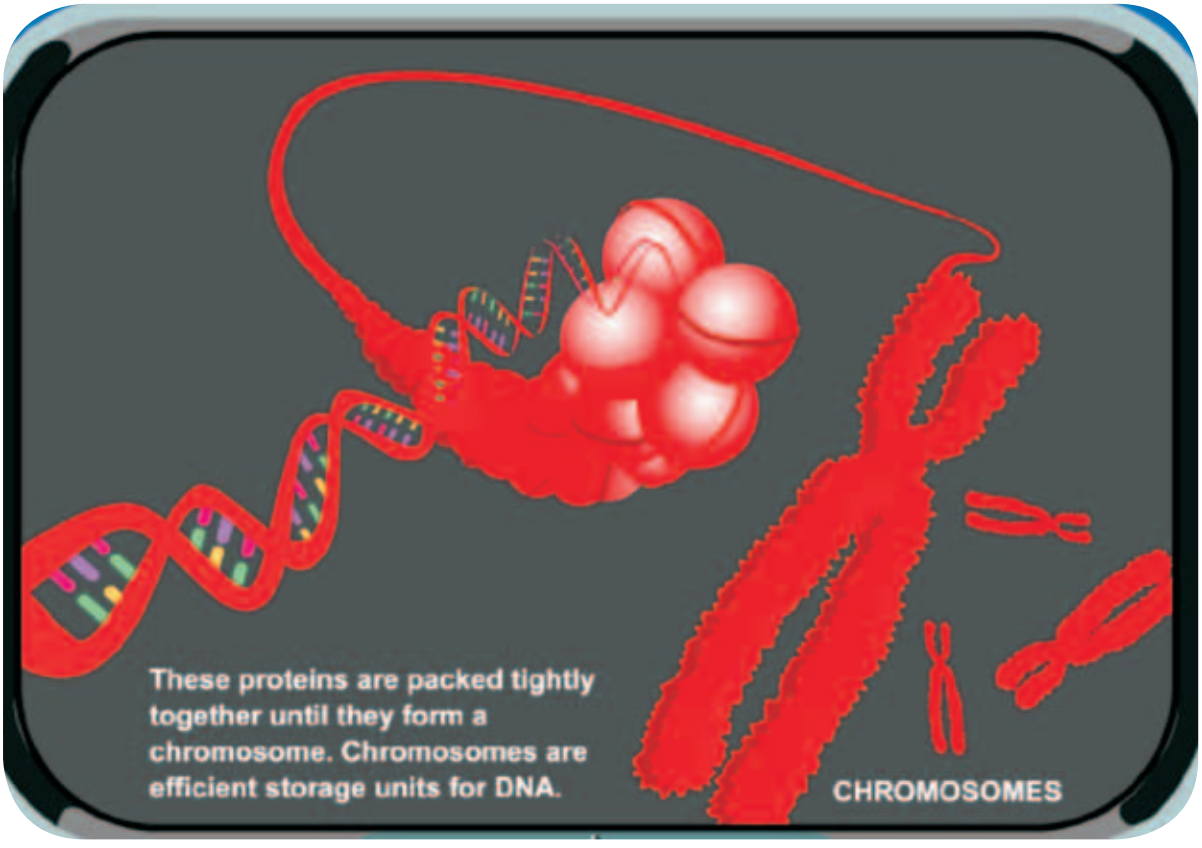




Amino Acids (Building block of Proteins) (Sentences)




WHAT IS A CHROMOSOME?
Each cell in our body contains a lot of DNA. In fact, if you pulled the DNA from a single human cell and stretched it out, it would be *three meters* long!
That's about as long as a car!
How does all of that DNA fit into a cell?
The DNA is packaged into compact units called "chromosomes."

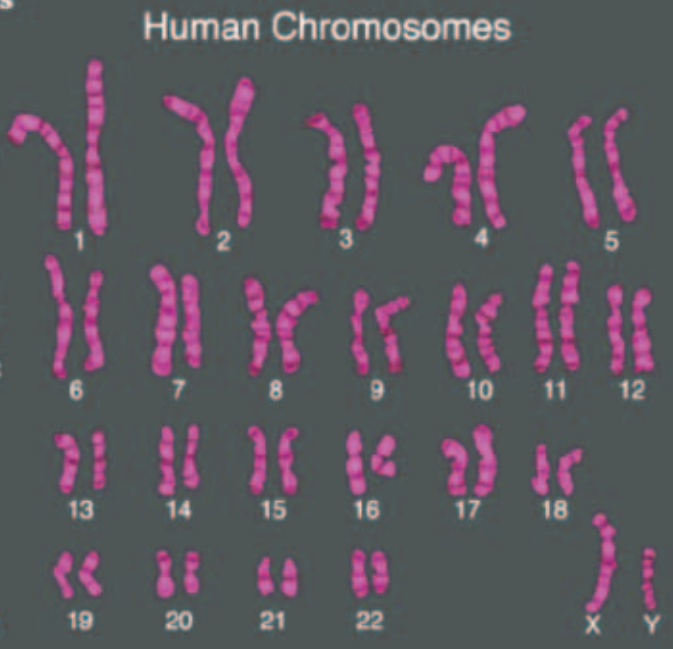

These proteins are packed tightly together until they form a chromosome. Chromosomes are efficient storage units for DNA.
CHROMOSOMES

How many chromosomes does one cell hold?

The correct answer to this depends on whether you're a fish or a fly, or a human.

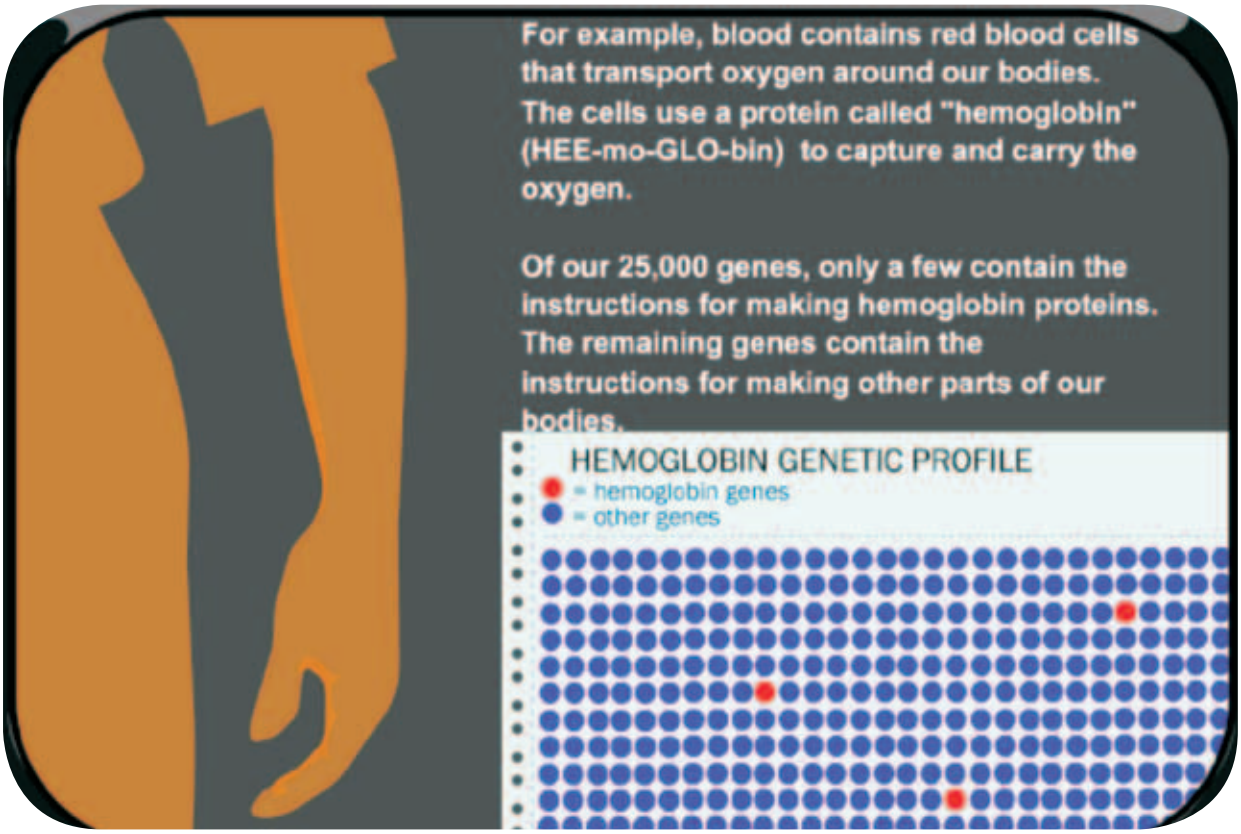
Each human cell has 46 chromosomes. All the DNA is organized into two sets of 23 chromosomes. We get genetic material from both of our parents - that's why children look like both their mom and dad.

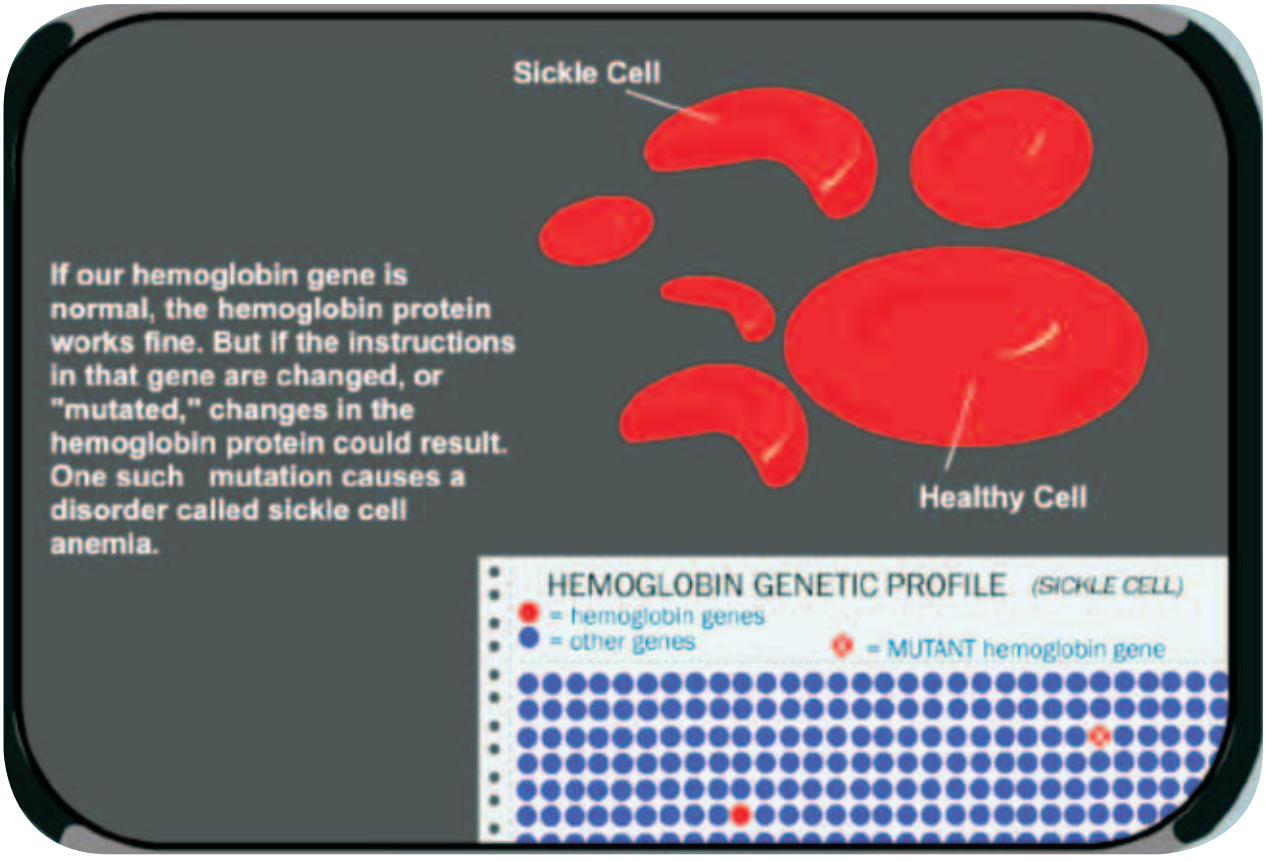
What can we learn from looking at our chromosomes?

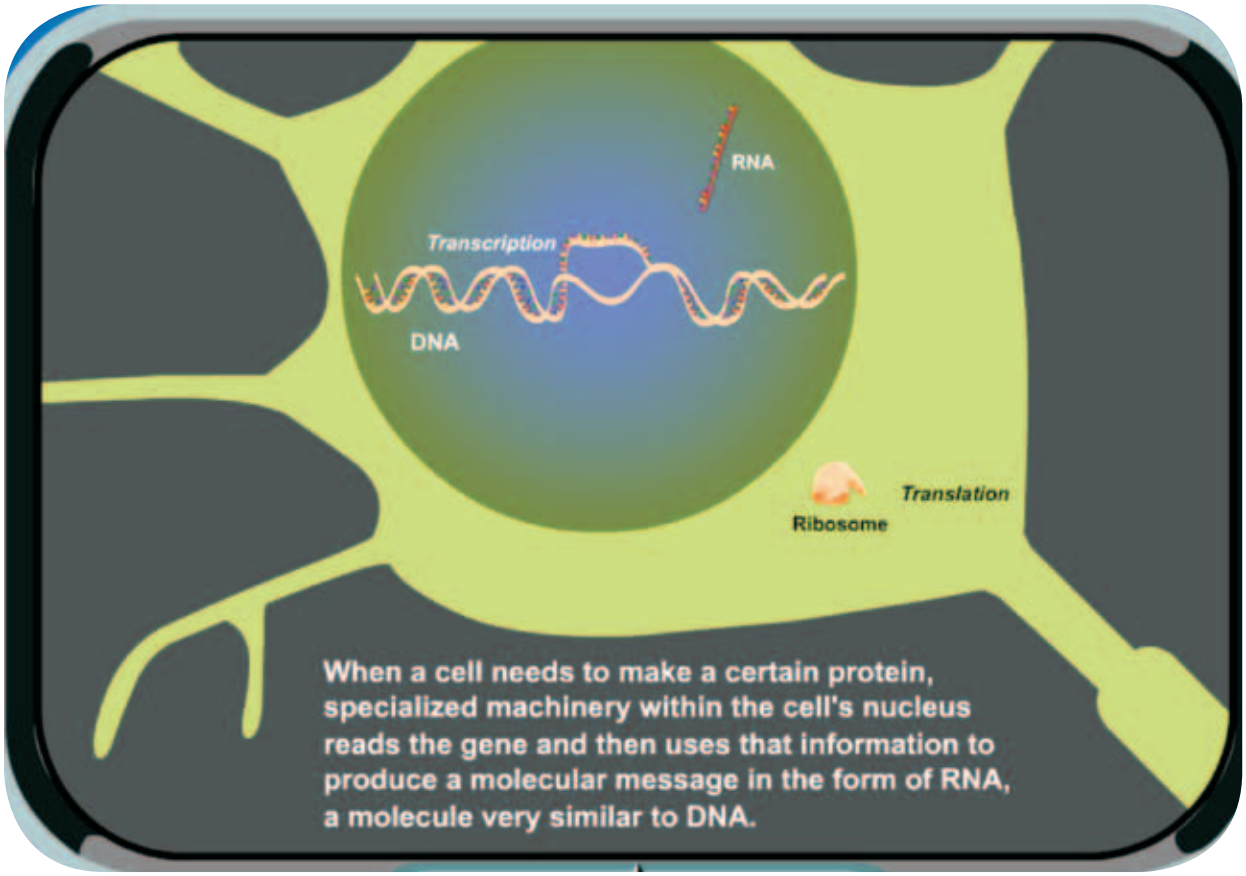


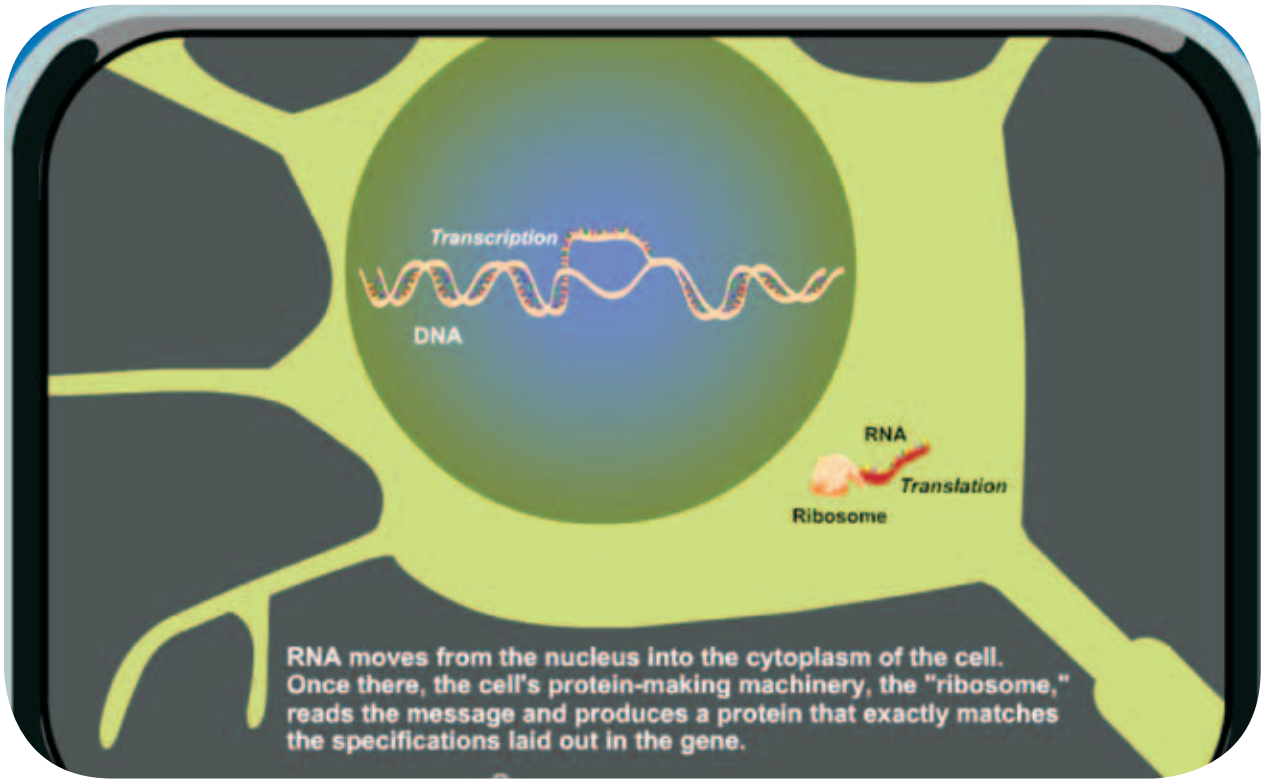
Look at this set of chromosomes. You can see that matching chromosomes have been lined up in pairs - one each from mom and dad. Although the DNA double helix is too small to see, chromosomes can be viewed with a microscope, as in this picture.

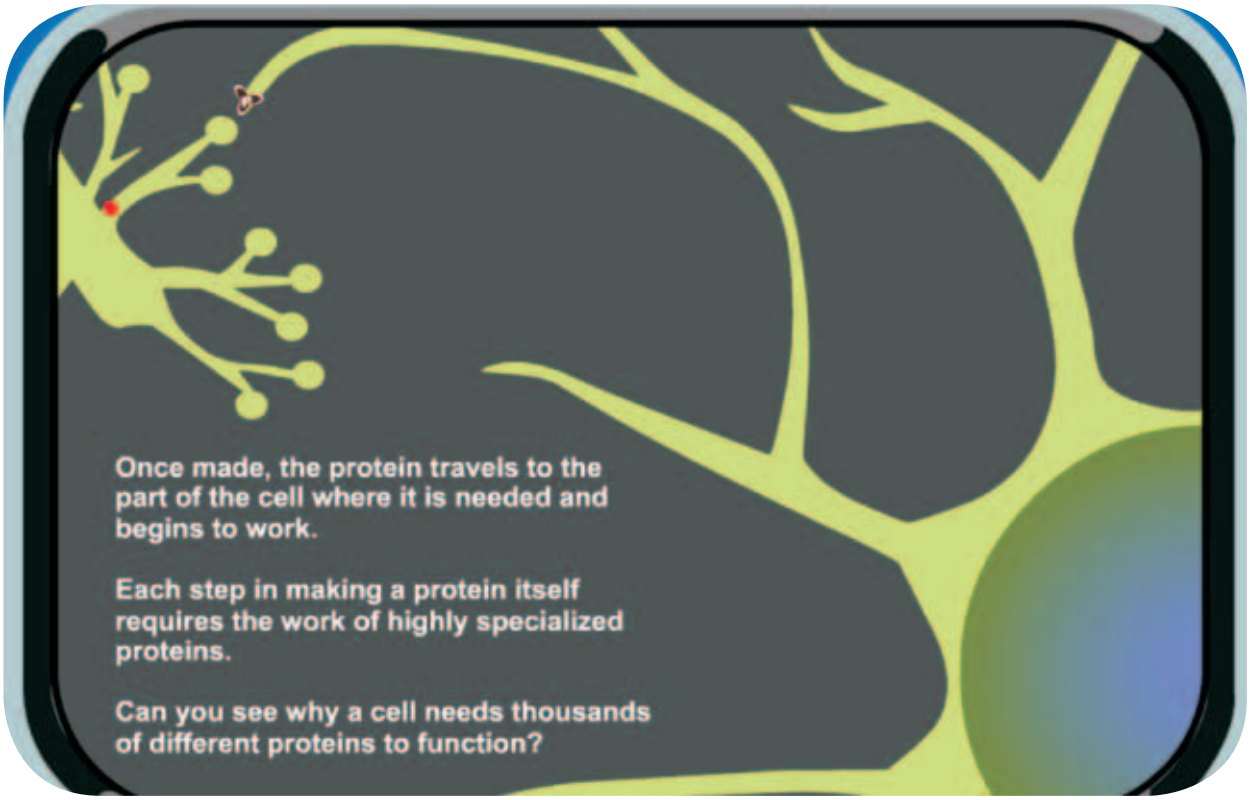
There are two sex chromosomes that determine whether you are male or female. In the picture the sex chromosomes are labeled "X" and "Y." The set of chromosomes in this picture are from a male - you can tell because females do not have a Y chromosome. Instead, they have two X chromosomes.


For example, blood contains red blood cells that transport oxygen around our bodies. The cells use a protein called "hemoglobin" (HEE-mo-GLO-bin) to capture and carry the oxygen.
Of our 25,000 genes, only a few contain the instructions for making hemoglobin proteins. The remaining genes contain the instructions for making other parts of our bodies.
HEMOGLOBIN GENETIC PROFILE
= hemoglobin genes
= other genes


Sickle Cell
Healthy Cell
If our hemoglobin gene is normal, the hemoglobin protein works fine. But if the instructions in that gene are changed, or "mutated," changes in the hemoglobin protein could result. One such mutation causes a disorder called sickle cell anemia.
HEMOGLOBIN GENETIC PROFILE (SICKLE CELL)
= hemoglobin genes
= other genes
= MUTANT hemoglobin gene


RNA
Transcription
DNA
Translation
Ribosome
When a cell needs to make a certain protein, specialized machinery within the cell's nucleus reads the gene and then uses that information to produce a molecular message in the form of RNA, a molecule very similar to DNA.


Transcription
DNA
RNA
Translation
Ribosome
RNA moves from the nucleus into the cytoplasm of the cell. Once there, the cell's protein-making machinery, the "ribosome," reads the message and produces a protein that exactly matches the specifications laid out in the gene.



Where exactly are our traits?

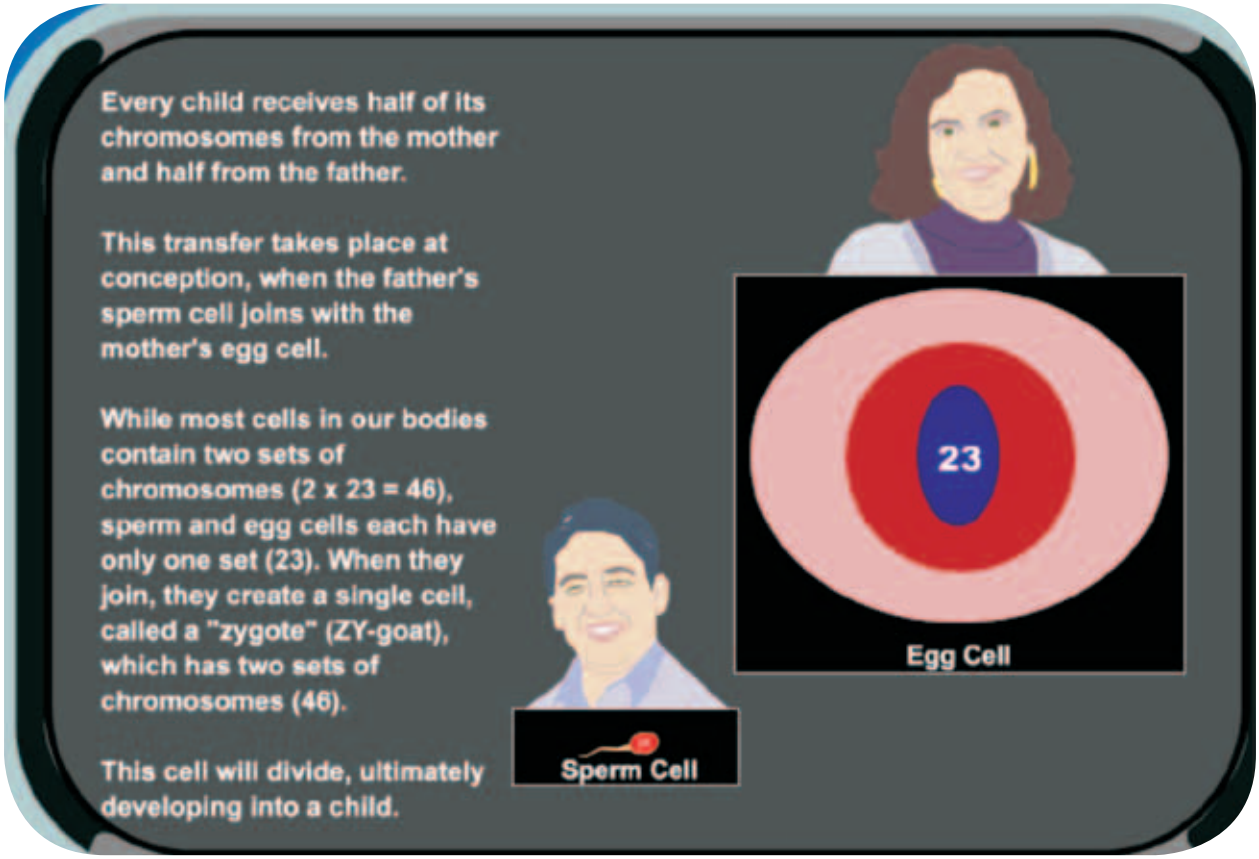
Our genes encode the instructions that define our traits. Each of us has thousands of genes, which are made of DNA and reside in our chromosomes.

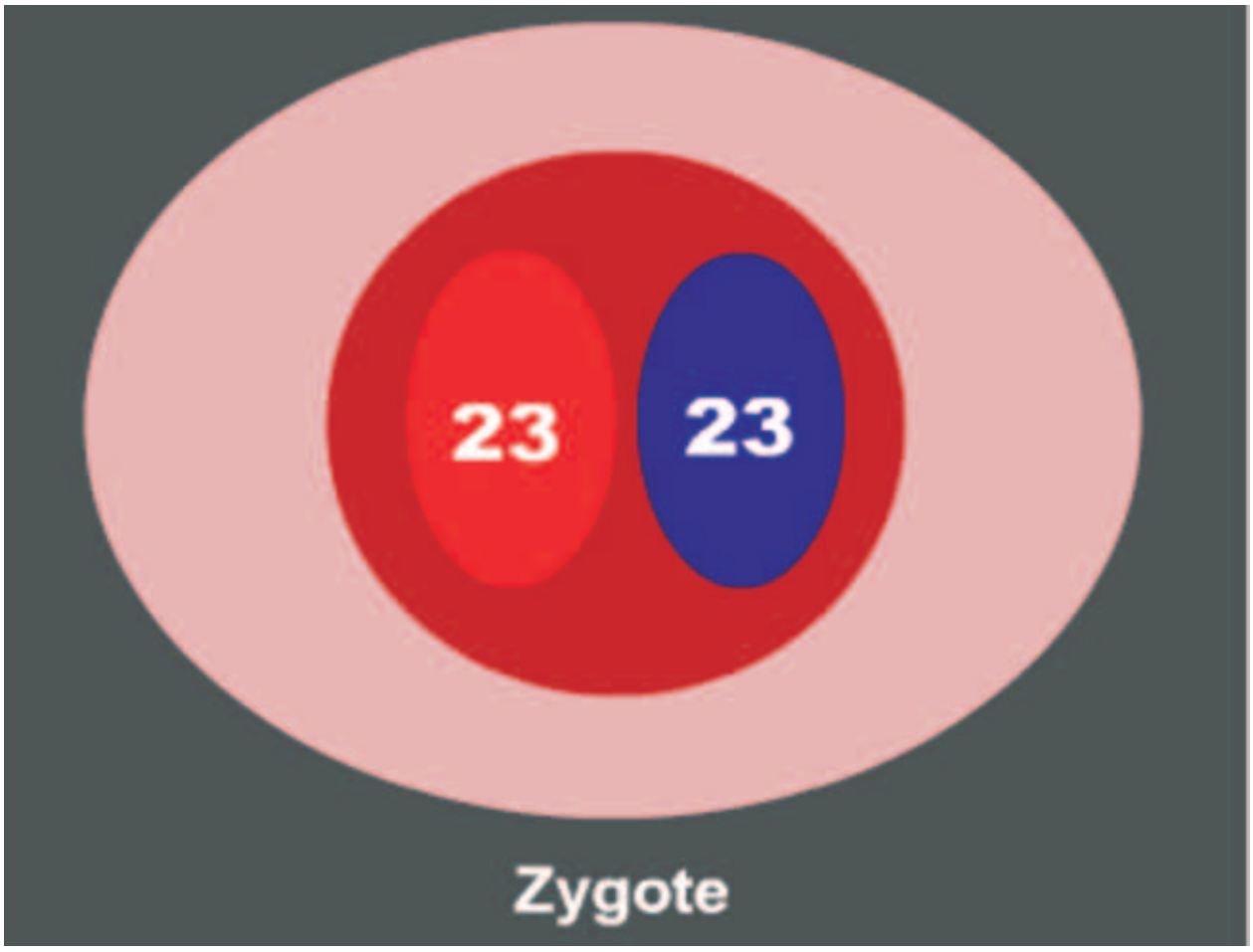
The environment we grow up and live in also helps define our traits. For example, while a person's genes may specify a certain hair color, exposure to chemicals or sunlight can change that color.

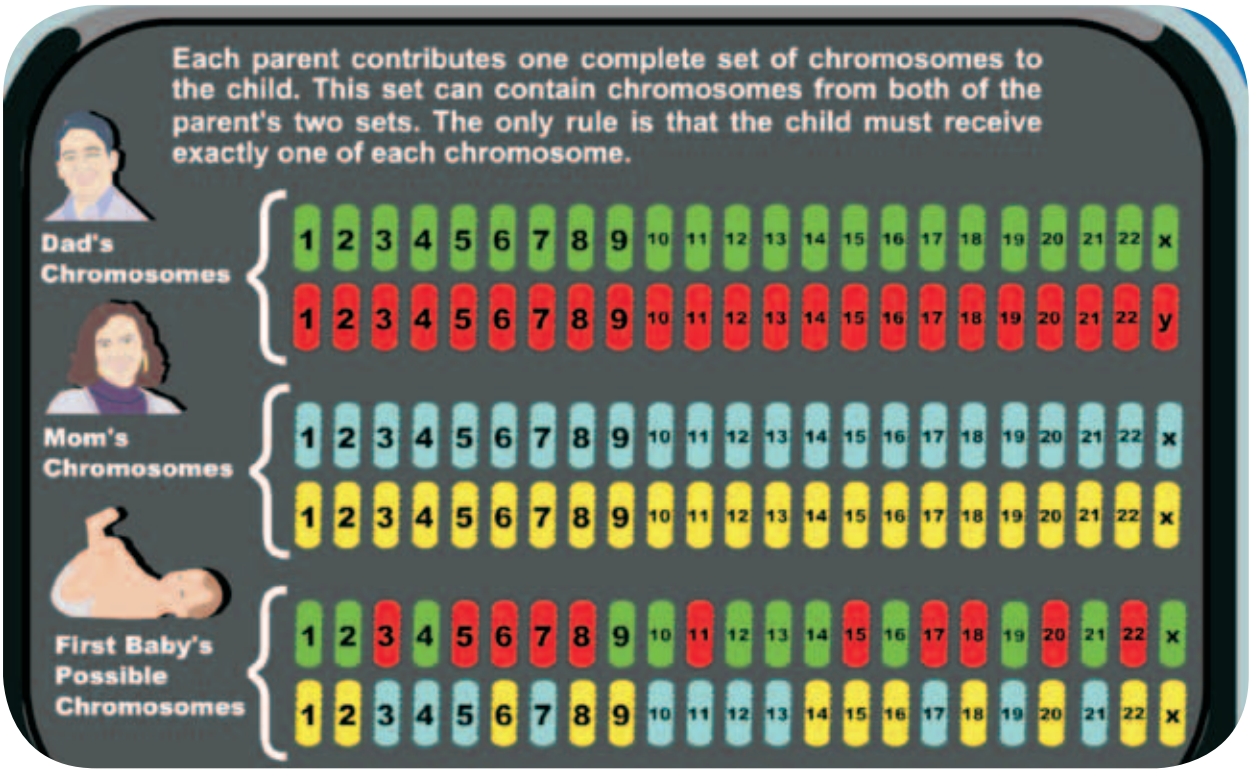
How do we get traits from our parents?

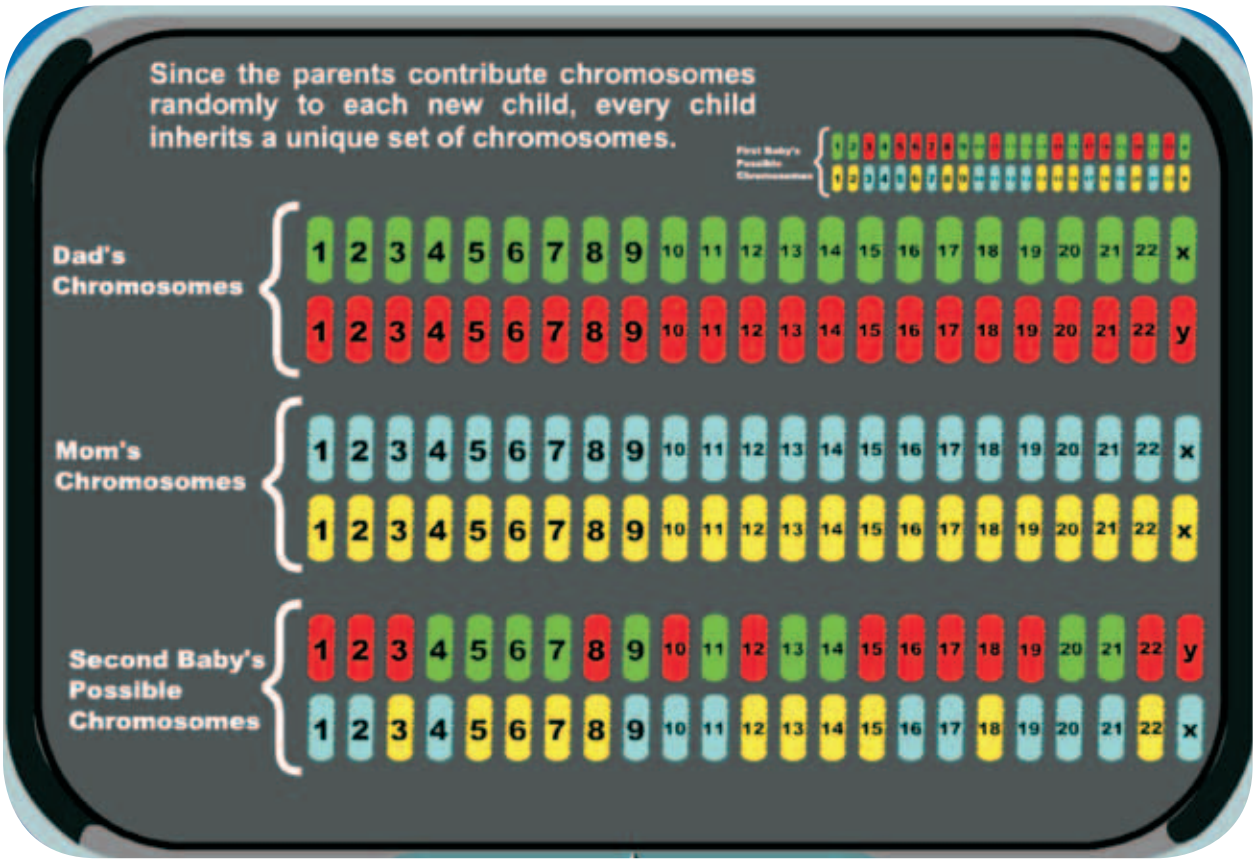
Humans have two complete sets of 23 chromosomes (2 x 23 = 46 total).

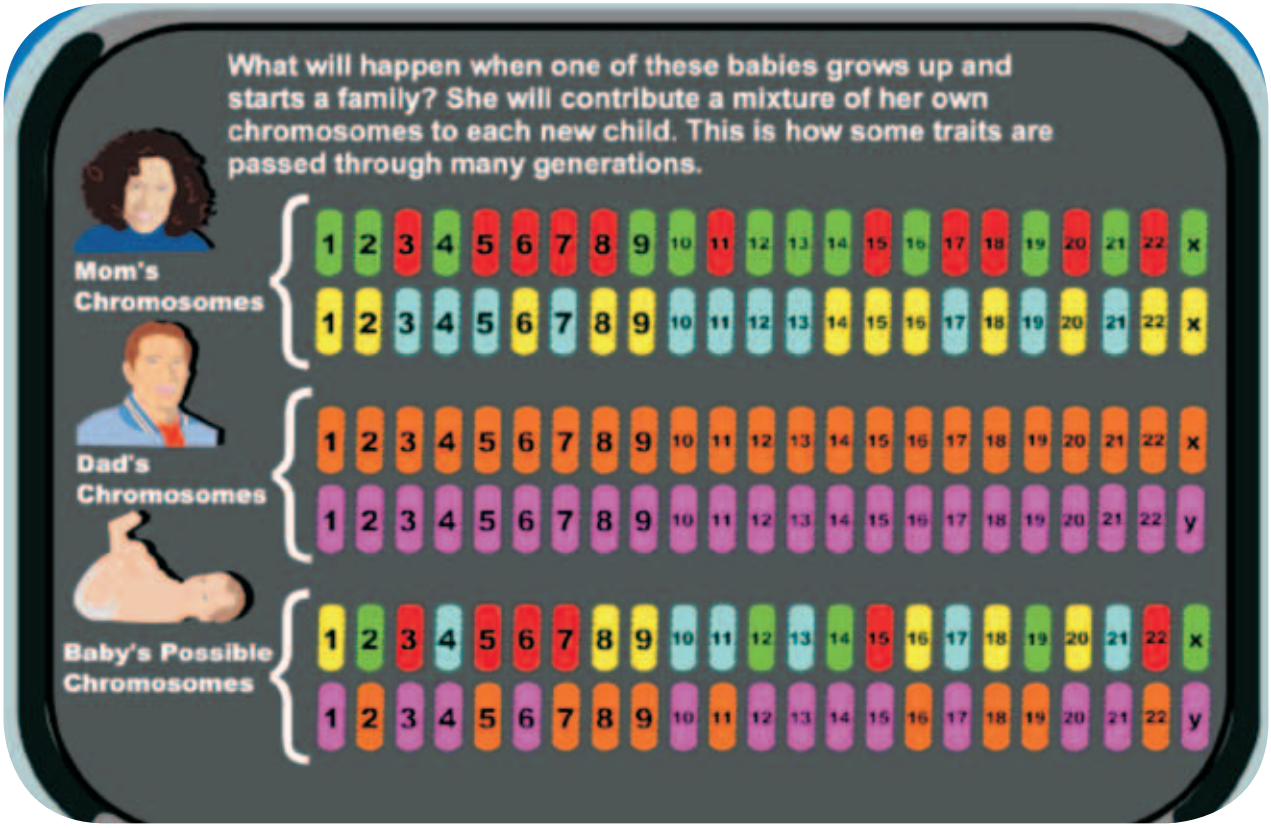
When parents conceive a child, they each contribute one complete set to the child. In this way, parents pass genes to the child.

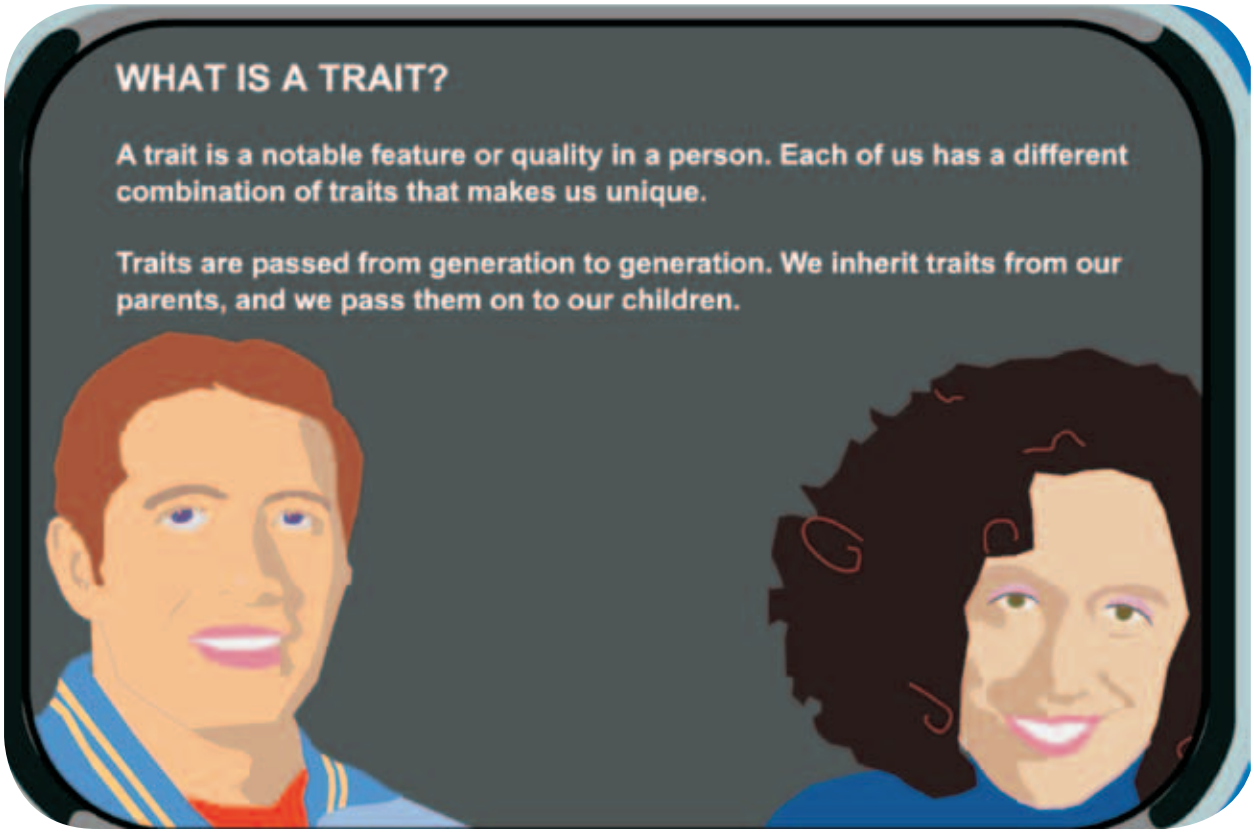

Every child receives half of its chromosomes from the mother and half from the father.
This transfer takes place at conception, when the father's sperm cell joins with the mother's egg cell.
While most cells in our bodies contain two sets of chromosomes (2 x 23 = 46), sperm and egg cells each have only one set (23). When they join, they create a single cell, called a "zygote" (ZY-goat), which has two sets of chromosomes (46).
This cell will divide, ultimately developing into a child.
23
Egg Cell
Sperm Cell

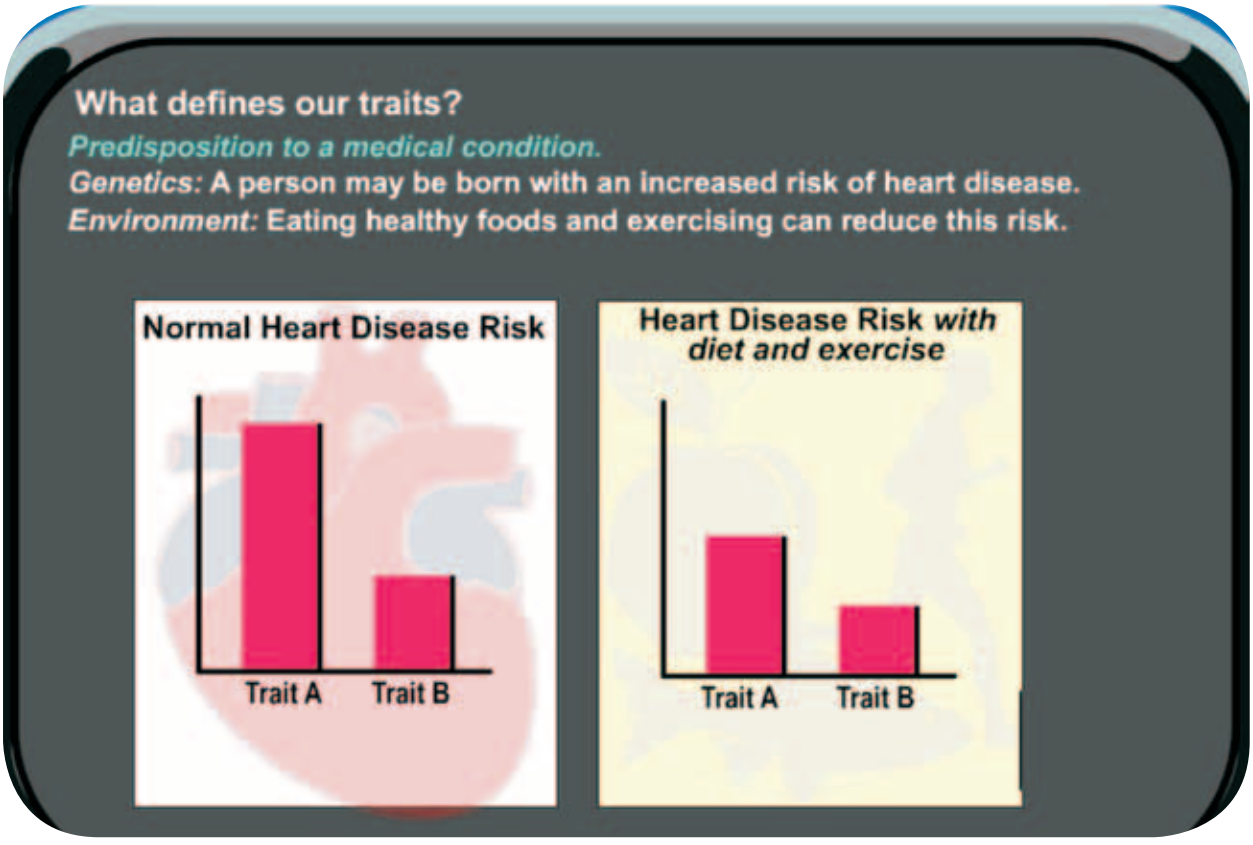

23
23
Zygote


Each parent contributes one complete set of chromosomes to the child. This set can contain chromosomes from both of the parent's two sets. The only rule is that the child must receive exactly one of each chromosome.
Dad's Chromosomes
Mom's Chromosomes
First Baby's Possible Chromosomes


Since the parents contribute chromosomes randomly to each new child, every child inherits a unique set of chromosomes.
Dad's Chromosomes
Mom's Chromosomes
Second Baby's Possible Chromosomes


What will happen when one of these babies grows up and starts a family? She will contribute a mixture of her own chromosomes to each new child. This is how some traits are passed through many generations.
Mom's Chromosomes
Dad's Chromosomes
Baby's Possible Chromosomes


WHAT IS A TRAIT?
A trait is a notable feature or quality in a person. Each of us has a different combination of traits that makes us unique.
Traits are passed from generation to generation. We inherit traits from our parents, and we pass them on to our children.



Thus, Environment has a role to play in manifestation of even a genetic disease

How are our traits determined?

Try to bend your thumb backwards at the joint. Some people can form at least a 45 degree angle, which is called a "hitchhiker's thumb." Other people have straight thumbs which do not bend in this way. Which one do you have?

Scientists describe the set of genetic information for each form as an allele (pronounced uh-LEEL).

We can describe the straight thumb allele with an "H" and the hitchhiker's thumb allele with an "h".

Straight Thumb (H)

Hitchhiker's Thumb (h)

How are our traits determined?

Each of us has two alleles for the thumb extension trait. As a result, we all have one of these combinations:

H + H =

H + h =

h + h =

How are our traits determined?

You can probably guess the trait in people who have two of the same allele:

Those with H + H will have straight thumbs.

Those with h + h will have hitchhiker's thumbs.

Scientists use the word "homozygous" (pronounced HO-mo-ZY-gus) to describe having two of the same allele for a trait.

H + H =

h + h =

H + h =

How are our traits determined?

But what about people who have one of each allele, or H + h? Will they have one straight thumb and one hitchhiker's thumb?

How are our traits determined?

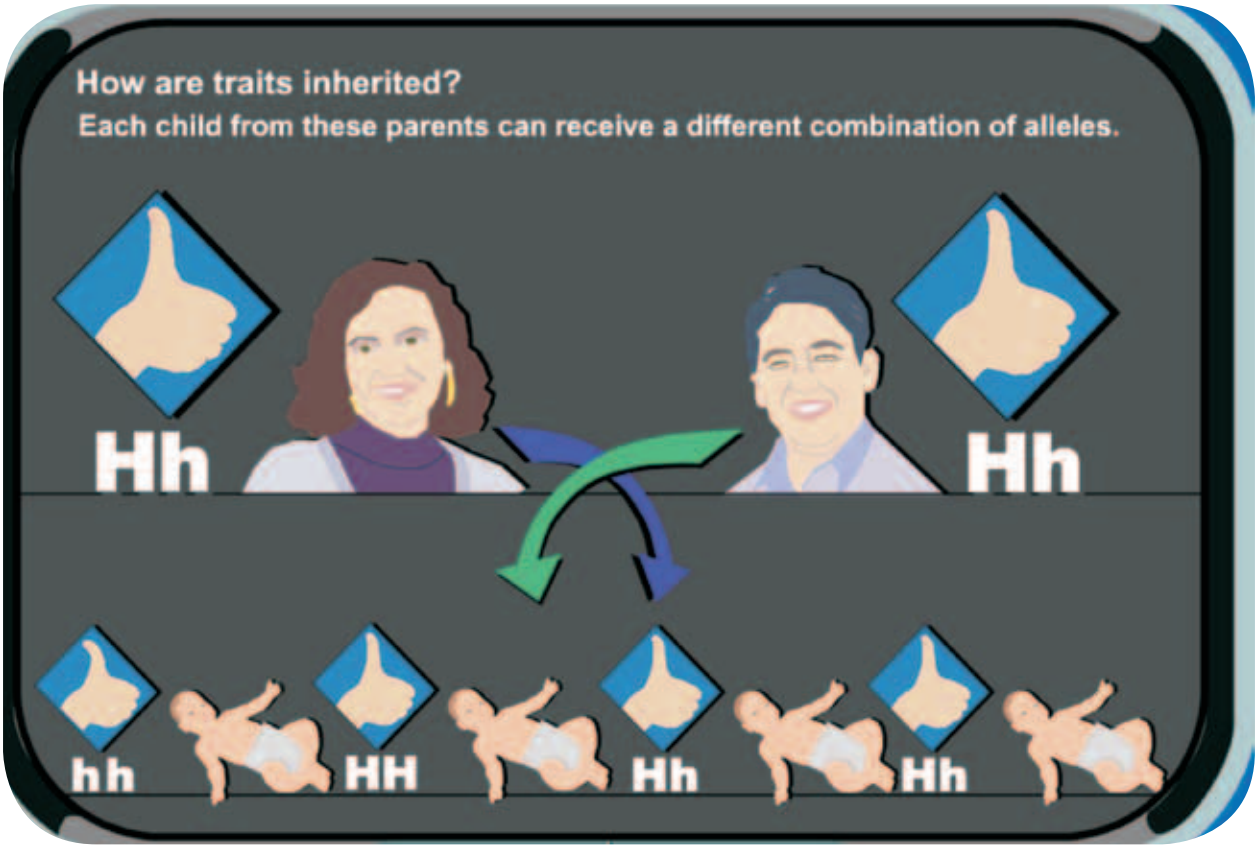
No. When two different alleles are present, they interact. For the thumb extension trait, the H allele masks the h allele. People with the H + h combination will have straight thumbs.

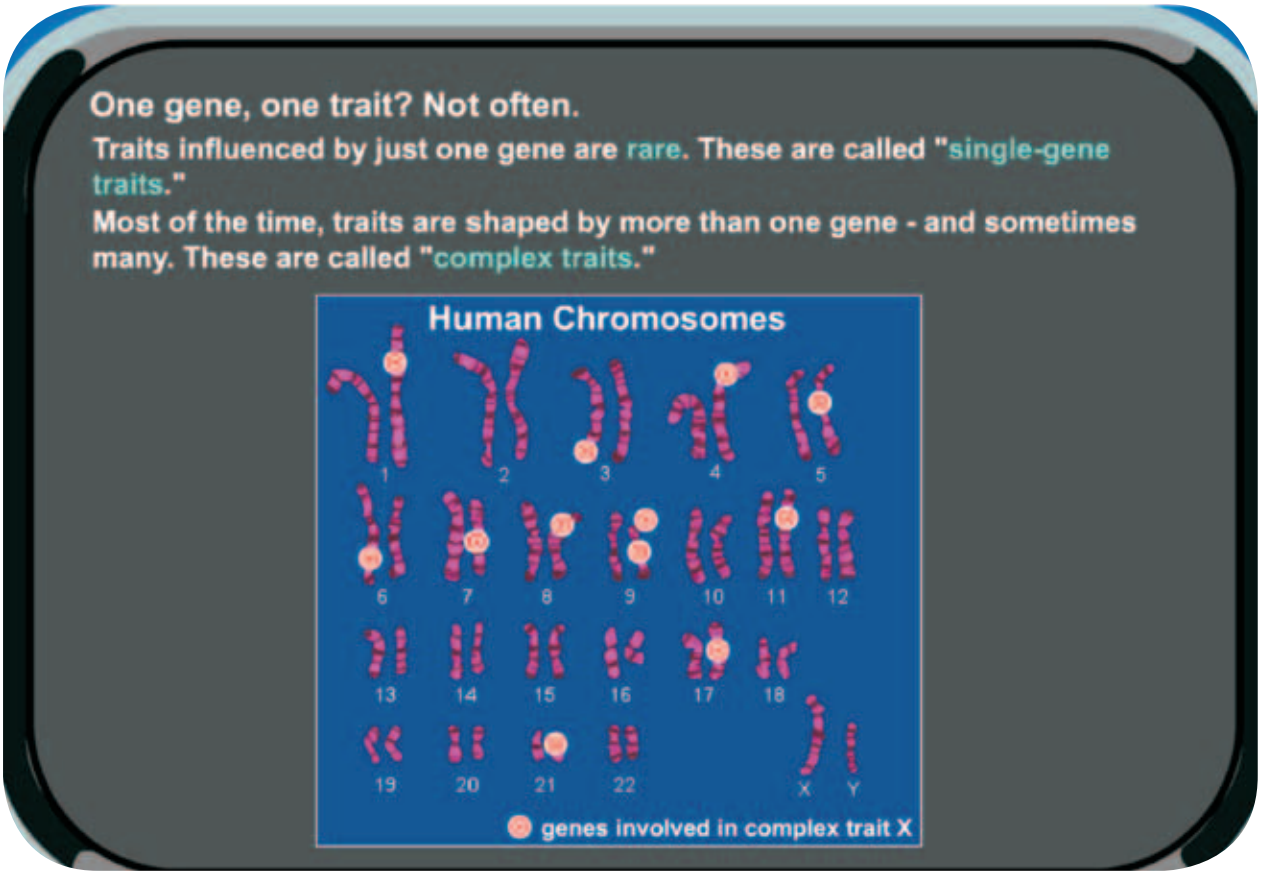
Hh

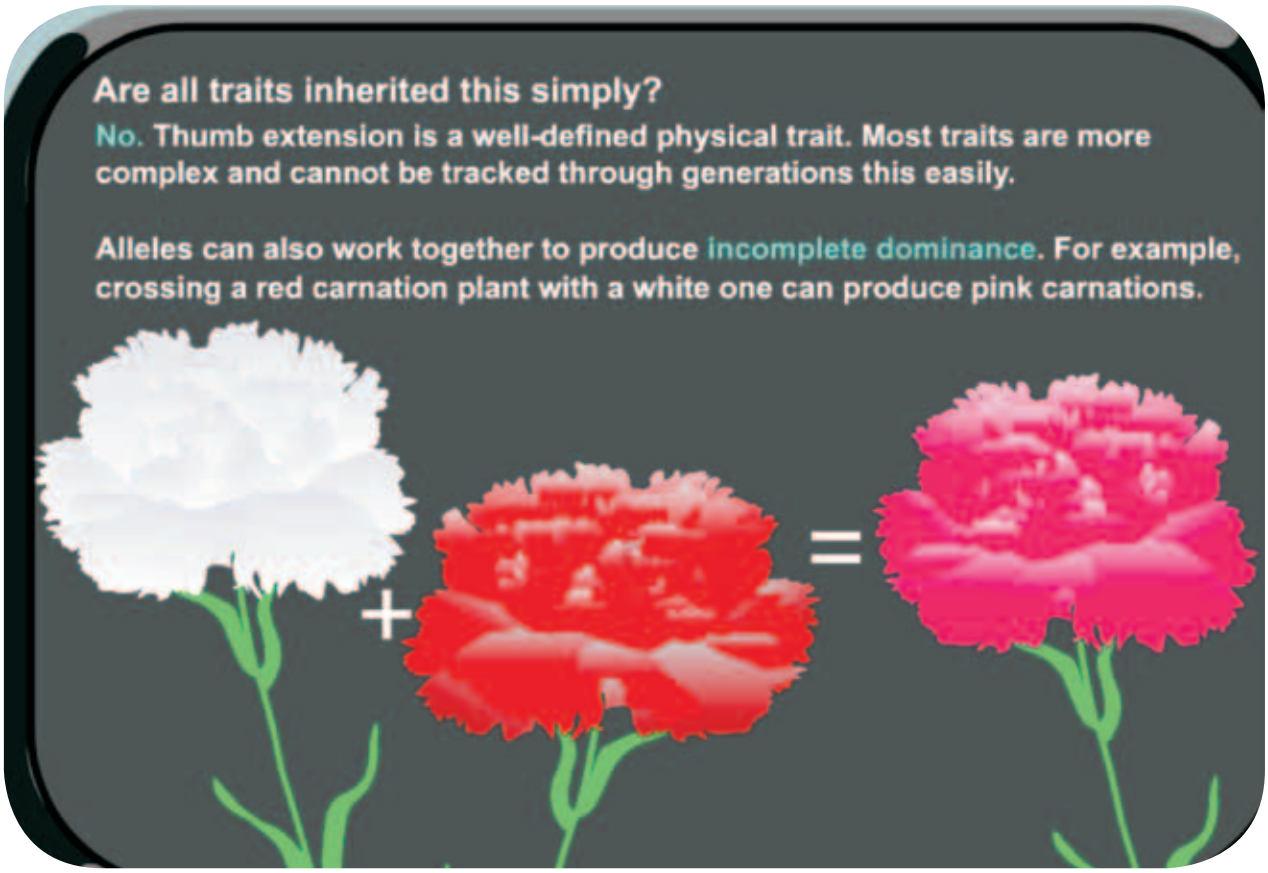
How are our traits determined?

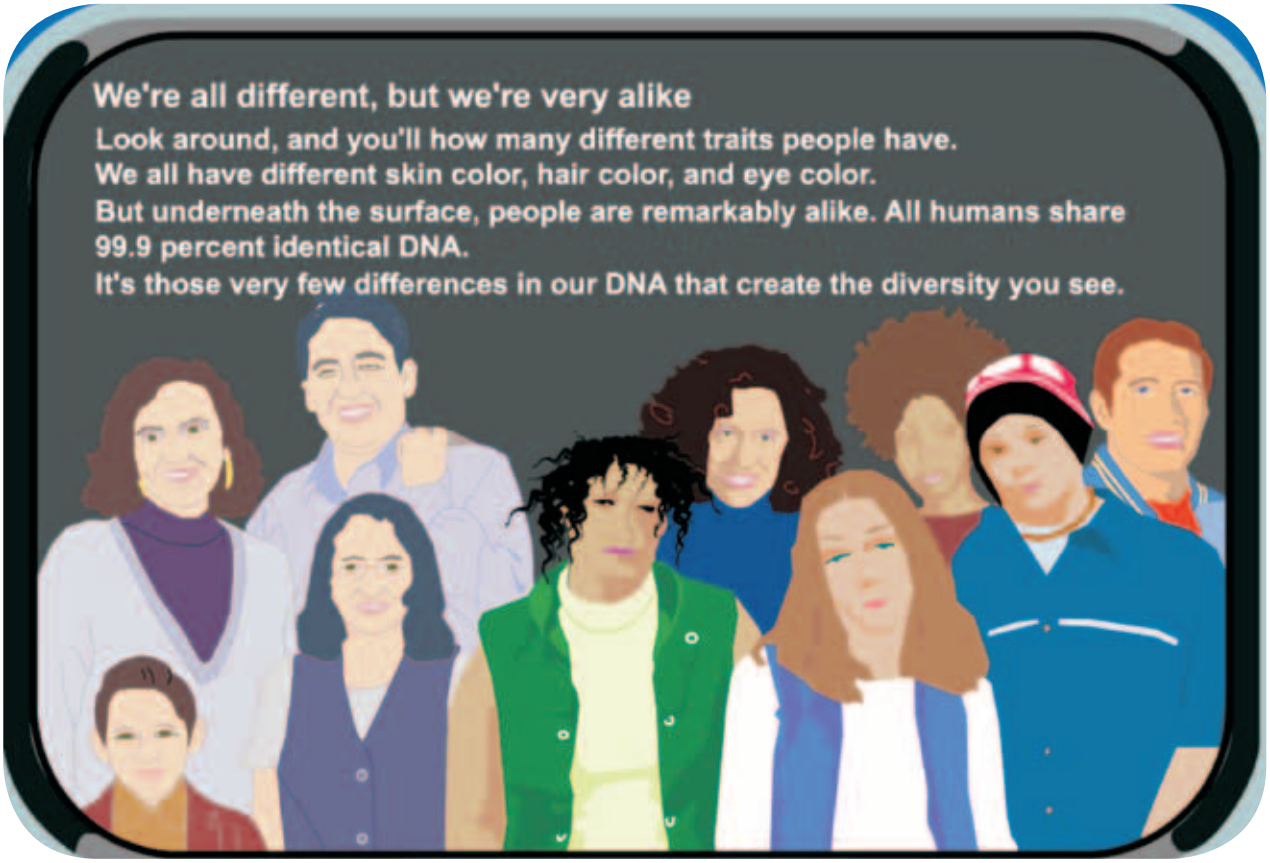
In this case, the H allele is called "dominant," and the masked "h" allele is "recessive".
Scientists use the word "heterozygous" (pronounced HET-er-oh-ZY-gus) to describe having two different alleles for a trait.

H *dominant* **h** *recessive*


How are traits inherited?
Each child from these parents can receive a different combination of alleles.
Hh
Hh
hh
HH
Hh
Hh


One gene, one trait? Not often.
Traits influenced by just one gene are rare. These are called "single-gene traits."
Most of the time, traits are shaped by more than one gene - and sometimes many. These are called "complex traits."
Human Chromosomes
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
X
Y
genes involved in complex trait X


Are all traits inherited this simply?
No. Thumb extension is a well-defined physical trait. Most traits are more complex and cannot be tracked through generations this easily.
Alleles can also work together to produce incomplete dominance. For example, crossing a red carnation plant with a white one can produce pink carnations.
+
=


We're all different, but we're very alike
Look around, and you'll how many different traits people have.
We all have different skin color, hair color, and eye color.
But underneath the surface, people are remarkably alike. All humans share 99.9 percent identical DNA.
It's those very few differences in our DNA that create the diversity you see.

GENES AND DISEASE

Genes are responsible for inheritance of all traits, in an individual. They play an important role in the causation of disease. Most diseases occur due to a complex interaction between environmental and genetic factors. Some diseases occur primarily due to genetic factors. It is important to understand where and how genes exist in our body and how they cause disease.

Cell is the smallest structural unit in the body. Every cell has a nucleus that contains DNA – the genetic material.

DNA in every cell in the body is alike though, functions of all cells in the body are not alike. For example, cells in liver, brain, heart, kidney, blood and other organs have different functions but the DNA in all is similar, in an individual.

- **Mature red blood cells, in circulating blood, do not contain nucleus or the DNA**

  One set of chromosome is obtained from the egg of mother and other set from the sperm of father to form a paired set of 23 chromosomes. **Thus, genes and chromosomes exist in pairs.**

- 22 pairs are alike and are called as autosomes, 23rd pair is known as sex chromosome which is XX in females and XY in males

Chromosomal disorders:

Disorders occurring, due to chromosomal aberrations, are called as chromosomal disorders. These aberrations may be structural or numerical defects occuring in chromosomes.

- There may be loss or gain of a part or whole of chromosome.
- Chromosomal defects are usually not inherited but remain limited to the individual

A gain of chromosome in the 21st pair of chromosome in the condition called Trisomy 21 results in Down syndrome, the commonest cause of mental retardation.

Genetic Disorders:

Genes are situated on chromosomes.

- Genes are made up of codons;
- Each codon consists of three nucleic acids;
- Each gene codes for a protein. In other words, a sequence of nucleic acids on the chromosome that codes for a protein is called as 'gene' sequences of nucleic acids;

Genetic defect is any change, deletion or insertion in the sequence of nucleic acids. This is called 'mutation'

Genetic Disorders are caused by defects or 'mutations' in genes. Defects in multiple genes lead to complex disorders having multi-factorial inheritance but when disorders are caused

by mutations in single genes, inheritance is in simple Mendelian fashion and risks can be predicted.

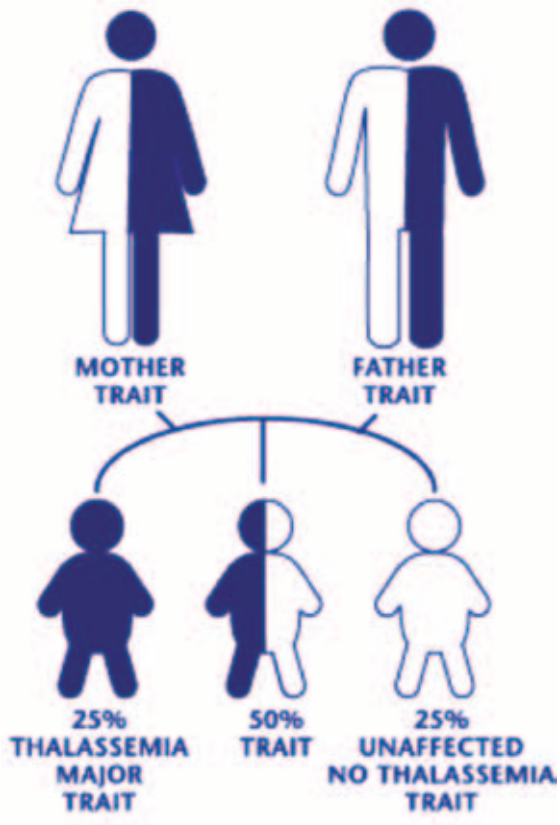
Single Gene Disorders

- Mutation can be Dominant or Recessive;
- Dominant mutation- mutation in one gene of a pair causes disease;
- Recessive mutation- defect in both genes of a pair causes disease;
- Diseases due to recessive mutation have a carrier (trait) state and a disease state;
- Carriers pass the trait to next generation;

Types of Inheritance

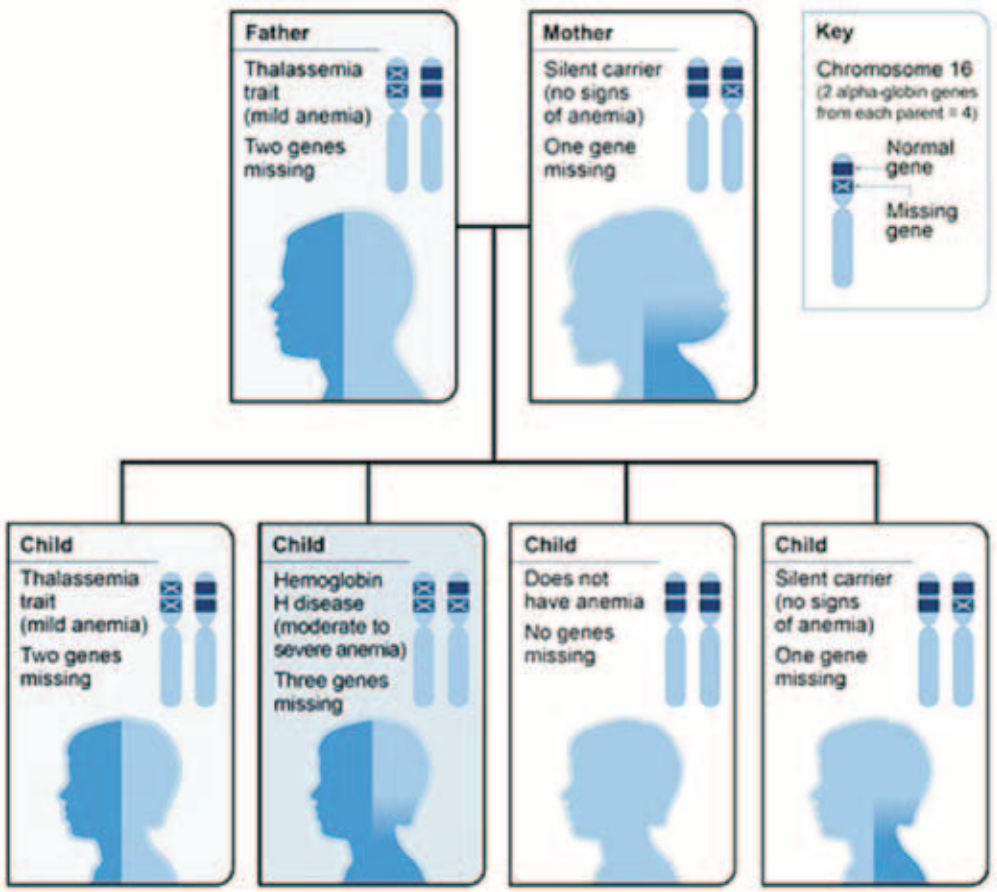
- Autosomal dominant
- Autosomal recessive
- X-linked dominant
- X-linked recessive (Gene on X chromosome)
- Y- linked (Gene on Y chromosome)

Carrier screening of populations can be applied for control and prevention of autosomal and X-linked recessive disorders.

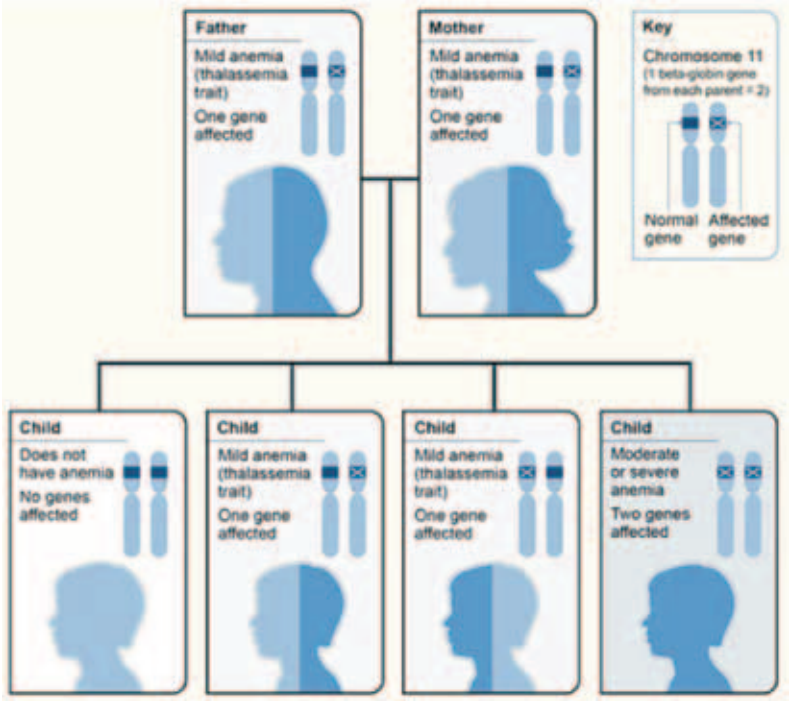


1) Alpha thalassemia has normally 4 genes: 2 from each parent : on chromosome no. 16

2) Beta thalassemia has normally 2 genes : 1 from each parent: on chromosome no. 11



Beta thalassemia with 2 genes



Hemoglobin E or haemoglobin E (HbE) is an abnormal hemoglobin, with a single point mutation in the β chain. At position 26 there is a change in the amino acid, from glutamic acid to lysine. Hemoglobin E has been one of the less well known variants of normal hemoglobin. It is very common in certain parts of India, but has a low frequency amongst other races. HbE can be detected on electrophoresis.

Hemoglobin E disease: Hemoglobin E disease results when the offspring inherits the gene for HbE, from both parents. At birth, babies are normal though the child has inherited defective gene for the hemoglobin E from both parents, however, later on they have a mild hemolytic anemia and mild splenomegaly.

Hemoglobin E trait: It occurs when the gene for hemoglobin E is inherited from one parent and the gene for hemoglobin A, from the other. This is called hemoglobin E trait, and it is not a disease. People who have hemoglobin E trait are asymptomatic and their state does not usually result in health problems. They may have a low mean corpuscular volume (MCV) and very abnormal red blood cells (target cells). Its clinical relevance is exclusively due to the potential for transmitting E or β thalassemia.

Hemoglobin E/β-thalassemia: People who have hemoglobin E/β thalassemia have inherited one gene, for hemoglobin E from one parent and one gene, for β thalassemia from the other parent. Hemoglobin E/β thalassemia is a severe disease, and it still has no universal cure. It affects more than a million people, in the world. The consequences of hemoglobin E/β thalassemia when it is not treated can be heart failure, enlargement of the liver, problems in the bones, etc.

Autosomal recessive Inheritance

- If one of the parents is carrier then there is a possibility of 50% healthy progeny and 50% carriers.
- If both the parents are carriers then there is a possibility of 50% carrier, 25% healthy and 25 % having a child with disease.

X- Linked Recessive Inheritance:

- Defective gene on X chromosome.
- Females are usually carriers.
- Males are affected.
- Examples- G6PD deficiency, Hemophilia, muscular dystrophy.

Genetic counseling in case of genetic disorders:

- Family history- disease occurring in any family member related biologically;
- If autosomal disease and the carrier state is detectable, advise pre-marital testing to avoid marriage between two carriers and post marital testing to avail prenatal diagnosis followed by termination of pregnancy;
- If X- linked disease, advise screening of female members, for carrier state;
- Multifactorial inheritance: advise Avoidance of environmental and nutritional risk factors associated with disease;
- Modulation of lifestyle to counter genetic predisposition;
- Regular checkups for early detection;

Defects at Birth

Questionnaire on 'Defects at birth':

1. Which of the following is not a birth defect?
   (a) Neural tube defect
   (b) Cleft lip and palate
   (c) Congenital cataract
   (d) Rickets

2. Which of the following statements is true?
   (a) Every three seconds, a baby is born, with a major birth defect, in India
   (b) Every three minutes, a baby is born, with a major birth defect, in India
   (c) Every three hours, a baby is born, with a major birth defect, in India
   (d) Every three days, a baby is born, with a major birth defect, in India

3. Which of the following statements is true?
   (a) Up to 20% of birth defects can be prevented
   (b) Up to 50% of birth defects can be prevented
   (c) Up to 70% of birth defects can be prevented
   (d) Up to 90% of birth defects can be prevented

4. When is the best time to take adequate precautions, for preventing birth defects?
   (a) Just after delivery
   (b) At the time of marriage
   (c) During antenatal care period (pregnancy)
   (d) During adolescence

5. Which of the following are preventive strategies, for birth defects?
   (a) Taking a multivitamin with folic acid and avoidance of alcohol and smoking, during pregnancy
   (b) Maintaining healthy weight and having regular antenatal check-ups
   (c) Awareness about family history and genetic risks
   (d) All of the above

*** 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:

I. Introduction Session (15 minutes)

II. Understanding the basics

III. Learning the tools

General Instructions

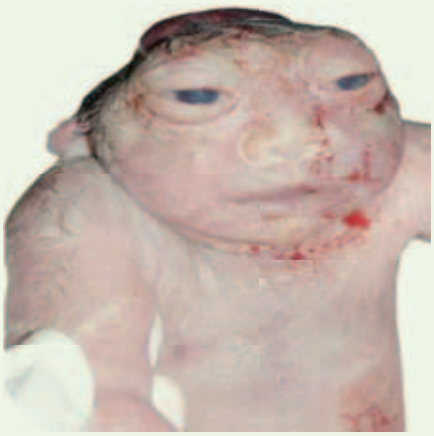
Before starting the training the trainer should keep the following points, in mind:

1. Training material that should be available, at training site: Rectangular paper, glue, medium size bowl (katori), a lawn tennis ball, a small thin
2. The training should make the session as interactive as possible
3. Use of pictures before, in the middle and at the end of the teaching session, can help them understand, this complex topic better.

I. Introduction Session

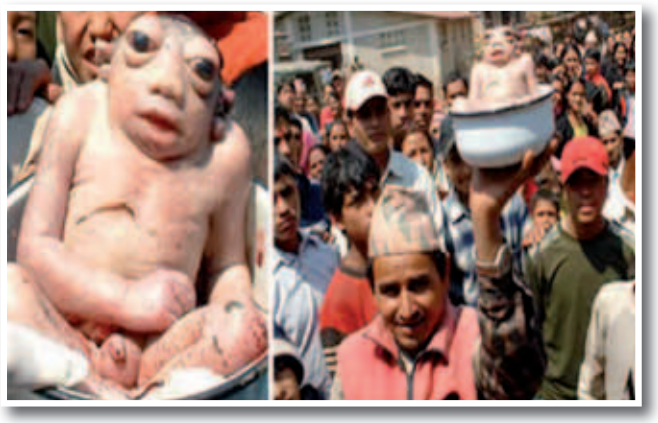
- The trainer must show pictures to the trainees and gather their views about the understanding of what the picture is suggestive of;
- Response of the trainees has to be documented on the white board/chart paper;
- Later, while summing up the introduction session the trainer must compile the views and co-relate it with the key messages provided, in the manual and discuss it with the participants;

Session 1A



- Have you ever seen this, human form, before in your area/locality?
- If yes, what came to your mind when you first saw this?
- What were the responses of the community?

***Instruction for trainer**- Capture responses of a minimum of 7-10 trainees and document them;

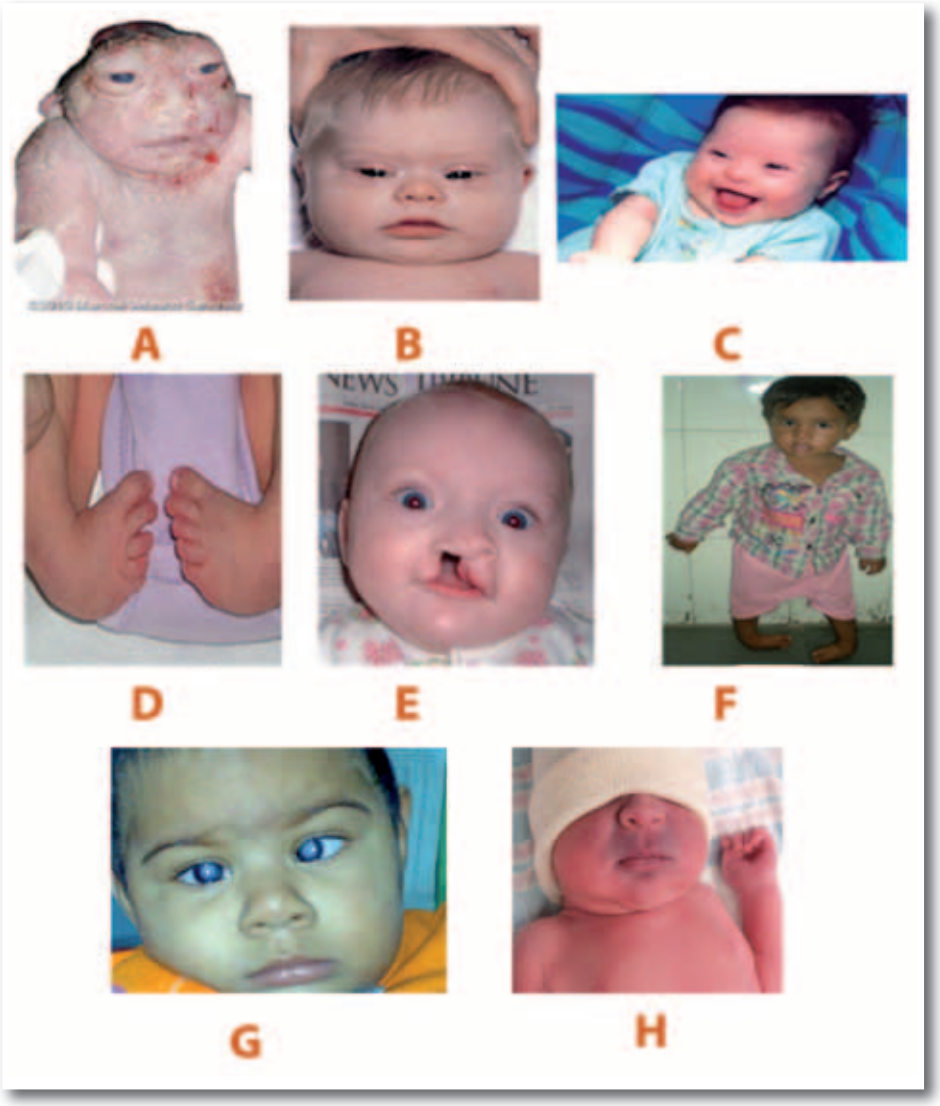


Key Messages by the facilitator

- Can Happen to anyone, regardless of economic status;
- Parents should not be blamed;
- Communities' perspective, beliefs, myths (result of past wrong doings), should be rationally explained to the trainees;
- Some of the birth defects can get cured, through timely intervention;
- RBSK program envisages timely referral to DEIC and for further evaluation and treatment;

Session 1B

Observe the pictures and identify the anomalies



Answers:

Fig A is anencephaly

Fig B and C is Down's syndrome

Fig D is Club foot

Fig E is Cleft lip /Cleft palate

Fig F Child is again a Club foot

Fig G Child has Congenital Cataract

Fig H Child with Cyanotic Heart Disease

Session 2: Birth-defect or Defect at Birth

1.1 Introduction

1.2 Birth defects are structural or functional abnormalities, present at birth, that can cause physical or mental disability, some may be fatal. Example if a child is born with cleft lip or palate, this is a structural defect, but because of this the child has feeding or speech problem, this is the functional defect and if not corrected this can lead to disability.

The prevalence of birth defects is 4-6 percent[3] among live births, globally, as well as in India. Birth defects may affect a single organ of the body or be present as multiple organ defect. Both genetic and environmental factors play a role in their pathogenesis. The families with previous history of birth defects have a higher chance of birth defect in subsequent pregnancy.

Major Contributors

1. **Genetic**-Caused when one or more gene doesn't work properly;
2. **Environment**-Women exposed during pregnancy to Rubella/German measles, alcohol, smoking, drugs - painkillers, anti-depressant, drugs for asthma-corticosteroids, anti-convulsants, medicines for thyroid diseases, uncontrolled diabetes and obesity in mother;

Some common birth defects are

- Neural tube defect
- Down's Syndrome
- Cleft Lip & Palate / Cleft palate alone#
- Club foot
- Developmental dysplasia of the hip
- Congenital Heart Diseases
- Congenital cataract

1.3 Prevention of birth defects:

Defects present since birth can be major anomalies, visible at birth, requiring immediate attention or invisible, internal organ defects, which may be missed and brought to light later on in life. 70% of birth defect can be prevented during antenatal period through regular check and care.

- Taking 5 mg of folic acid daily, starting from the day of marriage till 3 months after testing positive for pregnancy. This will prevent neural tube defect in the newborn;

[3] March of Dimes, 2006 Global Report

- Regular Antenatal checkup at least three times during pregnancy-
    1. Identification of and keeping diabetes under control;
    2. History of anticonvulsant drug like valproate; Use of medicines during pregnancy is found to increase risk for birth-defect;
    3. Medication--Mothers taking painkillers, anti-depressants, drugs for asthma-corticosteroids, anti convulsants, medicines for thyroid diseases, must discuss with the doctor during antenatal visit;
- Family members to maintain positive environment at home by avoiding any maternal stress and domestic violence;
- Maintain good hygiene by adopting safe sex practices and personal hygiene to prevent infection during pregnancy;
- Immunizations like Rubella vaccine[4] if given during adolescence can prevent a mother against certain infections, which in turn would prevent some birth defects;
- Smoking and alcohol consumption to be strictly avoided, during pregnancy;
- Contact with cats to be avoided, during pregnancy (To prevent Toxoplasmosis infection);
- Maintain a healthy weight;

Frequently Asked Questions

1. What is a birth defect?

A "birth defect" is a health problem or physical change, which is present in a baby at the time he/she is born. Birth defects can be mild, where the baby looks and acts like any other baby, or birth defects may be very severe. Some birth defects affect single organ while others affect multiple organs of the body. A few birth defects are visually easy to identify like cleft palate some others like congenital heart disease cannot be identified, without the knowledge of signs and symptoms.

Birth defects are also called "congenital anomalies" or "congenital abnormalities." The word "congenital" means "present at birth." The words "anomalies" and "abnormalities" mean that there is a problem present, in a baby.

2. What are the genetic and environmental causes of birth defects?

When a baby is born with a birth defect, the first question usually asked by the parents is "how did this happen?" Sometimes, this question cannot be answered. This can be very upsetting, for parents, because, it is normal to seek an answer as to why your baby has a health problem. For some birth defects, however, there is a known cause, which may have to do with either genetic or environmental factors, or a combination of the two. Here is some general information and terms related to the different causes of birth defects:

[4] This is not part of current RI program in the country

Inheritance

Inheritance is a word used to describe a trait given to you or "passed on" to you from one of your parents. Examples of inherited traits would be your eye color or blood type.

Chromosome abnormalities

Chromosomes are stick-like structures in the center of each cell and a change in its normal structure can lead to birth defects. For example Down syndrome is caused, generally, by mutation in chromosome 21.

Teratogens

A teratogen is an agent, which can cause a birth defect by affecting chromosomes/genes usually, in the first trimester. It could be a medication, a substance of abuse, alcohol, or an infectious viral disease like rubella (typically presented by fever with rashes and which can affect anybody), radiation exposure.

3. Why are birth defects a concern?

Birth defects are a concern as some of them cause life-long disability and illness, and with some, survival is not possible. Some birth defects that result in mentalretardation, may become completely irreversible if not intervened in, medically, in time. Early detection and management can help a child lead near normal life . Many physical defects, if detected early, can be treated with surgery, including cleft lip or palate, and certain heart defects.

Key Messages for Community

1. Birth defects can occur, in any family, regardless of economic status or education or social background;
2. Up-to 70% of Birth defects can be prevented;
3. A family can increase its chances of having healthy babies by promoting women's health conditions and adopting healthy behaviors, before she conceives;
4. Family must ensure that all pregnant women must get registered with a health worker, at the earliest, and undergo regular Ante-natal checkups;
5. A pregnant woman, in her first trimester, must consume folic acid, daily, to prevent birth defects in the newborn;
6. Couples' family history is important and marriage among close relatives must be avoided especially, in families with history of birth defects;
7. Minimizing unnecessary medication exposure and radiation exposure/smoking/ alcohol in pregnancy;
8. Contact with cats, during pregnancy, must be avoided;

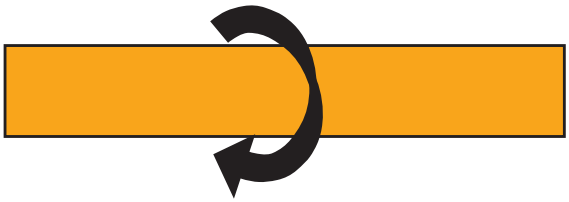
1. Neural Tube Defects

Introduction

Neural tube defect (NTD) is birth defects of the brain and spinal cord. NTDs occur when the neural tube, the structure that develops into the brain and spinal cord, fails to close completely. NTDs may occur in the first few weeks, after conception.

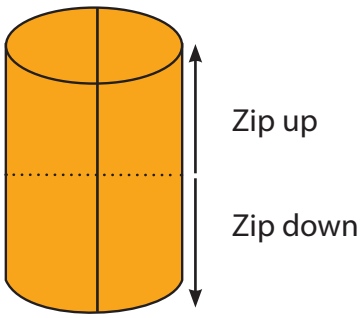
Exercise one

1. Take a rectangular paper roll it along the longer edge side;

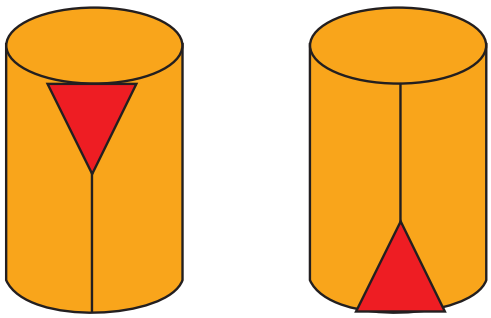


2. Make a tube by applying glue;
3. Put a nick, at the top end, in the middle and at bottom;
4. Ask the participants what will happen if, there was something inside the tube and these nicks were made;
5. This will help them understand neural tube defect better;
6. ***Remember Zip up & Zip down!**

The facilitator should highlight that the neural tube is formed before the mother comes to know about the pregnancy and hence it is important that she consumes folic acid (which is a vitamin, which is not stored in the body and hence has to be replenished every day), before she conceives/or plans to conceive. The defect at the top results:

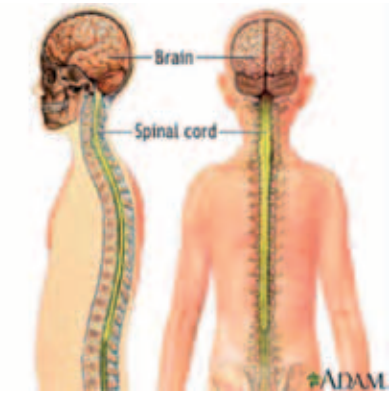


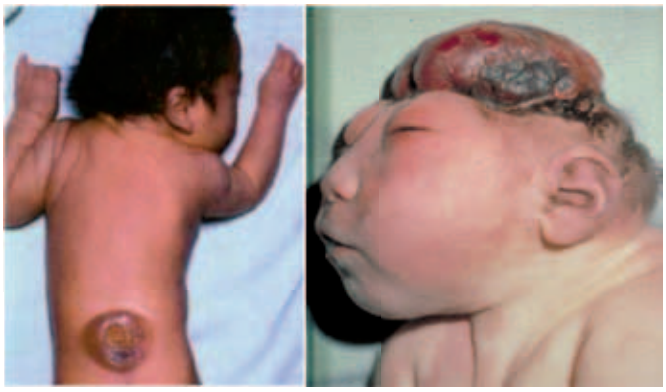
Normal (Fused Neural Tube)



Neural Tube with Defect Non fusion in upper and lower ends

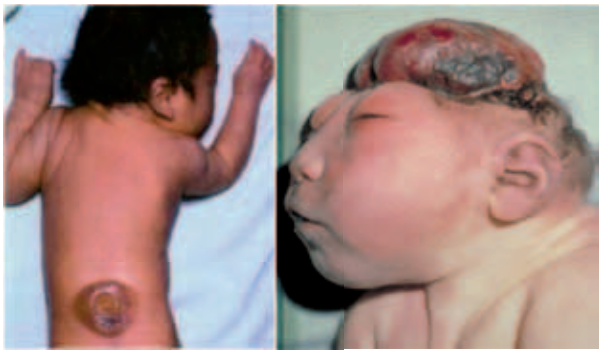
Picture





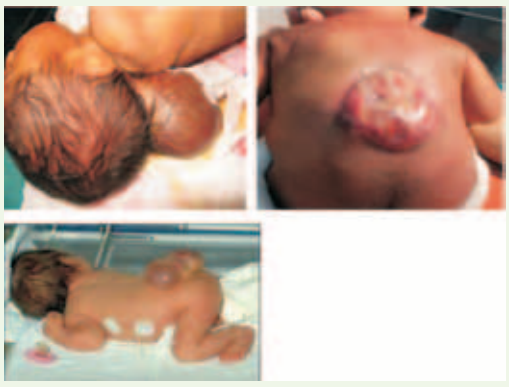
Types of NTDs: The two most common neural tube defects are spina bifida and anencephaly /meningomylocoele.

1. In spina bifida, the tube doesn't close completely during the first month of pregnancy. There is, usually, nerve damage that causes at least, some paralysis of the legs;
2. In anencephaly, much of the brain does not develop. Babies with anencephaly are either stillborn or die shortly after birth.



Spina Bifida Anencephaly

Signs and Symptoms-(At Birth –Delivery points)

Look	• Where is the swelling? Back or head? • How does it look like? Refer picture. • Is there any discharge from the back? • Can the child move both the lower legs? • Is there constant leakage, of stool, through the anal opening?	

Perform	• Examine the trunk, along with spontaneous movement of the legs, • To differentiate between reflexive and purposeful limb movement • Take a pin, for a mild painful stimuli, prick in the foot and look for a withdrawal movement

Action

- Handle the infant with a sterile, non-latex gloves and with sterile clothing and sheets.
- Cover the defect with non-adhesive dressing wet with sterile Ringer's lactate solution or saline.
- Refer to district hospital /nearest referral point with facility, for tertiary care

Key Messages to the Community

- Expectant mothers and their families must be counseled, on the importance of folic acid. Advise women to take a dose of 5 mg folic acid daily, after marriage, and to continue until they are 12 weeks pregnant (First Trimester). Please remember, Folic Acid should be taken regularly as it is, usually, not stored in our body.
- Pregnant women, already, having diabetes or those who are under anti-convulsant treatment must be advised to take 5 mg of folic acid and supplement with folic acid rich food like green leafy vegetables.
- Inform, an expecting mother, that alcohol and smoking in any amount, at any time of pregnancy, is harmful.

2. Down's Syndrome

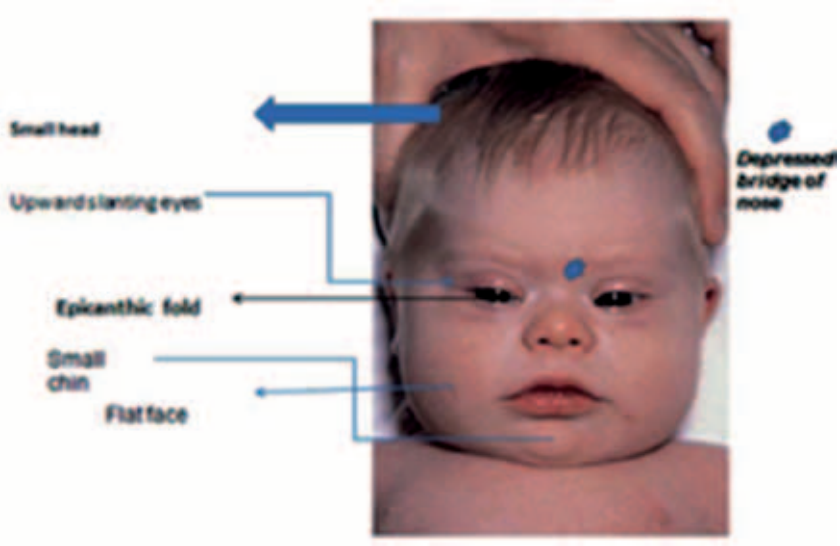
2.1 Introduction

Down syndrome is a genetic condition. The commonest form of Down syndrome is called Trisomy 21. The condition leads to problems in the way the body and brain develop. Down's syndrome is the most common single cause of human birth defects. It affects about 1 in every 800 babies. The chance of having a baby with Down syndrome increases significantly with the mother's increasing age. However in our country majority (in terms of absolute numbers) of Down Syndrome is contributed by mothers of younger age group. Children with Down syndrome have a widely recognized appearance. Physical and Mental development is often slower than normal. Most children with Down syndrome never reach, their average adult height.

Points to remember

- About 50 percent of babies with Down syndrome have a congenital heart defect. Some defects are minor and may be treated with medications, while others may require surgery.
- Children with Down syndrome are at increased risk of thyroid problems, which they may develop at any time, in life (30%). Regular screening for hypothyroidism is helpful as it can be treated otherwise, it would increase the mental retardation.
- The degree of mental retardation that accompanies Down syndrome varies widely, ranging from mild to moderate to severe. However, most mental retardation falls within the mild to moderate range. They can be educated with some special effort.
- Children with Down syndrome are also at increased risk for visual and hearing impairment.
- Common visual problems include crossed eyes, near- or farsightedness, and cataracts, which can be treated.
- Physical and Mental development is often slower than normal.

Can you spot any difference between these two babies?

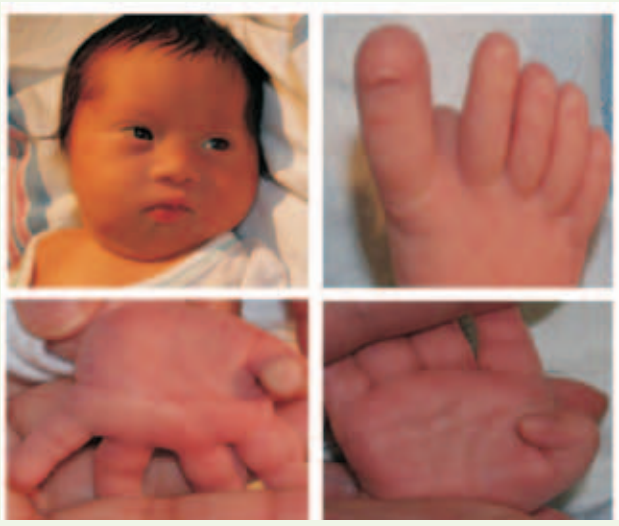


The name Down Syndrome comes from the physician Dr Langdon Down, who first described the collection of findings in 1866.It was not until 1959 that the cause of Down's Syndrome (the presence of extra #21 Chromosome) was identified.

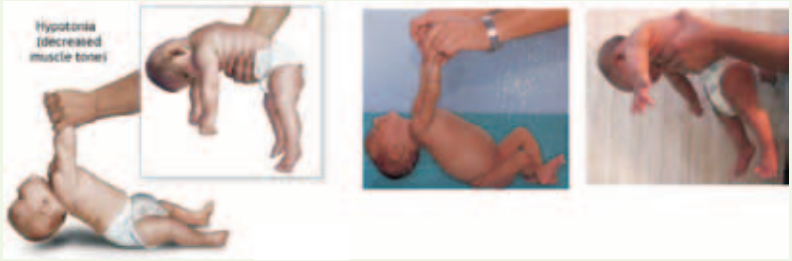
2.2 Signs and Symptoms

Look

1. The head may be smaller than normal and abnormally shaped.
2. Upward slanting eyes and inner corner of the eyes may be rounded instead of pointed.



3. Small ears
4. Flattened nose
5. Small mouth
6. Excess skin at the nape of the neck
7. Single crease in the palm of the hand (Simian Crease)
8. Wide, short hands with short fingers
9. Cleft in feet(Refer to picture above & below)

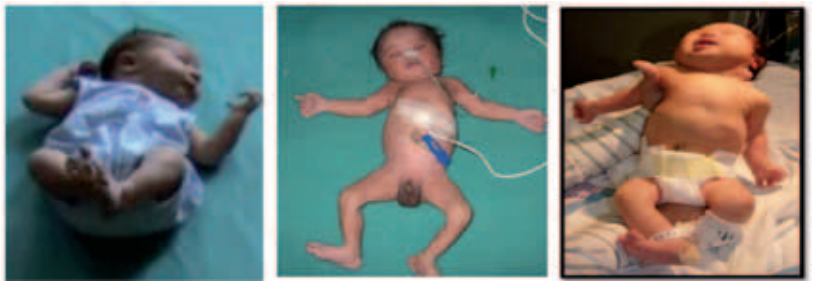
Ask	**At birth–delivery point up to 2 months** • Is this your first child? • What is your age? • Does any other elder sibling of this child have any known birth defect? **Age 2 months to 2 yrs** • Compared with other children, did (name) have any serious delay in sitting, standing, walking? • Can he/she name at least one object (animal, toy, cup, and spoon)? • Does (name) speak at all (can he/she make himself/herself understood in words; can he/she say any recognizable words)? • **Ages 3–9 Years:** Is (name)'s speech in any way different from normal?
Perform	• Decreased muscle tone at birth (Refer to section 3.5 to test it) 

2.4 Action:

Check the muscle tone: Decreased muscle tone at birth in Down syndrome

Now look at the posture i.e. way the child is lying and moving his/her limbs

Now look at this baby with Down syndrome:



Normal | Down Syndrome with "frog" like posture | Down Syndrome with low tone

The child has both the legs extended and falling passively on the mat like a frog and the hands also, helplessly, on the bed, with very little spontaneous movements, of the limbs.

When this baby was lifted, the examiner had to give much more support to the head and shoulders, than is usual, to keep the infant from sliding, out of her hands. Notice, how the both arms fall back (instead of being held in flexion), and the baby's chest seems to drape over the physician's hand.

This is because the tone of the muscles, in this baby, is less than what is normally seen, in newborns.

2.5 Counselling

To prevent any stigma it should be made clear to the parents that the problem can be from any parent's side. It could be from thefather or the mother, hence, nobody should be blamed.

- Parents and family must be counseled that the Early Intervention Services, if begin within first 3 months (after birth), ideally , enhances development, of their full potential.
- Quality educational programs, along with a stimulating home environment and good medical care enable people, with Down syndrome, to become contributing members of their families and communities.
- Children with Down syndrome need to be closely screened for certain medical conditions. They should have:
    - Eye exam every year during infancy;
    - Hearing tests every 6 - 12 months, depending on age;
    - Dental exams every 6 months;
    - X-rays of the upper or cervical spine between ages 3 - 5 years;
    - Pap smears and pelvic exams, beginning, during puberty or by age 21;
    - Hormonal essay for Thyroid hormone, for the baby, must be repeated after every 12 months;
    - Echo cardiography of heart, once a year;

2.6

Key Messages for Community

- Regular and good quality Antenatal Care is very important, in a woman, who has a previous h/o delivering baby with Down syndrome. Even though, the causative factors are not known but in Trans-locational type of syndrome genetic transmission does occur;
- With early intervention, Down's syndrome children can lead a near independent life;
- Speech can be improved with the help of parental encouragement and speech pathologist;
- Repeated thyroid tests should be done to start, timely treatment as this would prevent mental retardation;
- These children love music, are very affectionate towards their parents and are simple human beings (Gunter Grass-Nobel laureate);

2.7 FAQ

What is tone of the muscle?

The term muscle tone refers to two aspects of muscles' structure and function. Tone is usually defined as the minimal contraction, at rest.

What is Muscle Structure?

The inherent stiffness of a muscle - its resistance to being stretched and firmness when palpated (squeezed). Feel the muscles of a young adult and that of an old person. In the old person it is soft as there is very little resistance, whereas in the young person the feel is firm. Similarly compare the muscle feel of a normal child with that of a child with Down Syndrome.

What is the Function of Muscle?

For a muscle's (or groups of muscles') readiness for action, we require two kinds of actions one at rest and another during motion. At rest, muscle tone helps us to maintain our posture against gravity, whether lying on the bed or sitting or standing normally. So we need to watch the posture, both in a normal child and in a child with decreased muscle tone. During motion i.e. when we walk or run, good muscle tone would help in normal pattern of activity.

The term low muscle tone is used when the muscles' stiffness is less than usual (i.e. it is low) and the readiness for action is also low (muscles respond slowly).

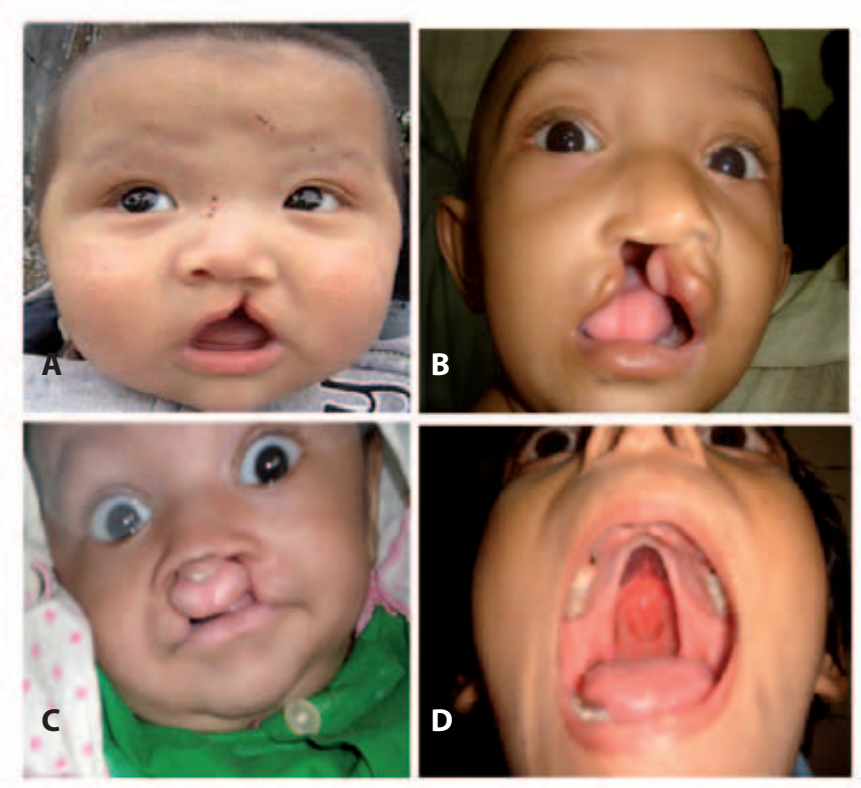
3. Cleft Lip and Cleft Palate

3.1 Introduction

Cleft lip and cleft palate are congenital anomalies of the mouth and lip that occur during pregnancy. In a cleft lip, the two sides of the lip do not fuse together as they should during fetal development. With cleft palate, the roof of the mouth fails to form completely, during pregnancy. A child may be born with a cleft lip, a cleft palate or both.

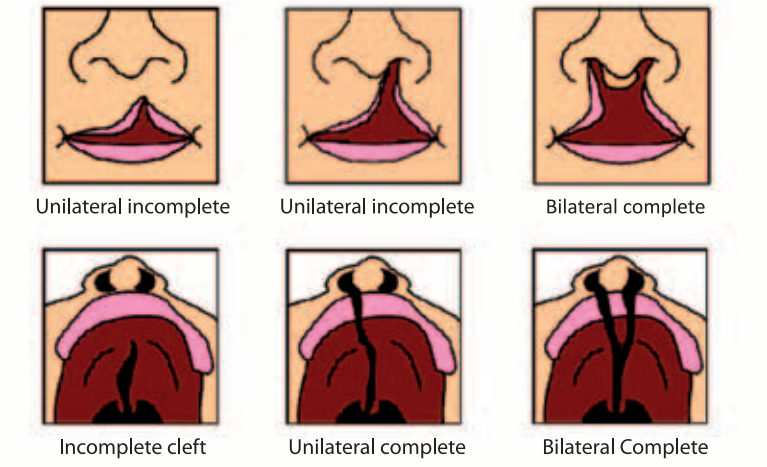
Cleft lips can be as mild as a slight notch in the red part of the upper lip that does not require emergency treatment and as severe as a severe cleft lip involving total separation of the lip, all the way up, into the nose.

Cleft lips can involve a single cleft (which is known as a unilateral cleft), or a double cleft (bilateral cleft). They invariably occur on the upper lip. Cleft palates can range from a tiny little hole in back of the roof of the mouth to a major cavity that runs all the way from the front to the back of the mouth. This creates an opening between the roofs of the mouth. Smoking by mother and diabetes are two of the associated causes for cleft palate in newborns as per National Birth Defects Prevention Study done in United States. Cleft lip is common in males. Cleft palate is more common in females.



Cleft Lip and Palate

a. Signs and Symptoms

Look	**Delivery Point –At birth** • Cleft lip is obviously visible; • Gently open child's mouth and look; • After cleaning the finger or wearing gloves, you can try to palpate carefully for any cleft in the palate; **2 months -2 years (by mobile team)** • Cleft lip is obviously visible; • Mother will take the child in her lap, in a sitting position; • Ask the mother to gently open the child's mouth, neck to be extended and child must look towards the sky/roof/toy; In small children after cleaning the finger or wearing gloves, you can try to palpate carefully for any cleft in the palate; **Schematic Representation** 
Ask	• Does the child have regurgitation of food and liquids, through the nose? • Is the baby having difficulty in sucking? • Does the child have nasal tone of voice? • Does the child have frequent respiratory tract infection?
Perform	Counsel the parents before referring the case

b. Action

Peripheral oral examination and perceptual assessment are the necessary first steps in cleft palate speech evaluation because treatment is recommended only when speech impairment is perceived.

c. Counseling

- In this case parent counseling is very important;
- Teach parents how to feed the child;
  - Breastfeeding an infant with cleft palate may not be successful; it may require a changed feeding position so that **mother's breast tissue fills the gap in the lip or gum**;

- **Breastfeeding** an infant with a cleft palate is quite challenging unless the infant's cleft palate is very far in the back of the mouth and very small. Nursing at the **breast is best limited to 10 minute sessions**;
- For most mothers of infants with cleft palate, breast pumping should begin in the birth hospital using a high quality breast pump and continue after each infant feeding. A long thin spoon to be used to feed the infants if direct sucking is not possible

- The goals of treatment for cleft lip and cleft palate are to ensure the child's ability to eat, speak, hear and breathe and to achieve a normal facial appearance.
- Surgeries typically are performed in this order:
  - Cleft lip repair — between 1 and 4 months of age;
  - Cleft palate repair — between 5 and 15 months of age;
  - Follow-up surgeries — between age 2 and late teen years;

3.5 Key messages

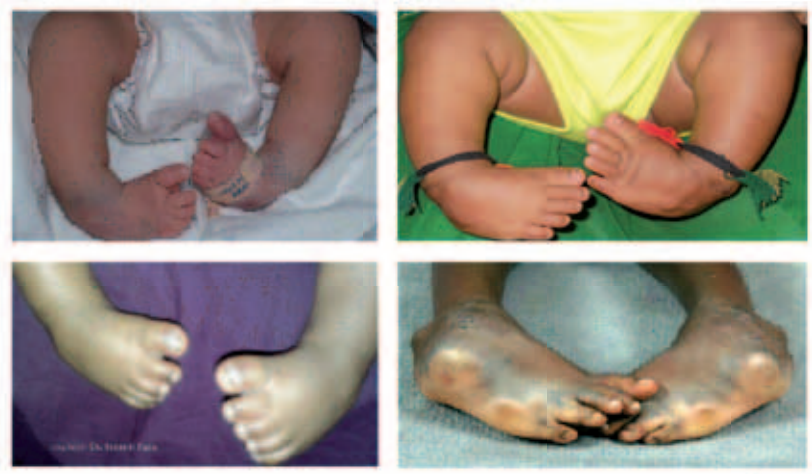
If not treated, this condition may lead to

- Poor speech;
- Impaired hearing and frequent ear infection;
- Regurgitation of food and liquids, through the nose;
- Frequent upper respiratory tract infections;
- Dental and orthodontic problems;
- Psychological and social problem;
- Failure to grow;

4. Club foot (Talipes)

4.1 Introduction

Clubfoot is a congenital deformity that twists the foot, ankle and toes, if not treated at an early stage, this deformity can lead to life time disability. With no proper treatment, child born with clubfoot cannot walk, run or play. Clubfoot is one of the most common congenital physical disabilities worldwide, known to occur in 1-3 of every 1,000 births worldwide with evidence of higher rates in our country. The cause is not known, but the condition may be passed down through families in some cases. The milder deformity may be due to position of the baby, in uterus.



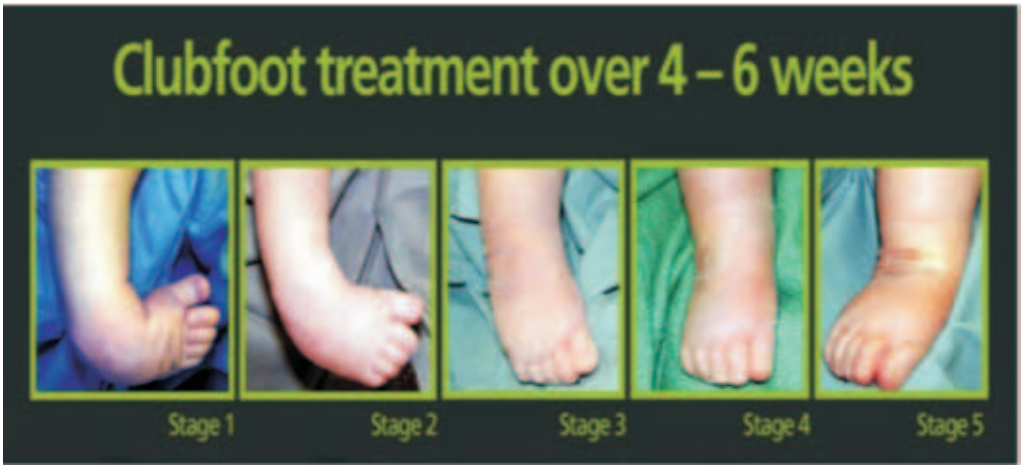
Untreated Neglected feet

4.2 Signs and Symptoms

Look	• Abnormal shape of the foot Inward turning of the front of the foot • Downward-pointing toes • Resting of the foot on its outer border • Rigidity and other changes in the movements of the foot • Toes cannot touch shin of same leg due to tightened Achilles tendon
Ask	If child is more than two years ask mother if child can walk, run or play like other children of his/her age?
Perform	Counsel and Refer the child

Counseling

- If the deformity is mild and the foot is mobile, at ankle, the mother can be reassured that doctors will teach her exercises to help correct child's foot;
- Refer to an orthopedic surgeon without delay and explain the parents this can be treated using a series of plaster casts over 4 - 6 weeks to correct the deformity, immediately followed by use of Braces;
- Majority of the children require a small surgery (cut the tendon at the back of the heel) prior to the final cast being applied, done using local anesthetic;



Before treatment

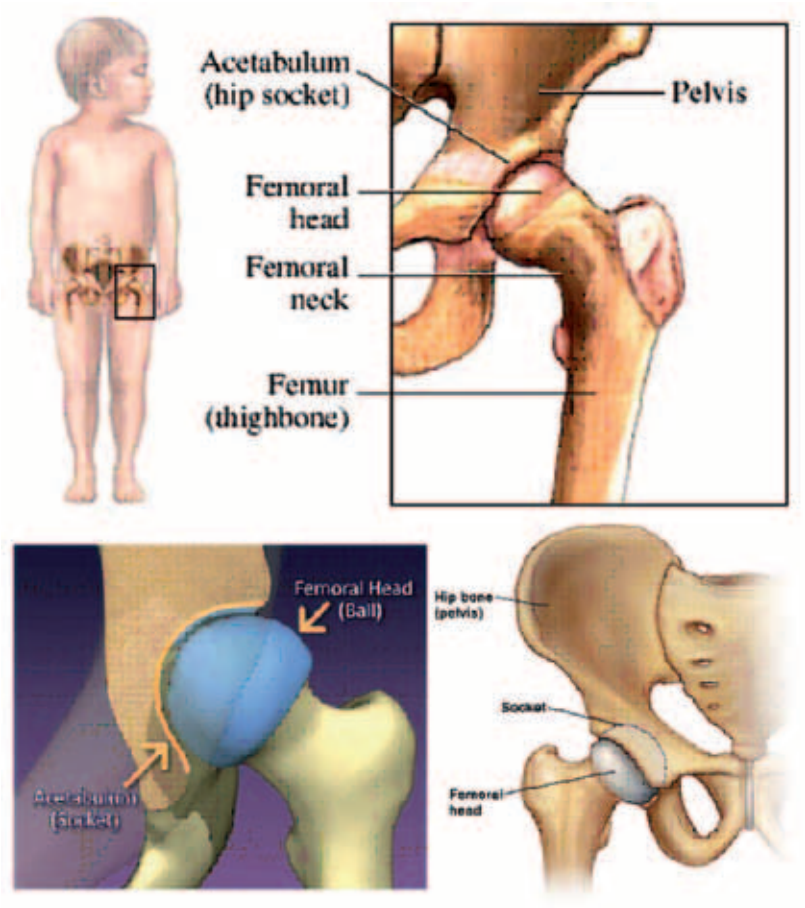
After treatment

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.

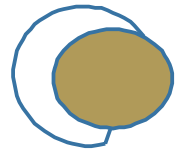


Hip dysplasia refers to an abnormality in the size, shape, orientation, or organization of the femoral head, acetabulum, or both.

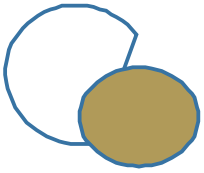
Acetabular dysplasia is characterized by an immature, shallow acetabulum and can result in subluxation or dislocation of the femoral head. In a sub-luxed hip, the femoral head is displaced from its normal position but still makes contact with a portion of the acetabulum. With a dislocated hip, there 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

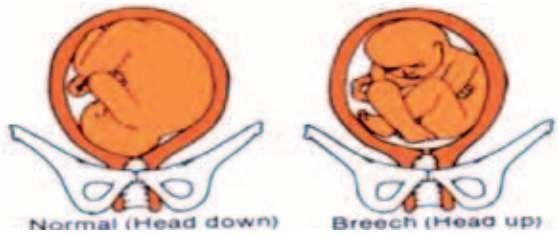
2) Assure follow-up at the age of 6 weeks, 3 month, 6 month and 12 month at the District Early Intervention center or trained pediatrician at the Block or Subdivision level;

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.

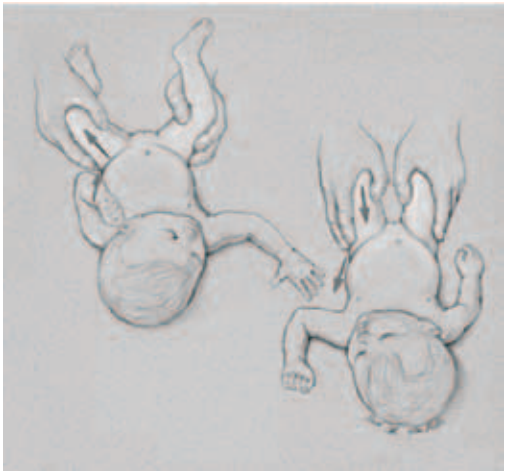
If any test is positive refer for USG at 6 weeks at DH/ DEIC and again for clinical examination at 6 weeks, 3 month, 6 month and 12 month at DH/DEIC

- 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



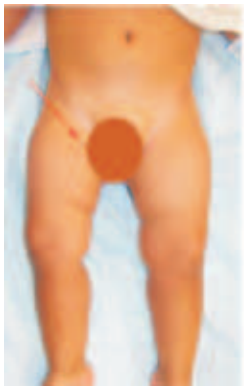
subluxate or dislocate an unstable hip posteriorly. These tests, generally, are only useful in infants three months or younger. Thereafter, soft tissue contractures limit the motion of the hip, even if it is dislocated.

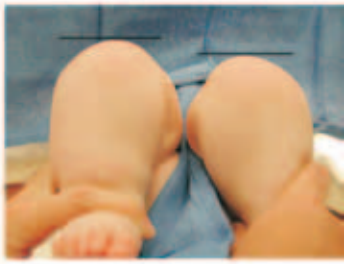
Tests commonly used to assess hip stability.
(A) Ortolani maneuver - A gentle upward force is applied while the hip is abducted.

(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;

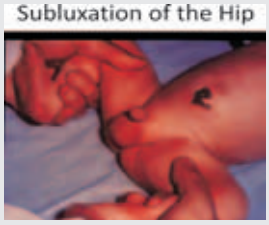
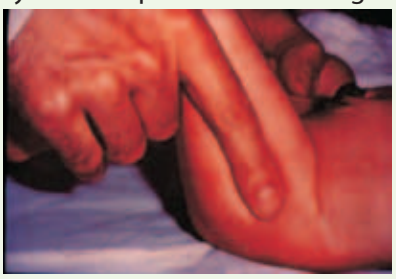
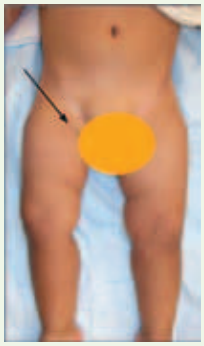
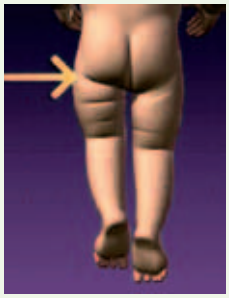
Barlow maneuver: "B" stands for **Band** (*in Hindi) or close : Hip is adducted and you may dislocate a unstable hip joint posteriorly;



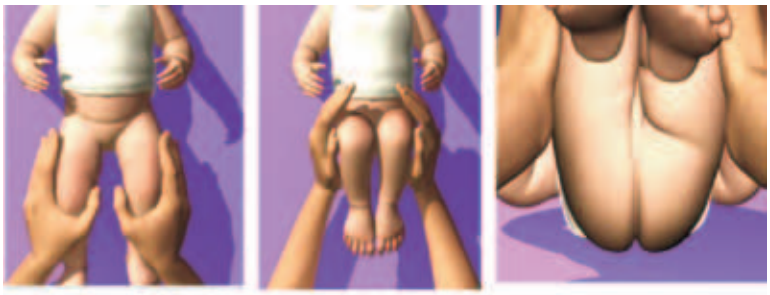


With Infant on a firm flat surface and hip and knees at 90°, turn the hip outwards for any restriction in the range of motion

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

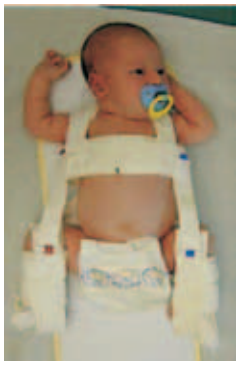


Above: measuring the length: Infant on his back on a firm flat surface, pelvis stabilized and hips flexed to 90 with knees in flexion. Vertical level of knees is assessed.

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

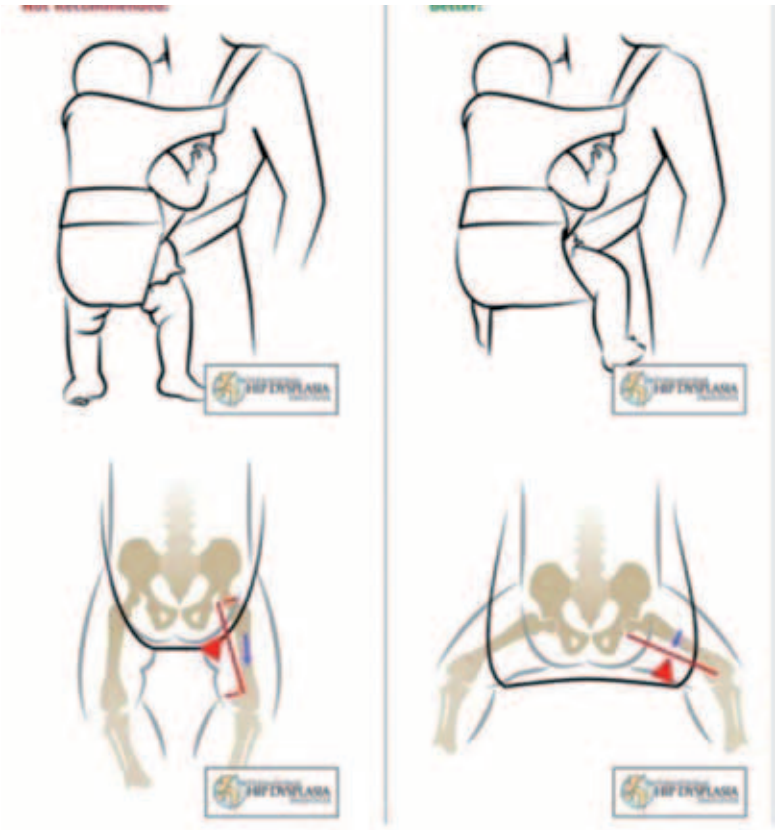
Explain the correct position: Swaddling infants with the hips and knees in an extended position increases the risk of hip Dysplasia and dislocation, so best is to carry the child as shown in the picture below.

Action: Refer for examination at CHC/DH.

Good practice

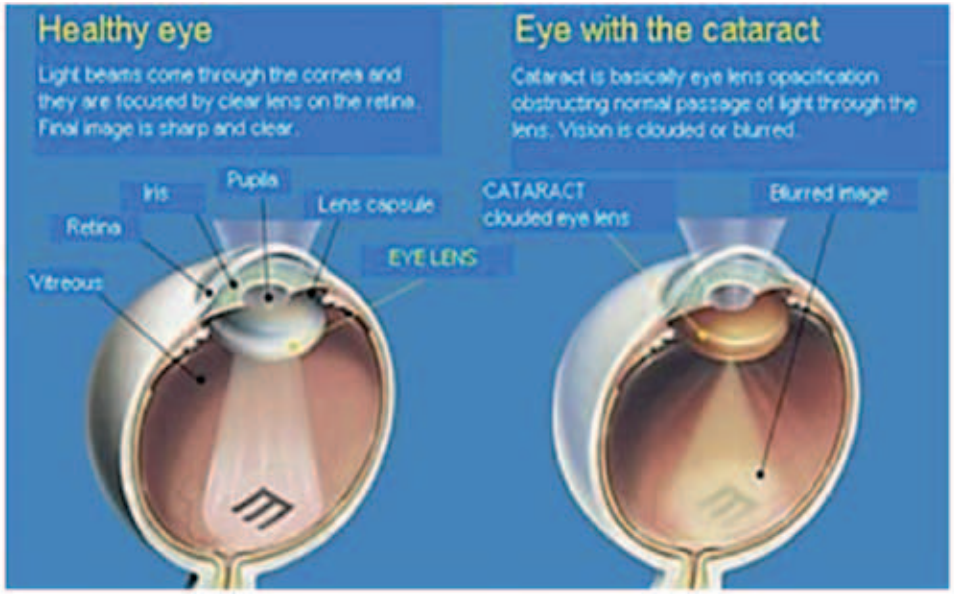
Baby Harness:

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.

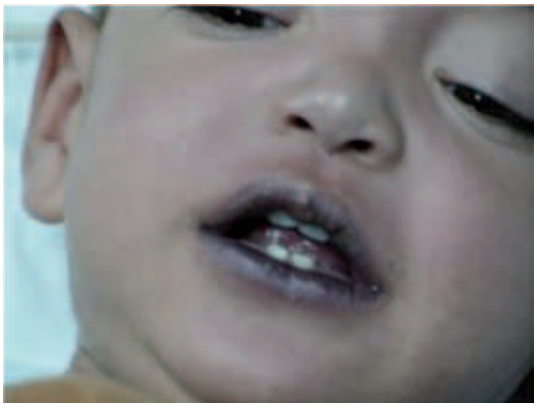
9. Critical Congenital Heart Defects (CCHD):

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;

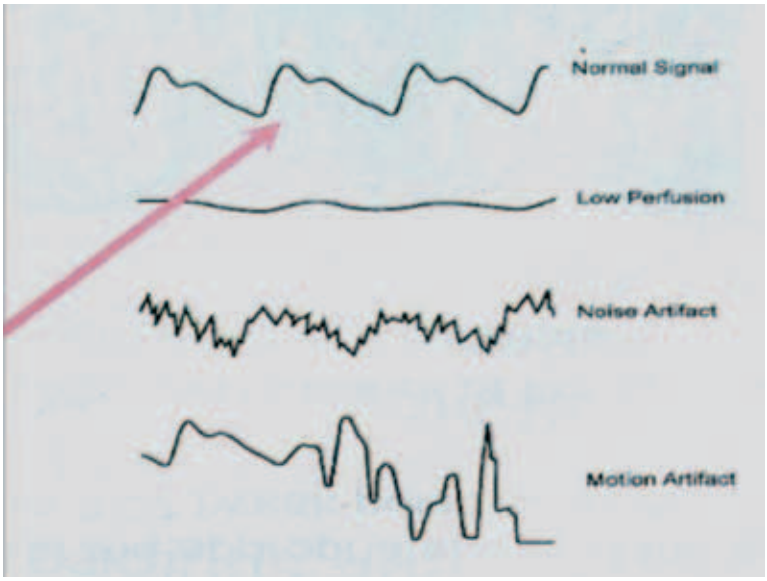
Prior to screening, Parents should be counseled about the importance and methodology of screening in simple messages, as under:

- 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?

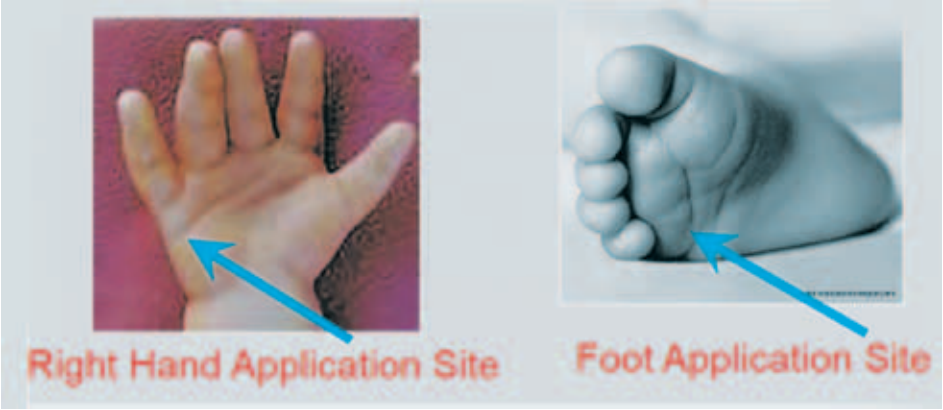
Ans. Simplest way is by Newborn screening using pulse oximetry, before the newborn is discharged.

Counselling

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

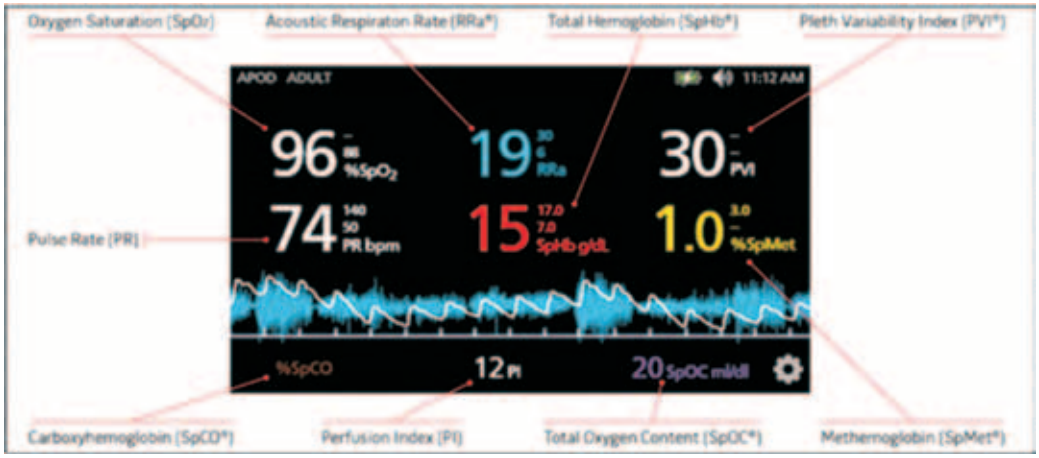
- Inform the parents/guardian that the purpose of screening is to screen for serious heart problems;
- Inform the parents/guardians that the baby will be screened through pulse oximetry on the baby's right hand and one foot, if possible;
- Inform the parents/guardian that the pulse oximetry test is not 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.

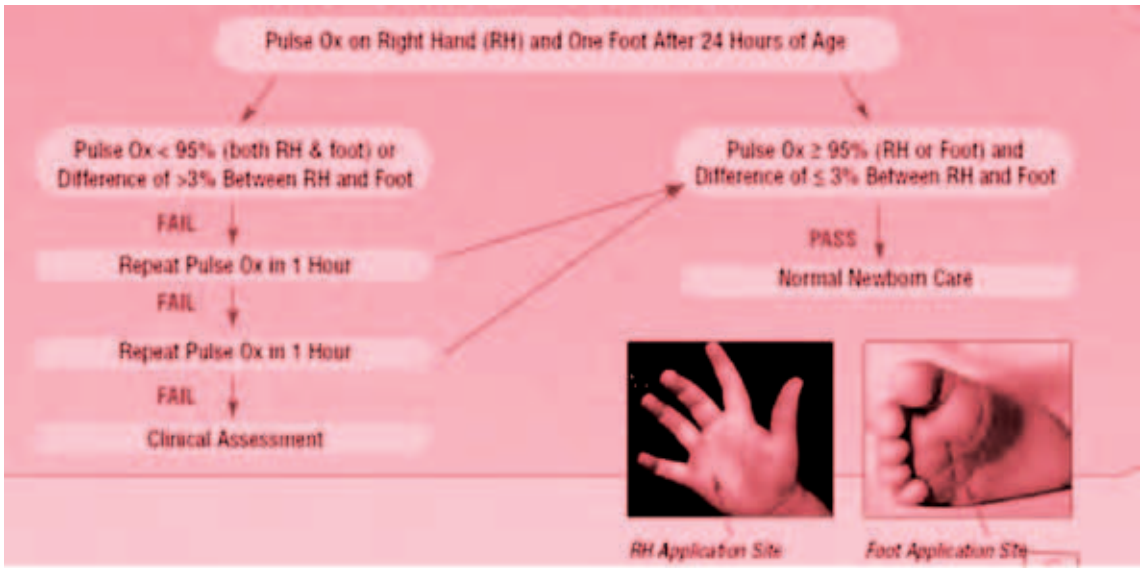
7. If an infant requires pulse ox monitoring for an extended amount of time, assess the site wherethe probe is placed at least every two hours. Monitor for signs of irritation and burning of the skin.

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

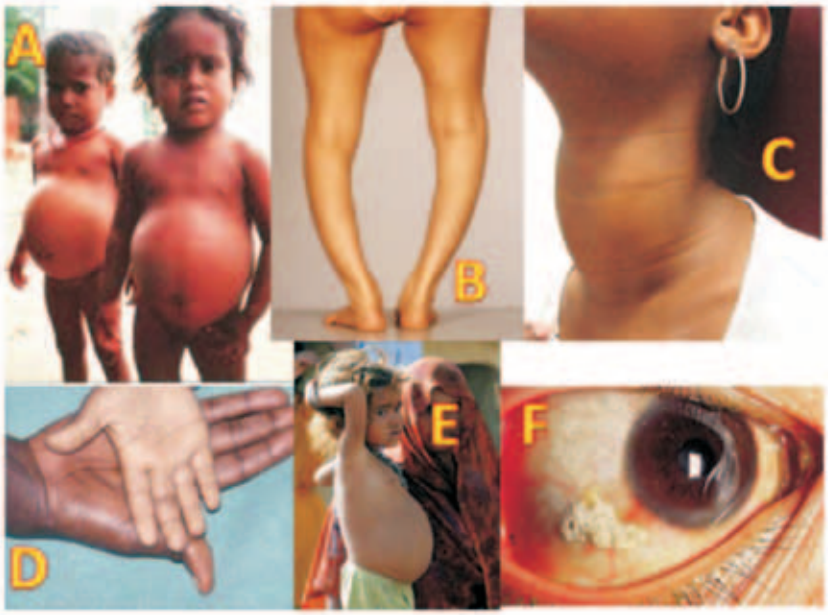
1. Introduction Session(15 mins)
2. Understanding the basics
3. Learning the tools

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.

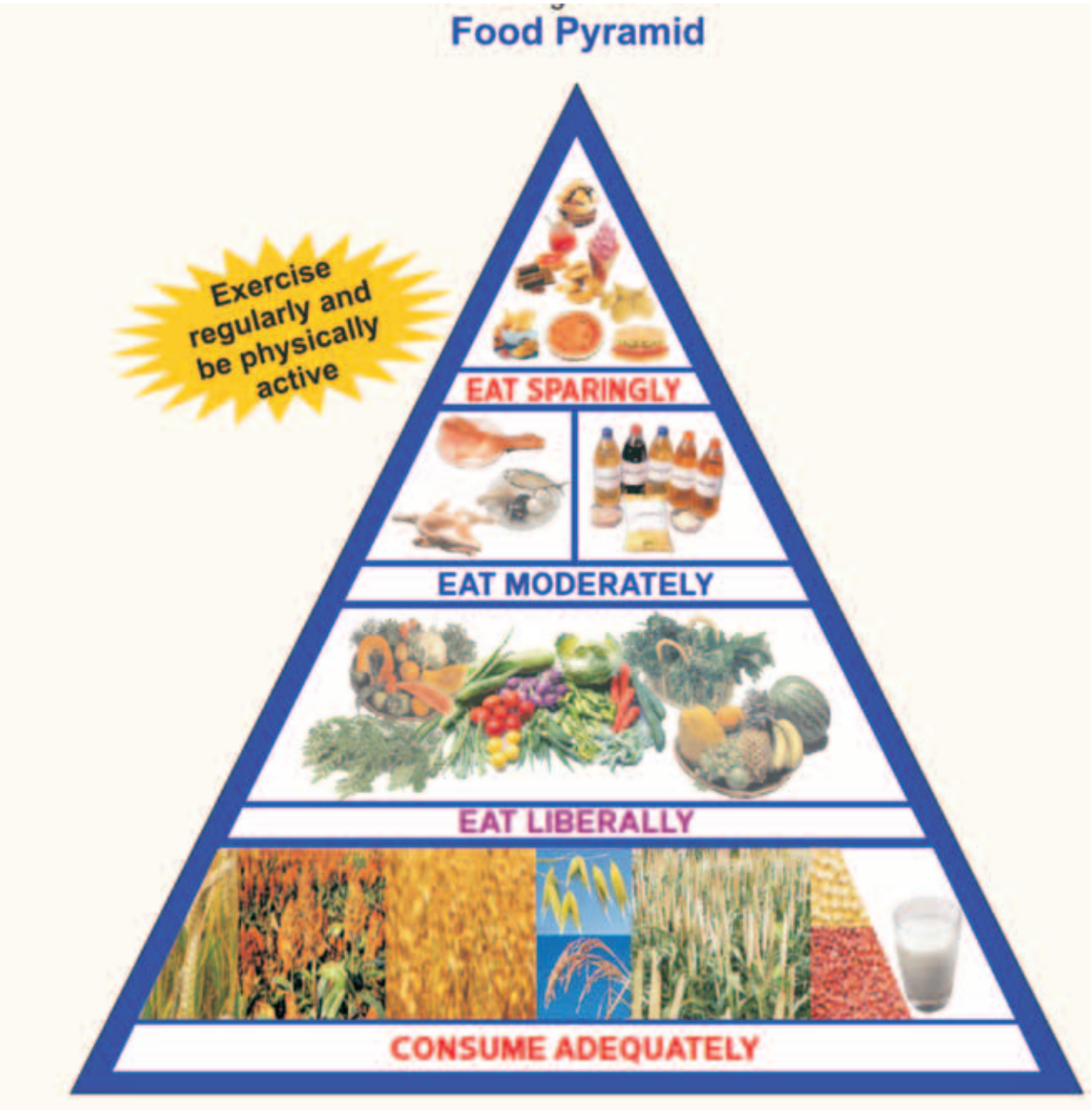
Courtesy: Dietary Guidelines for Indians: A Manual- National Institute of Nutrition, Indian Council of Medical Research, Hyderabad

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.

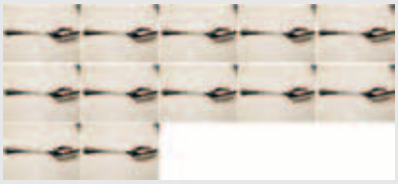
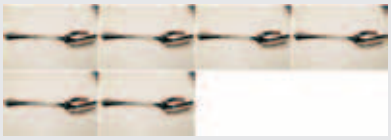
1. Eat variety of foods to ensure a balanced diet.
2. Ensure provision of extra food and healthcare to pregnant and lactating women.
3. Promote exclusive breastfeeding for six months and encourage breastfeeding till two years or as long as one can.
4. Feed home based semi solid foods to the infant after 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;

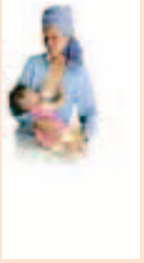
Standard measurements:

-

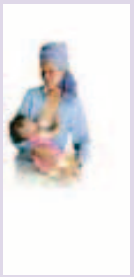
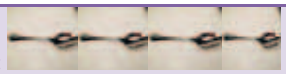
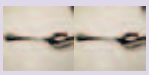
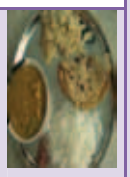
Diet plan for 6 months' old baby

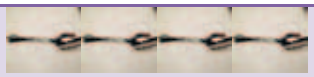
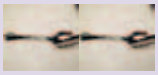
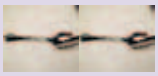
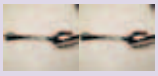
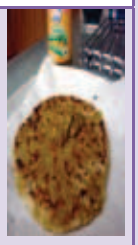
Meal timings	Food item	Ingredients	Cooked amount	+ Along with
Morning	Suji Porridge/Rice Porridge	Suji:  1 Tablespoon (15ml) OR Cooked rice:  2 Tablespoon Milk: ½ katori Sugar: 2 teaspoon (5ml)	 ½ katori (70 ml)	
Afternoon	Fruit Juice	½ Sweet lime/ ½ orange / 7-8 green grapes		
Evening	Suji Porridge/Rice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

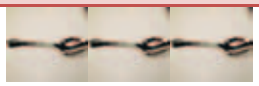
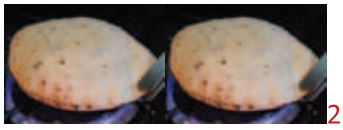
Meal timings	Food item	Ingredients	Cooked amount	+ Along with
Morning	Rice Khichri with or without vegetables	Cooked dal:  1 Tablespoon Cooked rice:  2 Tablespoon Seasonal cooked vegetable:  1 Tablespoon Oil/ghee/butter: 1 teaspoon	 ½ katori (70 ml)	
Afternoon	Mashed fruit	½ banana / 1 slice of papaya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

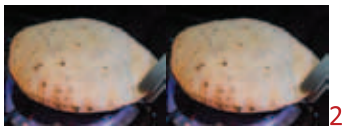
Diet plan for 12-36 months old baby

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)	 Continue breastfeeding
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		

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

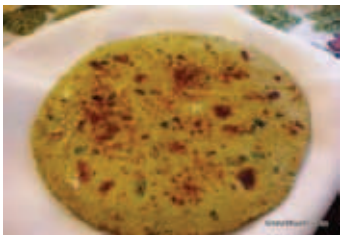
Ingredients (for 1 bowl): 300 ml

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

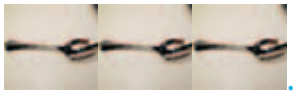
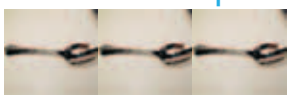
Water 200 ml.

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

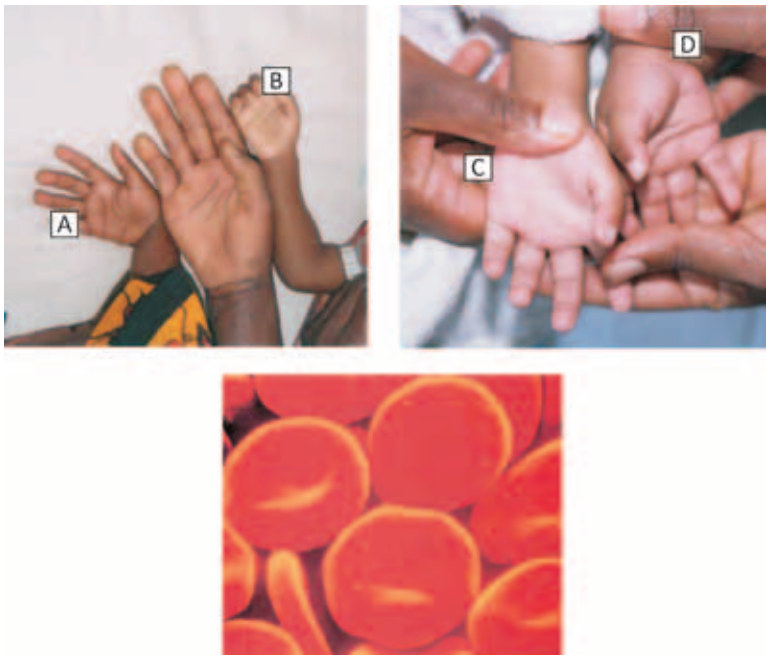
Method of preparation:

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;

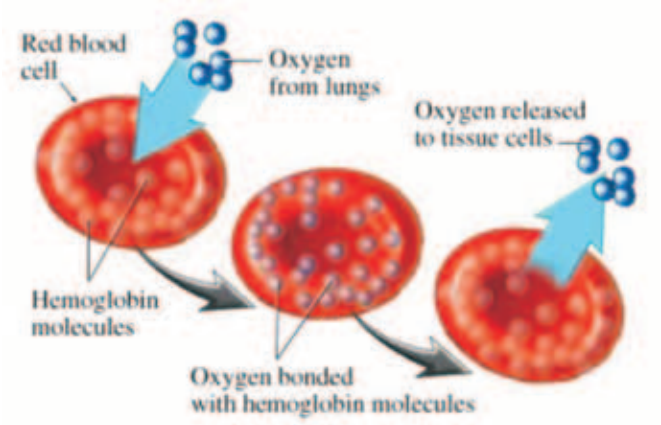
1 Anemia, especially, severe anemia

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.

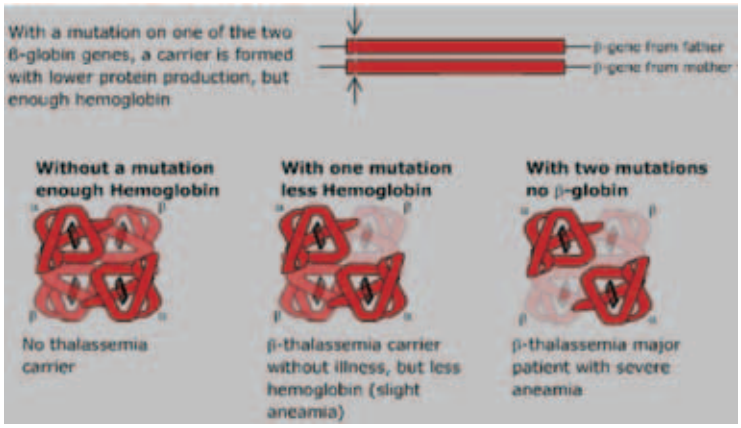
The disease can develop if only one parent has abnormal genes. If only one gene is inherited, the person will be a carrier of the disease. They will have mild or no symptoms.

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;

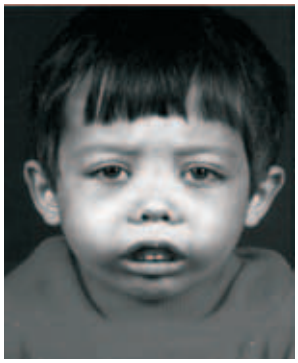
- Reduced appetite;
- Enlarged and fragile bones, including:

  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.

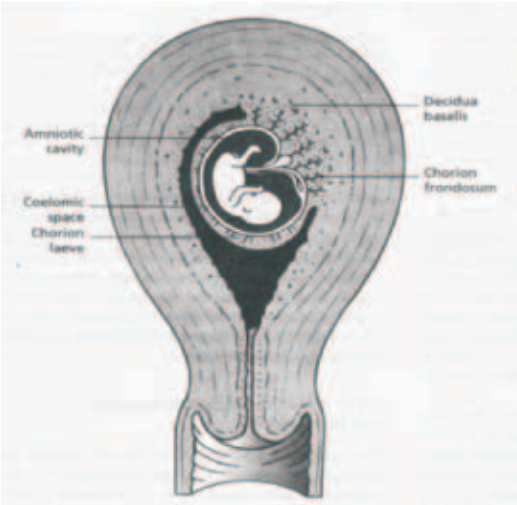
Treatment of Thalassemia:

- 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;



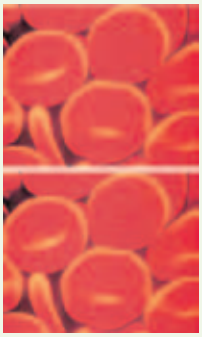
Prenatal Diagnosis

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.

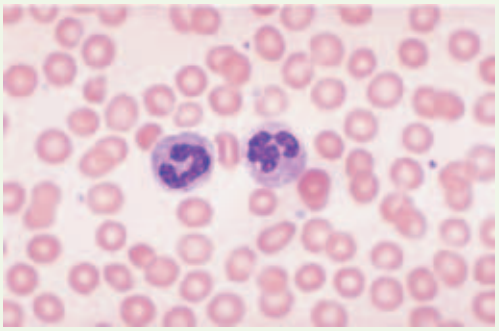
Thalassemia can be prevented. Advocate pre-marital or post-marital testing for thalassemia carrier status.

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

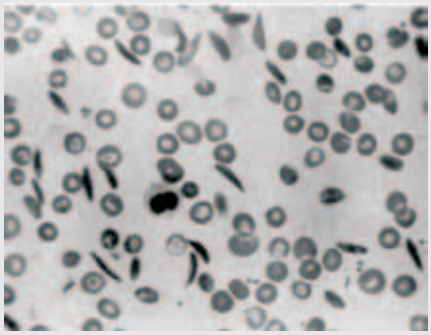
Haem (IRON) + Globin

Globin is a protein and has 2 chains

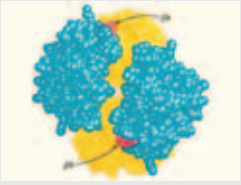
α chains: Yellow in color

β chains: Blue in color

Sickle shaped



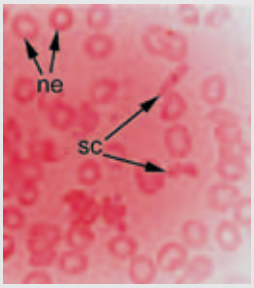
RBC with sickle shape as hemoglobin is defective. Sickle Cell Hemoglobin Aggregates under Low [O2]. Here in the blue chain i.e. β chain has a sticky surface (Red Patch), which makes it easier to aggregate.



Consequences of Red Blood Cell Sickling:

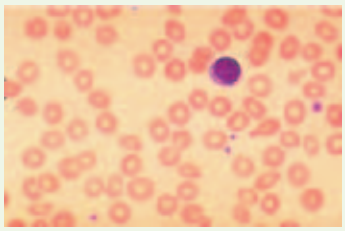
- Occlusion of small blood vessels, causing tissue damage;
- Red blood cell lifespan shortened from 120 to 20 days anemia as less no of RBC;

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



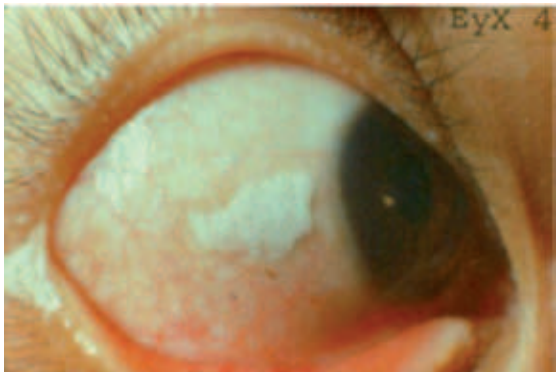
Iron deficiency anemia. Note the increased zone of central pallor and the more irregular shapes of the RBC's. This anemia is characterized by a decreased amount of hemoglobin per RBC, so the Mean Corpuscular Hemoglobin (MCH). There is reduced size of red blood cells, so that the mean corpuscular volume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

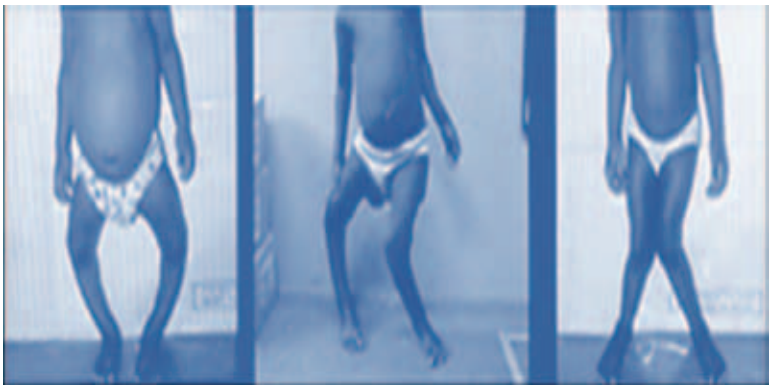
Key messages

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.

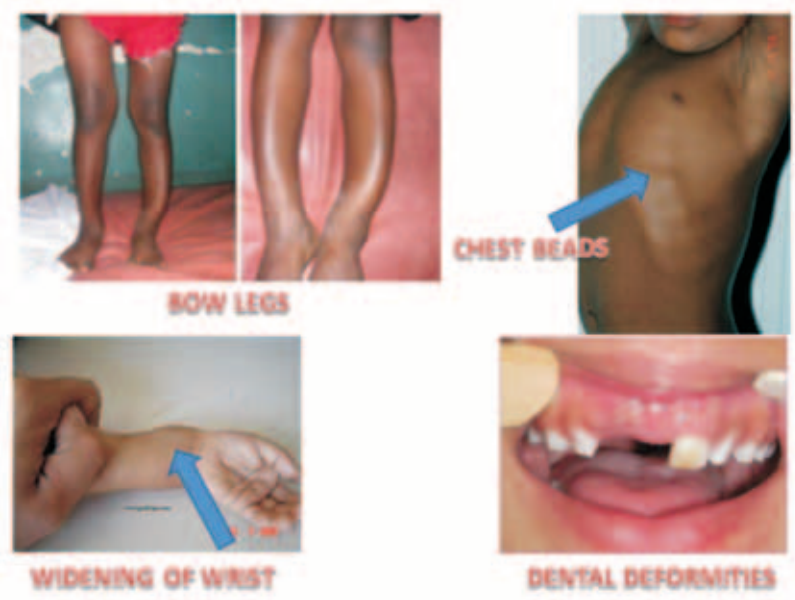
Tools for screening: Under the programme, MBHTs would ask some specific questions and identify visible signs of rickets.

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.

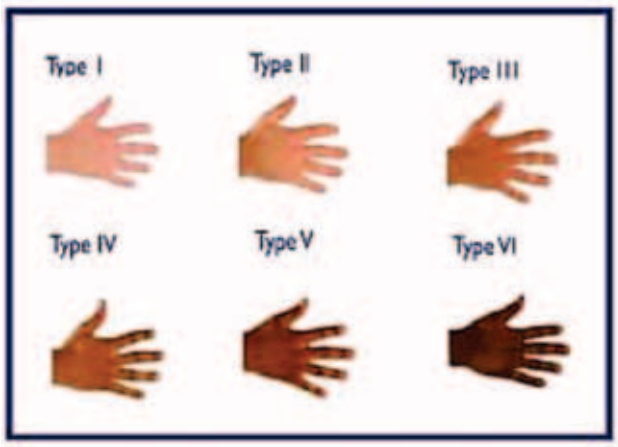
Preventive measures

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

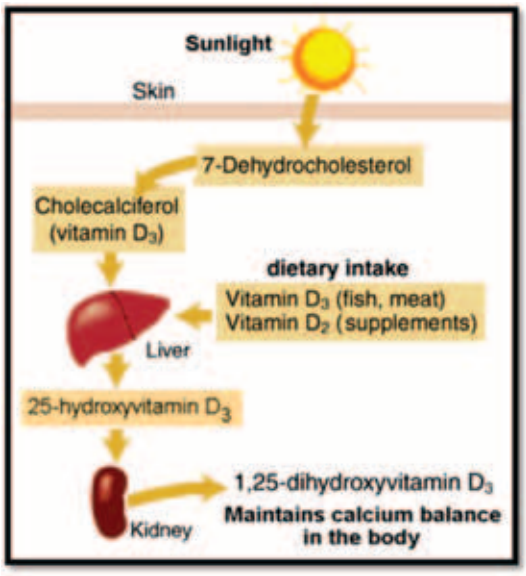
1. Exclusive breastfeeding till six months of age and intake of Vitamin D rich foods as part of complementary food.
2. All parents should be informed that prolong deficiency of Vitamin D may lead to rickets in children and would manifest, as pain, during walking.

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*

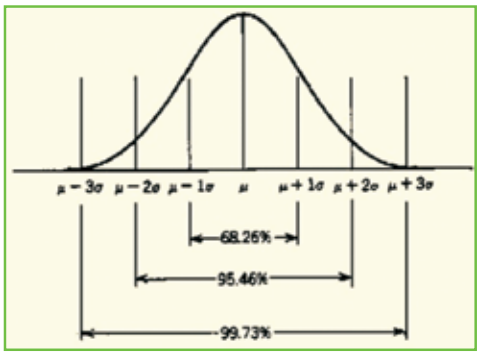
****When assessing weight-for-height, infants and childrenunder 24 months of age should have their lengthsmeasured lying down (supine). Children over 24 monthsof age should have their heights measured whilestanding. For simplicity, however, infants and childrenunder 87 cm can be measured lying down (or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

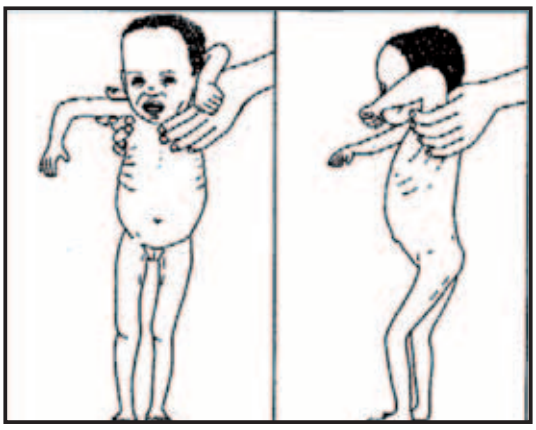
The reasons for the choice of this cut-off are as follows:

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);



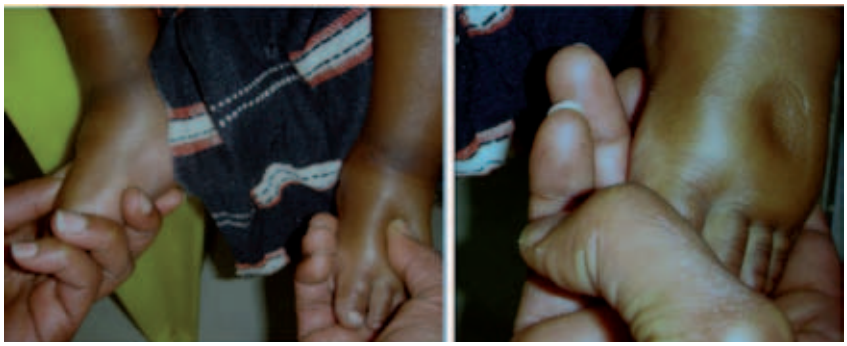
ASK –

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

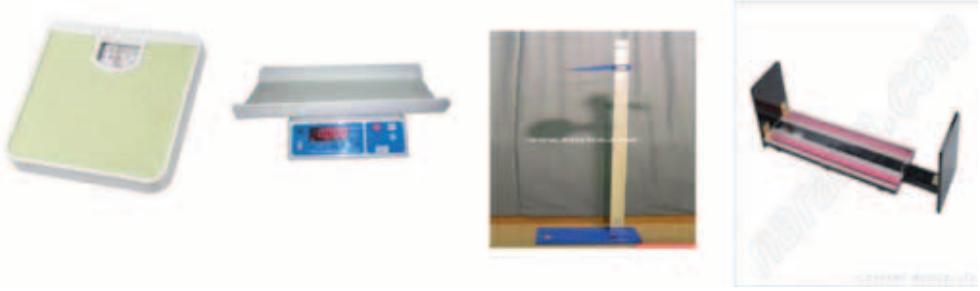
PERFORM –

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;

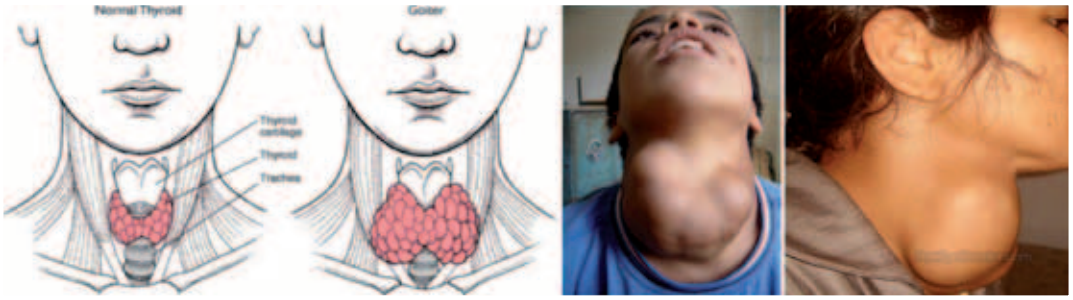
Daily intake of Iodine is met by well-balanced diet and drinking water (normal requirement 0.10 mg to 0.14 mg).

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

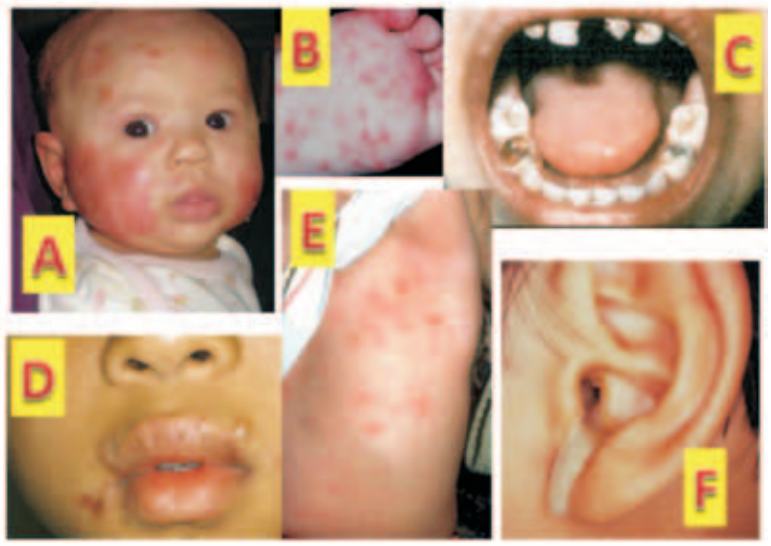
III. Learning the tools

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

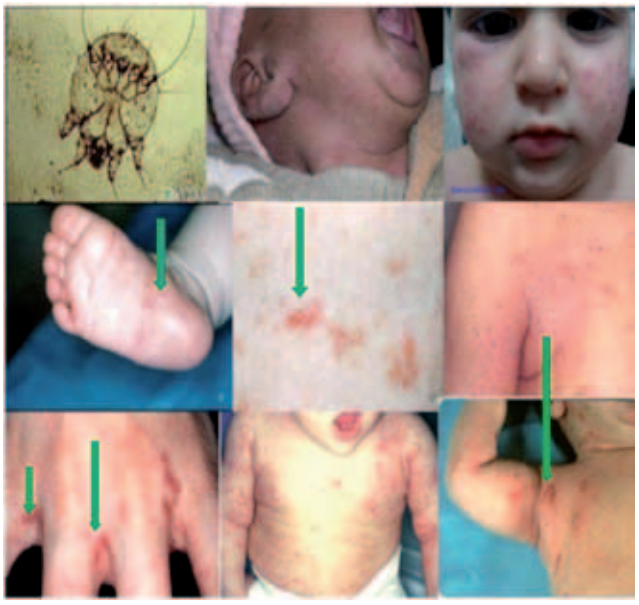
1 Skin conditions - Scabies, Fungal infection and Eczema

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

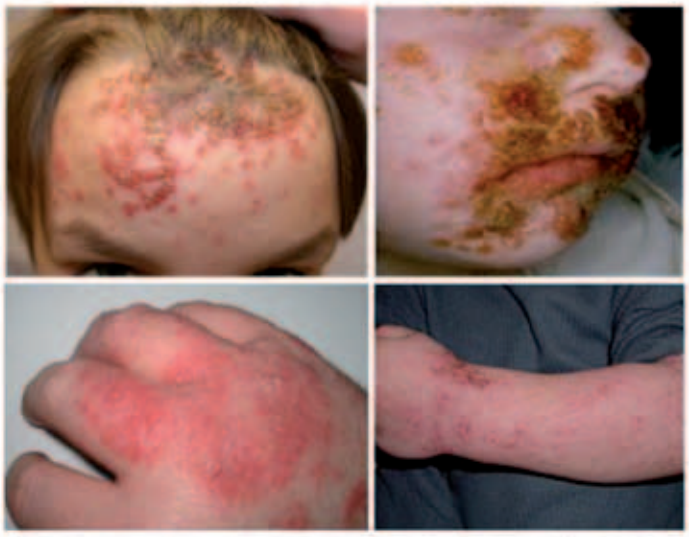
Introduction

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.

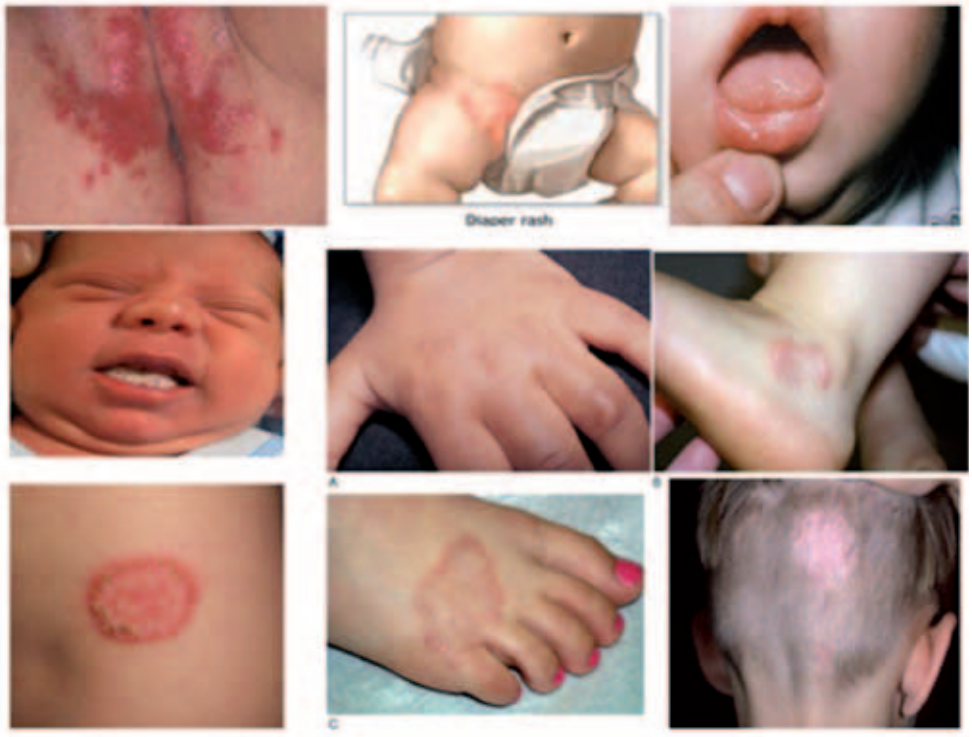
Fungal infections

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;

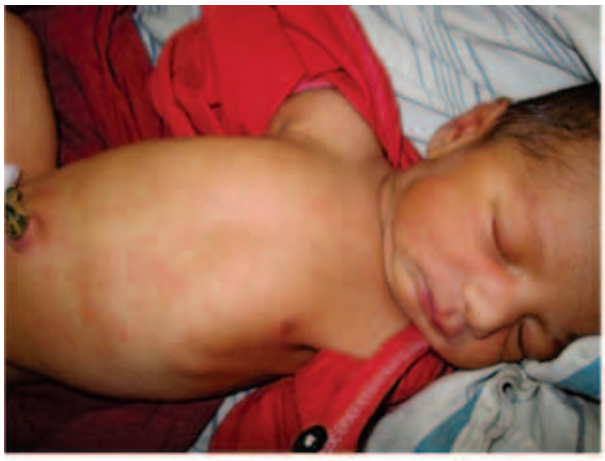
Preventive Measures:

- 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;

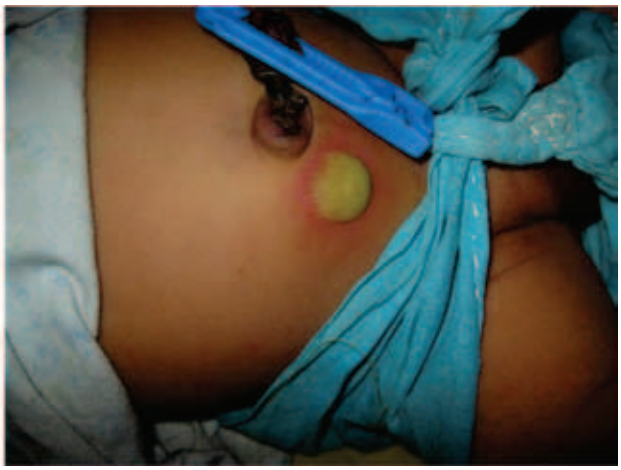
FAQs

- 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

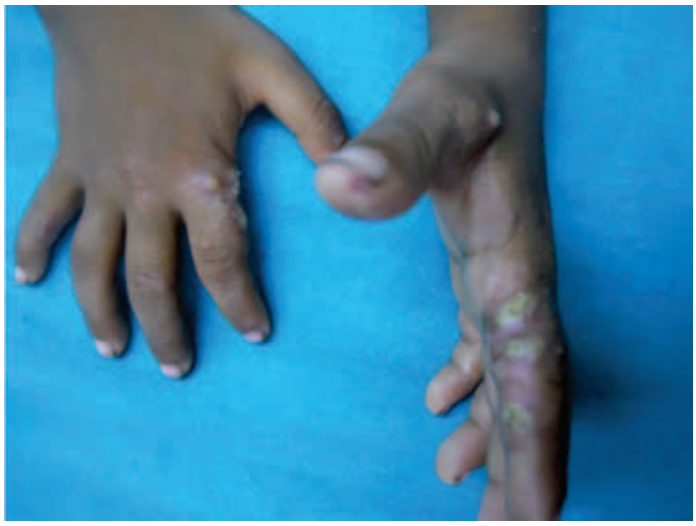
Some Photographs of the Common Skin Conditions in children



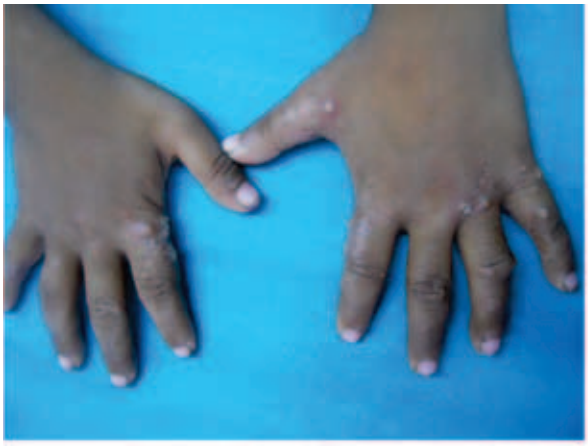
Erythema Neonatorum

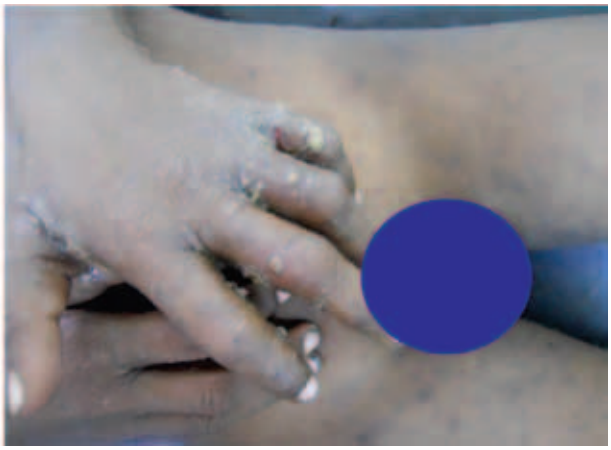


Pyoderma neonate



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.

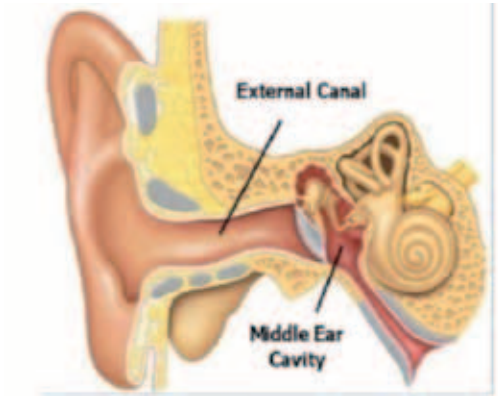
Tools for screening: Torch

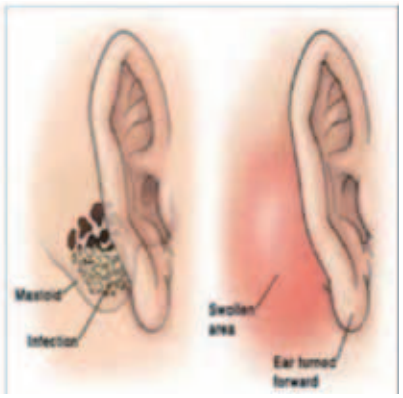
Sign & Symptoms- Ask, Look, Perform

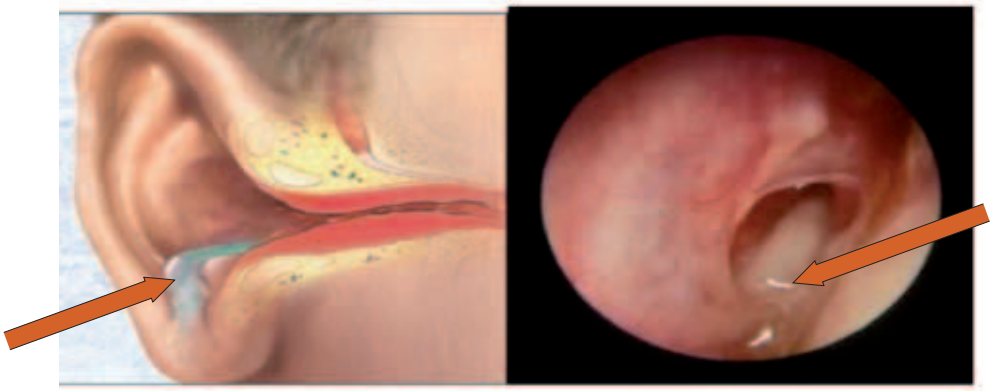
Ask	• Is the child having cold or fever? • Is there ear pain? • Is there discharge from ear (or pus)? If yes, for how many days? • Does the child keeps on rubbing the ear? • Is there a feeling of blocked ear? • Does the child complain of reduced hearing? • Is there pain behind the ears (tender)? • In 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:

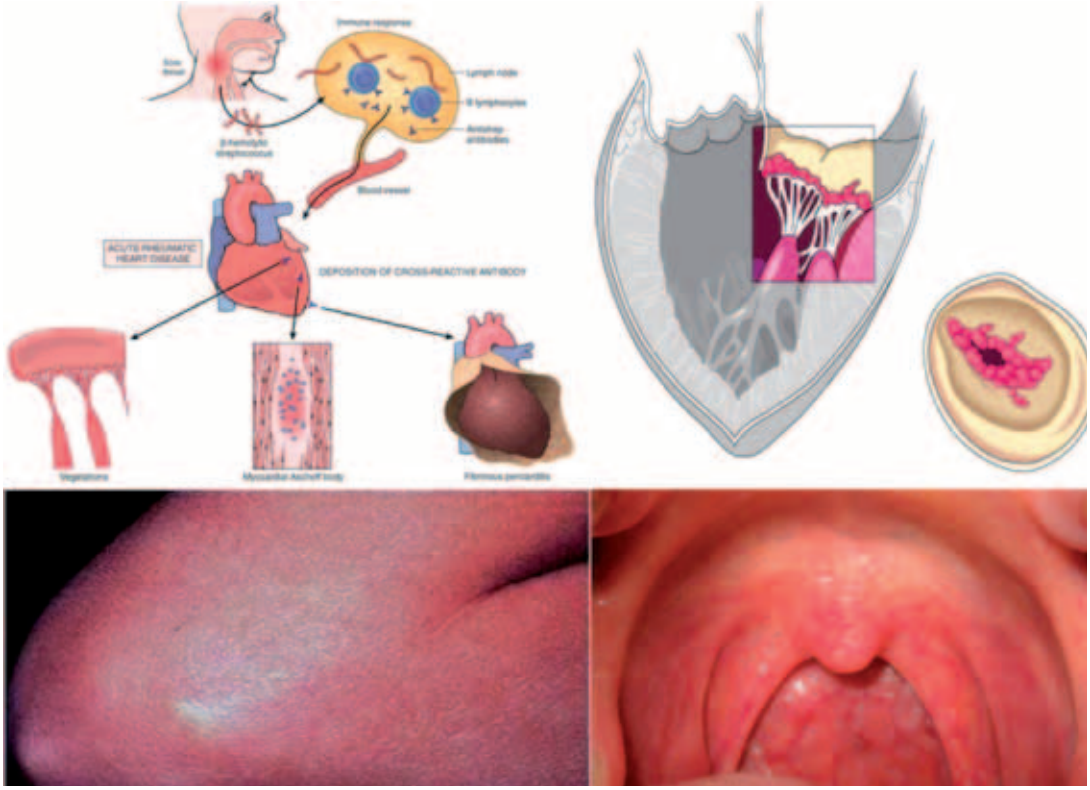
1) This is usually a late feature of Acute Rheumatic Fever in which, due to inflammation of the heart valves, especially the valve leaflets of the mitral valve may leave the leaflets with a scar and become adherent to each other, resulting in mitral stenosis (usually, seen late in the patient's course, 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.

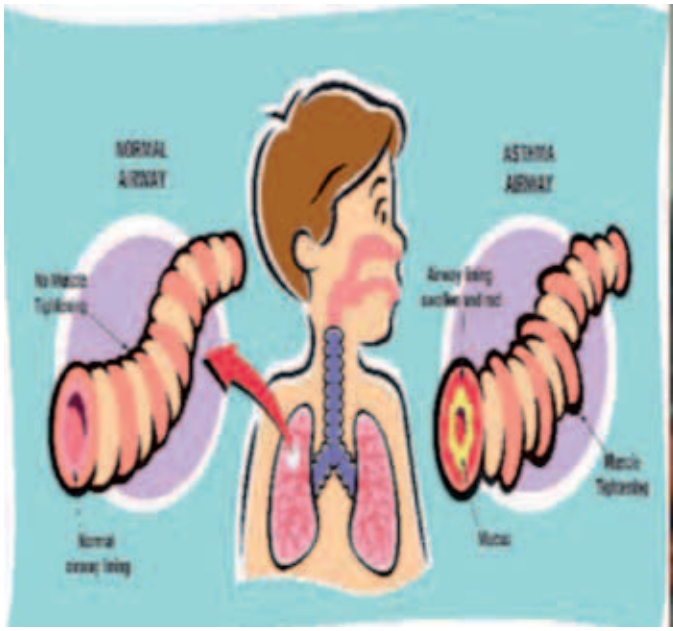
Estimated prevalence is 5% among children aged 1month to 14 years.

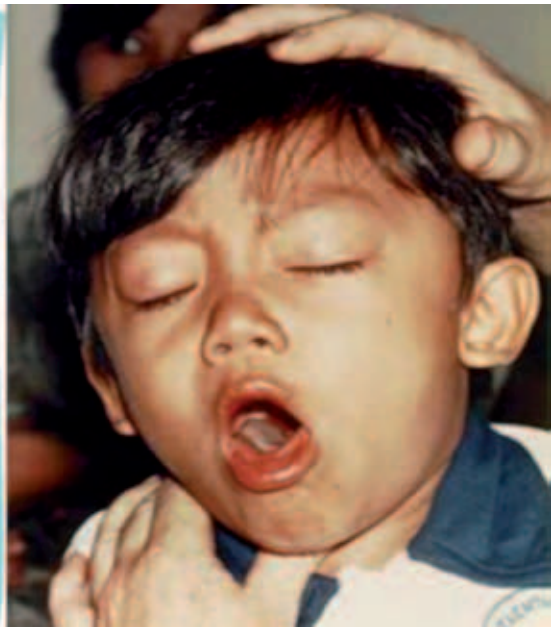
Tools for screening

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)

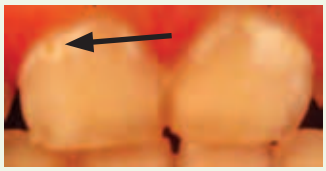
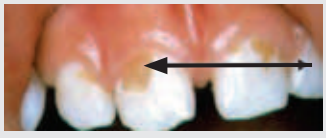
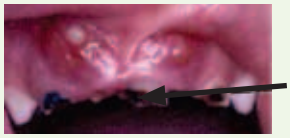
There are two sets of teeth, milk teeth and permanent teeth. The first milk tooth erupts at the age of 6-7months and first permanent tooth erupts at age of 6-7 years. Caries is a chronic disease affecting both milk teeth and permanent teeth, leading to their breakdown. Caries is further divided in to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

Early Childhood Caries (ECC):

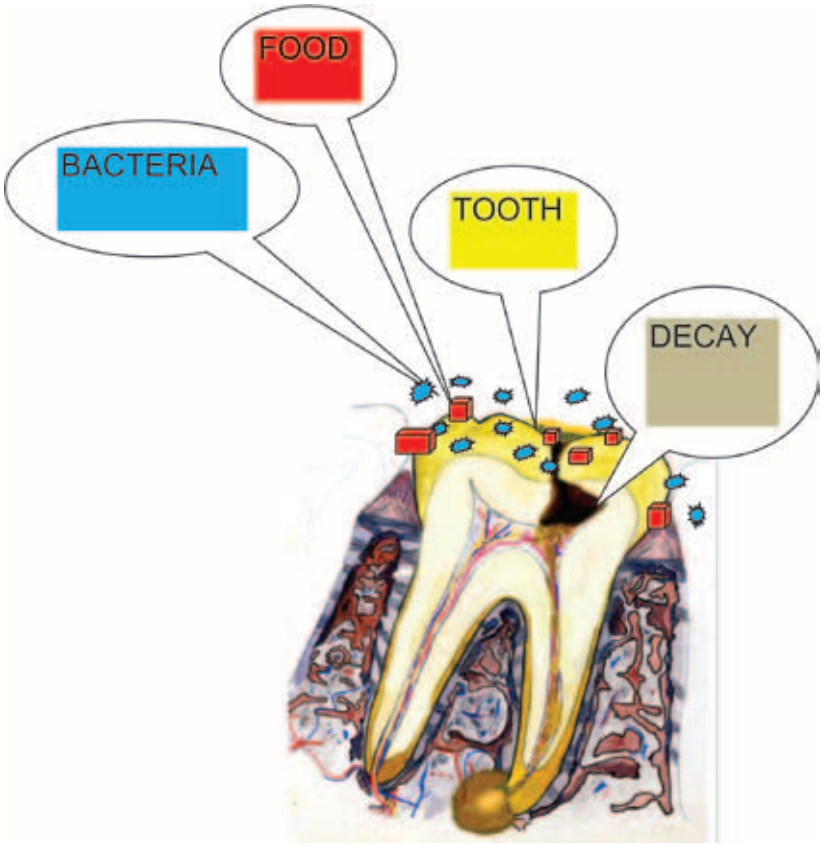
What is ECC?

- 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



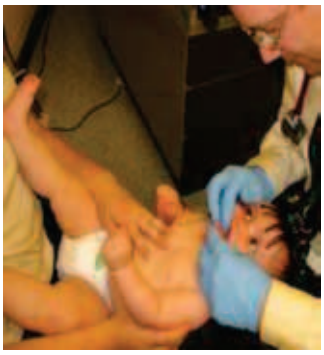
How to Identify ECC?

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

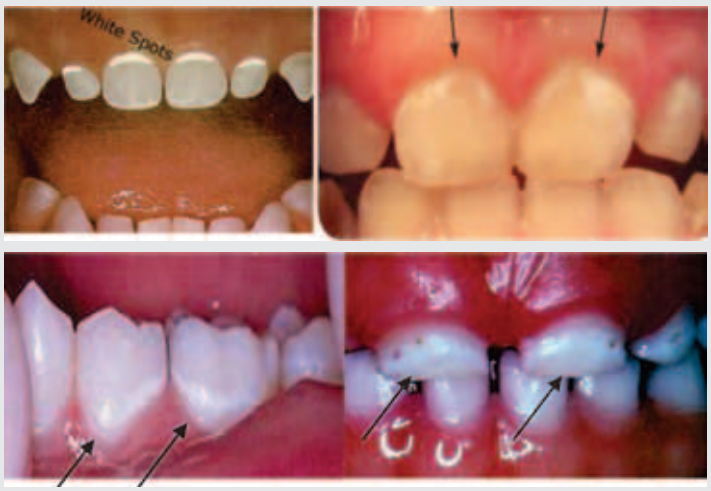
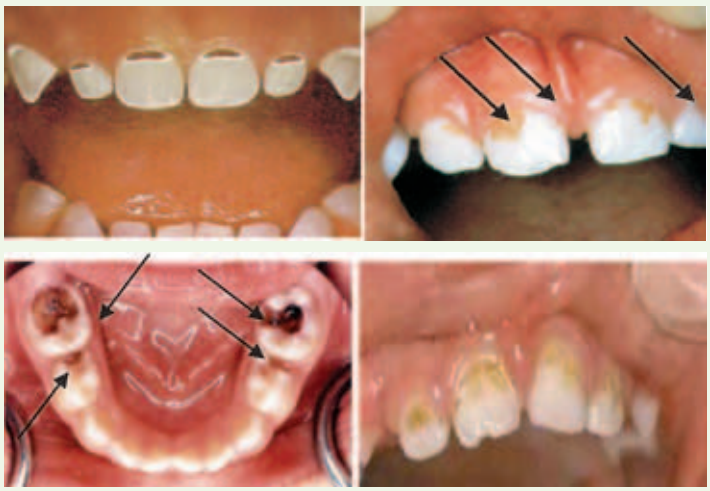
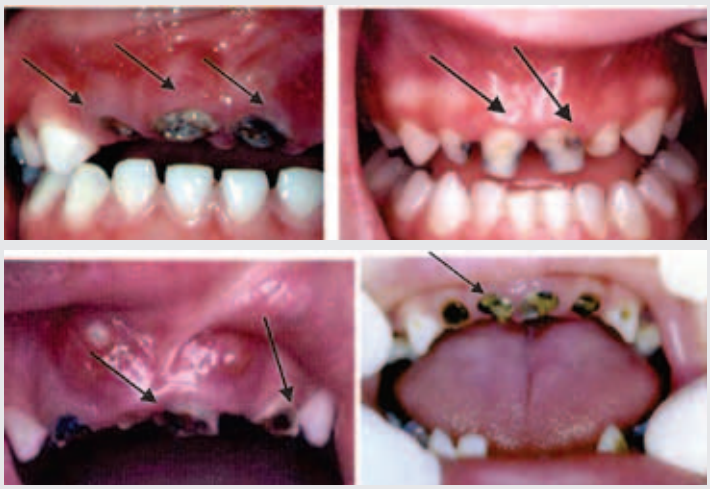
A. Instrumentation required to diagnose ECC in the periphery : Mouth Mirror, cotton, light source (torch)

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;

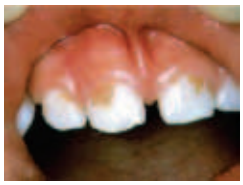
Sugar Discipline- Donot eliminate sugar; eat intelligently

3. **Avoid saliva-sharing**

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

C) Oral Health Education

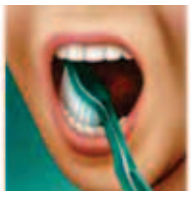
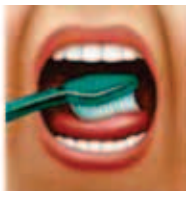
1. Start cleaning with wet cotton when **first tooth** erupts;
2. **"LIFT the LIP"**, once a month, at home, to check for white/brown spots;



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

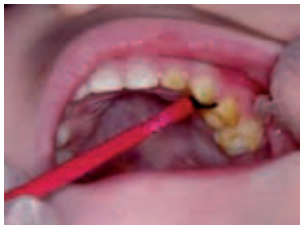
Fluoride varnish

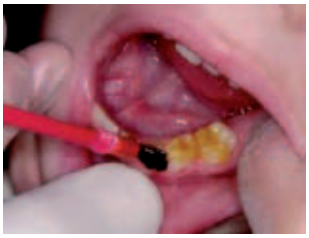
Procedure: Using gentle finger pressure, open the child's mouth;

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;

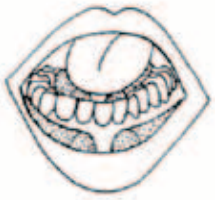
5. ART- Atraumatic Restorative Treatment

Instruments required: 2 x 2 gauze squares

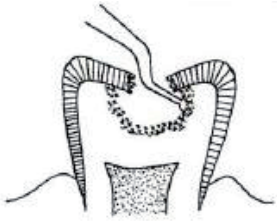
Gloves
Mouth mirror
Direct light source
Spoon Excavator
Cement carrier
Dental Cement

Procedure:

- Isolate using cotton rolls;

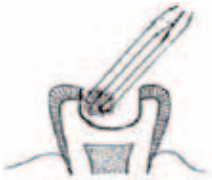


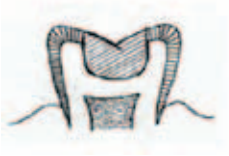
- Hand excavation to remove overhangs/Debreid softened tooth structure;



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.

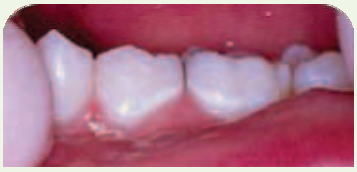
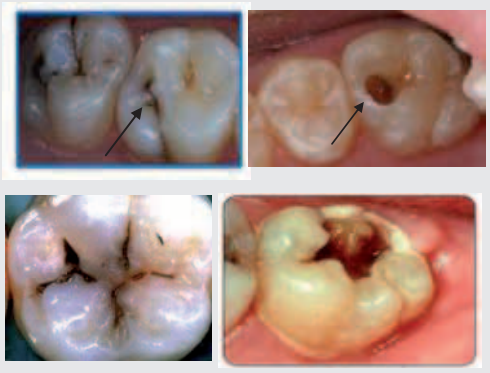
1. Do you pre-chew your baby's food? ¨ Yes ¨ No
2. Do you test the temperature of your baby's bottle with your mouth? ¨ Yes ¨ No
3. Do you lick your baby's pacifier or bottle nipple to clean it? ¨ Yes ¨ No
4. Do you share cups, forks or spoons with your baby? ¨ Yes ¨ No
5. Do you let baby put his hands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

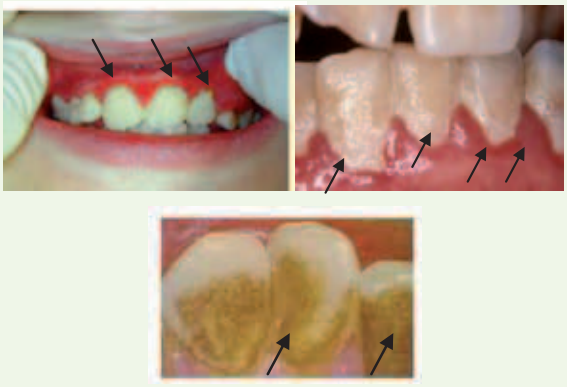
Chewing (occlusal) surface of teeth is more prone to caries because of the presence of grooves (pit and fissures) on it.

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.

CONVULSIONS in small children:

In infants between the ages of one month and one year convulsions are usually, associated with fever.

- If there is no fever, epilepsy should be considered, which is more prolonged and requires long term treatment, as compared to convulsions associated with fever which usually, stops by 5-6 years.
- Fits can be divided into generalized – that means involving the whole body or partial seizures --which involves only a particular function or part of the human body.
- Generalized seizures include tonic-clonic that means the body oscillates before, suddenly, becoming stiff and rigid with temporary cessation of respiration and then followed by sudden jerky movements of the limbs and the face accompanied by unconsciousness and frothing from mouth, usually.
- fits are those where there is sudden contraction of a muscle.
- Partial seizures include focal and temporal lobe fits. During some episodes partial seizures may be followed by generalized seizures.
- Generalised tonic-clonic fits are the most common type. The child may appear irritable or show other unusual behavior, for a few minutes, before an attack. Sudden loss of consciousness occurs during the tonic phase, which lasts 20–30 seconds and is accompanied by temporary cessation of respiratory movements and central cyanosis. The clonic phase follows and there are jerky movements of the limbs and face.
- The movements, gradually, stop and the child may sleep for a few minutes before waking, confused and irritable.
- Although a typical tonic-clonic attack is easily recognized, other forms of fits may be difficult to diagnose from the history provided by the mother.
- Infantile spasms may begin with momentary episodes of loss of tone, which can occur in bouts and be followed by fits in which the head may suddenly drop forward or the whole infant may move momentarily, like a frog.
- Recurrent episodes with similar features, whether they are changes in the level of consciousness or involuntary movements, should raise the possibility of fits.

Differential diagnosis

Convulsions must be differentiated from blue-breath holding attacks, which usually begin at 9–18 months' of age. Immediately, after a frustrating or painful experience infants cry vigorously and suddenly, hold their breath, become cyanosed, and in the most severe cases lose consciousness. Rarely, their limbs become rigid and there may be a few clonic movements, lasting a few seconds. Respiratory movements begin again and infants gain consciousness, immediately. The attacks diminish with age with no specific treatment. The mother may be helped, to manage these extremely frightening episodes, by being told that the child will not die and that she should handle each attack consistently by putting the child on his side. Rigors may occur in any acute febrile illness, but there is no loss of consciousness.

Febrile convulsions

Definition: A febrile convulsion is a fit occurring in a child aged from six months to five years, precipitated by fever, arising from infection outside the nervous system, in a child who is otherwise, neurologically, normal.

Convulsions with fever include any convulsion in a child of any age with fever, of any cause.

It may be the benign type "febrile convulsion " which improves over the time or it may be a feature of serious involvement of the brain and it's covering i.e. meninges also presenting with fever and convulsion.

Among children who have convulsions with fever involving the brain (pyogenic or viral meningitis, encephalitis) such children will have prolonged fits lasting for more than one hour and even after the fits have stopped the child does not appear to be normal.

Most of the fits that occur between the ages of six months and five years are simple febrile convulsions and have an excellent prognosis.

By arbitrary definition, in simple febrile convulsions the fit lasts less than 20 minutes, there are no focal features, and the child is aged between six months and five years and has been developing, normally.

Often fever is recognized only when a convulsion has already occurred. Febrile convulsions are usually of the tonic-clonic type. The objective of emergency treatment is the prevention of a prolonged fit (lasting over 20 minutes), which may be followed by permanent brain damage, epilepsy, and developmental delay.

An electroencephalogram (EEG) is not a guide to diagnosis, treatment, or prognosis.

Emergency treatment

A child who, has fever should have all his clothes removed and should be covered with a sheet only. He should be nursed on his side or prone with his head to one side because, vomiting with aspiration is a constant hazard.

Rectal diazepam (0.5 mg/kg) produces an effective blood concentration of anticonvulsant, within 10 minutes. The most convenient preparation resembles a toothpaste tube. Early admission to hospital or transfer to the intensive care unit should be considered if, a second dose of anticonvulsant is needed.

All children who have had a first febrile convulsion should be admitted to hospital to exclude meningitis and to educate the parents, as many fear that their child is dying, during the fit. Physical examination, at this stage, usually, does not show a cause for the fever, but a specimen of urine should be examined, in the laboratory, to exclude infection and a blood glucose test should also be performed. Blood should be taken for blood culture and plasma glucose and calcium estimations.

Most of these children have a generalised viral infection with viraemia. Occasionally, acute otitis media is present, in which case an antibiotic is indicated, but most children with febrile convulsions do not need an antibiotic. A pupuric rash suggests meningococcal septicaemia and the need for antibiotic like penicillin to be given immediately, either intravenously or intramuscularly.

Features of a tonic clonic convulsion:

A Tonic	***B. Clonic***
A1. Cry	***B1. Repetitive limb movement (rate can be counted)***
A2. Loss of consciousness	
A3. Rigidity	
A4. Apnoea (Cessation of respiration)	

Dangers of Convulsion:

- Inhalation of vomit;
- Hypoxaemia (Lack of oxygen);

Breath holding attack

- Usually, preceded by Pain or frustration;
- Immediately, after a frustrating or painful experience infants cry vigorously;
- Age usually, 6-18 months;
- Sudden stoppage of respiration and child turns blue;
- Limbs do not become rigid;
- Improves with time;

Simple febrile convulsions consist of all of the following:

- Duration less than 20 minutes;
- Child milestones and development, is normal;
- No focal features;
- Six months to five years;
- No developmental or neurological abnormalities;
- Not repeated in the same episode;
- Complete recovery within one hour;

Management of fever – There is no evidence that antipyretic treatment influences the recurrence of febrile convulsions, but fever should be treated to promote the comfort of the child and to prevent dehydration. The child's clothes should be taken off and he should be covered only with a sheet . The child should be given a good bath with tap water.

Paracetamol is the preferred antipyretic and adequate fluid should be given.

Anticonvulsant drugs – Rectal diazepam should be used, as soon as possible, after the onset of the convulsion. The parents should be advised not to give it if, the convulsion has stopped.

The indications for long term anticouvulsant prophylaxis have changed and the sole indication – frequent recurrences, which should be treated with phenobarbitone – is rare. There is no evidence that, in the minority of children, who later develop epilepsy, the prophylactic use of anticonvulsant drugs would have prevented it.

Immunization: Should continue normally in children with febrile convulsion but aftercounselling the parents, regarding management of fever.

As routine immunization is given to children 2–4 months old, this schedule is usually completed, before febrile convulsions occur. Babies having convulsions with fever, aged less than six months, should be assessed by a pediatrician.

Children who have febrile convulsions before immunization against diphtheria, pertussis, and tetanus because the immunization has been delayed should be immunized, after their parents have been instructed, about the management of fever and the use of rectal diazepam.

Measles, mumps, and rubella immunization should be given, as usual, to children who have had febrile convulsions, with advice about the management of fever to the parents. Rectal diazepam should be made available, for use, should a convulsion occur.

Prognosis:

Unless there is clinical doubt about the child's current developmental or neurological state, parents should be toldthat prognosis for development is excellent. The risk of subsequent epilepsy after a single febrile convulsion with no complex features is about 1%. With each additional complex feature the risk rises to 13%, in those children with two or more complex features. Only about 1% of children, with febrile convulsions, are in this group.

The risk of having further febrile convulsions is about 30%.

This risk increases in younger infants and is about 50% in infants aged under one year, at the time of their first. A history of febrile convulsions, in a first degree relative, is also associated with a risk of recurrence of about 50%. A complex convulsion or a family history of epilepsy is, probably, associated with an increase in the risk of febrile convulsion.

Information for parents

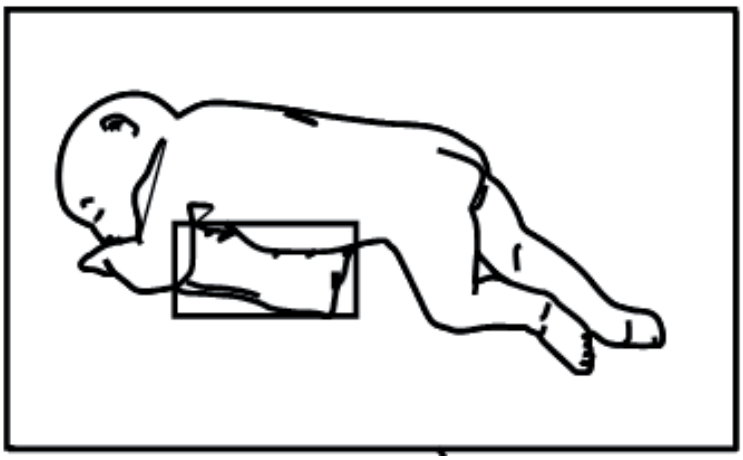
Information for parents should include:

- An explanation of the nature of febrile convulsions, including information about the prevalence and prognosis;
- Instructions about the management of fever, the management of a convulsion, and the use of rectal diazepam;
- Reassurance;

Basic life support in the community

Basic life support (BLS) should be given immediately whenever an infant stops breathing, even if no specialized equipment is available. It may be life saving.

Position should be on the side or prone with the head to one side:



Developmental delays and Disability

Questionnaire on Developmental delays including disability:

1. What percentage of children face, development delays
   (a) 1%
   (b) 10%
   (c) 25%
   (d) 50%

2. Which of the following is an example of fine motor activity
   (a) Walking
   (b) Running
   (c) Thinking
   (d) Writing

3. A child with Autism will have the following signs
   (a) No big smiles, or other warm, joyful expressions by six months of age or thereafter
   (b) No back and forth, sharing of sounds, smiles or other facial expressions by nine months or thereafter
   (c) No babbling and no back and forth gestures such as pointing, showing, reaching or waving by 12 months
   (d) All of the above

4. A male child has problem with inattentiveness, over activity and impulsivity. He is, most likely to be, suffering from
   (a) Autism
   (b) Attention Deficit Hyperactivity Disorder (ADHD)
   (c) Learning disorder
   (d) None of the above

5. A child of eight months age is not able to point in a direction using index finger, what skills are we evaluating
   (a) Fine motor
   (b) Gross motor
   (c) Learning disorder
   (d) Speech delay

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.

Discussion:

Care for Child Development:

(Based on WHO counsel the family cares for child development)

Decide whether each of the statements below is true or false.

Your facilitator may lead the group discussion using a card for each statement.

S/n	Statement	True or false
1	A toddler's brain is much less active than the brain of a college student	
2	The brain develops more rapidly, when the child first enters school than at any other age	
3	The experiences you have before, age three have a limited impact on later development	
4	A secure relationship with a primary caregiver especially the mother creates a favorable context for early development and learning	
5	A father should talk to his child, even before the child can speak	
6	Before a child speaks, the only way she communicates is by crying	
7	A mother does a better job when she feels confident about her activities to provide care	
8	Young children learn more by trying things out and copying others than by being told what to do	
9	A baby can hear at birth	
10	A baby cannot see at birth.	
11	A child should be scolded when he puts something into his mouth	
12	A child drops things just to annoy his father and mother	
13	A child begins to play when he is old enough to play with other children	
14	Talking to your child, while breastfeeding will distract the child from feeding	
15	Children can learn by playing with pots and pans, cups, and spoons.	
16	How a brain develops depends primarily on the genetic material you got from your parents who gave you birth	

Answers to Above Statements:

S/n	Statement	True or false
1	A toddler's brain is much less active than the brain of a college student.	F
2	The brain develops more rapidly when the child first enters school than at any other age	F
3	The experiences you have before age three have a limited impact on later development	F
4	A secure relationship with a primary caregiver esp. the mother creates a favorable context for early development and learning	T
5	A father should talk to his child, even before the child can speak	T
6	Before a child speaks, the only way she communicates is by crying.	F
7	A mother does a better job when she feels confident about her activities to provide care	T
8	Young children learn more by trying things out and copying others than by being told what to do	T
9	A baby can hear at birth	T
10	A baby cannot see at birth.	F
11	A child should be scolded when he puts something into his mouth	F
12	A child drops things just to annoy his father and mother	F
13	A child begins to play when he is old enough to play with other children	F
14	Talking to your child, while breastfeeding will distract the child from feeding	F
15	Children can learn by playing with pots and pans, cups, and Spoons.	T
16	How a brain develops depends primarily on the genetic material you got from your parents who gave you birth	F

Explanations for the above statements-

Question 5: *And even before the child is able to speak, he delights in being able to communicate through sounds and movements.

Question 9 & 10: From birth, babies can see and hear. The mother's face is the favorite thing the young baby wants to look at. The baby sees the mother's face and loves to respond to her smiles and sounds. A mother should begin to talk to her child from birth. Your baby starts learning from birth, with the environmental stimulation.

Question 7: Children need consistent loving attention from at least one person.

Question 8: Children learn by playing and trying things out, and by observing and copying what others do.

Question 16: Does a brain develop depending on the genetic material you got from your biological parents who gave you birth.

Answer: True/False (Answer: False)

How a brain develops hinges on a complex interplay between the genes you are born with and the experiences you have in the early years of life i.e. first three years of life. It is the early environment that shapes an individual and his or her personality as an adult, without which the genetic material is of no use.

Question 3: The experiences you have before age three have a limited impact on later development.

Answer: True/False (Answer: False)

Early experiences have a decisive impact on the architecture of the brain, and on the nature and extent of adult capacities

Question 4: A secure relationship with a primary caregiver esp. the mother creates a favorable context for early development and learning.

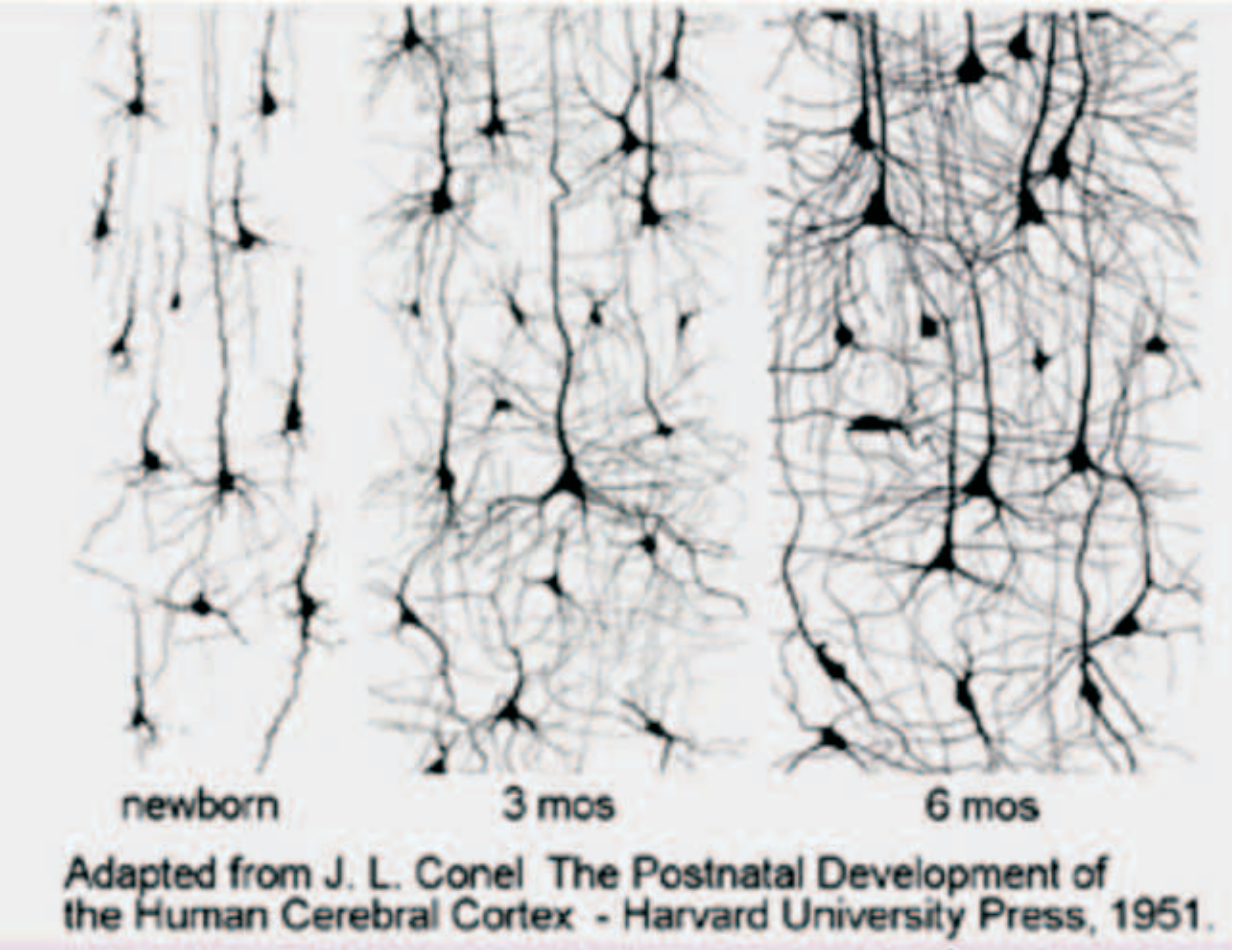
Answer: True/False (Answer: True)

Early interactions don't just create the context; they directly affect the way the brain is "wired".

Question 1: A toddler's brain is much less active than the brain of a college student.

Answer: True/False (Answer: False)

True. One billion wires are getting connected just after birth



Participants are supposed to know how to use the following materials in the field visit-

1. Screening tool cum Referral card for 0-6 years-Use of this tool will help in identifying children with developmental delays in the areas of vision, hearing, speech & language, cognition, motor and autism. Tool is included in the job aids. 0-2 year milestones are also supplemented with a Pictorial tool for quick identification of the developmental delays.
2. Developmental deviation or neuro-motor impairment including cerebral palsy-A pictorial tool depicting developmental deviation as compared with normal development.
3. Vision-Identification of vision related problems for 0-6 years. A pictorial tool depicting vision related problems.
4. Hearing and language for detailed assessment tool developed by CDC-LEST.
5. Cognitive tool-simple pictorial tool for identifying problems in cognition-

   This will help in identification of the impairment/disorder in respective domains.

Vision Impairment
Hearing Impairment
Neuro-Motor Impairment
Motor Delay
Cognitive Delay
Language Delay
Behaviour Disorder (Autism)
Learning Disorder
Attention Deficit hyperactivity Disorder

Child Development

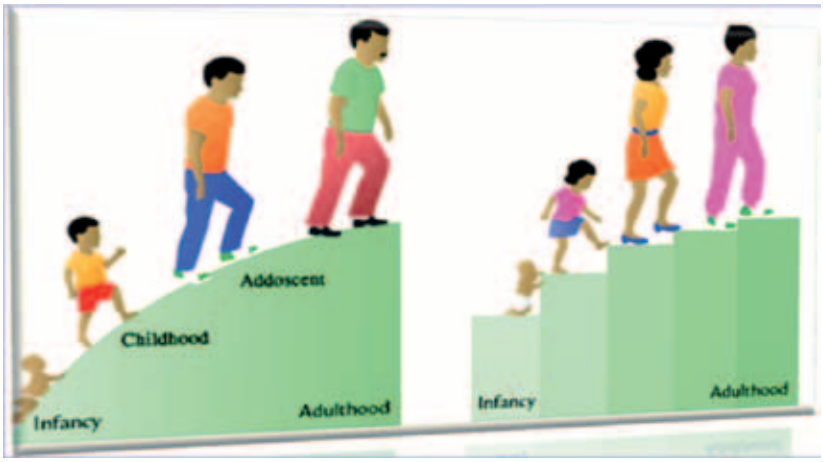
a. Definition, Process and Characteristics:

Who is a Child?

As per the Convention on the Rights of the Child (CRC), a child means every human being below the age of 18 years.

What is Child Development?

Child Development is the ability of the child to do more complex things, over a period of time and extends from the moment of birth till adulthood. Development starts right from the conception. Environment and learning experiences from the society, have a major role in child development.



Let us take the example a six month old child trying to pick up a pea or kismis (raisin) from the floor. Initially he or she would not succeed in the mission, but the same child at 9 to 10 months will easily pick up a small object holding it between his or her thumb and the index finger. This is development of the child's hand grip. If one is concerned about any child's development, one will have to check the Developmental Delay of the Child.

Growth refers to the child getting only bigger in size.	Development refers to acquiring skills and abilities to perform finer and more complex tasks
• Growth refers to quantitative changes i.e. increase in body size, proportion and structure, which can be measured through increase in height, weight and size of internal organs.	• It includes qualitative and quantitative changes related to functioning of a body. These changes are progressive, orderly, long lasting and coherent. Growth is one aspect of larger process of development.
• Growth stops at a particular age.	• Development is a continuous process that begins during the prenatal period and continues even when the physical changes are not visible.

b. Stages of child hood :

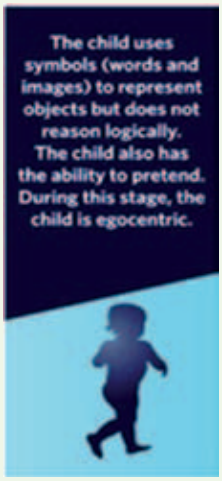
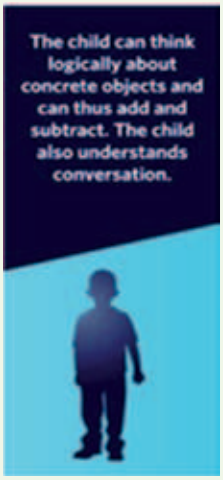
Childhood is divided into four major stages:

Each of the four stages are characterized by differences in Physical, Mental, Language, Social and Emotional abilities of an individual.

These are:

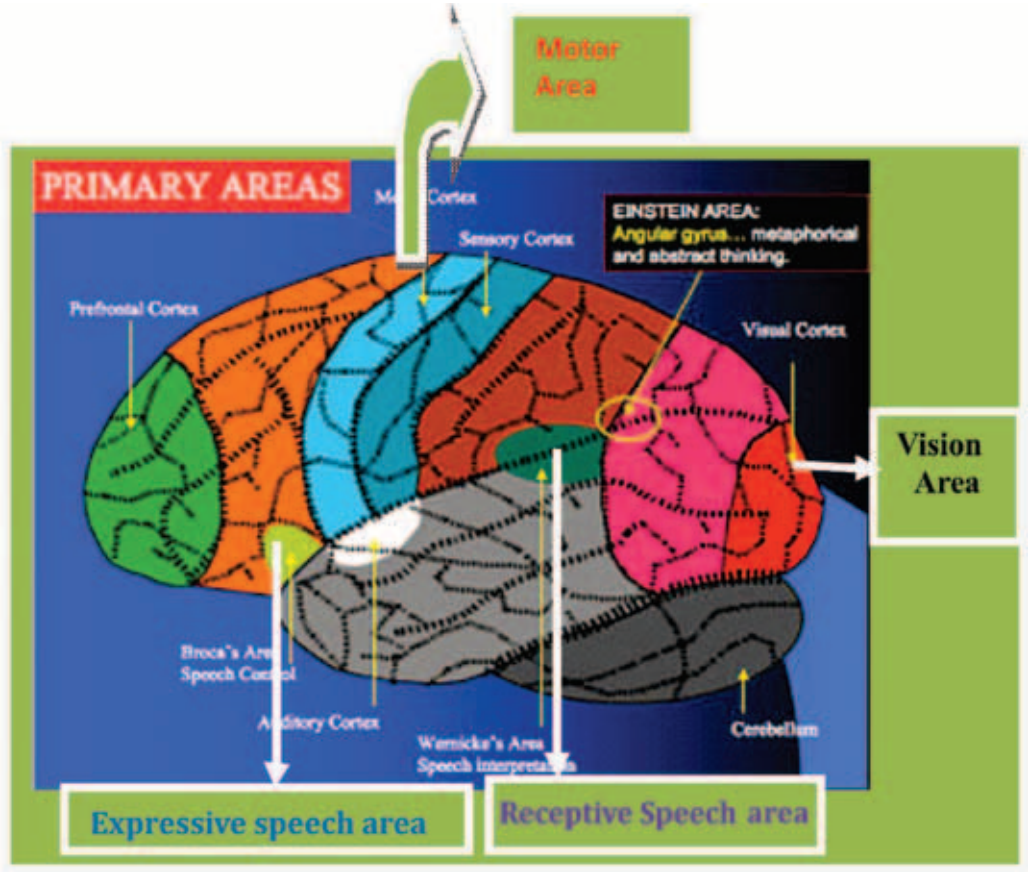
- Prenatal – Conception to birth.
- Infancy – birth to 2 years (Sensorimotor stage)
- Childhood – 2–12 years : 2-6 years and 6-12 years.
- Adolescence – 10–18 years.

Change from one stage to the other is a gradual and a continuous process

Sensor motor (Birth -2 years)	Preoperational (2-6 years)	Concrete Operational (6-12 years)	Formal operational (12 years –adult)
			
RBSK is to examine a child at:			
Birth to two years: Anganwadi center	Two to six years: Anganwadi center	Six to eighteen years: At School	

c. Areas of the Brain with their function:

Brain has different parts and these different parts of the brain perform different functions. A child learns through various senses including vision, hearing, touch, smell and taste. Cognition is the cumulative result of these sensory organs sending messages. Even if one part is affected the others areas of brain can be used for development.



The mobile team has to identify a child with such developmental delay, in any of these domains, and timely, refer to the DEIC, for intervention. At District Intervention center, the multidisciplinary team can specifically intervene in a particular domain but, at the same time other team members can stimulate other areas of the brain controlling different domains to help the child to accomplish normal development trajectory.

In a child with congenital cataract i.e. cataract since birth, the child's cognition is also affected. While to rectify the vision the ophthalmic surgeon needs to operate however, at the same time the child would require support in catching up cognition delay. In a room, to get light, if we are unable to open one of the closed windows, we must try to use other windows

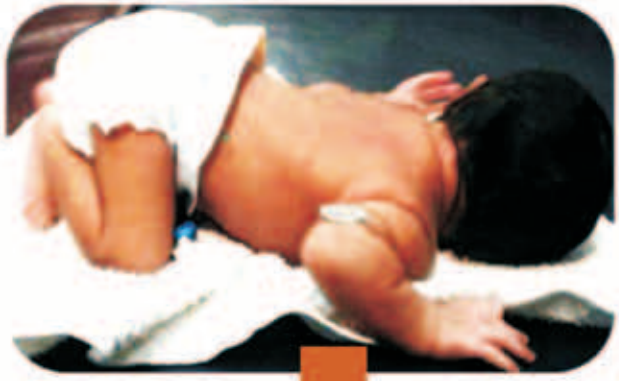
Pattern of Child Development and the Characteristics:

Understanding of pattern of child development and its characteristics help understand the process of child development

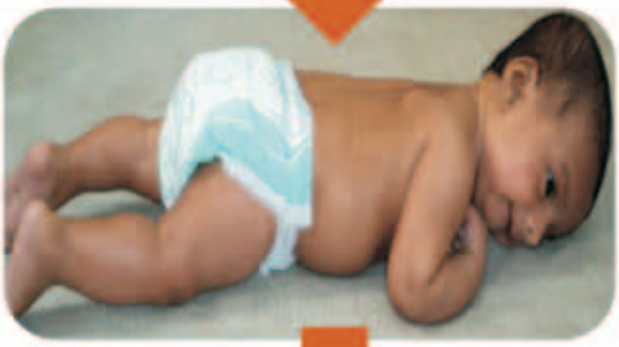
Pattern of Development:

- All children follow a predictable pattern of development

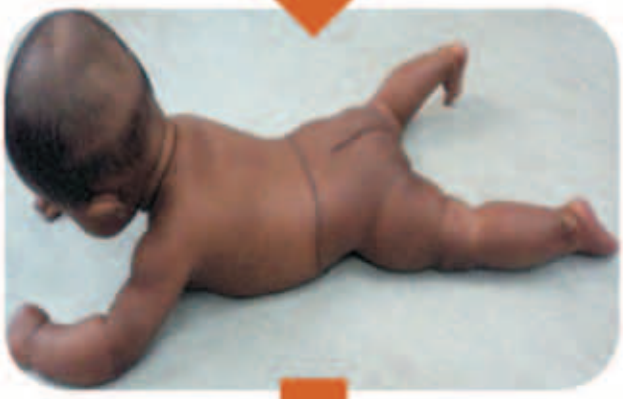
  A. Development Spreads over the Body, from Head to Toe. For example head region is the first to develop followed by trunk & then limbs. Child first learns head holding and then to sit and this is followed by standing and walking. Head to Toe or Cephalo- Caudal.



Flexed posture at birth



Extended at one month

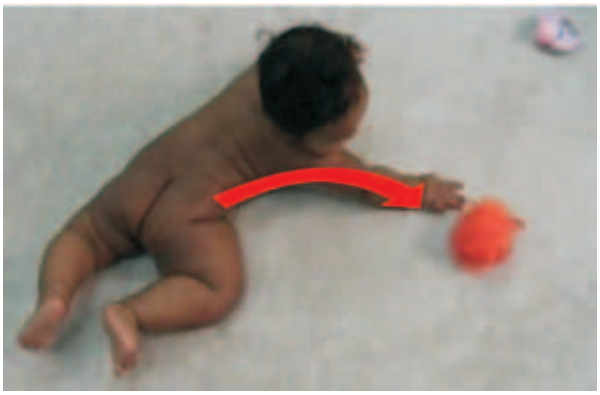


Extension up to thoracic spine

Extension up to lumbar spine

Cephalo-caudal development

B. Development proceeds from midline (centre) of the body to the distal parts. In midline we have head and neck, shoulder, trunk and pelvis. Arms and legs are the distal parts of the body. In essence, a child develops control over his/her head and shoulder, trunk and pelvis that is followed by his her ability to reach out and hold objects with hands. Head and trunk control, always, precedes ability to grasp and release.



Yellow arrow head shows the distal part i.e. hand.

Trunk and head are proximal parts of the body

C. Development Proceeds from Flexion to extension. Flexion is bending of the limb and extension is straightening of the limb or stretching out of a limb after it has been bent and the position attained. Child is born with all the four limbs bent and if they are not so, it is a sign of worry. Slowly, through development the limb stretches out and becomes straight.

D. Development Proceeds from Involuntary to Voluntary i.e. from spontaneous /automatic / uncontrollable to controllable. Let us take, for example,palmar grasp in a newborn: if we stimulate by placing our finger into the baby's palm the newborn responds by grasping the object and in this case, the finger. This grasp is very different from a 4 month old child reaching out, to a toy, and grasping it. The first is not in the control of the child so known as Involuntary reflex or uncontrollable (*known as primitive palmar grasp) whereas, the latter is voluntary and in the control of the child. He/she is attracted to the toy and hence, stretches the arm to hold it. Primitive Palmar grasp reflex in a newborn disappears by 2-3

months, after birth, as this is involuntary and must be replaced by a matured voluntary palmar grasp. A newborn can walk, known as stepping reflex but this is involuntary. Later on, this is replaced by voluntary walking.

Reflex	Onset	Elicitation	Disappears by :
Palmer grasp reflex (grasp response)	Birth	A finger or small object placed in the infant's palm elicits an involuntary flexion or grasp. Attempts to remove the object produce an even tighter grasp.	• Suppressed by about 2 to 4 months of age. • Should disappear by about 6 months of age. • Abnormal, if asymmetric or persistent. Often seen in hemiplegic.

E. Development Proceeds from Undifferentiated to Differentiated. Let us take the example of a two month old child who wishes to get a toy. The child would move all the limbs; use its facial expression and its, whole, body to explain to the mother to get the toy (Undifferentiated). But, a one year old child will do the same by pointing out, with a finger, to get the object. This ability to use the finger, in isolation of the hand or body requires Differentiated development.

F. Development Proceeds from Ulnar Palmar to Radial Digital Grasp (Voluntary Palmar grasp/ Voluntary release).

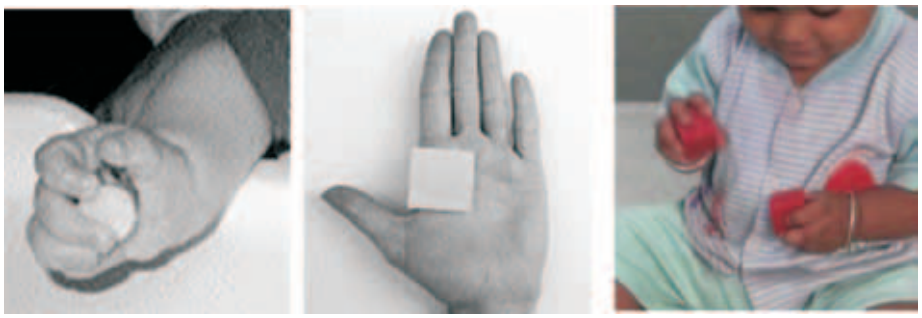
i. Age 4-5 months: Crude Ulnar Palmar Grasp

Observe the grasp of the object in the ulnar side of the palm and the lack of thumb involvement in this grasp. The picture, on the right, shows where on the palm an object is placed while using a crude palmar grasp.

ii. Age 5-6 months: Palmar Grasp

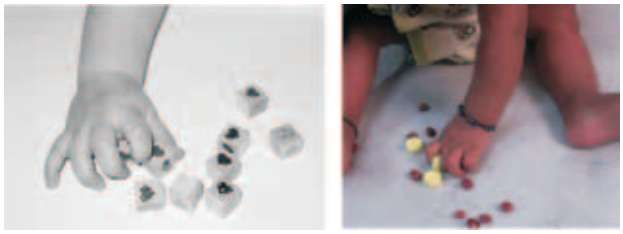
The object is secured in the center of the palm, in the palmar grasp. Again, there is lack of thumb use. Although the object is quite small, this infant has grasped it with the whole hand because he or she does not yet have the ability to use more precise movements. Note that now the object is in the center of the palm.

iii. Ages 6-7 Months: Radial Palmar Grasp



The object is secured in the radial side of the palm. Note the flexion of the ulnar fingers for stability and the thumb that is beginning to oppose and actively press the object into the palm.

iv. Ages 7-8 months: Raking Grasp



Note the flexion of the radial fingers to bring the objects into the palm while using the raking grasp.

v. Ages 8-9 months: Radial Digital Grasp (First two fingers and thumb)

Observe the full opposition of the thumb to help secure the object, and the flexion of the ulnar fingers for stability while using the radial digital grasp.

vi. Also Ages 8-9 months: Inferior Pincer Grasp

Note the adduction of the thumb to secure the object against the extended index finger while using the, inferior, pincer grasp.

vii. Ages 10-12 months: Pincer Grasp

Note: the full opposition of the pad of the thumb and the pad of the index finger to secure the object while using the pincer grasp. This is differentiated from the neat pincer grasp, in that the pad of the finger secures the object in the pincer grasp; whereas the tip of the finger secures the object in the neat pincer grasp.

A. Development is continuous and progressive. And, over a period of time, simple skills are replaced by finer and complex skills, through learning and practice. Crawling on 4 legs is replaced by walking on two legs;

B. Development follows Similar and Orderly Pattern. All children follow similar pattern of development with one stage leading to the next and it is always in order., e.g. all babies stand before they start walking. They cannot walk without standing first;

C. Development of each Child is Unique. Each child is unique and different from others due to his genes and environmental experiences. E.g., sister and brother, in spite of being brought up in the same family, both are different in looks, nature and habits.

D. Rate of development differs from one child to another. There are individual differences in rate of development due to heredity & environment influences, e.g. one child may walk at the age of 9 months and the other may do so at the age of 13 months. Both are normal. Hence we have normal range. Once it is outside, the normal range then, we say there is developmental delay and requires further evaluation, in details.

Understanding of pattern of child development and its characteristics helps us to understand the process of child development and help the child.

Exercise: Cover the right side and try to suggest the age of the child:

Radial-palmar grasp of cube Pulls round peg out 	**6-7 month**
Inferior scissors grasp of pellet: rakes object into palm 	**7-8 month (Raking)**
Scissors grasp of pellet held between thumb and side of curled index finger Takes second block: holds 1 block in each hand 	**8 month** (Four fingers against the thumb)
Radial-digital grasp of cube held with thumb and finger tips 	**8-9 month** (First two fingers & thumb)
Inferior pincer grasp of pellet held between ventral surfaces of thumb and index finger 	**8-9 months**

Isolates index finger and pokes Clumsy release of cube into box: hand rests on edge 	**10-11 months**
Pincer grasp, held between distal pads of thumb and index finger 	**10-11 months**
Fine pincer grasp of pellet between finger tips Marks with crayon Attempts tower of 2 cubes Precise release of cube Attempts release of pellet into bottle 	**11-12 months** (Fine pincer grasp)

Introduction to Developmental Milestones:

- Child's progress on the path of development across definite stages is marked by certain indicators called Developmental Milestones.
- Milestones are like guideposts for various stages of development, through which every normal child passes.
- Milestones indicate the age at which children are expected to perform tasks which are also called developmental tasks.

Every train has to reach a mile post or mile stone/destination at a particular time. There could be a delay

- For every child there is a normal range for completion of a 'milestone'. But each child reaches a 'milestone' or performs the expected 'developmental task' at his own pace and in his or her own way.
- If the child seems slow in reaching the mileposts within the stipulated time, increase stimulation of the child by talking and playing. If the child is still slow, take the child to the doctor.
- Sometimes, a developmental stage is skipped or another one is delayed or there is developmental deviations, but this need not be a cause for alarm. If accomplishment of 'milestones' is unduly delayed, it is a signal that a child should be medically examined and not labelled as disability or handicap.

Domains of mile stones:

- Thus, when we talk about normal development, we are talking about developing skills like:
  - **Motor development** which helps in any form of movement. There are two categories within the area of motor skills: Gross motor and Fine motor.
    - **Gross motor:** using large groups of muscles to sit, stand, walk, run, etc., keeping balance, and changing positions.
    - **Fine motor:** using hands to be able to eat, draw, dress, play, write, and do many other things.
  - **Speech and language:** speaking, using body language and gestures, communicating, and understanding what others say.
  - **Cognitive:** Learning and Reasoning. It includes, understanding, problem-solving, and remembering.
    - **Social:** Interacting with others, having relationships with family, friends, and teachers, cooperating, and responding to the feelings of others. Social (use of social skills), Emotional (emotional control). This includes the interaction the child develops initially with his or her mother and at a later stage with his friends.
    - **Adaptive Development:** needs to be assessed mostly when a delay has been confirmed and we need to start therapy. It basically deals with child's Self-care skills required for daily activities.
    - **Vision Problem** usually manifests during the first three years but rarely diagnosed and treated
    - **Hearing Problem** would manifest as speech and language delay

However, all the sensory organs are like windows to the brain. Sensory experiences enter through this window and help in wiring of the brain and developing intelligence.

Some highlights of the developmental milestones in motor area:

- 3-4 months- holds head upright
- 6 months- rolls from back to stomach
- 8-9 months- sits without support
- 9-10 months – crawls on arms and knees
- 12-15 months- stands alone
- 15-18 months – walk alone
- 2 years – jumps in place and runs well
- 3 years – walk upstairs and downstairs

Teeth and Teething as Mile stones

Although Parents (especially mother) consider that the eruption of the first tooth is a milestone in development, the age at which this occurs is of no practical importance. The first teeth to appear, at 6–12 months, are the lower incisors.

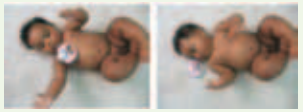
From the age of a few weeks, infants normally put their fingers, and later anything else that comes to hand, into their mouths and mothers often wrongly ascribes this to teething.

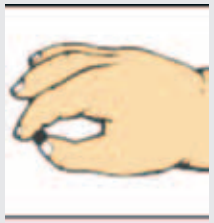
Teething produces only teeth. It does not, contrary to common belief, cause convulsions, bronchitis, or napkin rash.

Some parents insist their infants are particularly irritable when they are teething, but it is important to examine theinfant to exclude disease such as otitis media or meningitis before accepting the mother's explanation.

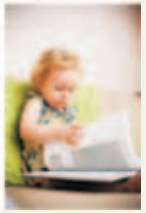
Dummies temporarily affect the growth of the mouth but there are no objections to using them. They should not be dipped in honey. Severe dental caries also follows the use of "comforters" or "feeders", which are filled with fluid containing sugar or honey.

Tetracycline or its derivatives should never be given to children less than eight years of age, as permanent brownish yellow staining of the teeth may occur.

Age in months	Gross Motor	Fine motor	Speech & Language	Vision	Social/emotional (play)	Cognition
2	Starts lifting the Head, occasionally, while on tummy (45 degree);	Opens hand, intermittently;	Make Coos laughs , throaty sounds like gargling cooing;	Can see large size objects ;	Social smile begins Responds to mother's facial expressions, after being talked;	Eye to eye contact;
						
4	Holds head up, lifts the head and chest with support on fore arm; Sitting with support; head held steadily;	Reaches for and grasps an object; Brings both hands in mid line and is able to play around with both hands;	Turns eyes to sound; Laughs aloud or squeals, with laughter;	Eyes can follow the toy; Stares at own hand; No crossed eye;	While sitting, in mother's lap, smiles back, at mother and holds head steadily;	Looks at objects, it is holding (observe the toy);
						
6	Able to sit, with support; Can roll over, from prone (lying on tummy) to supine (lying on back);	Holds object using thumb side (radial palmer grasp); Transfer object from hand to hand (begin);	Monosyllabic early balling 'ba' 'ba'; 'ma' Turns head to sound;	Can look for a dropped spoon; Shifts gaze from one object to another;	Stretches arm, to be picked up;	Moves to look for a fallen object; Child pays attention to a person and an object;
						

Age in months	Gross Motor	Fine motor	Speech & Language	Vision	Social/emotional (play)	Cognition
9	Sits without arm support Reciprocal (alternate hand s and legs movement) crawling	Holds object like marble between thumb and first two finger Transfer object from hand to hand (mature)	Polysyllabic babbling 'ma ma ma ma' Non specific mama dada	Avoids bumping into objects while moving	Plays peek a boo Responds to his her name	Looks for a toy that is completely covered
						
12	Able to stand alone and walk while holding the parents hand 	Able to pick up small object with thumb and finger tip 	Can say at least one meaningful word clearly and specifically like 'papa'; 'mama', 'dada' Understand the word 'No" 		Waves good bye Hugs doll or any one (express emotion of affection/joy/anger/ fear like kissing, cuddling, crying etc.) Gives object on request Able to deliver toys to the father or mother (15 months) 	Looks for a toy that is completely covered Puts block into cup 

Age in months	Gross Motor	Fine motor	Speech & Language	Vision	Social/emotional (play)	Cognition
15	Begins to walk alone, walking pattern is wide based, Creeps on the stairs 	Pointing with index finger (where is the bottle) Scribbles in imitation, Turns 3-4 pages at a time and tower of 2 blocks, Manipulation exploration of toys in hand 	Points to common object (in the picture book) when named, Can speak 4-6 words 	Can put a circular shape in a puzzle Looks for a toy that was displaced 	Pretends play like feeding the doll, 	Follows simple instruction – 'give me the ball'. 'come here' 'sit down' 
18	Child walks steadily even while holding or pulling a toy Begins to run Walks upstairs with help 	Spontaneously scribbles , Turns 2-3 pages at a time, Build tower of 3-4 	Has expressive vocabulary of 10-20 words • Can listen and respond to simple directions		Usually play beside other children but not with them 	Identifies at least one or two body parts when asked 

Age in months	Gross Motor	Fine motor	Speech & Language	Vision	Social/emotional (play)	Cognition
24	Runs well Able to jump, Walks up and down stairs without help (2 feet steps)	Open the bottle by turning cap Turn pages one at a time Imitates vertical or circular stroke with pencil, Build tower of 7-8 cubes	Speaks in two words combination – "mama milk'	Identifies a picture in a book or points to his own photo	Imitates every day activity like sweeping washing cloths	Opens lid of container to obtain a sweet Stack rings on a peg in order Mentions six body parts
		 				
36	Hops one to three times on one foot Can climb up and down stairs Able to go down stairs with alternating feet without holding	Mimic straight line and circle, Tower of 9 cubes or bridge	Is able to ask 'what is this' Speak simple sentences and three word sentences	Able to give the name of one to two colors	Able to play together with other friends (cross play)	Matches blocks that are of same colors Puts square triangle on the form board. Differentiate between cup plate Big and small
						

Developmental delay

Developmental delay is a descriptive term used, when a young child's development is delayed in one or more areas, compared to other children.

These different areas of development may include:

I. Gross motor development;

II. Fine motor development;

III. Speech and language development;

IV. Cognitive/intellectual development;

V. Social and emotional development;

Parents and others become aware of delay when the child does not achieve some or all of the milestones, at the expected age. Other children may present, with behavior problems which may be associated with delayed development.

The term developmental delay is often used, until the exact nature and cause of the delay is known. The significance of the delay is often only, determined by observing the child's development, over time.

An assessment is often needed, to determine what area or areas are affected.

What are the causes of developmental delay?

Disorders, which cause persistent developmental delay are often termed developmental disabilities. *Examples are cerebral palsy, muscle disorders, language disorders, autism, emotional problems and disorders of vision and hearing. All these conditions can cause developmental delay. However, one of the most common causes is an intellectual disability.*

Based on the domains or area of developmental delay the child may be placed in:

Focal delay: Delay in one area or domain;

Global delay: Delay in more than one area;

Area :	Diagnosis
Motor area or Domain	Neuro-motor impairment, like Cerebral palsy or others;
Cognitive area or Domain	Isolated Intellectual Disability or Mental retardation, either mild or severe;
Communication area including speech and language delay (Both Expressive and Receptive abilities.	a) Hearing problems or Deafness; b) Expressive language delay or speech problems; c) Articulation problems like stammering;Autism, which is also Communication Deficit but, also have social interaction problem and a repetitive stereotypical behavior patterns;
Receptive ability is the ability to receive sound i.e. ability to hear	
Expressive ability is to express through talking or gestures):	
Visual Impairment.	These are children diagnosed with partial to complete visual impairment;
Epilepsy or convulsions	
Problems at School going age	a) Attention-deficit/hyperactive disorder (ADHD); b) Learning disorder (LD) among school children (6-9 years);

Range of disabilities, common among children

Speech and language impairment are (approximate prevalence 6%);
Learning disabilities (8%);
Attention deficit disorder (7%);

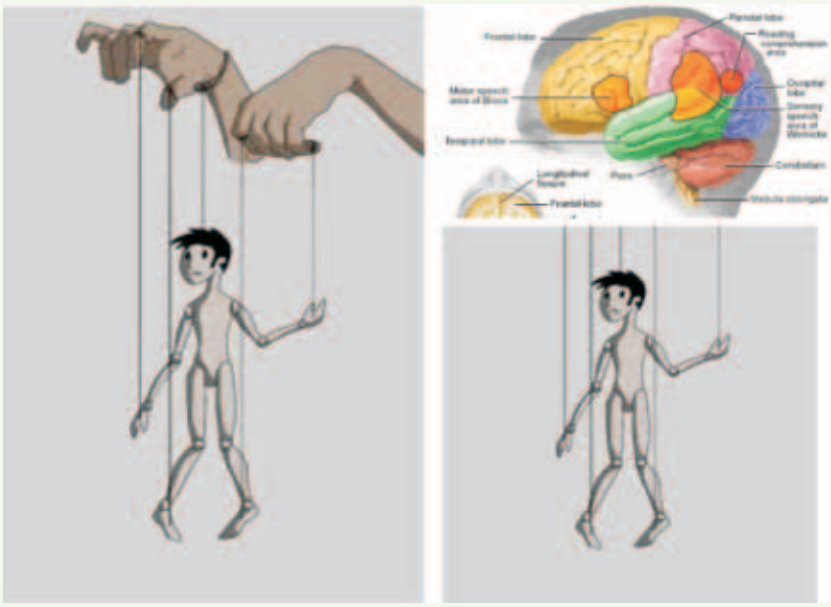
Less common conditions include:
Mental retardation (1%–2%);
Cerebral palsy (0.2%);
Autism and autism spectrum disorders (0.5%);
According to the US Department of Education, 13.2% of school-age children are in special education, most of them diagnosed with learning disabilities or mental retardation;

1 Neuro-motor Impairment

A) Background

Neuro-motor- has two Parts: Neuron and Motor.

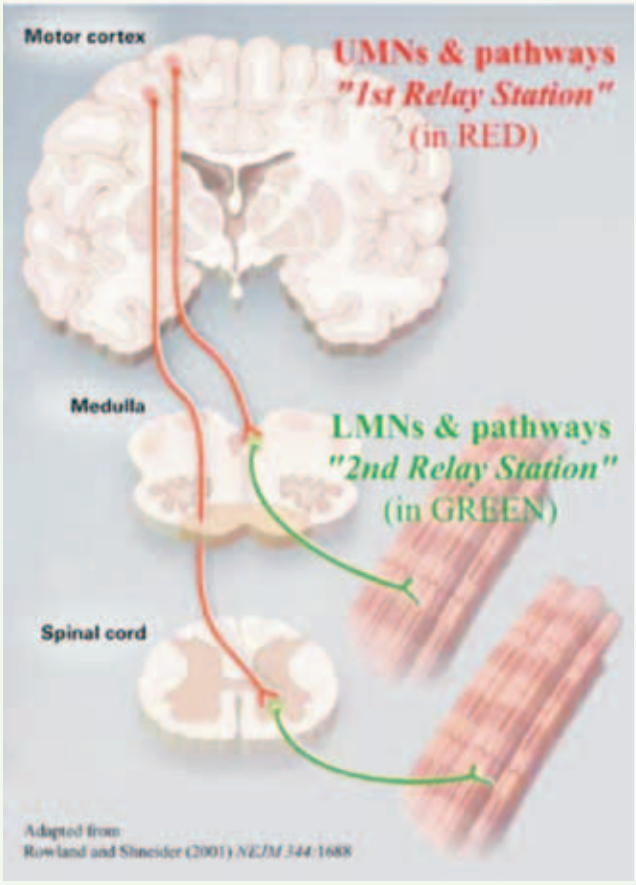
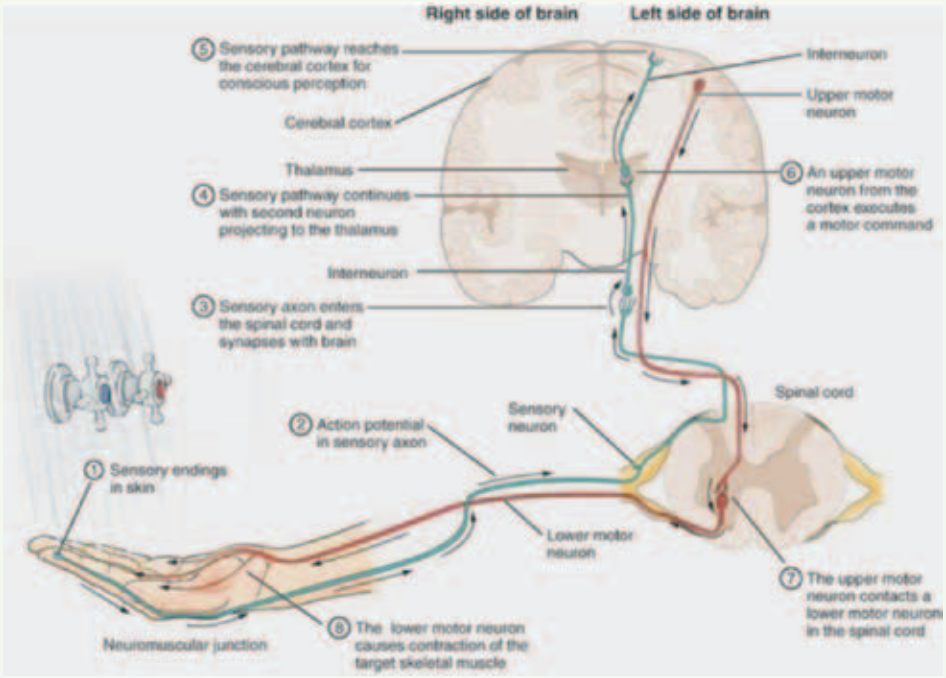
Neurons are the cells of the brain which, through spinal cord and the peripheral nervous system, control the muscles and its function i.e. the movements. This is very much like the puppet master, who in this case is the Brain. Brain through wires controls the functioning of the muscles and also guides the movements of the body (puppet). For smooth and matured movement, the brain, on one hand, has to pull and relax the correct wires and at the same time message has to go, from the muscles and joints, to the brain informing him of the position of the limbs. In children, this system is not matured and through repeated actions and learning, by the brain, it acquires enough skill to perform the role of a matured puppet master.



- Puppet master = Brain
- Spinal cord and the peripheral nervous system = wires from the brain
- Muscles = learn and can perform mature function, provided the puppet master pulls the correct wires.
- Correct information must go to the puppet master from the periphery, as the position and movement of the limbs of the puppet.

Development of skills in a child occurs as the brain matures through myelination i.e. covering of the wires and better connectivity among the neurons.

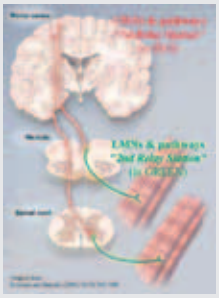
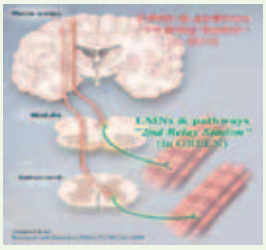
Any, adverse, condition, that affects the normal functions of the brain and spinal cord, may cause disorder of movements that restricts movements and daily activities of a child.

Brain **Brain stem** **Spinal cord** **Muscle**		Motor neurons (Cells) in the brain are concentrated in the motor cortex and can be thought of as the 'power station' or '1st relay station', which produces the initial signal whenever speech, swallowing or movement is initiated. These motor neurons are known as the 'upper' motor neurons (UMNs). From here, messages are sent along nerve tracts or wires to groups of cells, motor neurons located in the brainstem (lower part of the brain), or in the spinal cord. These '2nd relay station' neurons, known as the 'lower' motor neurons (LMNs), in turn send their wires to the muscles of the body, stimulating them to contract and cause movement. Where the UMNs and their pathways to the LMNs are shown in red and the LMNs and their pathways to the muscles are shown in green
		Red lines show before movement of the muscle the message from the brain goes to the spinal cord (UMN) and then from the spinal cord to the muscle, leading to the muscle contracting and moving of the limbs. Green lines show message from the muscle telling about the position going to the spinal cord and then to the brain

B) Definition: Neuro-motor Impairments:

- Neuro-motor impairment is caused by neurological (brain/spinal cord/muscle) damage that affects child's ability to move one or more body parts;

- This injury could be one time insult or progressive;
- Onset of this injury could be either before two years or after 2 years;
    - In children it usually, refers to the brain insult/injury at the time of birth or just before birth but that is a one-time insult and usually does not progress.
    - As the child grows older, the brain matures, and therefore the child improves in motor function with time.
    - Neuromotor impairments can be broadly, divided into three groups:
        1. **Cerebral palsy** (CP)which is one time injury i.e. Non progressive brain injury before the age of 2 years.
        2. **Neuromuscular disorders** (NMD) which is injury to the cells of the lower part of brain (lower motor neurons) and their connections up to the muscle.
        3. Others include progressive degenerative diseases usually, above the age of 2 years.

Diagnosis of Neuro-Motor impairment		
A	Static or progressive difficulty in performing activities related to movements of the limbs or coordinated movements of the body	
B	Any one of the following : a) findings, suggestive of progressive lesions usually of brain or spinal cord, age above 2 years: If yes should be included in the third group of neuron muscular impairment: Other NMI.	
	b) findings, suggestive of static lesions usually, of the nerve cells in the lower part of brain known as lower motor neurons and their connections up to the muscle: If yes should be included in the second group of neuron muscular impairment: NMD under NMI.	
	c) findings, suggestive of non progressive lessions, onset before 2 years, cerebral in origin (upper motor neurons): If yes should be included in the first group of neuron muscular impairment: CP under NMD.	

Cerebral Palsy is characterized by, all of the following:		
1	Age of onset before 2 years	Manifestation appears before the age of 2 years;
2	Non progressive in Nature	One time damage of the brain, no progressive damage;
3	Cerebral in origin	(Brain is involved);
4	Predominant motor impairment with abnormalities of: a) tone b) posture c) movement;	

Postural tone

Muscles, in our body, are always in a state of contraction (tension) whether at rest or during movement. This is the tone and since this allows us to maintain our posture it is also known as postural tone.

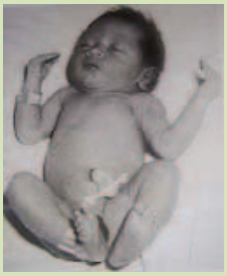
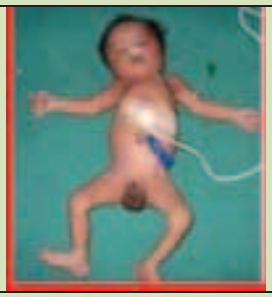
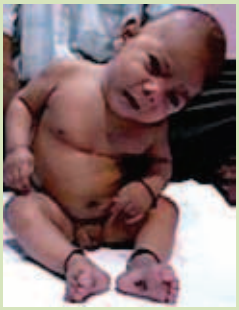
It is due to the tone, of the muscles, that we maintain our posture and move about, against gravity i.e. we can sit, stand and walk.

Damage can be at level of the 1) Brain, 2) Spinal Cord, 3) Connection between the spinal cord and the Muscle or 4) Muscle itself.

1) **Brain:** Damage to those areas of the brain that regulate tone of the muscles alters normal tone.

2) **Connection between the spinal cord or brain stem and the Muscle or Muscle itself:** Damage to the connection between the spinal cord and muscle or the muscle itself leads to less tone. The child looks like a ragged doll, unable to lift his head, unable to sit without support or cannot walk or walks with wide gait. As a result, it becomes difficult to sit, stand and walk, for the child, or able to follow the age appropriate mile stones.

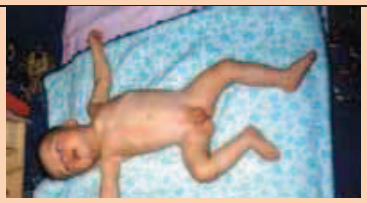
Abnormal tone affects every voluntary muscle in the body, that influences postures and movement. Abnormal postural tone is the common factor in all types of cerebral palsy. **Illustration of Low tone or Hypotonia.**

		Ragged doll unable to sit either requires support of the wall or sits with both legs spread behaves like a child with low tone
		
This picture is of a newborn with low tone sleeping like a frog	Normal child with legs bent (Flexed)showing normal tone	This picture is of a newborn with low tone sleeping like a frog
		
Head falling to the side at 6 months	Head falling to the front	Head falling to the back at 6 months
		
Sitting with legs apart and round back because of low truncal tone	Walking with legs apart because of low tone	Stands with support with head falling on one side because of low tone

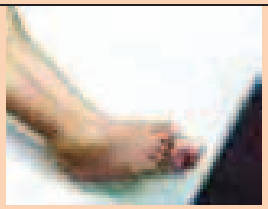
Assessment and Clinical Clues of a Possible Motor Disorder

I Observe posture

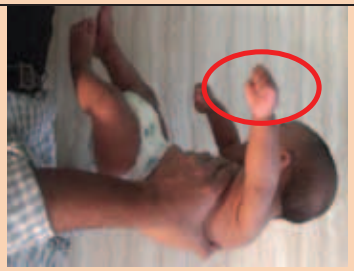
1) **Hypotonia (floppiness)** of the trunk: The baby lies in a frog like position .The baby slips through the hands when held under the arms in a vertical position.

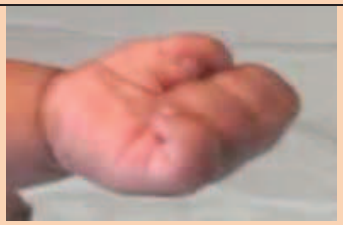


2) **Plantar flexed feet** (highlighted with the red ring)



3) **Hands** held habitually **in a fisted position** (highlighted with the red ring)





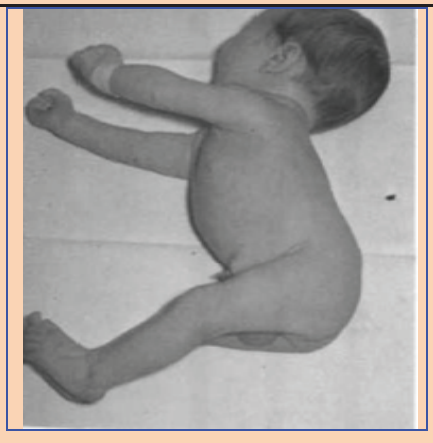
4) **Non-sequential Motor Development** like:

a)Early rolling by 3 months (rolls as a piece)

b)Brings head and chest up on forearms in- prone- position prior to developing good head control

c)Preference for early standing prior to sitting

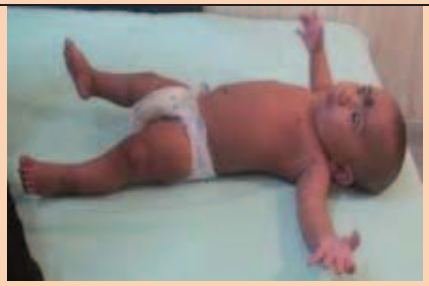
d)Preference for using one hand more than the other before 3 years



(a)

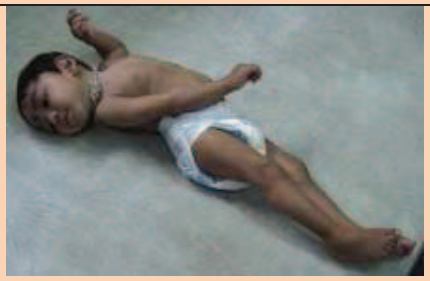
5) Qualitative **Differences in Motor Development** commonly **reported** by parents and caregivers

a)Startles easily; **jittery**

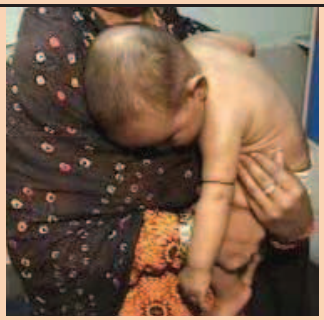


b)Does not like to cuddle; seems **"stiff"** (difficult to carry the child)

c)**Arches back** frequently



d)Baby seems **"floppy"** (Baby slips through the hands when held under the arms in an erect position)

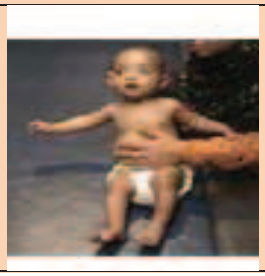


c)**Infrequent or limited** variety of **movement**

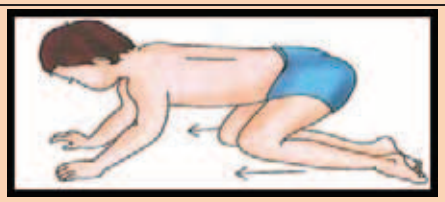
d)**Favors one side** of body more than the other

e)**Feeding problems,** particularly **after 6 months**

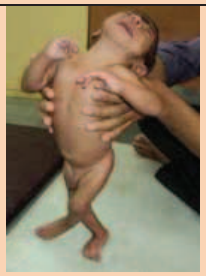
f)**Falls backward** in a sitting position



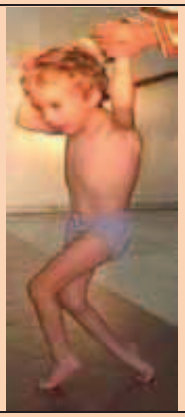
g)Crawls in a **"bunny hop"**



i)**"Scissors" legs** while standing



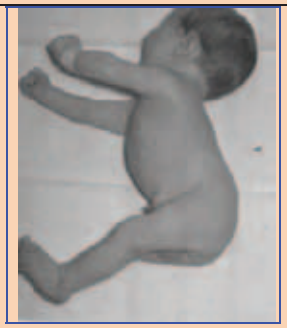
h)**Walks on tiptoes**



j)Sits with legs in **"w" position** (reversed tailor position)

II Observations of Movement

a) Rolling as a unit (**log rolling**) after the age of **6 months**



b) **Hyperextension of head and neck** when prone in conjunction with significant head lag when pulled to sit

Significant head lag when pulled to sit and Hyperextension of head and neck

c) Readily lifts head and neck when prone, but **arms are kept extended along trunk**

d) When pulled to sit from lying down position, comes to standing instead of sitting position

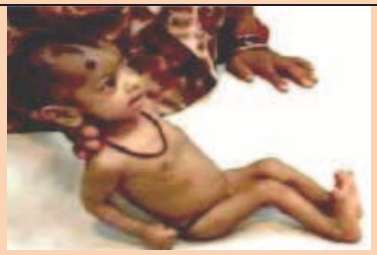
III Observe in sitting position :

One or more of the following occurs in the sitting position:

a)Hips and knees are flexed and hips are adducted

b)Legs are positioned in a reverse tailor or "w" posture

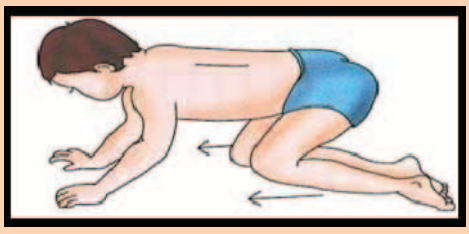
c)A tendency to thrust trunk backward while sitting



IV Observe in crawling position :

One or more of the following is observed during crawling:

a)Legs are moved as a unit resulting in "bunny hop" movements



b)Hips are excessively adducted, reciprocal movements of legs are done very slowly, and movements are 'Jerky" in appearance

c)Legs are kept extended and adducted while child creeps (pulls body forward with arms)

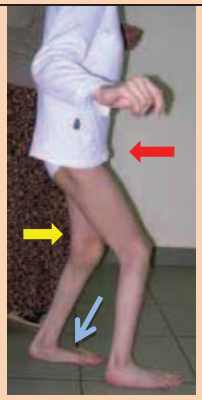
One or more of the following is observed during standing:

a) In a supported standing posture, legs are excessively extended and adducted, and child stands on toes.

V Observe in walking position :

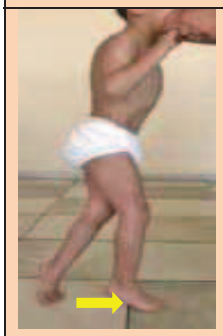
One or more of the following is observed during walking:

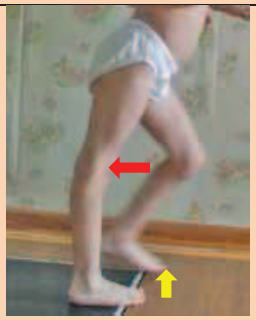
a)Crouched gait (hips are flexed and adducted, knees are flexed, and feet are pronated)



Red arrow- Flexion of hips, Yellow arrow- Flexion of knees, Blue arrow – Pronated feet

b)Intermittent tiptoe gait and overextension of the knees





Intermittent Tiptoe gait	Red arrow – Overextension of the knee Hyperextension of the knees Yellow arrow- Tiptoe

In order to detect,Neuro-motor impairments, ask the following questions and observe the child: **(only for child > 2 years)**

1. Does your child have difficulty in any one of the following? ☐
   a) Sitting ☐
   b) Getting up from floor ☐
   c) Standing ☐
   d) Running ☐

2. Did your child start performing the following activities later than children of his or her age? ☐
   a) Started sitting without support beyond his or her birthday ☐
   b) Started walking without support beyond his or her second birthday ☐

3. Does your child any of the following? ☐
   a) Toe-walking ☐
   b) Abnormal posture of any limb ☐
   c) Decreased or unequal use of any limb ☐
   d) Frequent falls ☐

4. Does your child have difficulty in performing any of the following activities? ☐
   a) Bathing /cleaning himself or herself ☐
   b) Toileting ☐
   c) Dressing ☐
   d) Feeding self ☐

In order to detect Neuro-motor impairments ask the following questions and observe the child**: (Only for child <2 years)**

1. Does your child move all the limbs equally when awake i.e. both hands and legs equally or he has any difficulty? (alternate/ both legs together)
2. Does your child after the age of 3 months keep the fist tightly closed most of the time or hold the thumb adducted across the palm during wakefulness?
3. Does your child sleep with the shoulder, hip and thighs of child remaining flat on the mat, with very little spontaneous movement? (like a frog)
4. Does the child keep the hands and feet close to the body in a stiff posture with scissoring of legs?
5. Does the child keep his or her head stretched backwards and the entire spine stretched like a bow with toes pointing straight?
6. Did your child start performing the following activities later than children of his or her age?
   a) Started Head holding beyond 4 months: while on mothers shoulder or when on tummy lifting the head
   b) Started sitting without support beyond 9 months
   c) Started standing without support beyond 18 months
   d) Started walking without support beyond his or her second birthday
7. Does your child do any of the following?
   a. Toe-walking
   b. Abnormal posture of any limb
   c. Decreased or unequal use of any limb
   d. Frequent falls

Cerebral palsy

Cerebral palsy is defined as 'a disorder of movement and posture due to a defect or lesion of the immature brain' (Bax 1964). It may occur in utero, during birth, or within three years after birth. Although it is essentially a motor disorder, it is often associated with cognitive deficits, visual and hearing disturbances, and seizure disorders. The lesion in the brain remains static and non-progressive but the motor and functional abilities may deteriorate, as age progresses.

Cerebral palsy causes variable impairment of the coordination of muscle action, with resulting inability of the child to maintain normal postures and perform normal movements.

Associated problems of Cerebral palsy

- Cognitive and perceptual disorder;
- Inadequate habituation and state control (inconsolable cry, unable to maintain sleep);
- Emotional disturbances;
- Visual impairment;
- Speech and language disorder;
- Hearing impairment;
- Seizure disorder;
- Feeding difficulties (uncoordinated lip, tongue and jaw movements, swallowing problems);
- Orthopaedic problems (contractures, deformities, spinal deformities);
- Dental problems;

Incidence of Cerebral Palsy

The current prevalence of cerebral palsy is estimated to be one to three per 1000 children of early school age.

Causes of Cerebral Palsy

- Preterm brain injury (certain areas of the brain more affected);
- Term brain injury due to lack of Oxygen or circulation of blood to the brain or both. (certain areas of the brain are destined to suffer most);
- High level of newborn jaundice not treated properly leading to damage of certain areas of the brain;
- Brain malformations since birth;

Impact on the child and the Family

CNS dysfunction has mild to severe impact on motor development which, in turn influences cognitive and sensory processing. The resulting movement and functional limitations due to brain lesions depend on area and extent of damage. There may be associated health problems

like recurrent lung infections, inadequate nourishment due to feeding difficulties, and improper digestion of food due to poor posture and lack of mobility, constipation and others. Concurrent seizure disorder requires medications that also cause diminished alertness and further reduce movements and learning. They, therefore, require continuous medical support for one reason or the other.

Due to movement restrictions, children with neuro-motor disability are unable to explore their environment that, almost invariably, affects social and emotional development. Avenues of learning using different sensory organs suffer greatly, due to disorders of movements and locomotion, and are further compromised if there are associated deficits of hearing, sight, tactile processing and/or perception. Thus, it is the combined effect of organic damage and the resultant deprivation of exploration, due to movement restrictions, that affects the overall development of the child. Some children having continuous involuntary movements and facial twitching and no speech may appear to have intellectual disability which, they actually may not have.

Having such a child in the family makes the parents handicaped in many ways. A considerable amount of financial resources of the family is spent for the wellbeing of the child and transportation to avail therapy and medical services, procuring furniture and aids and appliances, and medications, if needed. Due to motor disability of the child, it becomes physically impossible for the parents to carry the child and move about which, indirectly, restricts them to attend social functions, family gatherings, and visit to the neighbors. Inadequate number of mobility aids like wheelchairs in public places -- like bus terminus and railway station, lack of wheelchair accessibility on public transport system, and above all public apathy, towards the need of the child all add woes to the family's plight, having a child with motor disability.

Early Recognition of Cerebral Palsy

The following are the early indicators of cerebral palsy:

In supine:

- Asymmetrical posture (head and trunk are not aligned);
- Asymmetrical tone and movement patterns, e.g., flexor hypertonicity in arms and extensor hypertonicity of legs;
- Opisthotonic posture (head and trunk stiffly hyperextended in supine posture);
- Head lags when pulled to sit, unable to anchor at the pelvis;
- Unable to lift head, to an upright position, either from falling forward or backward when held, in a sitting position;
- Frog posture in supine with no movement against gravity;
- Asymmetrical tonic neck reflex with involvement of trunk;

In prone:

- Unable to lift head, even momentarily, in prone, cannot clear airway;
- Persistence of flexion due to increased tone;
- Fully rounded trunk with head hanging forward, due to Hypotonia;

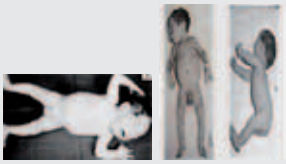
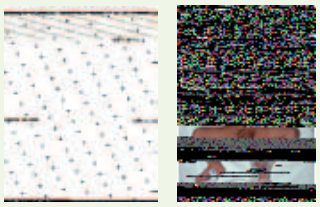
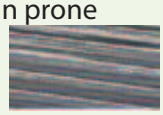
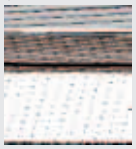
In sitting:

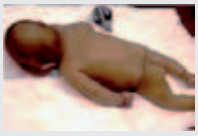
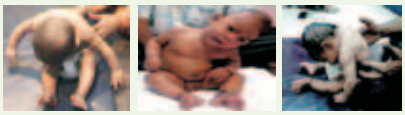
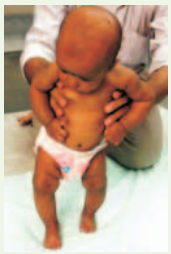
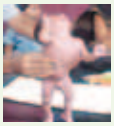
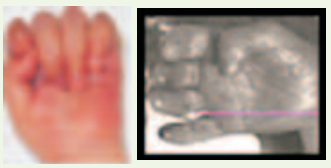
- Unable to hold upright posture, due to Hypotonia;
- Head thrown back, due to intermittent spasm;
- Asymmetrical weight bearing with flexed one arm (due to increased tone) and internal rotation and adduction of the affected hip (hemiparesis);

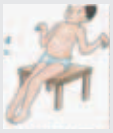
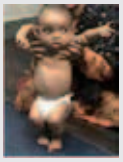
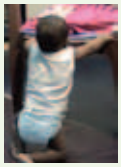
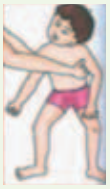
Standing:

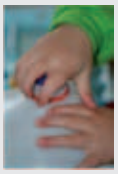
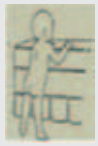
- Pushes head backward, cannot conform in standing position;
- Unable to put weight through legs (hypotonia);
- Stands on toes with internal rotation of hips (increased extensor hypertonicity);
- with foot, flat in one leg and the foot is plantarflexed with hip, internally, rotated and knee flexed of the affected side (hemiparesis);

Exercise: spot the abnormality.

Normal Development	Deviated Development
At Birth	
• at birth flexed posture in supine: 	• Stiff legs • Legs extended as compared to bend legs seen normally 
• At birth, flexed in prone posture 	• Pushes back, head to one side (arching of back)  • Frog position 
At 1 month	
• Slowly the bend (flexor) posture is straightening up 	• Cannot lift head Unable to clear the breathing passage when put in prone position 
At 3 month	
• Lifts head up in prone 	• Cannot lift head up in prone 
• Head control 	• No head holding 
• Can lie straight with head and trunk aligned in supine 	• One arm and leg bent, the other arm and leg straight 
• Brings two hands together 	• Cannot bring hands together 

Normal Development	Deviated Development
By 6 months	
• Lifts head and chest up • Weight bearing on straight arms in prone 	• Cannot lift head and trunk up, • Cannot bear weight through arms 
• Sits leaning on hands 	• When made to sit cannot lift head, rounded back 
	• Child arches back when made to sit 
• Takes weight on feet when held in standing 	• Head falls back when pulled to sit • Arms pull back 
	• Tiptoe standing 
• Holds object using thumb side (radial palmer grasp) • Transfer object from hand to hand (begin) 	• Stiff legs, pointed toes 
	• Stiff legs which are crossed like scissors 
	• Stiff arms and fisted hands 
By 9 months	
• Sits alone; reaches out 	• Round back, Poor head lifting requires support still unable to sit properly 

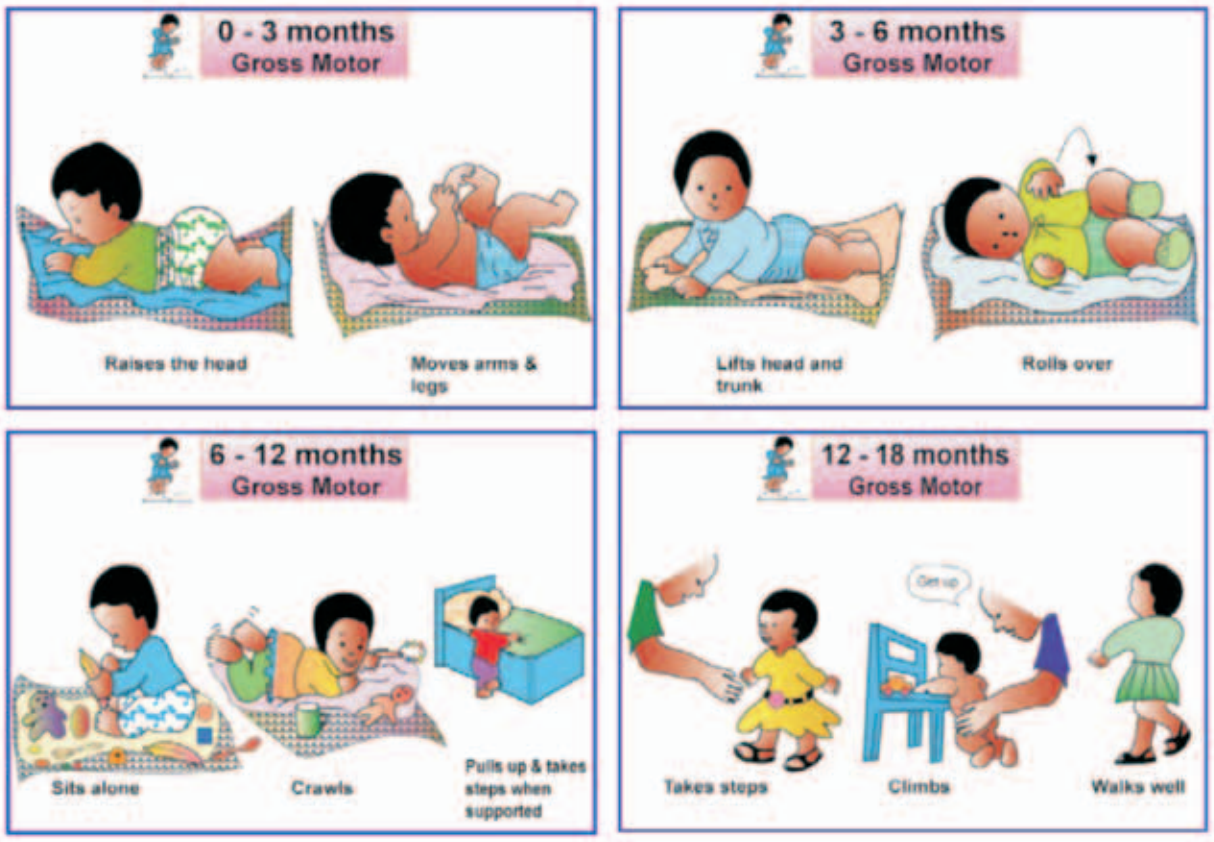
Normal Development	Deviated Development
• Supports self when placed in standing 	• Poor use of hands for play as they are engaged in support; Abnormal postures    Hypertonia Hypotonia Fluctuating Tone    Sitting • Does not take weight on legs 
By 12 months	
• Crawls well 	• Cannot crawl, drags both legs together (bunny hopping) • Uses only one side of the body or drags self by only using arms 
• Pulls to stand holding something 	• Difficulty pulling to stand • Stiff legs, pointed toes 
By 18 months	
• Stands and walks alone, moves in and out of sitting 	• One arm stiff and bent • Poor standing balance • Uses only one hand to play • One leg may be stiff • Sits with weight on one side  Unable to hold head Straight

Normal Development	Deviated Development
• Sits straight  • Uses both hands  • Turn pages one at a time • Imitates vertical or circular stroke 	Abnormal postures   Requires support to stand  Tiptoe walking on one side  Hypertonia  Hypotinia  Fluctuation Tone

Gross Motor:

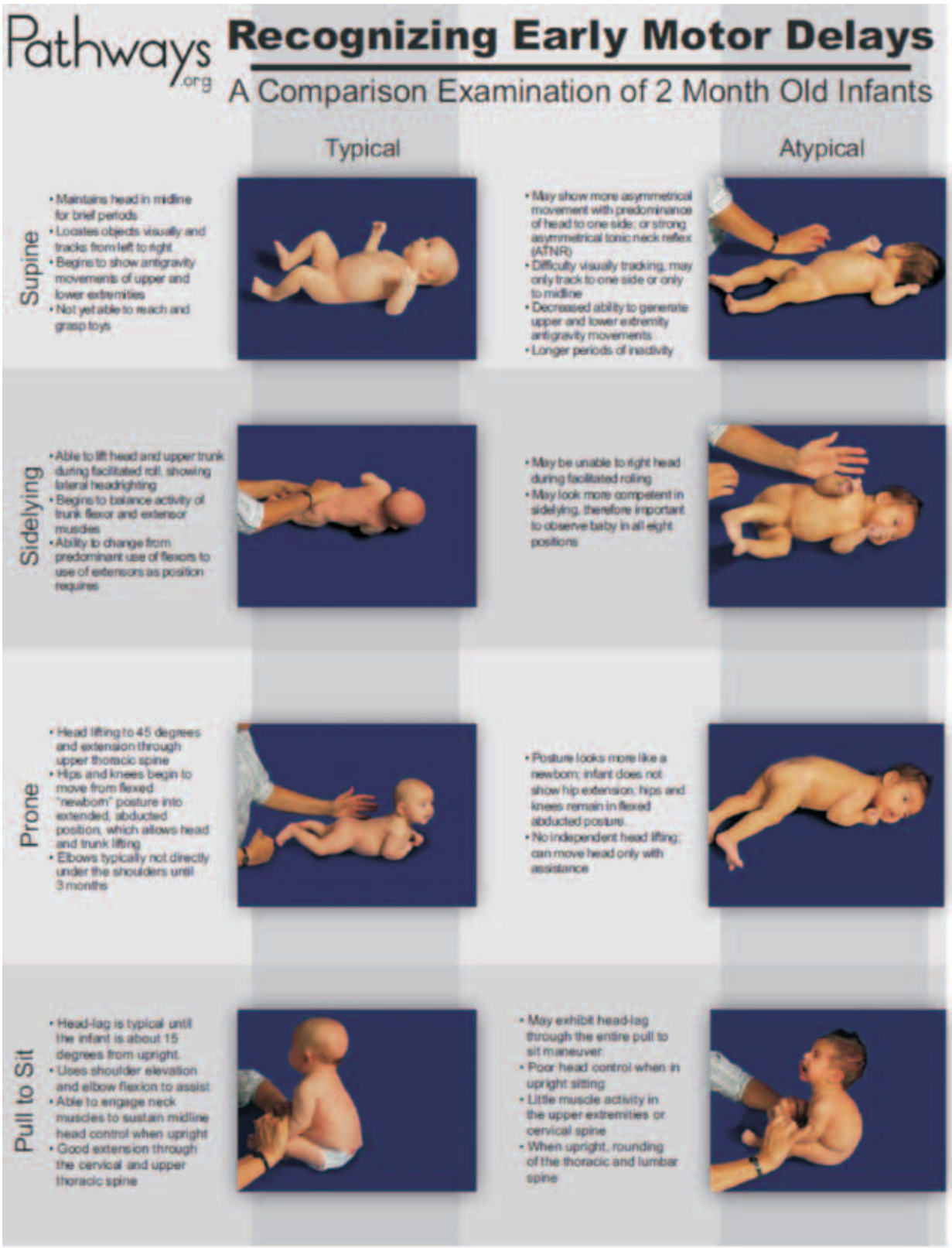
I. Pictorial tool for Gross motor development

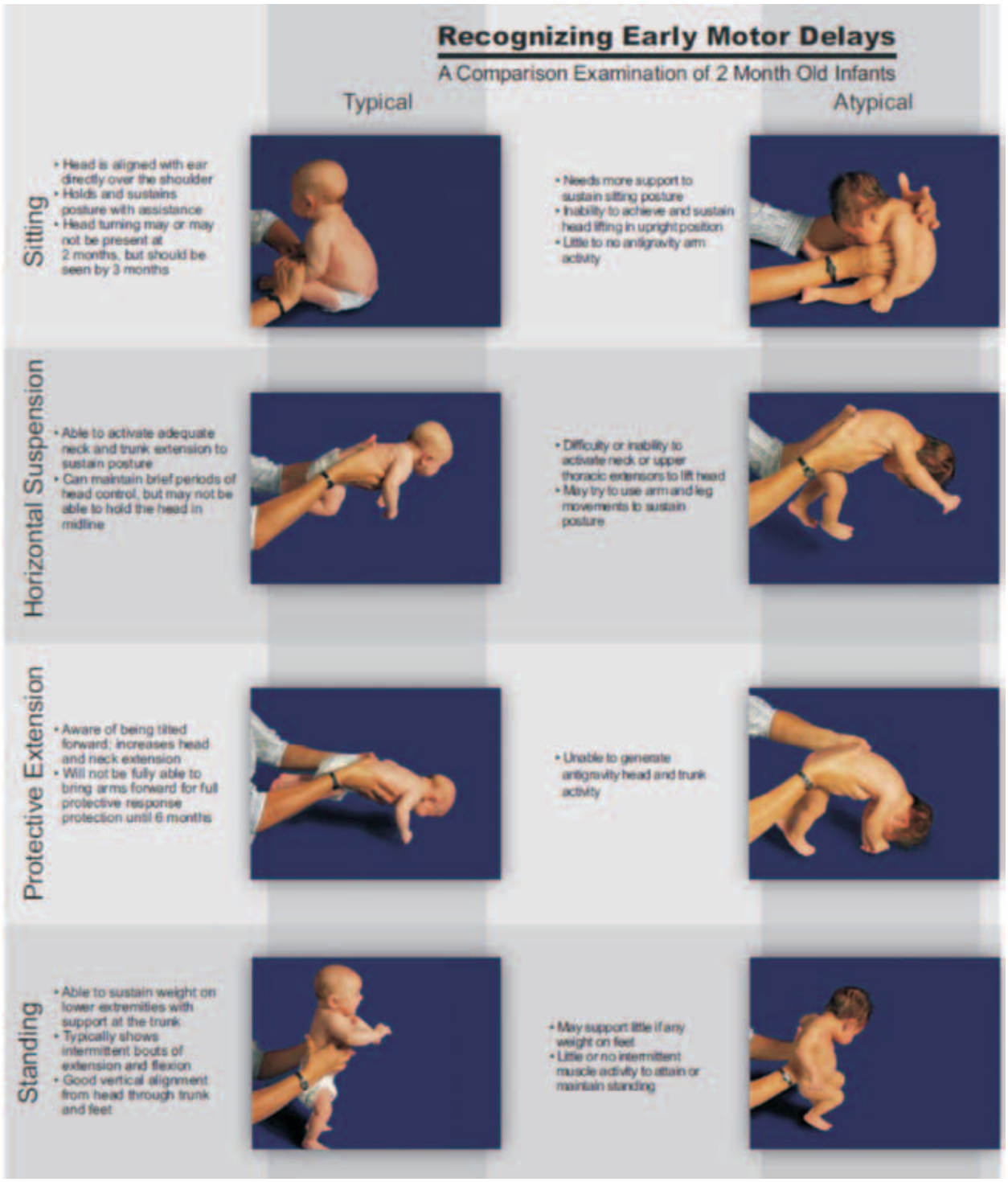
II. Tool for screening cases suspected to have gross motor problems



Birth to 3 months	**Raises head**	**Moves arms and legs**	
3 to 6 months	Lifts head and trunk	Rolls over	
6 to 12 months	Sits alone	Crawls	Pulls up and takes steps when supported
12 to 18 months	Takes steps	Climbs	Walks well
3 to 4 years	Walks on toes	Can jump forward	Can throw and receive ball

Tool for screening cases, suspected to have gross motor problems:




Recognizing Early Motor Delays
A Comparison Examination of 2 Month Old Infants
Typical
Atypical
Sitting
• Head is aligned with ear directly over the shoulder
• Holds and sustains posture with assistance
• Head turning may or may not be present at 2 months, but should be seen by 3 months
• Needs more support to sustain sitting posture
• Inability to achieve and sustain head lifting in upright position
• Little to no antigravity arm activity
Horizontal Suspension
• Able to activate adequate neck and trunk extension to sustain posture
• Can maintain brief periods of head control, but may not be able to hold the head in midline
• Difficulty or inability to activate neck or upper thoracic extensors to lift head
• May try to use arm and leg movements to sustain posture
Protective Extension
• Aware of being tilted forward: increases head and neck extension
• Will not be fully able to bring arms forward for full protective response protection until 6 months
• Unable to generate antigravity head and trunk activity
Standing
• Able to sustain weight on lower extremities with support at the trunk
• Typically shows intermittent bouts of extension and flexion
• Good vertical alignment from head through trunk and feet
• May support little if any weight on feet
• Little or no intermittent muscle activity to attain or maintain standing


Recognizing Early Motor Delays
A Comparison Examination of 4 Month Old Infants
Typical
Atypical
Sitting
• Shows good head control and chin tuck, with head in midline
• Requires support only at hips and pelvis; has extension to mid-thoracic spine
• Begins to move in anterior-posterior planes and comes back from forward flexion at the hips into upright sitting
• Does not sustain head lifting; cannot turn head to look side-to-side
• Must be held high under the armpits for support
• Uses extremity posturing to compensate for decreased proximal strength
Horizontal Suspension
• Able to keep neck and trunk extended with head upright to 45 degrees, steady and in midline
• Shows trunk extension into lumbar spine and scapular adduction
• Freely moves arms and legs
• Able to hold head up briefly but cannot maintain it in midline
• Cannot sustain thoracic trunk extension and does not show hip extension
• Cannot maintain trunk extension while moving arms and legs
Protective Extension
• Displays extension through neck, trunk and hips that is maintained during forward tilting
• Cannot bring arms fully forward to surface because they are being used to sustain extension
• Unable to sustain strong neck, trunk and hip extension during forward tilting
• Uses excessive asymmetry and flexed arms to sustain extension to avoid hitting his head
Standing
• Keeps hips just behind shoulders
• Has active extension into lower thoracic and lumbar spine, but no full hip extension
• Can sustain standing posture; requires minimal support at lower trunk to aid in balance
• Requires support in the upper thoracic area to sustain standing
• Intermittent extension used to produce head lifting
• Shoulders remain well forward of hips
• Lacks adequate hip and trunk control for sustained weight bearing

Recognizing Early Motor Delays

A Comparison Examination of 4 Month Old Infants

	Typical		Atypical	
Sitting	• Shows good head control and chin tuck, with head in midline • Requires support only at hips and pelvis; has extension to mid-thoracic spine • Begins to move in anterior-posterior planes and comes back from forward flexion at the hips into upright sitting		• Does not sustain head lifting; cannot turn head to look side-to-side • Must be held high under the armpits for support • Uses extremity posturing to compensate for decreased proximal strength	
Horizontal Suspension	• Able to keep neck and trunk extended with head upright to 45 degrees, steady and in midline • Shows trunk extension into lumbar spine and scapular adduction • Freely moves arms and legs		• Able to hold head up briefly but cannot maintain it in midline • Cannot sustain thoracic trunk extension and does not show hip extension • Cannot maintain trunk extension while moving arms and legs	
Protective Extension	• Displays extension through neck, trunk and hips that is maintained during forward tilting • Cannot bring arms fully forward to surface because they are being used to sustain extension		• Unable to sustain strong neck, trunk and hip extension during forward tilting • Uses excessive asymmetry and flexed arms to sustain extension to avoid hitting his head	
Standing	• Keeps hips just behind shoulders • Has active extension into lower thoracic and lumbar spine, but no full hip extension • Can sustain standing posture; requires minimal support at lower trunk to aid in balance		• Requires support in the upper thoracic area to sustain standing • Intermittent extension used to produce head lifting • Shoulders remain well forward of hips • Lacks adequate hip and trunk control for sustained weight bearing	

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Recognizing Early Motor Delays

A Comparison Examination of 6 Month Old Infants

Supine

Typical

- Able to symmetrically lift and sustain upper and lower extremities against gravity
- Demonstrates increased antigravity control of the muscles of the trunk and increased freedom of extremity movement
- Exhibits quick visual-motor response of looking, reaching, grasping and transferring objects

Atypical

- Shows improved ability to hold head and trunk in midline, but still without adequate antigravity movement
- Has excessively abducted and externally rotated upper and lower extremities, with movement primarily on the surface
- Appears visually interested in objects but unable to reach and grasp

Sidelying

- Rolls independently and easily from supine through sidelying into prone in either direction
- Shows active head righting and upper extremity pushing against the surface to raise body while reaching with the other hand

- Requires assistance from examiner in rolling from supine to sidelying
- Unbalanced neck, shoulder and back extension prevents use of the arm to assist in the rolling maneuver

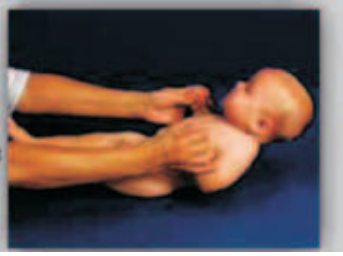
Prone

- Bears weight on extended arms and forearms, with extension into the lumbar spine and lower extremities
- Shows emerging upper extremity control in weight shifting for reaching, grasping and playing
- Grasps toy towards thumb side of palm

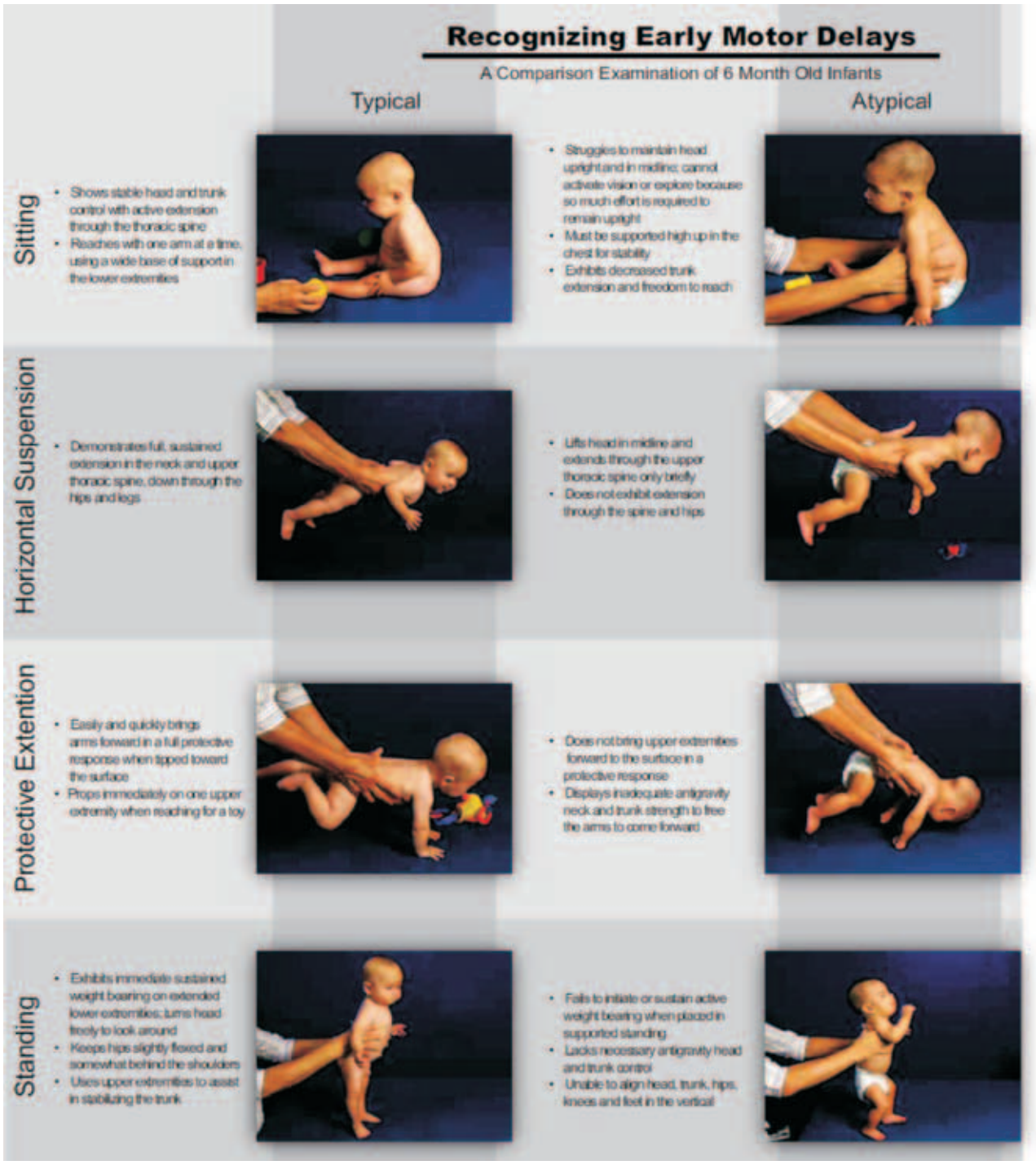
- Does not choose prone position for play due to decreased head, shoulder and trunk control
- Has decreased upper extremity power, preventing weight shift towards the pelvis necessary for freedom in the upper extremities
- Positions elbows behind shoulders, preventing head and trunk lifting

Pull to Sit

- Responds quickly and assists in the maneuver by actively flexing neck and lifting head
- Also uses activity in the upper extremities and abdominals to assist
- Shows good symmetry in the head, neck and upper extremities



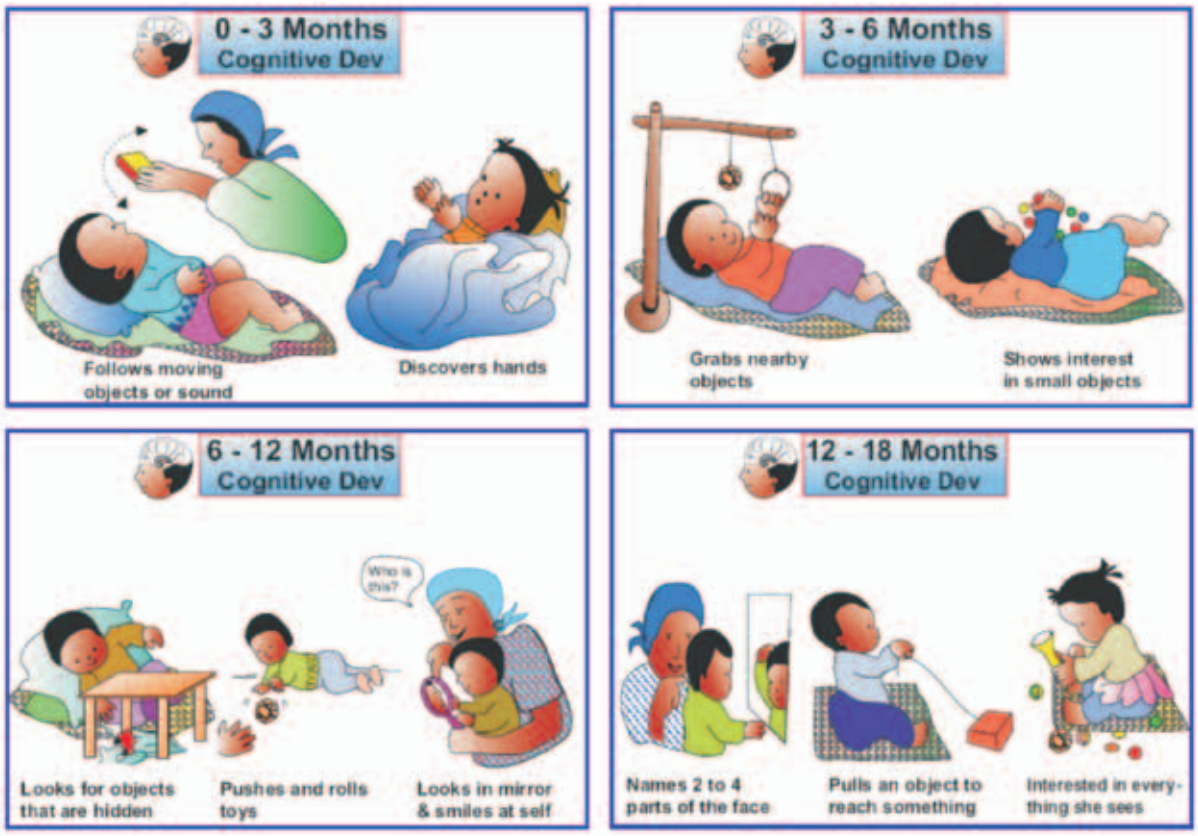
- Assists minimally in the pull to sit maneuver
- Demonstrates complete head lag until the upright position
- Does not assist with upper extremity pulling


Recognizing Early Motor Delays
A Comparison Examination of 6 Month Old Infants
Typical
Atypical
Sitting
• Shows stable head and trunk control with active extension through the thoracic spine
• Reaches with one arm at a time, using a wide base of support in the lower extremities
• Struggles to maintain head upright and in midline; cannot activate vision or explore because so much effort is required to remain upright
• Must be supported high up in the chest for stability
• Exhibits decreased trunk extension and freedom to reach
Horizontal Suspension
• Demonstrates full, sustained extension in the neck and upper thoracic spine, down through the hips and legs
• Lifts head in midline and extends through the upper thoracic spine only briefly
• Does not exhibit extension through the spine and hips
Protective Extention
• Easily and quickly brings arms forward in a full protective response when tipped toward the surface
• Props immediately on one upper extremity when reaching for a toy
• Does not bring upper extremities forward to the surface in a protective response
• Displays inadequate antigravity neck and trunk strength to free the arms to come forward
Standing
• Exhibits immediate sustained weight bearing on extended lower extremities; turns head freely to look around
• Keeps hips slightly flexed and somewhat behind the shoulders
• Uses upper extremities to assist in stabilizing the trunk
• Fails to initiate or sustain active weight bearing when placed in supported standing
• Lacks necessary antigravity head and trunk control
• Unable to align head, trunk, hips, knees and feet in the vertical

2 Cognition:

I. Pictorial tool for cognitive development;

II. Tool for screening cases, suspected to have cognitive problems;



Birth to 3 months	Follows moving objects or sounds	Discovers hands	
3 to 6 months	Grabs nearby objects	Shows interest in small objects	
6 to 12 months	Looks for objects that are hidden	Pushes and rolls toys	Looks in mirror & smiles at self
12 to 18 months	Names 2 to 4 parts of the face	Pulls an object to reach for something	Interested in everything it sees

18 to 24 months	Knows/ can name 2-3 body parts	Understands "yes" and "no"	Plays with many objects
2 to 3 years	Knows colours	Knows difference between large and small	Imitates animals
3 to 4 years	Can match,similar objects	Knows purpose of objects	Can name 10 body parts
5 to 6 years	Can tell about the, purpose of, body parts	Can tell sequence	Can order objects by size

Tool for screening cases suspected to have cognitive problems

Slow reaction: responds slowly to what others say and to what happens in her surroundings. Sometimes do not respond at all

Absence of clarity: they cannot express clearly their thoughts, needs and feelings

Inability to learn fast: cannot learn anything new and different as easily as others. They are slow in learning.

 What is this?		
Inability to understand quickly: cannot understand easily what they see, hear, touch, smell or taste	Inability to decide: cannot take even simple decisions. Do not know what to do, say, and so on	Lack of concentration: cannot give continuous attention to one person or one activity. Some of them have difficulty in changing from one activity to another
		
Short temper: some find it difficult to control their feelings. May throw things all over, injure themselves or others	Inability to remember: some can remember only for a short time of what they are told. Sometimes they do not remember at all	Lack of coordination: some have difficulty in sucking, chewing or eating, use of hands or moving from place to place

Features of Mental retardation :

1. Slow Reaction 2. Absence of Clarity 3. Inability to Learn fast 4. Inability to Understand quickly
5. Inability to Decide 6. Lack of Concentration 7. Short Temper 8. Inability to Remember
9. Lack of Coordination 10. Delay in Development

3 Vision Impairment

Vision Screening for Infants and Children

Good vision is essential for proper physical development and educational progress, in growing children. The visual system in the young child is not fully mature. Equal input, from both eyes, is required for proper development of the visual centers in the brain. If a growing child's eye does not provide a clear focused image to the developing brain, then permanent, irreversible, loss of vision may result. Early detection provides the best opportunity for effective, inexpensive treatment.

Age of screening:

I. Vision screening at District facility for preterm children: objective for Retinopathy of prematurity;

II. Vision screening from 0-3 years: "S" subjective and by history mainly;

III. Vision screening from 3-6 years: "S" subjective and by history mainly;

IV. Vision screening from 6-18 years: "O" objective by appropriate standard testing method;

Age of screening	Place of screening	Tools for screening	Person
Newborn esp. Preterm	Facility, District Hospital	Indirect ophthalmoscope	Ophthalmologist
0-3 years	Anganwadi center	1) Questionnaire 2) Torch 3) Toy 4) Occluder 5) Raisins	Mobile team
3-6 years	Anganwadi center	Do	Mobile team
6-18 years	School	Snellen's chart	Mobile team

Vision screening from 0-3 years

I. OBJECTIVES:

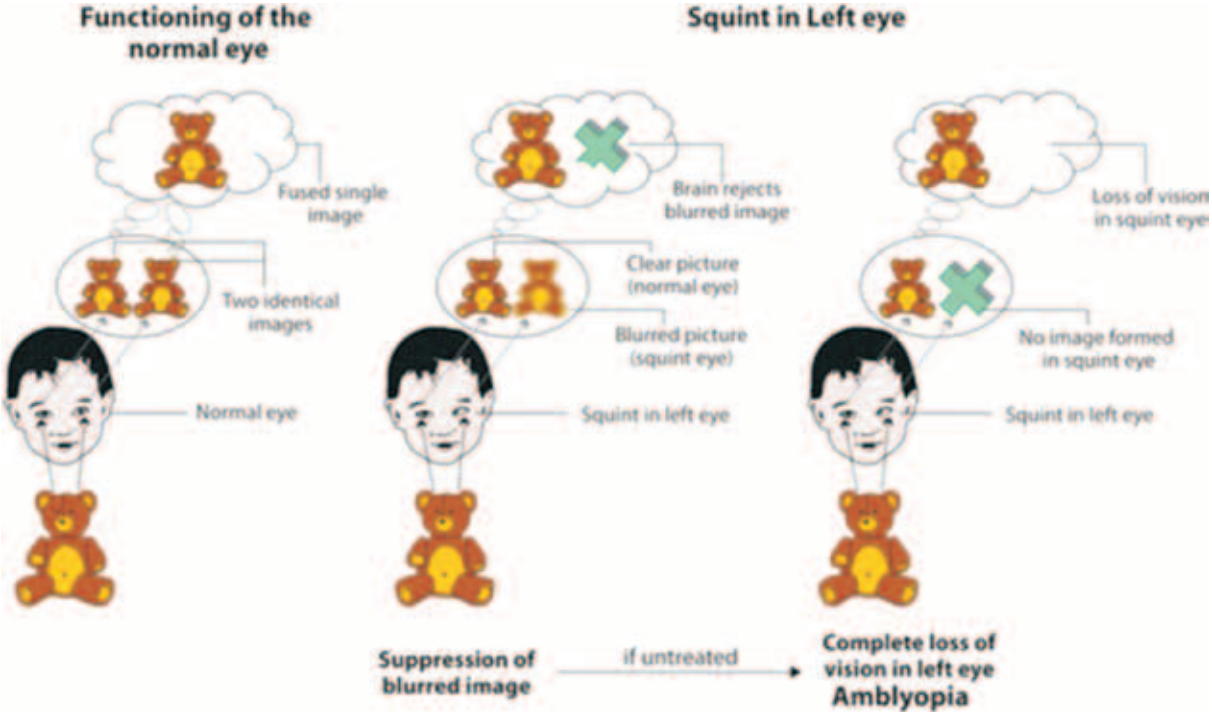
After reviewing this chapter and having successfully completed, a training session, the screener will be able to:

1. Understand the vision screening services offered, to the preschool age and/or kindergarten population, by the Health Authorities.
2. Understand the purpose of the screening procedures for Nasal lacrimal duct obstruction, refractive errors/visual acuity, to avoid amblyopia.
3. Accurately, carry out the screening procedure.
4. Record and interpret the results of the screening procedure.
5. Make appropriate referrals, if indicated, and liaise with other professionals involved in follow up (e.g. eye doctors, teachers etc.).
6. Make immediate advices to the caregivers.

VISION DISORDERS THAT MAY BE DETECTED BY SCREENINGfrom 0-3 years:

Courtesy:Arvind eye hospital, Maduraifor Pediatric Ophthalmology and Strabismus

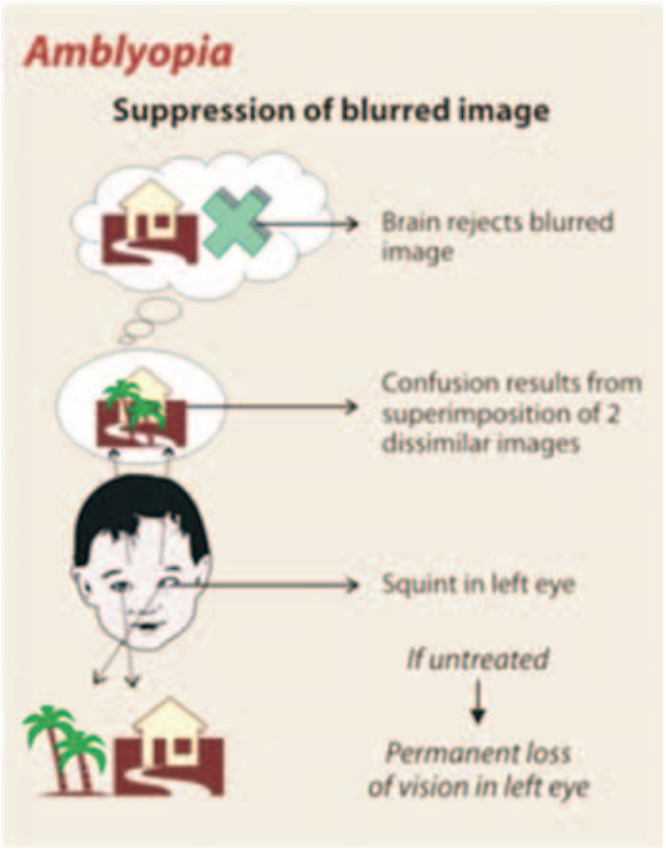
The purpose of vision screening is to detect vision disorders, such as refractive errors, amblyopia and strabismus, at an early age (less than 6 years.)



Courtesy: American Association for Pediatric Ophthalmology and Strabismus

AMBLYOPIA:

A common vision problem in children is amblyopia, or "lazy eye." It is so common, that it is the reason for more vision loss, in children, than all other causes put together. Amblyopia is a decrease in the child's vision that can happen even when there is no problem with the structure of the eye. The decrease in vision results when one or both eyes send a blurry image to the brain. The brain then "learns" to only see blurry with that eye, even when glasses are used. Only children can get amblyopia. If it is not treated, it can cause permanent loss of vision. Eyes are the windows to the brain through which visual stimulation reaches the brain along the visual pathway. If, for some reason, there is prolonged



visual deprivation to the portion of the brain serving the eye, it may lead to failure of its development.

Amblyopia affects approximately 2% of all children. If untreated, amblyopia can cause irreversible visual loss. The best time for treatment is in the preschool years. Improvement of vision after the child is 8 or 9 years of age is rarely achieved.

There are several different types and causes of amblyopia:

1) **Strabismic amblyopia or crossed eye or eyes are not looking straight:**

   Strabismic amblyopia develops when the eyes are not straight. One eye may turn in, out, up or down. When this happens, the brain "turns off" the eye that is not straight and the vision subsequently drops, in that eye.

2) **Deprivation amblyopia:** when light cannot pass through the eyes e.g. cataract.

   Deprivation amblyopia develops when cataracts or similar conditions "deprive" young children's eyes, of visual experience. If not treated very early, these children can have very poor vision. Sometimes this kind of amblyopia can affect both eyes.

3) **Refractive amblyopia:**

   When there is a large or unequal amount of refractive error (glasses strength) in a child's eyes.

   The end result of all forms of amblyopia is reduced vision in the affected eye(s).Usually the brain will "turn off" the eye that has more far-sightedness or more astigmatism. Parents and pediatricians may not think there is a problem because the child's eyes may stay straight. Also, the "good" eye has normal vision. For these reasons, this kind of amblyopia in children may not be found until the child has a vision test. This kind of amblyopia can affect one or both eyes and can be helped if the problem is found, early.

Strabismus is misalignment of the eyes in any direction. This should not be seen after 3 months. Amblyopia may develop when the eyes do not align. If early detection of amblyopia secondary to strabismus is followed by effective treatment, then excellent vision may be restored.

The eyes can be aligned in some cases with glasses and in others with surgery. However, restoration of good alignment does not assure elimination of amblyopia.

Refractive errors cause decreased vision, visual discomfort ("eye strain"), and/or amblyopia. The most common form, near-sightedness (poor distance vision) is usually seen in school-age children and is treated effectively, in most cases, with glasses. Far-sightedness can cause problems with focusing at nearby objects and may be treated with glasses. Astigmatism (imperfect curvature of the front surfaces of the eye) also requires corrective lenses, if it produces blurred vision or discomfort. Uncorrected refractive errors can cause amblyopia particularly if they are severe or are different between the two eyes.

Myopia: image is focused anterior to the retina therefore, patients are nearsighted (i.e. have better near vision than distance vision).

Hyperopia: image is focused posterior to the retina therefore the patient is farsighted (i.e. has better distance vision than near vision). High degree of Hyperopia is a common cause of amblyopia and accommodative esotropia.

Astigmatism: a type of refractive error caused by a cornea that is not perfectly sphericaltherefore the eye has 2 focal points. (Blurred vision) A patient can have problems withboth near and distance vision.

Tool 1: ***From Birth to three years***

Child Vision Development Checklist for Parents/Caregivers

1) During the first month of life, does your child?
    a. Look towards the face of the person holding them?
    b. Closes eyes to sudden, bright light?
2) When your child is 2 months, does your child?
    a. Follow a moving object? Follow light past midline?
    b. Look at the eyes of the person, holding it ?
    c. Switch gaze between two people or objects?
3) When your child is 4 months, does your child?
    a. Reach towards an object and grasp it?
    b. Fixate on a close object, with eyes not crossing?
    c. Respond to the full range of colors?
    d. Show visual interest to close and distant objects?
4) When your child is 6 months, does your child?
    a. Enjoy looking in a mirror?
    b. Sustain visual interest at close and distant objects?
    c. Maintain fixation on stationary object, even in the presence of competing moving stimuli?
    d. Begin, to demonstrate, hand-eye coordination?
5) When your child is 7-12 months, does your child?
    a. Notice small objects such as breadcrumbs?
    b. Smile back at another person reciprocal smile?
    c. Recognize objects that are partially hidden?
    d. Scan eyes, around the room, to see what is happening?

6) When your child is 18 months, does your child?

   a. Point to objects or people using words "look or see"?

   b. Look for and identify pictures in books?

   c. Play with simple puzzles?

7) When your child is 24-36 months, does your child?

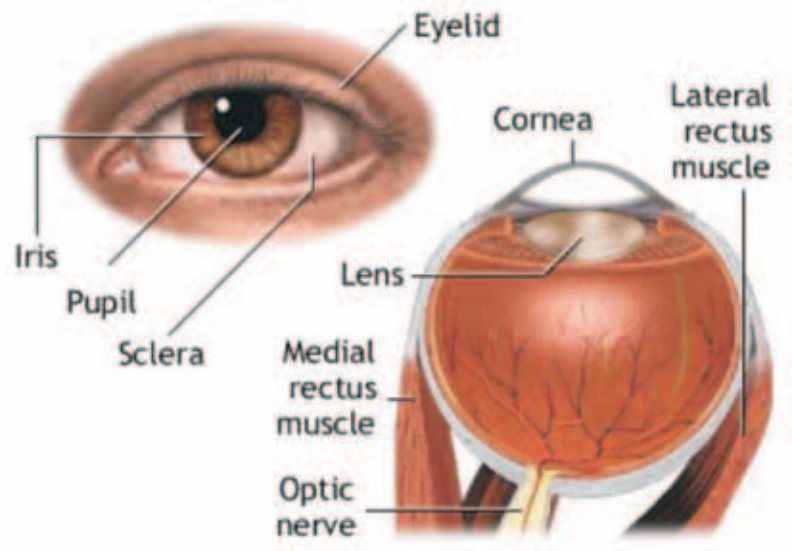
   a. See small pictures well, with both eyes?

   b. Show ability to arrange similar pictures, in groups?

   c. Watch and imitate, other children (30-36 months)?

Child's Name_____ DOB/AGE_____

Parent/Caregiver Name_____



From six years to 18 years

Teacher and Child Vision Pre-Screening Worksheet

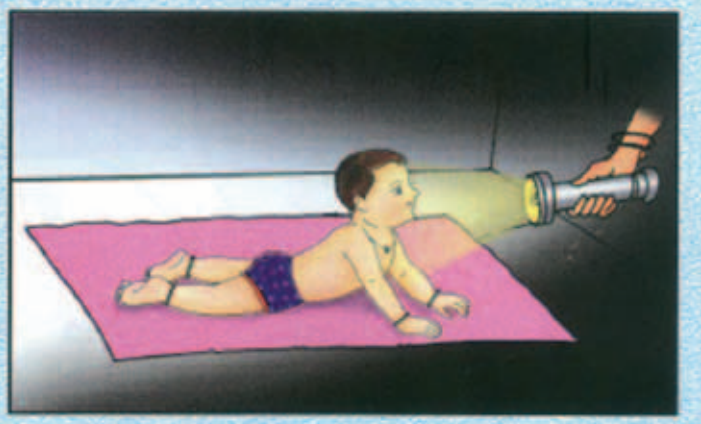
Purpose: To identify eye or vision problems, throughout the year. Child is asked to report any complaint about his/her eyes. Teachers would be inform by the mobile team to report any abnormal visual behaviors or any visual complaints, as expressed by the child, whenever, they occur and give report, prior to screening especially tilting his/her head while looking at the blackboard or holding the book very close to face.

NORMAL VISUAL DEVELOPMENT

The following is the sequence of normal visual development in children.

The child's capabilities at different ages is also indicated.

Birth to 3 months



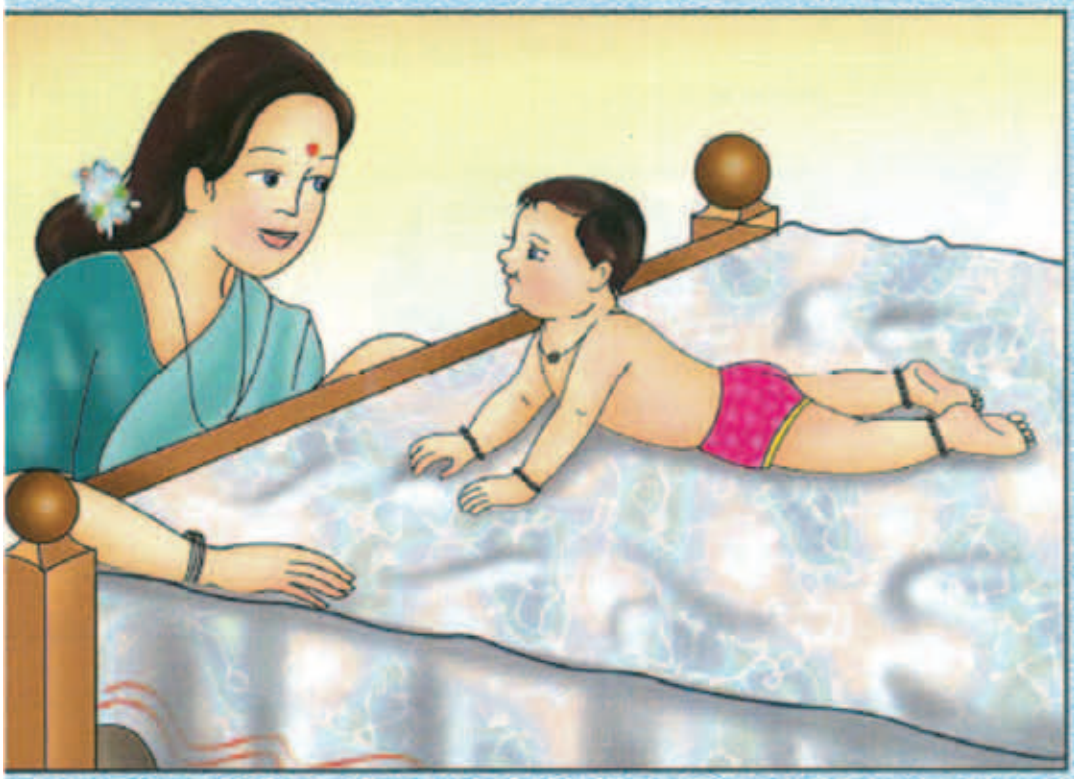
Child looks at and follows light with eyes

Child looks at objects and human faces

Child looks towards the source of sound

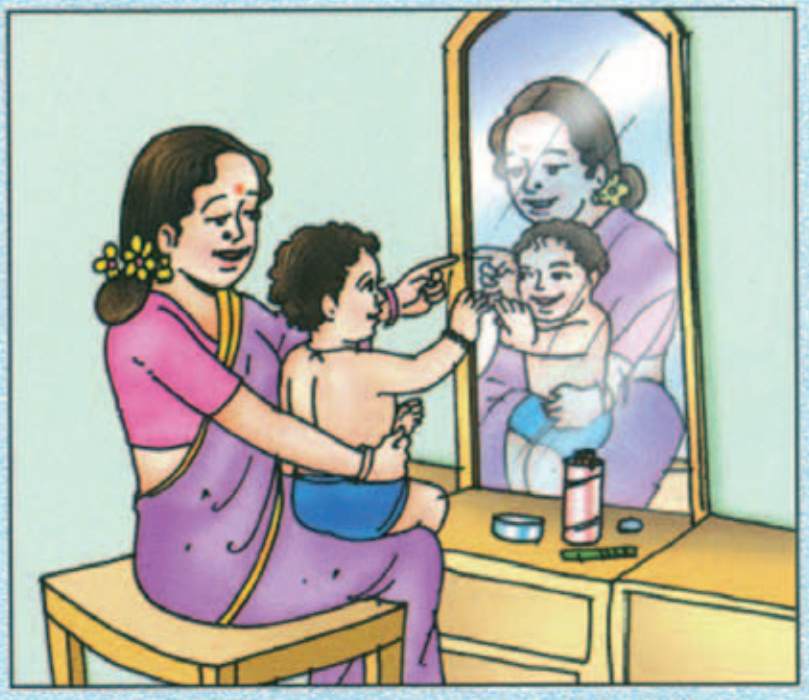
3-6 months

Child reaches with hands to toys shown to him

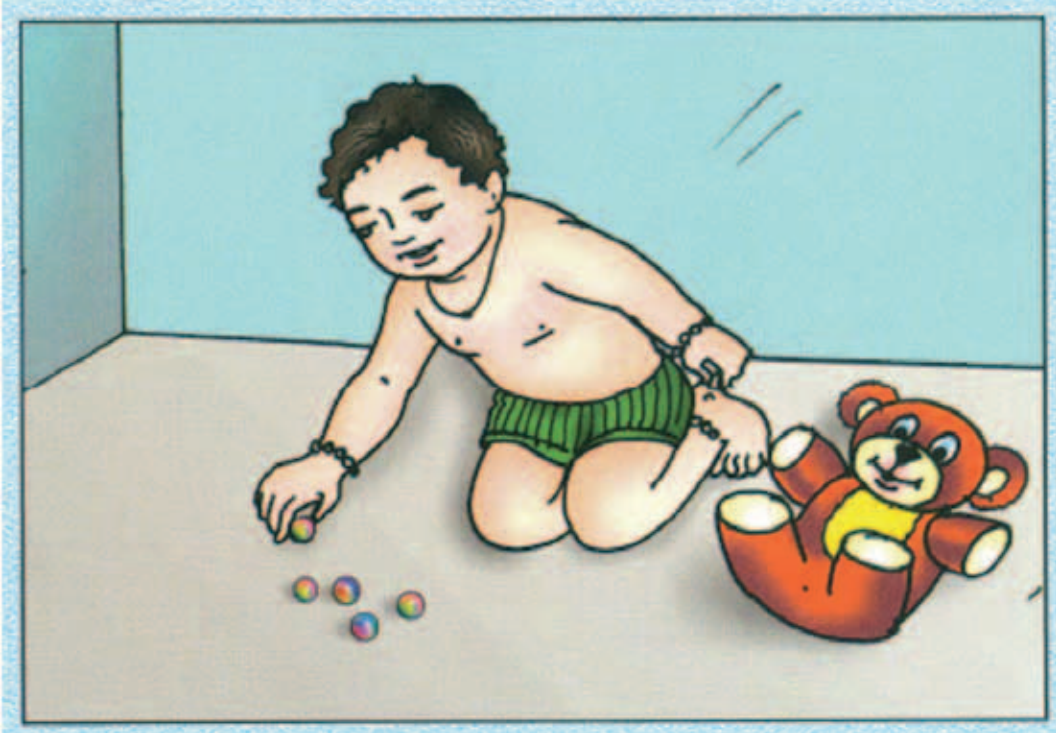


Child maintains eye contact during face to face interaction

6-9 months



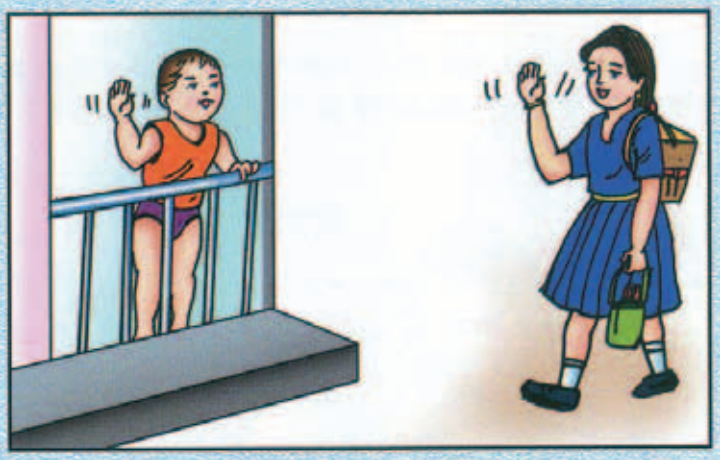
Child smiles at mirror image of himself.



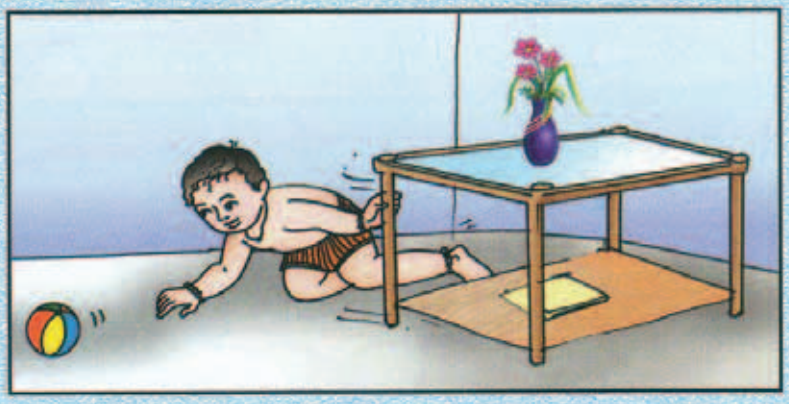
Child picks up small objects like beads & marbles on looking at them

9-12 months

Child manipulates objects in hand and looks for details



Child imitates simple actions like Namaste or bye-bye



Child moves about (while crawling or walking) avoiding obstacles

4 Hearing,Speech/language delays and disorders

Objectives:

1) What are speech and language delay and disorders?
2) Describe the key milestones, in the development of language and speech.
3) List indicators, for further evaluation or referral, of language and speech delays.
4) Differentiate global delays, autism and specific language impairment.

Speech and language development begins long before a child utters the first recognizable word. Since birth a child listens to speech sounds and attaining the communication skills on which future language development will depend. The timely attainment of communication skills, speech and language milestones, sets the foundation for a child's subsequent academic and social success. You can watch for speech and language mile stones beginning with the earliest well child visits.

What are speech/language delays and disorders?

- Speech is the sound that comes out of our mouths. When it is not understood, by others, there is a problem. Speech problems could be inability to speak at all or have problems such as stuttering and mispronunciation, which can be very frustrating to the child. Ability to hear is essential for speech. **Speech is speaking ability**
- Language also has to do with meanings, rather than sounds alone. Language is both Hearing/listening and Understanding ability. It deals with Hearing/listening and Understanding the meaning of words, one hears. At times, Language is also used as a measure of intelligence. Language delays are more serious than speech problems.

Language delay is when a child's language is developing in the right sequence, but at a slower rate. Speech and language disorder describes abnormal language development. Delayed speech or language development is the most common developmental problem. It affects five to ten percent of preschool children. These children may have trouble producing speech sounds, using spoken language to communicate, or understanding what other people say. Speech and language problems are often, the earliest sign of a learning disability.

Language has two components: Receptive and Expressive

LANGUAGE - RECEPTIVE: Hearing and Understanding. It deals with Hearing and Understanding meaning of words one hears. It also refers to, simply as Language. The components are:

1) Hearing;
2) Understanding the meanings of words;
3) Understanding and communicating the Body parts;
4) Understanding and following directions;

LANGUAGE - EXPRESSIVE: Talking. It deals with Speaking or vocalizing. It also refers to, simply as speech.

1) Expressive vocabulary;
2) Communicating with others either by a) Gesture or b) verbally;

What causes speech and language problems?

1) Hearing loss is often overlooked, and easily identified. If your child seems to be suffering from speech/language delay, its hearing should be tested.
2) Intellectual or cognitive disability a common cause of speech and language delay.
3) Extreme environmental deprivation can cause speech delay. If a child is neglected or abused and does not hear others speaking, they will not learn to speak.
4) Prematurity can lead to many kinds of developmental delays, including speech/language problems.
5) Auditory Processing Disorder describes a problem with decoding, speech sounds. These kids can improve with speech and language therapy.
6) Neurological problems like cerebral palsy and traumatic brain injury can affect the muscles needed for speaking.
7) Autism affects communication. Speech/language/communication problems are often an early sign of autism.
8) Structural problems like cleft lip or cleft palate can interfere with normal speech.
9) Selective mutism is when a child will not talk, at all, in certain situations, often at school.

What should my child be able, to do?

Up to 12 months:

Hearing and Understanding	Talking
Birth-3 Months • Startles to loud sounds; • Quietens up or smiles when spoken to; • Seems to recognize your voice and quietens up, if crying • Increases or decreases sucking behavior, in response to a sound; • Smiles when spoken to,by you;	**Birth-3 Months** • Makes pleasure sounds (cooing, gooing); • Cries differently, for different needs; • Smiles, when sees you;
4-6 Months • Moves eyes in the direction of sounds; • Responds to changes in tone, of your voice, e.g. angry voice • Notices toys that make sounds or looks around to dog barking; • Pays attention to music;	**4-6 Months** • Babbling sounds more speech-like with many different sounds, including *p, b and m(6m);* • Chuckles and laughs (4m); • Vocalizes excitement and displeasure (4m); • Makes gurgling sounds, when left alone and when playing with you (4m);

7 Months-12 months	7 Months-12 months
• Enjoys games like peek-a-boo and pat-a-cake; • Turns and looks in direction of sounds, when you call his or her name; • Listens, when spoken to; • Recognizes words for common items like "cup", "shoe", "book", or "juice"; • Begins to respond to requests (e.g. "Come here" or "Want more?")	• Babbling has both long and short groups of sounds such as "tata upup bibibibi"; • Uses speech or non-crying sounds to get and keep attention; • Uses gestures to communication (waving, holding arms to be picked up); • Imitates different speech sounds; • Has one or two words (hi, dog,dada, mama) around first birthday, although sounds may not be clear;

What should my child be able to do?

12 months to 24 months:

Hearing and Understanding	Talking
• Point to pictures, in a book, when named. • Point to a few body parts, when asked; • Follow simple commands and understands simple questions ("Roll the ball,""Kiss the baby," "Where's your shoe?"); • Listen to simple stories, songs, and rhymes;	• Say more words every month; • Use some one- or two- word questions ("Where doggy?""Go bye-bye?""What's that?"); • Put two words together ("more milk,""no water,""mummy book"); • Use many different consonant sounds at the beginning of words;

What should my child be able to do?

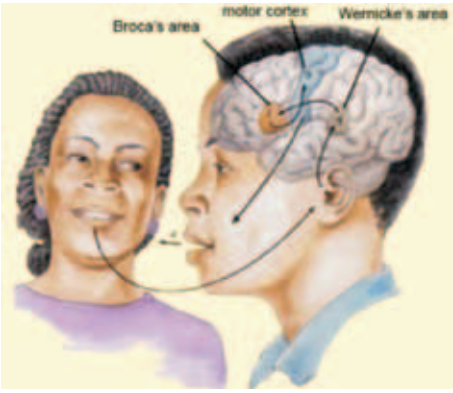
24 – 36 months

Hearing and Understanding	Talking
• Understand differences in meaning ("go-stop,""in-on,""big-little,""up-down"); • Follow two requests ("Get the book and put it on the table"); • Listen to and enjoy hearing stories, for longer periods of time;	• Has a word for almost everything, introduced to; • Use two- or three- words to talk about and ask for things; • Usek, g, f, t, d, and n sounds; • Speech is understood, by familiar listeners, most of the time; • Often ask for or direct attention to objects, by naming them;

Language development

Language is one of the most amazing things, that we are capable of. It may even be that we the Homo sapiens are the only creatures on the planet who have it. In animals, only the dolphins show any indication of language development, although, we are, as yet, unable to understand them.

We seem to be "built" to speak and understand a language. The specialized areas of the brain, such as Brora's (Expressive speech area) and Wernicke's areas (Receptive speech area), suggest that genetics provides us with, at the very least, the neurological foundations for language.



Receptive language:
Voice > External Ear > Middle ear > Inner ear > Receptive speech area > Understands

Expressive language : >
Expressive speech area starts pronunciation > motor cortex > muscles that help in articulation > finally speaks

When a child hears any voice, sound waves passes through the ear and goes to the Receptive speech area, where the meaning of the word is understood and associated with past accumulated learning. When the child wants to speak back, this message then passes to the Expressive speech area which plans the pronunciation process. Lastly, this information is routed to the motor cortex, which controls the muscles that one uses to pronounce the word such as the tongue, palate and jaw.

Thus, for proper production of speech, we require:

1) External Ear: It has to receive the sound. (Improper formation of external ear may affect hearing and hence speech);
2) Sound needs to be conducted through the middle ear to the inner ear. (In recurrent pus discharge from the ear this conduction may be interrupted leading to hearing problem);
3) Sound from the inner ear reaches the Receptive speech area of the brain. (In case the child has congenital deafness of neural origin, no sound reaches the brain, again hearing is affected leading to speech problems);
4) Receptive speech area makes meaning of the sound or words taking help from past learning. (Children who haveexperienced a damage, to this part of the brain, could speak, but their speech is often incoherent and makes no sense, as they can hear but cannot understand, the meaning of the words);
5) The message from the receptive area reaches the Expressive speech area;
6) Expressive speech area plans the pronunciation process. If, this part of the brain is damaged, then the child cannot speak, though he can hear and understand the spoken language;
7) From the Expressive speech area the message reaches the motor area, from which the muscles, required to produce the sound, are controlled. (Damage to this area leads to improper coordination of the muscles leading to problem of articulation);
8) Finally we require a structurally intact palate , lip for producing the proper pronunciation (cleft lip or palate leads to defective speech);

In general, women's overall reading abilities are better than men's, and this gender difference often makes itself apparent when children are still at primary school. Girls also seem to be better at spelling. The explanation here might be that females use both hemispheres of the brain in processing sounds, while males tend to use mainly,the left side. If girls are therefore better at isolating the various sounds, in a word, it would make sense that they would also be better at decoding it and spelling it.

Hearing, Speech and Language Milestones:

S. No.	Activity	Age in months	Yes/No	Red Flag
1	Baby responds to sound or voice by startles, blinks, quietens up or wakes up;	Birth		1) *Does not startle to or awaken to loud sounds. Suspect hearing impairment at any age;
2	Baby turns towards the source of sound (localisation);	3-6 months		1) *Does not responds to changes in tone of voice; 2) Poorsound localization or lack of responsiveness by 6 months (delay or impaired hearing)

Language:

S. No.	Activity	Age in months	Yes/No	Red Flag
1	Baby startes making sounds other than crying like "ooh" or "ng"? Baby startes laughing out aloud, belly laughing or squealing sound?	3-6 months		If not making sounds, other than crying, by 6 months
2	Child makes sound like ma-ma, da-da.–bababa, duhduhduh(babbling polysyllabic); Responds to name;	6-9 months		*Loss of ability to coo or babble, by 9 months * Is still making only vowel sounds with no speech like consonants e.g. "aaaa" , instead of occasional "mmmm" or "bah", by 9 months
3	Child understands simple word like no, bye-bye, and go to sleep?	9 -12 months		1) No babbling by 12 months; 2) Does not respond to own name or common words like "no "or bye or bye, by 12 months; 3) Does not utter one meaningful word, by 12 months;
4	Child says at least some single meaningful word like mama, dada, just to label the appropriate parent;	15-18 months		Is not using pointing or gesturestocommunicate,by 15 months; If by 15 months child is not speaking at least two meaningful words and if by 18 months child is not speaking at least five meaningful words;
5	Child consistently combining words in short phrases like mama water, mama milk, papa shirt;	18-24 months Expressive speech		If by 24 months: the child is not combining 2 words into phrases e.g. mummy go , daddy ball; If by 24 months the child does not follow simple commands " get me the ball" *does not point to body parts, named or pictures;

Conclusion:

Defect in hearing and understanding i.e. **Receptive speech**. Refer for hearing related problems to DEIC, for further assessment and management.

Defect in "Talking" i.e. Expressive speech. Refer for speech/language related problems problem to DEIC, for further assessment and management.

*Refer to **Language Evaluation Scale Trivandrum** (0-3 years) at Annexure V

Recap: Speech and Language

By 6 Months: Does the child-	Startle in response to loud noises?
	Turn to where a sound is coming from? (Orients to sound)
	Make different cries for different needs (hungry, tired)?
	Watch your face as you talk to him/her?
	Smile/laugh in response to your smiles and laughs?
	Imitate coughs or other sounds such as ah, eh, buh?
	Utter consonant sounds like "p", "b" "m"?
By 9 Months: Does the child-	Respond to his/her name?
	Reach to be picked up?
	Play social games with you (Peek-a-boo)?
	Babble and repeat sounds such as babababa or duhduhduh?
By 12 Months: Does the child-	Follow simple one step directions? (Sit down)?
	Look across the room to a toy when adults point at it?
	Consistently use 3-5 words?
	Use gestures to communicate (waves hi/bye, shakes head for No?
	Get your attention using sounds, gestures and pointing while looking at your eyes?
	Understand being told NO?
By 24 Months: Does the child-	Understand the meaning of in and out, off and on?
	Point to more than 2 body parts when asked?
	Use atleast 20 words consistently?
	Respond with words or gestures to simple questions? (Where's ball? What's that?
	Demonstrate some pretend play with toys (feeding a doll)
	Make atleast four different consonant sounds (p, b, m, n, d, g, w, h)?
	Enjoy being read to and sharing simple books with you?
	Point to pictures using one finger?
By 30 Months: Does the child-	Understand the concepts of size (big/little) and quantity (a little/a lot more)?
	Use some adult grammar (two biscuits, bird flying)?
	Participate in some turn-taking activities with peers, using both words and toys?
	Combine several actions in play (feeds doll and puts her to sleep, puts block in the train and drives the train, drops the blocks off?

By 36 Months: Does the child-	Understand who, what, where and why questions?
	Create long sentences using five to eight words?
	Talk about past events (trip to Dadi's house, day at park)?
	Tell simple stories?
	Show affection for favorite playmates?
	Engage in multi-step pretend play (pretending to cook a meal, repair a cycle)?
	Have an understanding of the function of print (menus of remote control, lists, signs)?
	Show interest in, and awareness of, rhyming words?

Recap: Hearing:

By Birth: Does the child-	Listen to speech?
	Startle or cry at noises?
	awaken at loud sounds?
By 3 Months: Does the child-	Smile when spoken to?
	Seem to recognize your voice and quieten up, if crying?
By 4-6 Months: Does the child-	Respond to changes in your tone, of voice?
	Look around for new sounds, eg the doorbell?
	Notice toys that make sounds?
By 7-12 Months: Does the child-	Recognize words, for common items?
	respond to requests ("Come here")?
	Turn or look up, when you call his or her name?
By 12-24 Months: Does the child-	Point to pictures, in a book ,when they are named?
	Follow commands and understand simple questions?
	Listen to simple stories, songs and rhymes?
By 24-36 Months: Does the child-	Understand differences in meaning ("Go-stop")?
	Continue to notice sounds (mobile ringing)?
	Follow 2 requests (get the ball and put it on table)?
By 36-48 Months: Does the child-	Hear you, when you call, from another room?
	Hear TV, at the same volume, as others?
	Answer simple who, what, where, why questions?

5 Autism

What are Autism Spectrum Disorders?

Autism spectrum disorders (ASDs) are a group of developmental disabilities caused by a problem with the brain. The exact cause is not known. People with ASDs have serious impairments with social, emotional, and communication skills. ASDs can impact a person's functioning at different levels, from very mildly to severely. A child with ASD will look like any other child. There is usually nothing about how a person with an ASD looks that sets them apart from other people, but they may communicate, interact, behave, and learn in ways that are different from most people. The thinking and learning abilities of people with ASDs can vary – from gifted to severely, challenged.

What are some of the signs of ASDs?

Personwith ASDs have serious impairments with social, emotional, and communication skills.

A) Social Skills

Social impairments are one of the main problems in all of the autism spectrum disorders (ASDs). People with ASDs do not have merely social "difficulties", like shyness. These social problems are often combined with the other areas of deficit, such as communication skills and unusual behaviors and interests. For instance, the inability to have a back-and-forth conversation is both a social and a communication problem.

Normal Infants:

Typical infants are very interested in the world and people around them. By the first birthday, a typical toddler tries to imitate words, uses simple gestures such as waving "bye -bye," grasps fingers, and smiles at people. One-way very young children interact with others is by imitating actions—for instance, clapping when mom claps.

Autistic Infants:

But the young child with autism may have a very hard time learning to interact with other people. Children with ASDs may not show interest in social games like peek-a-boo or pat-a-cake. Although the ability to play pat-a-cake is not an important life skill, the ability to imitate is. They might not make eye contact and might just want to be alone. Many children with ASDs have a very hard time learning to take turns and share.

B) Communication

Each person with an ASD has different communication skills. Some people may have relatively good verbal skills, with only a slight language delay with impaired social skills. Others may notspeakat all or have limited ability or interest in communicating and interacting with others. About 40% of children with ASDs do not talk, at all. Another 25%–30% of children with autism have some words at 12 to 18 months' of age and then lose them.[1] Others may speak, but not until later in childhood.

C) Repetitive behaviors and routines

Unusual behaviors such as repetitive motions may make social interactions difficult. Repetitive motions are actions repeated over and over again. They can involve part of the body or the entire body or even an object or toy. For instance, people with ASDs may spend a lot of time repeatedly flapping their arms or rocking from side to side. They might repeatedly turn a light on and off or spin the wheels of a toy car, in front of their eyes. These types of activities are known as self-stimulation or "stimming."

People with ASDs may have problems with social, emotional, and communication skills. They might repeat certain behaviors and might not want change, in their daily activities. People with ASDs often thrive on routine. A change in the normal pattern of the day—like a stop on the way home from school—can be very upsetting or frustrating to people with ASDs. They may "lose control" and have tantrum, especially, if they're in a strange place.

Also, some people with ASDs develop routines that might seem unusual or unnecessary. For example, a person might try to look in every window he or she walks by, in a building or may always want to watch a video, in its entirety—from the previews, at the beginning through the credits, at the end. Not being allowed to do these types of routines may cause severe frustration and tantrums.

It is very important to begin this intervention as early as possible in order to help your child reach his or her full potential. Acting early can make a real difference.

Possible Red Flags for Autism Spectrum Disorders :

Children with an autism spectrum disorder might:
Not play "pretend" games (pretend to "feed" a doll);
Not point at objects to show interest (point at an airplane flying over);
Not look at objects when another person points at them;
Have trouble relating to others or not have an interest in other people, at all;
Avoid eye contact and want to be alone
Have trouble understanding other people's feelings or talking about their own feelings;
Prefer not to be held or cuddled or might like to be cuddled only when they want to;
Appear to be unaware when other people talk to them but, respond to other sounds;
Be very interested in people, but not know how to talk to, play with, or relate to them;
Repeat or echo words or phrases said to them, or repeat words or phrases in place of normal language (echolalia);
Have trouble expressing their needs using typical words or motions;
Repeat actions over and over again;
Have trouble adapting to changes in routine;
Have unusual reactions to the way things smell, taste, look, feel, or sound;
Lose skills they once had (for instance, stop saying words they were once using);
Talk to your child's doctor if your child loses skills, at any age.

Today, the main research-based treatment for ASDs is intensive structured teaching of skills, often called behavioral intervention. It is very important to start this intervention as early as possible to help your child reach his or her full potential. Acting early can make a real difference.

CHILDREN from the age of 1-year onwards:

I. Explore the environment;
II. Use body purposefully to reach or acquire objects;
III. Explore and play with toys;
IV. Move from one toy to another or from one activity to another;
V. Seek Pleasure and avoid pain;

PLAYING WITH CAR / TOY

Exploration of environment in an autistic child:

I. Remains fixated on a single item or activity;
II. Performs strange actions, like rocking, hand flapping;
III. May show no sensitivity to burns or bruises;

6 Learning disability: For school going children aged 6 years to 9 years

What is a learning disability?

Some individuals, despite having an average or above average level of intelligence, have real difficulty acquiring basic academic skills. These skills include those needed for successful reading, writing, listening, speaking and/or mathematics (difficulty in counting and calculations). These difficulties might be the result of a condition - Learning Disability (LD).

- "Specific learning disability" means a disorder in one or more of the processes involved in understanding or in using language, spoken or written, which may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.
- Disorders included, such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.
- Disorders not included, a learning problem that is primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage.

- A learning-disabled is a child with average intelligence whose vision, hearing, motor ability is normal, yet he or she does not perform well, at the school.
- It does not include children with mental retardation, visual problems, hearing problems or neuro-motor impairment.

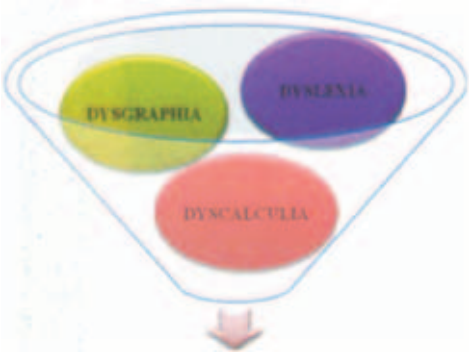
Many children with LD have to struggle with reading. The difficulties often begin with individual sounds. Students may have problems with rhyming, and pulling words apart into their individual sounds and putting individual sounds together to form words (blending). This makes it difficult to decode words accurately, which can lead to trouble with fluency and comprehension. As students move through the grades, more and more of the information they need to learn is presented in written (through textbooks) or oral (through lecture) form. This exacerbates the difficulties they have, succeeding in school.

Other related categories include disabilities that affect memory, social skills, and executive functions such as deciding to begin a task.

Types of learning disabilities:

LD is a broad term. There are many different kinds of learning disabilities. Most often, they fall into three broad categories:

- Reading disabilities (often referred to as dyslexia)difficulty in reading;
- Written language disabilities (often referred to as dysgraphia) difficulty in writing;
- Math disabilities (often called dyscalculia) difficulty in calculating;



Signs and symptoms

A child with LD would:

- Have trouble learning the alphabet, rhyming words, or connecting letters to their sounds;
- Make many mistakes, when reading aloud, and repeat and pause often;
- Not understand what he or she reads;
- Have to struggle with spellings;
- Have very messy handwriting or hold a pencil, awkwardly;
- Struggle to express ideas in writing;
- Learn language late and have a limited vocabulary;
- Have trouble remembering the sounds, that letters make, or hearing slight differences, between words;

Dyslexia	• Letter and word recognition; • Understanding words and ideas; • Reading speed and fluency; • General Vocabulary skills; • Remembering sound;
Dysgraphia	• Neatness & consistency of writing; • Accurately copying letters & words; • Spelling consistency; • Writing organization & coherence;
Dyscalculia	• Difficulty learning mathematical concepts; • Memorizing mathematical facts; • Difficulty organizing numbers; • Poor 'Number sense';

Dyslexia (difficulty reading)

Dyslexia is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. Reading disabilities affect 2 to 8 percent of elementary school children. To read successfully, one must:

- Focus attention on the printed symbols;
- Recognize the sounds associated with letters;

- Understand words and grammar;
- Build ideas and images;
- Compare new ideas to what you already know;
- Store ideas in memory;

A person with dyslexia can have problems in any of the tasks involved, in reading.

Dysgraphia (difficulty writing)

Writing too, involves several brain areas and functions. The brain networks for vocabulary, grammar, hand movement, and memory must all be in good, working order. A developmental writing disorder may result from problems in any of these areas. For example, a child with a writing disability, particularly an expressive language disorder, might be unable to compose complete and grammatically correct sentences. Such a child would be presented as one who has difficulty in

- Neatness & consistency of writing;
- Copying letters & words, accurately;
- Spelling consistency;
- Writing organization & coherence;

Dyscalculia (difficulty with mathematics)

Arithmetic skills involve recognizing numbers and symbols, memorizing facts, aligning numbers, and understanding abstract concepts like place value and fractions. Any of these may be difficult for children with developmental arithmetic disorders, also called dyscalculia. Problems with number or basic concepts are likely to show up early. Disabilities that appear in the later grades are more often tied to problems in reasoning.

7 Attention Deficit Hyperactivity Disorder (ADHD)

Attention-deficit/hyperactivity disorder (ADHD) refers to a constellation of inappropriate behaviors found in many children and adults. The essential feature of ADHD is a persistent pattern of inattention and/or hyperactivity-impulsivity. These features are more frequently displayed and more severe than typically observed in a child, at a comparable level of development.

A child with ADHD may be unusually, active and/or impulsive for their age and has trouble sustaining attention in various settings, like at school, at home or at work. He often fails to give close attention to details or makes careless mistakes, does not wait for his term during sports, is talkative and does not sit quiet, for long, at places where he is expected to (for e.g., in a classroom). These behaviors may contribute to significant problems in social relationships and learning. For this reason, children with ADHD are sometimes seen as being "difficult" or as having behavior problems.

The symptoms should be inconsistent with developmental level and should have persisted for at least six months, to a degree that is maladaptive and inconsistent with developmental level and causes impairment.

Diagnosis and management of children with ADHD have been controversial but behavioral therapy, medications and counselling are usually attempted.

8 Adolescent Health

Adolescence (10-19 years) as defined under RCH programme, Ministry of Health & Family Welfare, is a phase of life which has recently gained recognition, as a distinct phase of life, with its own special needs. This phase is characterized by acceleration of physical growth and, psychological and behavioral changes thus, bringing about transformation from childhood to adulthood.

This module defines adolescence and it aims at generating an understanding of what is special about adolescence and provides an overview, of important matters, concerning adolescent health and development. It examines the perceptions of adolescents and of adults regarding adolescents' health concerns and explores the rationale for investing in adolescent health. This module is a foundation for all the subsequent modules wherein issues pertaining to adolescent health and development have been dealt with, in greater depth.

Facilitators are to make necessary arrangements for these sessions, like preparing flip charts/ slides.

India is the largest democracy, in the world. In absolute terms, India is the fastest growing country globally, with 18 million people added, annually. The number of adolescents (age 10-19) is increasing and comprises over one-fifth of the population.

Adolescence: "Adolescence" covers ages 10-19years in the RCH-programme.

Activity 1

Divide the participants into 3 groups and give them the following group work:

Group1: List physical changes that occur during adolescence in boys and girls;

Group2: List sexual developmental changes in girls and boys;

Group3: List emotional and social changes that occur during adolescence both, in, girls and boys;

Give participants 10 minutes for group work to discuss among themselves and come up with their respective list.

Give blank flip charts and markers to each group.

After the small groups complete their lists, make the entire group to sit together and have one person, from each group, to present the group work (each group 5 minutes). Ask all the group members to come forward while their representative is presenting their response. After each group's presentation, ask the other two groups if they want to add more points to the list or need any clarification. The charts with all points, collated, may look as following:

Physical events/changes

Boys	Girls
• Growth spurt occurs • Muscles develop • Skin becomes oily • Shoulders broaden • Voice cracks • Under arm and chest hair appears • Pubic hair appears • Facial hair appears • Penis and testes enlarge • Ejaculation occurs	• Growth spurt occurs • Breasts develop • Skin becomes oily • Hips widen • Under arm hair appears • Pubic hair appears • External genitals enlarge • Uterus and ovaries enlarge • Menstruation begins

Now put up the prepared flip chart

Boys	Girls
Physical events/changes	
• Growth spurt occurs • Muscles develop • Skin becomes oily • Shoulders broaden • Voice cracks • Underarm and chest hair appears • Pubic hair appears • Facial hair appears • Penis and testes enlarge	• Growth spurt occurs • Breasts develop • Skin becomes oily • Hips widen • Underarm hair appears • Pubic hair appears • External genitals enlarge • Uterus and ovaries enlarge

Sexual Development
• Sexual organs enlarge and mature • Erections in boys • Sexual desire • Sexual attraction • Menarche, Ovulation • Sperm Production, Ejaculation • Initiation of sexual behaviors

Emotional and Social Changes
• Preoccupied with body image • Want to establish own identity • Fantasy / daydreaming • Rapid mood changes, Emotional instability • Attention seeking behavior • Sexual attraction • Curious, Inquisitive • Full of energy, Restless • Concrete thinking • Self-exploration and evaluation • Conflicts with family over control • Seek affiliation to counter instability • Peer group defines behavioural code • Formation of new relationships

Show the following chart/slide to participants. The changes during adolescence are correlated with the complaint/concerns, adolescents, mostly, are bothered and might present, to you. These expressions have possible health implications.

Changes in adolescents and possible health implication

Changes during Adolescents	Health Implications
Physical Changes	
Normal growing-up	Anxiety and tension
Increase in height and	Increase nutrition requirement–if inadequate, under-nutrition and anemia
Breasts Development	Stooping of shoulders, poor posture, back pain
Skin becomes oily	Acne
Desire to be thin, have a good	Protein-energy malnutrition, anemia, Stunting
Sexual Development	
Desire to have sex	Unsafe sex leading to unwanted pregnancy, STIs, HIV; Need of health education and services
Ejaculation	Fear, guilt, myths-emotional problems
Menstruation	Dysmenorrhea, Menorrhagia-Anemia, Poor menstrual hygiene may lead to RTIs
Emotional changes and Social development	
Development of identity	Confusion, moodiness, irritation
Very curious	Experimentation, Risk taking behaviour
Peer pressure	Effect on lifestyles
	• Unhealthy eating habits – leading to obesity
	• Smoking and alcohol use leading to ill health
	• Speed driving, accidents

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. It is generally considered that adolescents are a healthy section of our population. While they no longer have diseases like pneumonia, diarrhea, measles etc. that are common during childhood, adolescents have a different set of problems. To have a health problem, it is not necessary for the adolescent to be sick. Even normal growth and development processes can cause health problems in adolescents.Many of these have an impact on National demographic and health indicators.

Vulnerability of Adolescents:

Adolescents are vulnerable by virtue of

- Normal developmental processes
- Family/Peer/Environmental influences
- Lifestyle patterns;

And are "At Risk" because of certain behaviors.

Within adolescents there are some special attention groups

- "Out of school" adolescents and street adolescents
- Sexually abused adolescents
- Commercial sex workers
- Adolescents with mental and physical disabilities
- Orphan Adolescents, those in institutions
- Adolescents in conflict with the law
- Working Adolescents

Adolescents in general and especially, the above mentioned special attention groups even more, are vulnerable and need special attention. The various issues related to adolescence-growing up, new behaviours etc. have not only a huge socio-economic impact just by their sheer numbers but also impact the National Health indicators.

Facts about Adolescents, in India

- Adolescents comprise about 22% of India's population.
- Girls make up 47% of adolescent population.
- Anemia and Stunting are widely prevalent, especially in girls.
- 50% girls are married by 18 years (NFHS 2).
- Adolescents (15-19 years) contribute 19% of TFR (NFHS 2).
- High Maternal mortality among adolescent mothers.
- Un met need for contraception (15-19 years) 27% (NFHS 2).
- Contraceptive use is 8% and contraceptive use of modern methods is 5%.
- Premarital sexual relations are increasing.
- RTIs are common in young women.
- Misconceptions about HIV/AIDS are wide spread.
- 40% start, taking drugs & substance abuse between 15-20 years (UNODC, 2002).
- Nearly, one out of three in 15-19 years is working. 21% as main workers and 12% as marginal workers (Census 2001).
- Girls and rural adolescents are disadvantaged.

Facilitator emphasize that

A. Adolescents make up 1/5(22%)of the total population of India and investing in them will yield rich dividends;

B. These facts suggest that major risks which adolescents face, in India are because of early pregnancy, childbirth and risk of HIV, STIs, and substance use;

C. The adolescents who fall in the special attention groups are more at risk of identity crisis and low self-esteem, guilt, frustration and mental health problems.

However adolescents are a group who can be molded and helped to change their erratic behaviors to more responsible ones to improve their self-worth and esteem.

Many people and groups including health workers, teachers, social workers, religious leaders, and, of course, parents have important contributions to make to the health of adolescents. People who interact with adolescents on a regular basis (parents, teachers) and people who do not interact with adolescents on a regular basis (policy makers, administrators) have different perspective for adolescents and perceived priorities of adolescent issues.

Adolescents issues: Different Perspectives	
Parents' Perspective	Examination marks, Growth, Career, Happiness, Good citizen, Marriage
Teacher's Perspective	Examination marks, all round development, career, civic sense, safe behaviour
Health Sector's Perspective:	Growth, Health protection and promotion, Safety, early pregnancy, HIV/STI
Administrator's/Policy makers' Perspective	Healthy and productive population
Adolescents themselves	Body image, Career, Sexual concerns, general health

Many adolescents give high priority to issues like how they look (bodyimage), acne, education and career issues in addition to sexuality issues (menstruation, masturbation etc.), which may not match the perspective of the other people who decides what adolescents needs. This results in barriers for adolescent information and service access.

Priority Health Problems of adolescents

- Sexual and reproductive health problems
- Nutritional problems
- Substance abuse
- Injuries and accidents
- Acute and chronic diseases (like asthma, TB, Diabetes, etc.)

Clustering of problems is common

What adolescents do today will have an influence on their health as adults and on the health of their children, in future. Improvements in the health of adolescents will increase their achievements in school and will lead to greater productivity. Investing in Adolescents, Health will reduce the burden of disease during this stage and in late life. It is during adolescence that behaviors are formed which often last a lifetime. These are formative years, where physical, emotional and behavioral patterns are set. A healthy adolescent becomes a healthy adult.

It is important to influence the health seeking behavior of adolescents as their situation will be central in determining India's health, mortality, morbidity and population growth scenario. Adolescent pregnancy, excess risk of maternal and infant mortality, reproductive tract infections, sexually transmitted infections, and the rapidly rising incidence of HIV/ AIDS in this age group are some of the public health challenges. Adolescents have the right to information, knowledge about reproduction, sex, contraception, health issues, options/ choices available, make decisions, and access to safe services. Reasons for investing in adolescent health and development are

- To develop capacity of adolescents to cope with daily life situations and deal with them effectively;
- To inculcate healthy habits and lifestyles;
- To reduce morbidity and mortality in adolescents;
- To impact National indicators like high TFR, MMR & IMR, arrest HIV epidemic;
- A healthy adolescent grows into a healthy adult, physically, emotionally and mentally- maximize potential and productivity;
- Economic benefits increased productivity, averting future health costs of treating AIDS, tobacco related illness, life-style related illness;
- As a human right, adolescents have a right to achieve optimum level of health;

Communicating with adolescents

Adolescents may gather a lot of information on sexual reproductive health and their concerns from peers and/or from other sources. These may not always be accurate. Inaccurate communication on sexual and reproductive health matters among adolescents (peers), and inadequate communication between them and their parents and other adults around them results in inadequate access to the reproductive health information and services, by adolescents.

Communicating with adolescents may be perceived difficult because they are not willing to talk to adults about their worries and apprehensions of life due to the lack of confidence in themselves and in others. They have not been able to build relationships with adults around them. In order to provide adolescents with the health services they "need", we need to re-look at conventional "blinders" (perceived notion of right and wrong) which may limit our vision and imagination.

For effective communication it is important to know what Adolescents need. Under RBSK the mobile health team may ensure the following to attract attention of adolescents. Adolescent-in turn look for 'friendly' Providers defined as:

- Provider who is aware of adolescent issues;
- Provide correct and complete information;
- Respect and empathy for adolescent's needs and concerns;
- Increase self-confidence in adolescents;
- Ensures privacy and confidentiality;
- Non-judgmental friendly attitude;
- Good communication and counseling skills;
- Help develop life skills;
- When adolescents approach to seek help on such issues the health care provider should use this opportunity to promote their health and development holistically.

How to be youth friendly

The Government of India has a special responsibility in strengthening the abilities of health service providers to be youth friendly, and so this group has been identified as a priority. The RBSK Mobile Health Teams are reaching out to adolescent girls and boys in schools and this gives us an opportunity to interact with them and help adolescent guiding them to Adolescent Friendly Health Centers for appropriate actions. The RBSK mobile teams have an important role to play to bridge between the AFHCs and the adolescent in the community by being sensitive to the needs of the adolescents.

Services for adolescents must demonstrate relevance to the needs and wishes of young people. Establishing trust, encouraging friendly and non-judgmental attitude of provider, and ensuring confidentiality helps build effective communication channels. Inadequate communication on sexual and reproductive health matters and social taboos attached to them, along with the way adolescents feel, when visiting service providers, makes communication, with them, rather challenging. Effective communication is a skill, to be practiced. Following are some examples which the RBSK team need, to know and do differently.

Non-verbal Communication
• Friendly - welcoming/ smiling
• Non-judgmental/ empathetic
• Listens/attentive/ nods head to encourage and acknowledge client's responses
• Allows client, enough time to talk

Verbal Communication
• Greets client
• Tells clients about their choices/options
Explains what to do
• Language was simple and brief, when the team speaks with adolescents. It is important to use. Simple language, which is understood by the adolescent.
Privacy and confidentiality
• It is ideal that Male MO is interacting with male adolescents and Female MO with female adolescents.
• In case, both the MO of the team are males, ensure, that the female member of the team is present during discussion with female adolescent and vice versa.
• Ensure, that, when you are discussing adolescent health issues with an adolescent client not more than the required person/s are present, in the room or enter the room.
• Explain to the adolescents that the discussion between the adolescent and the RBSK team member is kept confidential and no information and name would be shared with anybody. Data is maintained without any mention of name.

We all use verbal and non-verbal skills while communicating with others. Similarly Health Service providers use them to communicate with patients and similarly should do with adolescent clients. Sometimes, without realizing it, you may communicate one message verbally, while communicating the opposite message non-verbally. Non-verbal actions may also be"positive"or"negative". RBSK team must avoid negative nonverbal actions while dealing with adolescent clients.

Example of negative non-verbal actions	List of positive non-verbal actions
Leaning away from the client	**Leaning towards the client**
Sitting with arms crossed	**Smiling without showing tension**
Glancing at ones watch obviously and more than once	**Facial expressions which show interest and concern**
Not making or maintaining eye contact	**Maintaining eye contact with the client**
Frowning	**Encouraging supportive gestures such as nodding ones head**
Fidgeting	**Avoiding nervous mannerisms**
Flipping through papers or documents	
Yawning or looking bored	**Appear attentive and listening**

Facilitators to emphasize: Adolescents are extremely aware of and sensitive to non-verbal messages. Improving communication and counselling skills will contribute to quality services, for adolescents. It is important for RBSK teams to be conscious of their interactions with adolescents. It is also important to make young clients comfortable, during the visit.

Examples of adolescent problems and suggestive actions of RBSK teams

Problem Cards	What is the cause of the problem?	How would you deal with it if such a case comes to you?
Kajal is a 14 year old girl. She is worried since she has not started having her periods.	There is wide range of normalcy in age of onset of menstruation and varies from individual to individual and depends both on physiological, nutritional aspects.	Reassure her, ask her to follow weekly IFA supplementation regime of WIFS or National Iron plus initiative. If anemic send her to PHC. Tell her to report if no periods by age 16.
Lakshmi is 16 years old and has normal periods. She is very worried because her breasts are not as developed as her friends'.	Human body develops differentially and is dependent on various factors. Her periods are normal, which is an indication of start of secondary sexual development. Her breasts may develop gradually.	Reassure her, counsel her to take balanced diet.
Saroj, a 15 year old unmarried girl complains of foul smelling vaginal discharge, accompanied by itching in the genital region. Her periods started six months back and she is not sexually active.	It may be a case of infection of the reproductive tract.	Refer to AFHC/ Gynecology Department at DH

Problem Cards	What is the cause of the problem?	How would you deal with it if such a case comes to you?
Babita is 13 years old and has a lot of thin, white discharge from vagina.	White discharge with no infection is normal development.	Reassure her that it is normal at this age and is not an infection/disease.
Fatima is 16 years old and has a lot of bleeding and pain in the abdomen during periods, every month. She feels very weak.	It is a menstrual disorder which is common in girls. Her weakness may be due to anemia because of excessive loss of blood.	Reassure her that it is not a disease, for weakness due to bleeding, ask her to follow weekly regime of IFA iron supplement under WIFS or National Iron Plus Initiative.
Kamla is 15 years old and started her periods 2 years ago . She has not had her period for the last 2 months.	Enquire whether she is sexually active.	If yes, do not be judgemental (tone or gesture), she needs to be referred to ARSH clinic
	If she is not sexually active	Counsel that girls of her age do miss their periods. She will have her periods spontaneously.

For more details refer Orientation Programme for ANM/LHVs to provide Adolescent-Friendly Reproductive and Sexual Health Services: Handouts, MoHFW, GoI available at http://nrhm.gov.in/about-nrhm/guidelines/nrhm-guidelines/adolescent-reproductive-and-sexual-health-arsh.html.

Ministry of Health & Family Welfare
Government of India
Nirman Bhawan, New Delhi