

Tele-Rehabilitation Guide

(for CBR Facilitators)



Jan Vikas Samiti



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FORWARD

Stephen Hawking says “people with disabilities are vulnerable because of the many barriers we face: attitudinal, physical, and financial. Addressing these barriers will unlock the potential of so many people with so much to contribute to the world”. A significant number of the total population in India are persons with disabilities, majority of whom live in rural areas. In an era where 'inclusive development' is being emphasized as the right path towards sustainable development, focused initiatives for the welfare of persons with disabilities are so essential and need of the hour. The Sustainable Development Goals 2015 pledges for 'leaving no one behind'. However, the matter of fact is majority of the children with disabilities in the rural areas are left behind unattended mostly due to non availability of rehabilitation professionals leading to severe disability conditions.

JVS believes that in the absence trained rehabilitation professionals in the rural areas, building the capacities of the community workers in rehabilitation therapy will be an effective way of addressing this very important concern. This way we can facilitate timely intervention and speed up the process of rehabilitation of every child with a disability until the last one. With this intention, JVS brings out this 'Handbook on Tele-rehabilitation guide for CBR Workers'. This handbook gives a detailed explanation on tele-rehabilitation and all that a community worker needs to know on disability and rehabilitation while engaging with the children with disabilities.

I sincerely hope this handbook will be a very useful tool in the hands of hundreds of community workers who in turn will bring significant improvements in the lives of children with disabilities in the remotest areas of the country.

I congratulate Mr Hiranand for preparing the content for this handbook and the JVS team for designing and making it available for use for community workers.

Fr. Chandran Rymonds
Director
Jan Vikas Samiti

INTRODUCTION

“India lives in its villages” – Mahatma Gandhi

Every time when I visited villages in different parts of the country, I found the children with disabilities (CwDs) in neglected situation due to a range of barriers, such as, lack of health and rehabilitation services in their local areas, limited availability of services, physical barriers and inadequate skills and knowledge of health and lack of community workers. As per census 2011, there are 2.68 Cr persons with disabilities in India, which is 2.21% of the total population. Majority (69%) of persons with disabilities live in rural areas. 75% of the country's healthcare infrastructure is concentrated in urban areas while more than 75% of the population lives in rural areas.

In order to reach out to the poorest of the poor, especially children with disabilities, Jan Vikas Samiti (JVS) initiated a project called 'Sambhav'. The Project 'Sambhav' aims to capacitate CBR facilitators in rural areas on rehabilitation diagnosis, making custom made treatment/rehabilitation plans and providing appropriate therapies to the children and youngsters with disabilities. Project “Sambhav” is a joint dream of Jan Vikas Samiti (India), Liliane Fonds and Groot Klimmendaal, The Netherlands.

This Handbook on Tele- Rehabilitation guide for CBR facilitator will provide simple and practical platform for community facilitators to learn the basics of rehabilitation and apply same on children and youngsters with disabilities and enable the process of rehabilitation. My sincere thanks to the Jan Vikas Samiti and Fr. Chandran Riymonds, the Director of JVS for his encouragement and guidance in publishing the tele-rehabilitation guide This Handbook is dedicated to the unsung heroes who have labored for the cause of persons with disabilities.

Mr. Hira Nand
Project Officer
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Chapter - 1

Tele-Medicine -

- ☺ The use of information and communication technologies. (“ICT”)for health.(WHO on e-Health)
- ☺ Tools and services using information and communication technologies that can improve prevention, diagnosis, treatment, monitoring and management.(EU Commission)
- ☺ Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status (American Telemedicine Association).
- ☺ It includes a growing variety of applications and services using two-way video, email, smart phones, tablets, wireless tools and other forms of telecommunications technology.
- ☺ It has been fuelled by the increasing speeds and decreasing cost of technology.

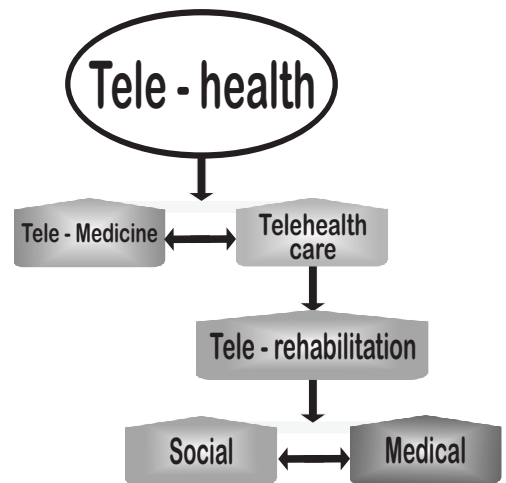


Fig-1

Tele-Rehabilitation-

- ☺ Tele-rehabilitation is the clinical application of consultative, preventative, diagnostic, and therapeutic rehabilitation services via two-way interactive telecommunication technology. (American Occupational Therapy Association).
- ☺ It is developed to provide reasonable access to individuals who are geographically remote and to those who are physically and economically disadvantaged.
- ☺ It also has the capacity to improve the quality of rehabilitation health care.
- ☺ Tele-rehabilitation relates to the services delivered by a number of health disciplines including physiotherapy, speech pathology, occupational therapy, biomedical engineering.
- ☺ It optimizes the timing, intensity and duration of therapy that is often not possible with in the constraints of face-to-face treatment protocols in current health systems.Fig.2



Fig-2

History of Tele-rehabilitation:

- ☺ Tele-rehabilitation is a remarkably new field, essentially "created" in 1997 when the National Institute on Disability and Rehabilitation Research (US Department of Education) issued a set of proposed priorities for a new Rehabilitation Engineering Research Centre (RERC) in the area of what was called tele-rehabilitation.
- ☺ India, with its diverse landmass and huge population, is an ideal setting for telemedicine. Telemedicine activities were started in 1999.
- ☺ The Indian Space Research Organization (ISRO) has been deploying a SATCOM-based telemedicine network across the country since that year.
- ☺ Government agencies-Department of Information Technology and Ministry of Health & Family Welfare, state governments, premier medical and technical institutions of India-have taken initiatives with the aim to provide quality healthcare facilities to the rural and remote parts of the country.
- ☺ India, with its large medical and IT manpower and expertise in these areas, India holds great promise and has emerged as a leader in the field of telemedicine.

Benefits of Tele- Rehabilitation

- ☺ Best benefit the end-user (i.e., an individual with a disability) within their environment.
- ☺ Therapist does not need to visit service user at their home.
- ☺ Better clinical support in local communities.
- ☺ Improved access to specialized services.
- ☺ Need not for service user to overcome physical barriers.
- ☺ Care givers need not to go to rehabilitation centre.
- ☺ Save time-decreased travel between rural
- ☺ Cost effective-tele rehabilitation may reduce the cost of rehabilitation in certain scenarios
- ☺ Tele rehabilitation is equally as effective as conventional rehabilitation in improving activities. of daily living, motor function, and quality of life.

Role of Tele- Rehabilitation in CBR settings

- ☺ Tele rehabilitation can be used to improve Community Based Rehabilitation (CBR) systems, particularly in developing countries where rehabilitation services are very expensive and not available at the community level.
- ☺ Community based rehabilitation programs can be strengthened by using tele rehabilitation, and that tele rehabilitation can address the unserved needs of persons with disabilities located in remote area. Tele rehabilitation can provide synchronous and comparatively low cost but quality rehabilitation services regardless of time, space, and location.
- ☺ Its flexibility, remote availability, and cost effectiveness helpful for community based settings.
- ☺ Tele-rehabilitation methodology can be used to provide rehabilitation services to achieve WHO goals (e.g., improved access to health care services and professionals).

Technologies used in Tele-rehabilitation:

- ☺ National Delivery Plan 2012 documents that by deploying technology in healthcare “provides an opportunity to treat patients in new ways and means to help manage rising costs and demands”
- ☺ As information and communication technology has progressed in healthcare, the possibilities for effective tele rehabilitation in therapies such as these has improved.(Fig.3)

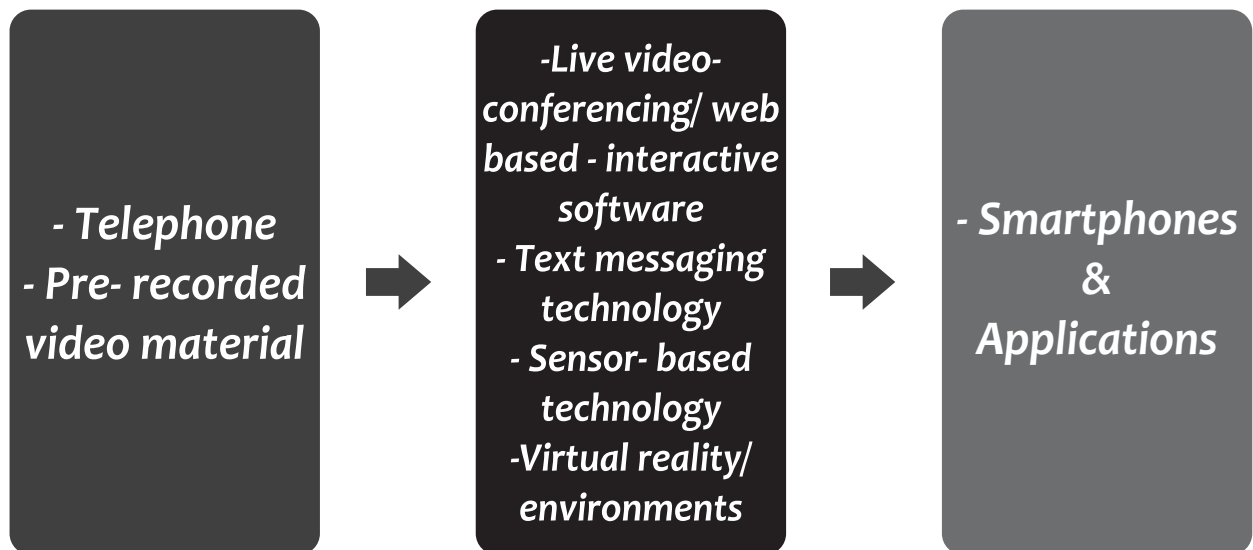


Fig - 3

- ☺ In recent years, tabs, smart phones have revolutionised communication within the medical setting. This modernisation is allowing the opportunity to provide medical support to people who are in need of it.
- ☺ It has been reported that half of smart phone owners use their devices to get health information, with one fifth of smart phone users actually using health related applications (apps). There are a wide range of mobile apps available for healthcare professionals, medical students, patients and the general public.

Equipments used in Tele-rehab-

- | | |
|----------------|-------------------------|
| a) PC Hardware | b) Software |
| c) Tabs | d) Smartphones |
| e) Web camera | f) Microphones |
| g) Headsets | h) Internet Connections |
| i) Wi-Fi | |

Methods:

☺ **Textual Based Technologies**

- Ø Written report
- Ø E-mails
- Ø Cell phone text message

☺ **Audio (Voice/ Sound) based Technologies**

- Ø Telephones(Landline calls)
- Ø Cell phones
- Ø Voice messages

☺ **Vision based technologies**

- Ø Video may be used either in real-time (synchronously, such as video conferences)
- Ø Asynchronous or store and forward (visual data may be useful to transmit still images or photographs via a “store and forward” mode in which data is first acquired and stored and then forwarded via the internet or via cell phone at some future time)

☺ **Wireless Technologies**

- Ø PDA's (Personal Digital Assistants) can be used for several functions.
- Ø Global Positioning Systems (GPS) can guide visually or cognitively impaired individuals as they travel through streets or exit from buildings.
- Ø Cell phones and smart phones.

☺ **Web-based Technologies**

- Ø Website offers a wide variety of incorporating text, audio, images, and video experiences that may incorporate both real-time communication and stored material for asynchronous use into a rehabilitation service.

☺ **Virtual Reality**

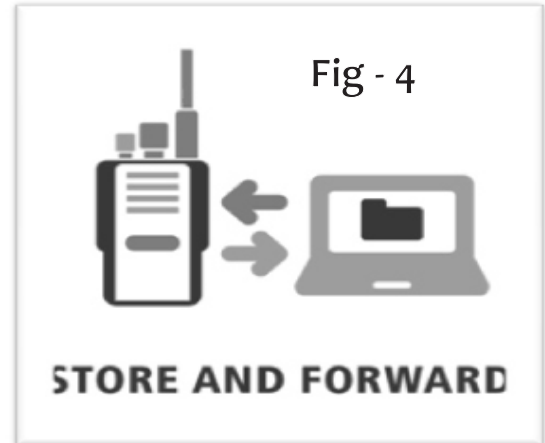
- Ø Virtual Reality (VR) provides a unique opportunity to simultaneously present and manipulate a variety of visual, auditory, tactile, and even olfactory sensations to represent physical experiences.

Store and Forward method of Tele-rehabilitation:

- Ø Store-and-forward telemedicine is collecting clinical information and sending it electronically to another site for evaluation. Information typically includes demographic data, medical history, and documents such as laboratory reports, image, and video and/or sound files.

Benefits of Store and forward

- Ø They do not need to travel – participants can be located anywhere.
- Ø Waiting times are reduced – specialist reports are often received within a few hours of the request.
- Ø Primary care providers and medical specialists can review patient cases, regardless of their respective locations.
- Ø Second opinions can quickly obtained
- Ø Service user's portals allowing communication between a user and their health care professional.
- Ø Implemented in scenarios where the subscribing devices are geographically distant, lack direct connectivity and/or where the network is experiencing high error rates.
- Ø The Store and Forward process can overcome language and cultural barriers. (Fig.4)



Chapter - 2

Ethics in Tele-Rehabilitation Service Provision:

- ☹️ A patient survey predicts that 75% of all patients expect to use digital services in future.
- ☹️ 75% of the country's healthcare infrastructure is concentrated in urban areas while more than 75% of the population lives in rural areas.

Ethics concerns in the use of Tele-medicine/Rehabilitation:

- ☹️ Lack of focus on privacy and confidentiality.
- ☹️ Lack of proper patient informed consent.
- ☹️ Presence of technical and other staffs without prior information and consent of patient.
- ☹️ Lack of awareness of patient about remotely located personnel.
- ☹️ Few concerns on taking video, clicking photographs and lack of understanding of technology due to illiteracy and language.

Ethical considerations in use of Tele-medicine/Rehabilitation

- ☹️ There is no universal law for telemedicine practice, and different countries/region has taken different approaches in regulating it.
- ☹️ Ministry of communication and Information Technology Government of India brought out first policy document in the 2003 defining telemedicine practice and legal issues addressing guidelines for service delivery.
- ☹️ In the year 2005, Indian task force on Telemedicine was constituted by the Ministry of Health and Family Welfare which has identified Legal, Ethical and Socioeconomic aspect of telemedicine.
- ☹️ The Information Technology Act, 2000 (“IT Act”), The Information Technology (Reasonable security practices and procedures and sensitive personal data or information) Rules, 2011 (“Data Protection Rules”) and the Information Technology (Intermediaries guidelines) Rules, 2011 (“Intermediary Guidelines”).

- ☹️ Telemedicine in any setting, rural or urban, health care providers must place patient welfare above all.
- ☹️ Protect confidentiality, ensure privacy, promote trust in healing relationship and ensure fair and equitable access to quality service.
- ☹️ Consent is one of the major requirements under the Data Protection Rules.
- ☹️ Patient must be informed about the purpose of the data being collected and whether it would be transferred to any third party.
- ☹️ State regulations- no state in India has yet developed guideline, law or any advisory documents.
- ☹️ Security of health information –getting debated, concern expressed but no consensus yet.

Chapter - 3

Disability Creation Process

- ☺ According to the Disability Creation Process model, a disabling situation corresponds to the lack, or reduced, realisation of life habits, i.e. of daily activities or a social role valued by the persons or his/her socio-culture context according to his/her characteristics(age, sex and socio-cultural identity etc.)and which insures his/her survival and wellbeing in his/her society.
- ☺ Disability is not a definite status but an evolving notion.
- ☺ It is relative varying over time, gender, age, context and environment.
- ☺ It is a situation that can be modified by reducing impairment or developing capabilities(acting on personal factors)as well as by adapting the environment (acting on environmental factors)
- ☺ When acting on such factors, it is therefore possible to transform a disabling situation into a situation of social participation.

Human Development model

- ☺ This model analyses human development as an interaction between personal factors and environmental factors which influence the degree of social participation.

Fig.1

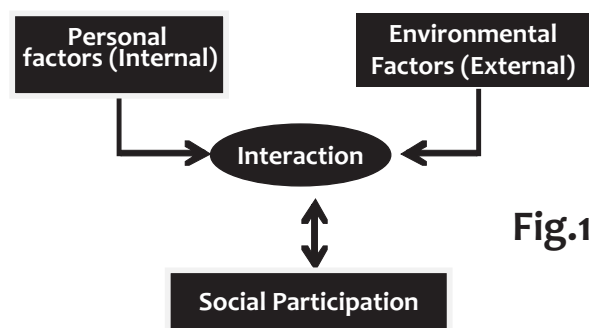


Fig.1

Human Development Model (RIPPH, 1996)*

Disability Creation Process:

- ☺ The Disability Creation Process is an adaptation of the Human Development Model in the area of disability.
- ☺ It uses the central notion of social participation as resulting from an interaction between personal factors and environmental factors.
- ☺ **Personal factors**, which are internal, are the result of the combination of **organic systems** (for example, the muscular system) and **capabilities** (for example, motor activity capabilities). Organic systems can vary in degrees, from integrity to organic impairment (or deficiency).
An individual's capabilities can also vary from capacity to inability (or functional impairment).
- ☺ **Environmental factors** constitute either facilitators or obstacles regarding an individual's life habits. Environmental factors enable social participation or, on the contrary, worsen a disabling situation.

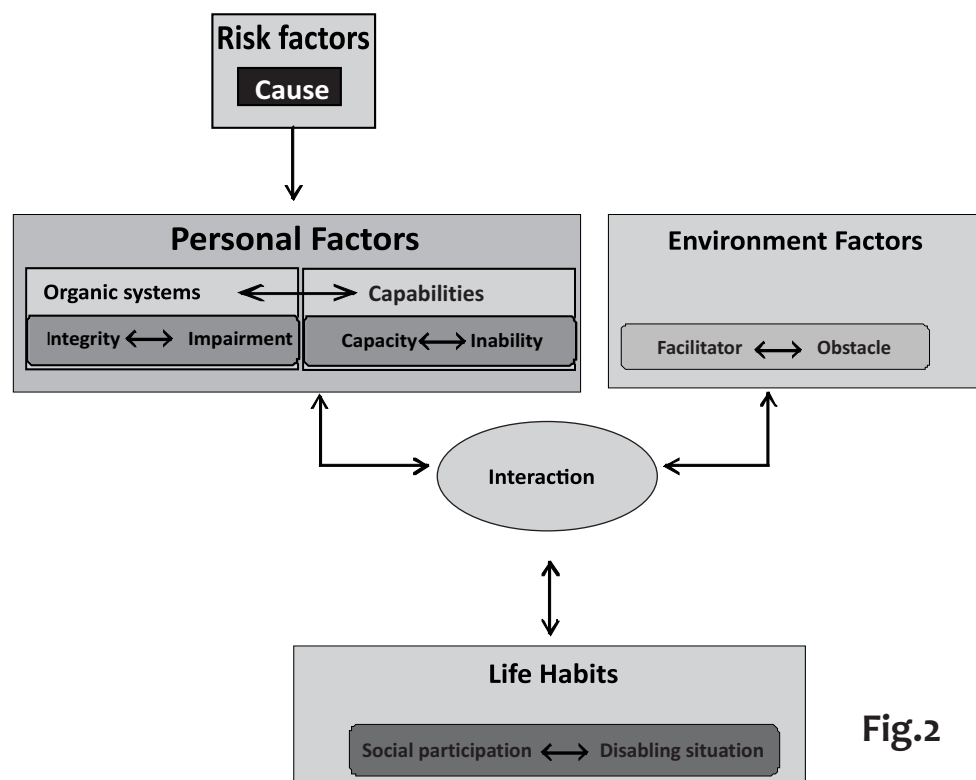


Fig.2

*International Network on the Disability Production Process (RIPPH, Réseau International sur le Processus du Production de Handicap)

Personal factor, Organic systems and Capabilities

- ☺ A **personal factor** is a characteristic of the person such as age, gender, socio-cultural identity, organic systems and capabilities etc.
- ☺ An **organic system** is a group of bodily components all sharing a common function.
- ☺ **Impairment** refers to the degree of anatomical, structural, or physiological anomaly or alteration of an organic system.
- ☺ **Capability** is the extent to which a person is capable of doing a physical and intellectual activity.
- ☺ The notions of capabilities and impairment are measured in terms of degrees.

Categories of organic system:

- | | |
|-------------------------------------|------------------------|
| a) Nervous system | h) Urinary system |
| b) Auricular system | i) Endocrine system |
| c) Ocular system | j) Reproductive system |
| d) Digestive system | k) Cutaneous system |
| e) Respiratory system | l) Muscular system |
| f) Cardiovascular system | m) Skeletal system |
| g) Haematopoietic and immune system | n) Morphology |

Categories of capabilities:

- I. Intellectual capabilities
- II. Language capabilities
- III. Behaviour capabilities
- IV. Sense & perception capabilities
- V. Motor activity capabilities
- VI. Breathing capabilities
- VII. Digestion capabilities
- VIII. Excretion capabilities
- IX. Reproduction capabilities
- X. Protection & Resistant capabilities

Risk Factors:

- ☹ Risk factors can represent a cause of limitation for personal factors.
- ☹ An environmental factor is a physical or social dimension that determines a society's organisation and context.
- ☺ Facilitator refers to an environmental factors that contributes to the completion of life habits(when interacting with environment factors)
- ☹ An obstacle is an environmental factor or situation that hinders the completion of life habits (when interacting with environment factors)

Categories of environmental factors:

- ☹ Social factors
- ☹ Political & Economic factors
- ☹ Socio-cultural factors
- ☹ Physical factors
- ☹ Nature
- ☹ Development

Example 1. Environmental factors-
Obstacle (shown in figure

- ☹ To reach the first floor where no ramp or lift for wheel chair user is an obstacle for participation.
- ☺ Ramp acts as a facilitator for wheel chair users.



Fig.3



Fig.4

Example 2. Environmental factor as a facilitator (shown in figure)

Example 3. Conventions, Laws and Legislations act as facilitator to promote inclusion in mainstream society.

Life habits, situations of social participation and disabling situation:

- ☺ Life habit is a daily activity or social role valued by the person's socio-cultural context and characteristics (age, gender, socio-cultural identity etc.), which insure survival and well-being in society throughout life time.
- ☺ A situation of social participation corresponds to the full realisation of life habits, for example:
 - Cook and eat
 - Work
 - Playing
 - Go to cinema
 - Go to school
- ☹ A disabling situation corresponds to lack of , or reduced ,realisation of life habits , for example:
 - Cannot do work
 - Does not have job
 - Cannot go out
 - Cannot live where he/she want

Life habits categories:

- Personal care
- Nutrition
- Fitness
- Communication
- Housing
- Mobility
- Responsibility
- Interpersonal relationship
- Community life
- Education
- Employment
- Recreation
- Other habits

Chapter - 4

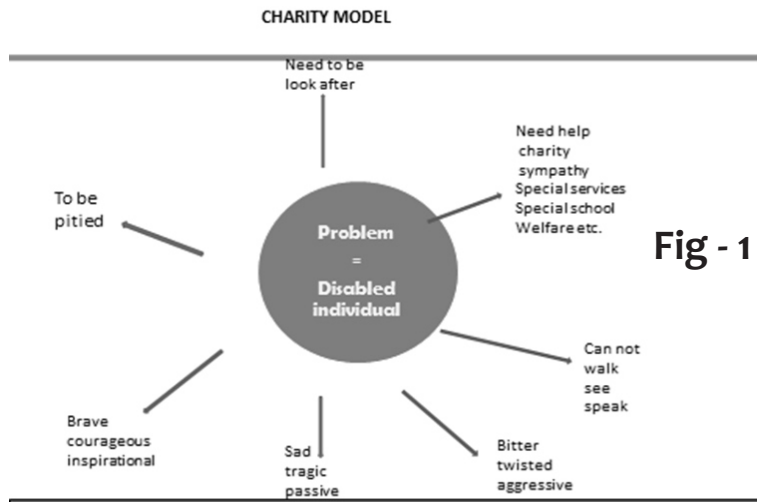
Models of Disabilities

- ☹ Models of Disability are tools for defining impairment and, ultimately, for providing a basis upon which government and society can devise strategies for meeting the needs of people with disabilities.
- ☹ Models of Disability are essentially devised by people about other people.
- ☹ Models provide an insight into the attitudes, conceptions and prejudices before and after impact of disability.
- ☹ Models reveal the ways in which our society provides or limits access to work, goods, services, economic influence and political power for people with disabilities.

TYPES :

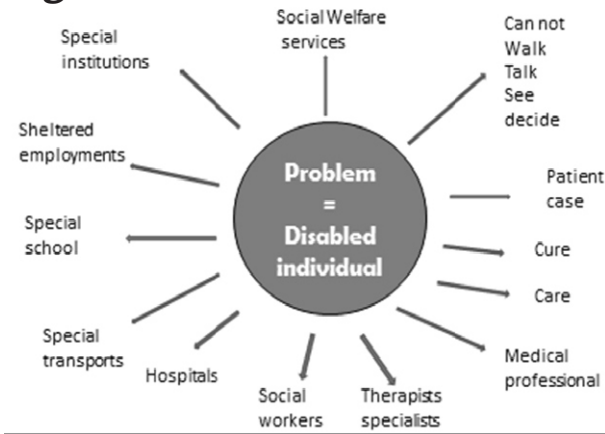
1. Charity Model:

- ☹ Charity Model describes disabled people as victims of circumstance, deserving of pity.
- ☹ Charity model portrays individual with disabilities as **“problem”**. Fig - 1



MEDICAL MODEL

Fig - 2



2. Medical Model:

- ☹ The medical model looks at what is 'wrong' with the person, not what the persons needs.
- ☹ It creates low expectations and leads to people losing independence, choice and control in their own lives.
- ☹ In the medical model, management of the disability is aimed only at a care and cure, again this model portrays individual with disabilities as **“problem”**.(Fig.2)

3. Social Model:

- ☹ The social models of disability says that disability is caused by the way society is organised, rather than by a person's impairment or difference.
- ☹ In this model, disability is not a feature of an individual, but rather a complex collection of conditions, many of which are created by the social environment.
- ☹ The social model looks at ways of removing barriers that restrict life choices for people with disabilities.
- ☹ When barriers are removed, disabled people can be independent and equal in society, with choice and control over their own lives.(Fig.3)

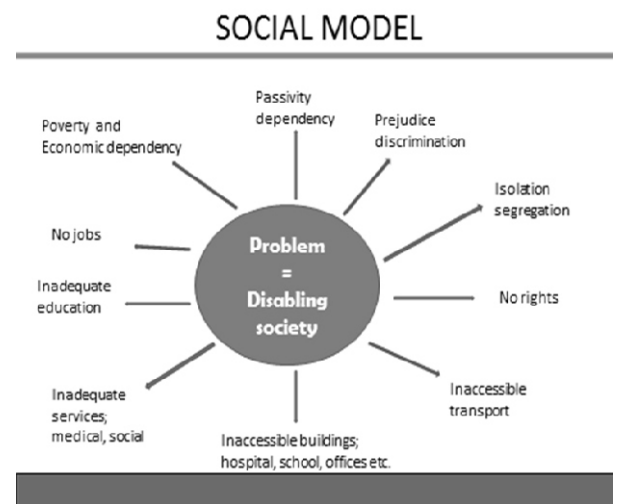


Fig - 3

4. Human Rights Model:

- ☹ Disability is an unavoidable and universal part of human diversity.
- ☹ Shift from a charitable to a rights-based approach whereby individuals are respected and empowered.
- ☹ Human rights model contains both sets of human rights, civil and political as well as economic, social and cultural rights.(Fig.4)

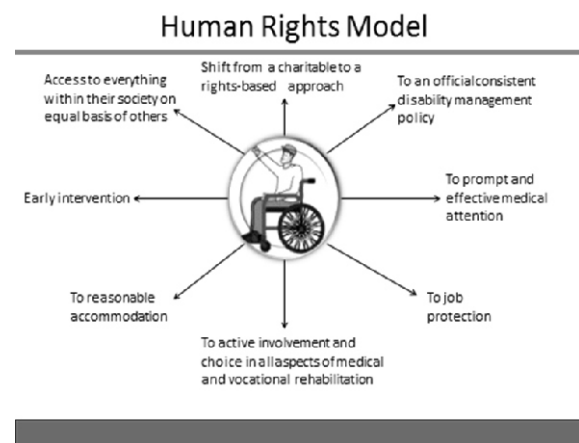


Fig - 4

5. Bio-Psycho-Social Model:



Fig - 5

- ☹ ICF is based on this model, an integration of medical and social.
- ☹ This provides a coherent view of different perspectives of health: biological, Individual and social
- ☹ Most holistic: Medical, Psychosocial and Environmental factors.
- ☹ Focuses on how a disability influences a person's functioning.
- ☹ Allow medical label to be part of identity. (Fig.5)

Chapter - 5

The International Classification of Functioning, Disability and Health (ICF)

- ☉ The International Classification of Functioning, Disability and Health (ICF) is a framework for describing and organising information on functioning and disability. It provides a standard language and a conceptual basis for the definition and measurement of health and disability.
- ☉ The ICF received approval from all 191 World Health Organization (WHO) member states on May 22, 2001, during the 54th World Health Assembly. Its approval followed nine years of international revision efforts coordinated by WHO.
- ☉ WHO's initial classification for the effects of diseases, the International Classification of Impairments, Disabilities, and Handicaps (ICIDH), was created in 1980.
- ☉ A companion classification for children and youth (ICF-CY) was published in 2007. (Fig.1)

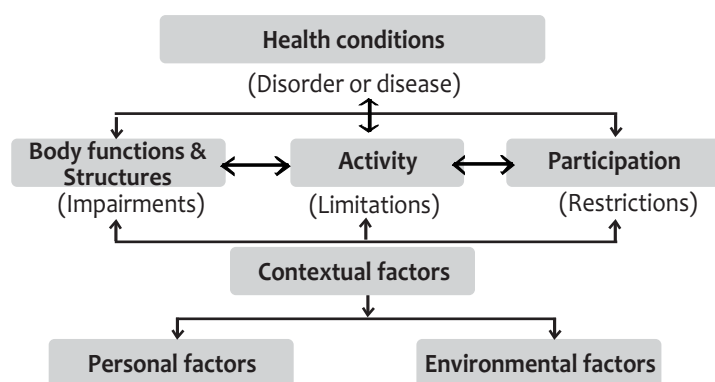


Fig - 1

- ☉ The International Classification of Functioning, Disability, and Health (ICF) describes functioning at three perspectives: **body, person** and **societal**.
- ☉ The ICF organizes information in two parts. The first part deals with Functioning and Disability, the second part covers contextual factors.
- ☉ Components of Functioning and Disability are divided in: (1) Body component including **Body functions and Anatomical structures**. A problem in body function or structure is noted as an Impairments; (2) '**Activity**' and '**Participation**' components where Activity is defined as the execution of a task or action by an individual and Participation is defined by involvement in a life situation. A difficulty at the person level would be noted as an activity limitation, and at the societal level as a participation restriction.
- ☉ Component of **Contextual factors** is an independent and integral component of the classification and is divided into (1) '**environmental factors**' and (2) '**personal factors**'. 'Environmental factors' have an impact on all components of functioning and disability but 'Personal factors' are not classified in the ICF.

Definitions:

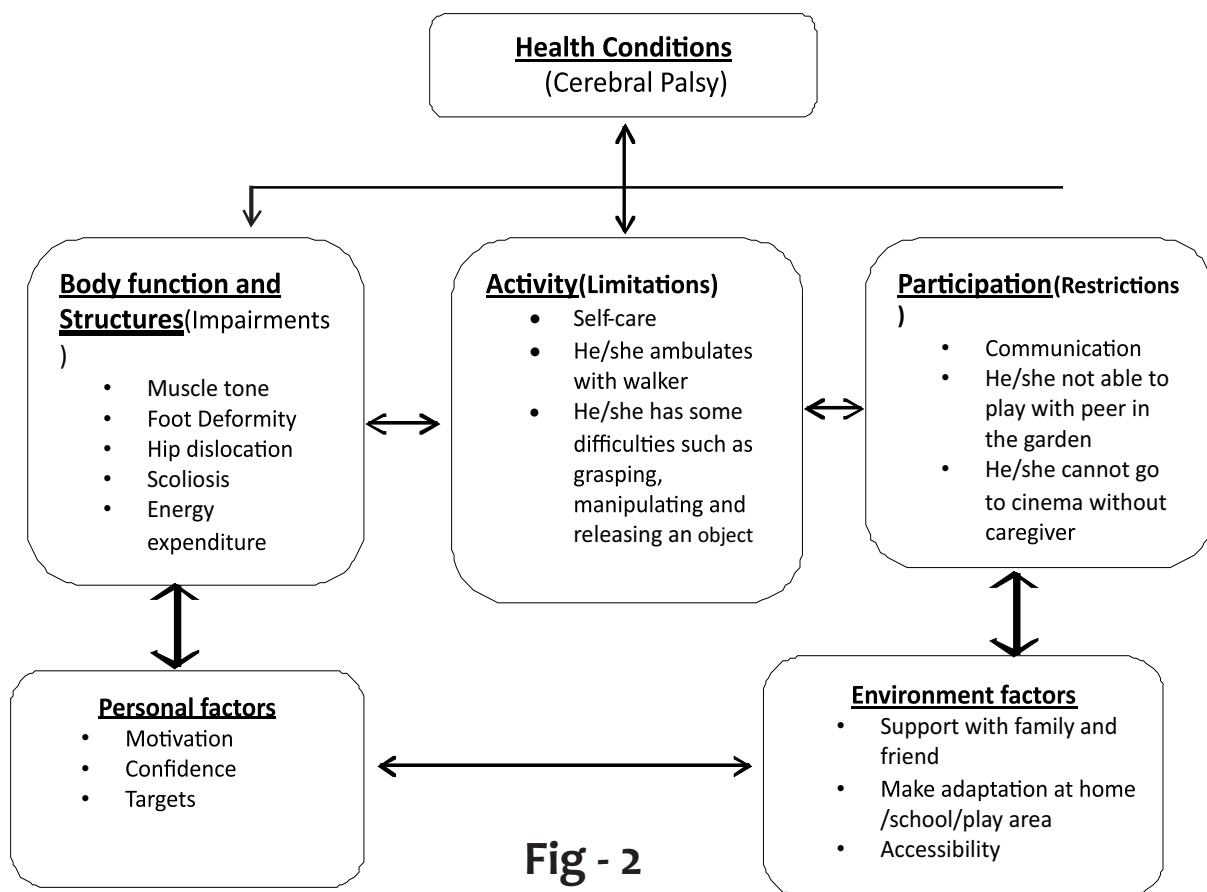
- ☹ **Body Functions:** Body functions are physiological functions of the body systems (including psychological functions)
- ☹ **Body structures:** are the anatomical parts of the body such as organs, limbs and their components.
- ☹ **Impairments:** are the problems in the body functions and structures such as significant deviations or loss.
- ☹ **Activity:** is the execution of a tasks and action taken by an individual.
- ☹ **Participation:** is involvement in a life situations .
- ☹ **Activity Limitations:** are difficulties an individual may have in executing certain tasks.
- ☹ **Participation restrictions:** are problems an individuals experience in involvement in life situations.
- ☹ **Environmental factors:** make up the physical, social and attitudinal environment in which people live and conduct their lives. These are either barriers to or facilitators of persons life functioning.

Aims of ICF

- ☹ To provide scientific basis for understanding and studying health and health related states, outcomes and determinants.
- ☹ To establish a common language for describing health and health related states in order to improve communication between different users, such as health care workers, policy-makers and the public, including people with disabilities.
- ☹ To permit comparison of data across countries ,healthcare discipline ,services and time.
- ☹ To provide systemic coding scheme for health information systems.

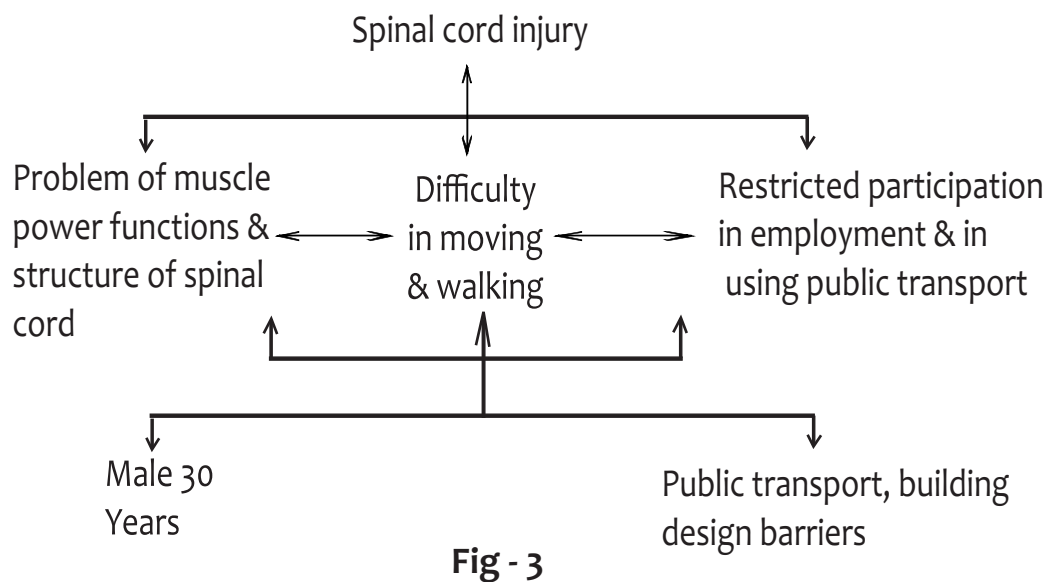
Applications of ICF:

- ☹ **As a statistical tool:** in the collection and recording of data(i.e. in population studies and surveys or in management information systems.)
- ☹ **As a research tool:** to measure outcomes, quality of life or environmental functions.
- ☹ **As a clinical tools:** in need of assessment ,matching treatment with specific conditions, vocational assessment ,**rehabilitation** and outcomes measures.
- ☹ **As a social policy tools:** in social security planning , compensation systems, and policy design and implementation.
- ☹ **As an educational tools:** in curriculum designing and to raise awareness and undertake social action.



Example of ICF Model –Cerebral palsy (Fig.2)

Example 2.Spinal cord injury (Fig.3)



Chapter - 6

CBR to CBID (Community Based Rehabilitation to Community Based Inclusive Development)

- ☉ CBR is a strategy for rehabilitation, equalisation of opportunity, poverty reduction and social inclusion.
- ☉ CBR is multisectoral strategy

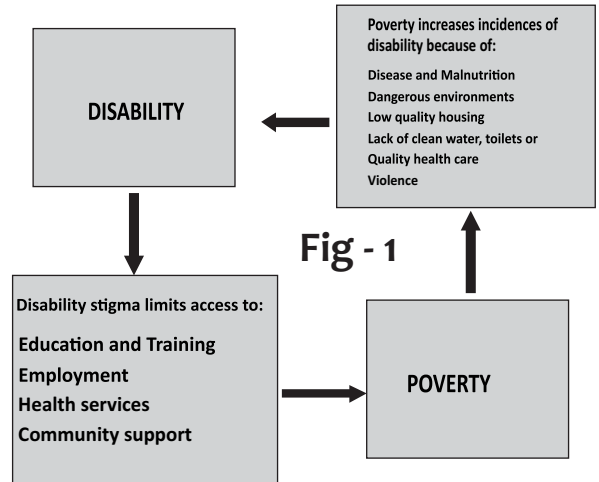
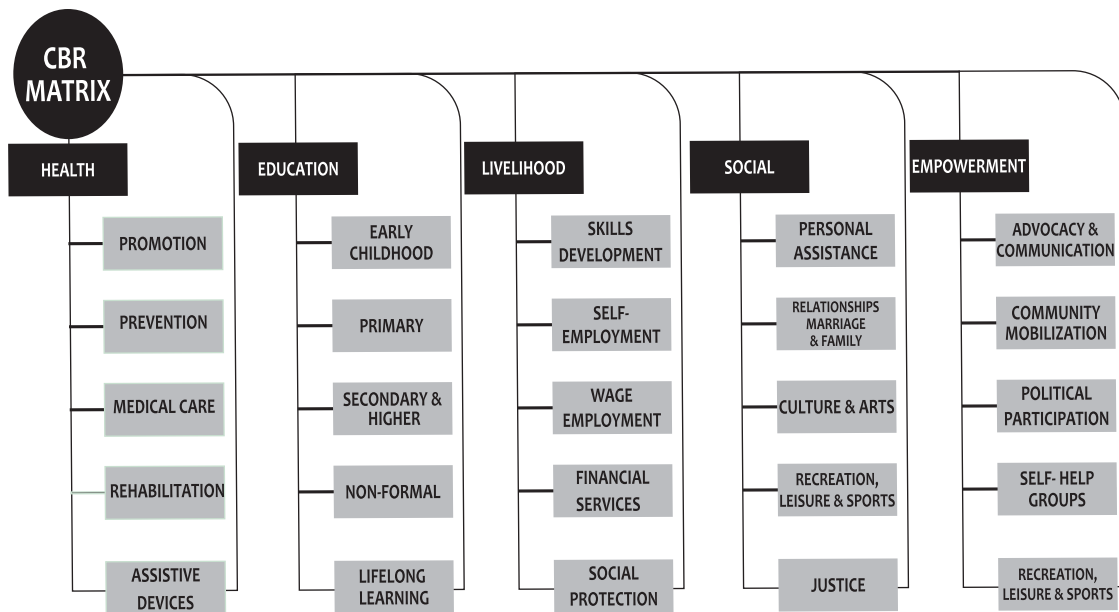


Fig - 1

Disability and Poverty:

- ☉ People experiencing poverty are more likely to become disabled.
- ☉ People who are disabled are more likely to be poor.
- ☉ The cost of living with a disability can be increase the household poverty which means disability is not an issue limited to individuals.
- ☉ Exclusion and social-stigma, low income, and high cost rehabilitation and care, all create a **vicious cycle** that hold back not only individuals with impairments but their families and children too. Fig - 1



Source - WHO

Fig - 2

CBR Matrix:

- ☉ Focuses on the five key domains (components): health, education, livelihood, social and empowerment.
- ☉ Each component has five sub-headings (elements).
- ☉ The CBR matrix endorses a holistic approach to inclusion of persons with disabilities. Fig - 2

- ☉ Works towards inclusive health, inclusive education, inclusive livelihood and inclusive society; need to be an aim and outcomes of any CBR program.
- ☉ The CBR matrix can be a planning tool for CBR implementers.
- ☉ CBR Matrix conceptualizes a community based inclusive development to ensure individuals with disabilities living in the community are integral all development initiatives.
- ☉ CBR Matrix facilitates and promotes inclusive development at community level, a bottom up approach to ensure development really becomes inclusive.
- ☉ The guidelines make it clear that programs are not expected to implement all elements according to the matrix.
- ☉ Implementers can choose the options that are best suited to their local context, need and resources. They can work in partnership with other organisations for support in the area where they lack expertise.

Inclusive Development:

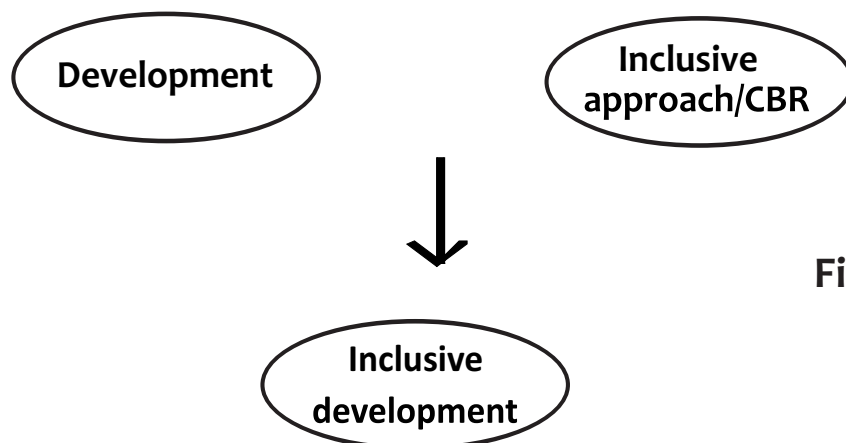


Fig - 3

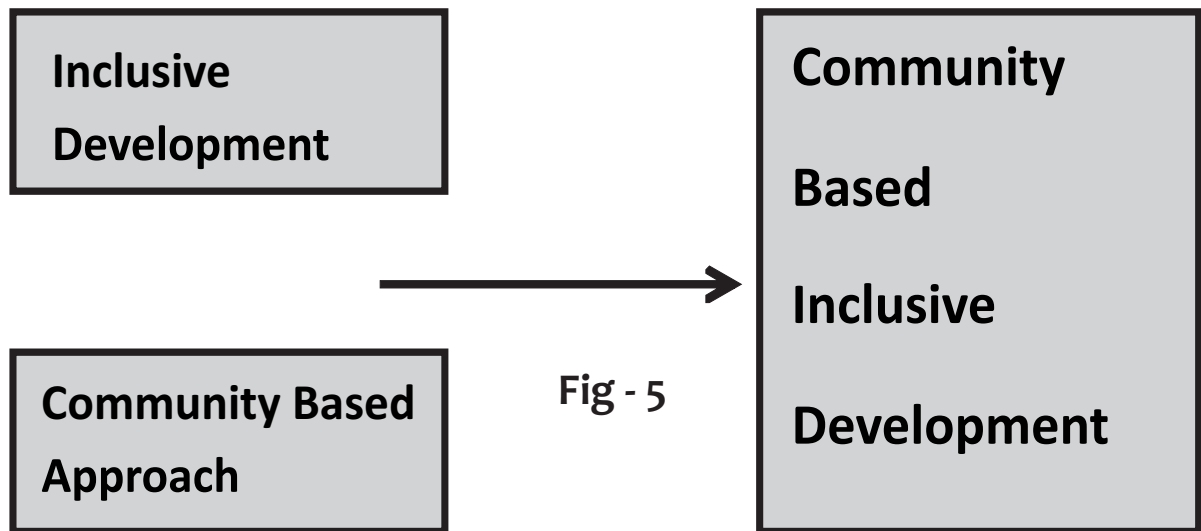
Society for All:

- Inclusive Development
- Inclusive Health
- Inclusive Education
- Inclusive Society
- Inclusive livelihood
- Society for All



Fig - 4

Community Based Inclusive Development (CBID)



- Development needs to become inclusive and community based.
- Community based inclusive development will facilitate development initiatives to become disabled people centered and community centered.
- Address their needs as well as the community and build their capacity.
- Remove barriers for active participation and the same time to promote community action.
- Foster self-reliance, equal rights and opportunities.

Chapter - 6

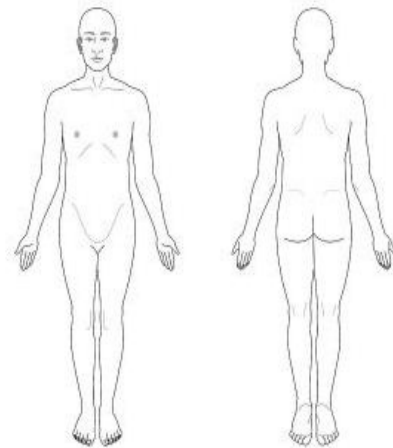
Basic Anatomical Terminology:

Anatomy:

- ☉ Anatomy is the field of biological sciences concern with the identification and description of the body structures of living things.

Anatomical position:

- ☉ In this position the body is straight in standing position. The palms are hanging by sides closed to the body and are facing forwards. The feet also point forwards and the legs are fully extended.
- ☉ Anatomical position is very important because the relation of all structures is described as presumed to be in anatomical position.(Fig.1)



Anatomical position

Fig - 1

Supine position:

- ☉ In this position body is lying down with face pointing upwards.
- ☉ All the remaining positions are similar to anatomical position with the only difference being in a horizontal plane rather than a vertical plane.(Fig.2)

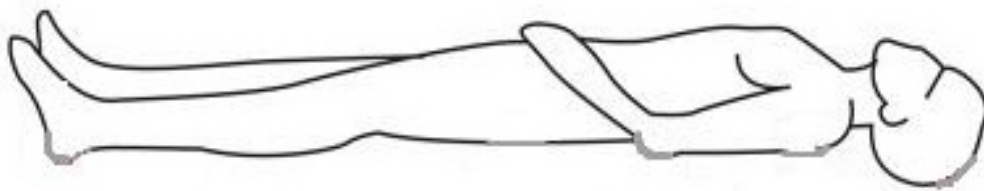


Fig - 2

Prone position:

- ☉ This is the position in which back of the body is directed upwards.
- ☉ The body lies in a horizontal plane with face directed downwards.(Fig.3)



Fig - 3

Anterior: Refers to the front of the body.

Posterior: Refers to the back of the body.

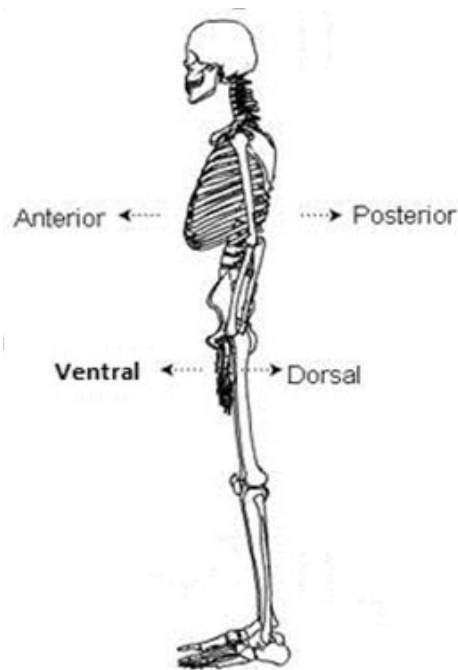


Fig - 4

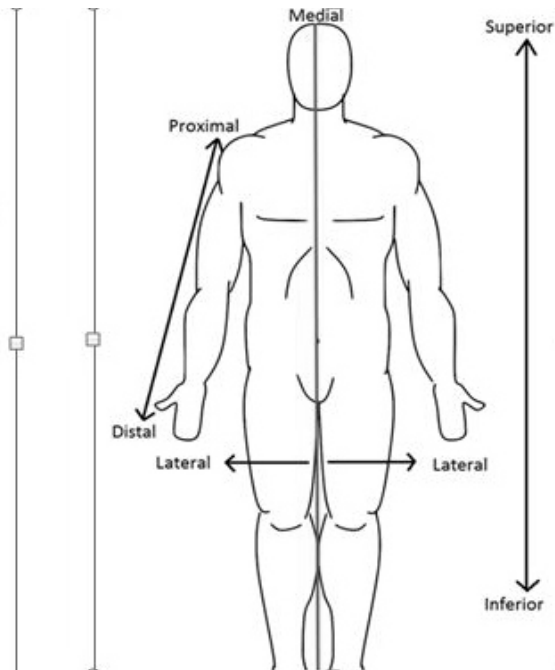


Fig - 5

Superior:Up (towards the head). Example- The head is superior to the shoulder. (Fig.5)

Inferior:Down (towards the feet).Example-The hips are inferior to the chest. (Fig.5)

Medial:Means towards the median plane (towards the midline of the body). (Fig.5)

Lateral:Means away from the median plane (away from the midline of the body). (Fig.5)

Proximal: Closer to its origin.

Distal: means further away

Example:

The knee joint is proximal to the ankle joint.

The wrist joint is distal to the elbow joint.

Planes:The anatomical planes are different lines used to divide the human body.

Sagittal plane:

A vertical line which divides the body into a left section and a right section.(Fig.6)

Horizontal plane: (Transverse plane):

A horizontal line which divides the body into an upper section(superior) and a lower section(Inferior)(Fig.6)

Frontal Plane: (Coronal plane):

A vertical line which divides the body into a front (anterior) section and back (posterior) section.(Fig.6)

Sagittal plane



Horizontal plane



Frontal plane



Fig - 6

Exterior and Interior:

- ☉ **Superficial:** Nearer to the surface of the body.
- ☉ **Deep:** Further from the surface of the body.

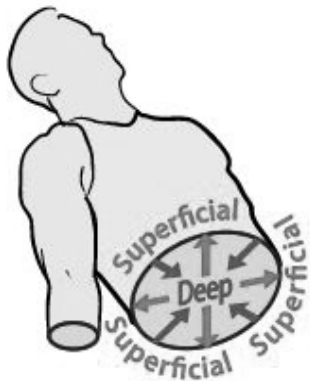


Fig - 7

Anatomical terms of motion:

- ☉ Motion, the process of movement, describes using specific anatomical terms.
- ☉ Motion, includes movements of organs, joints, limbs and specific sections of the body.
- ☉ The terminology used to describe this motion according to its direction relative to the anatomical position of the joints.

Flexion:

- ☉ Refers to the movement where angle between two bones decreases.
- ☉ Flexion is commonly known as bending. (shown in fig.8)

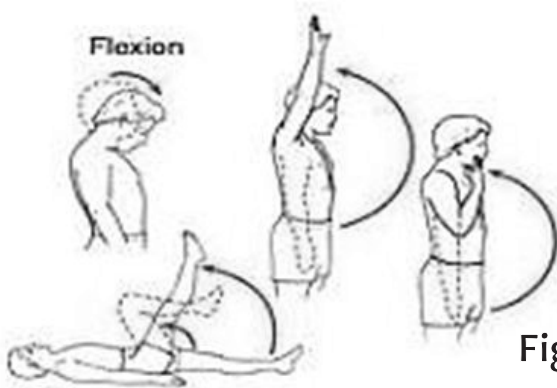


Fig - 8

Extension:

- ☉ Refers to where the angle between two bones increases
- ☉ Extension is otherwise known as straightening. (Shown in Fig.9)

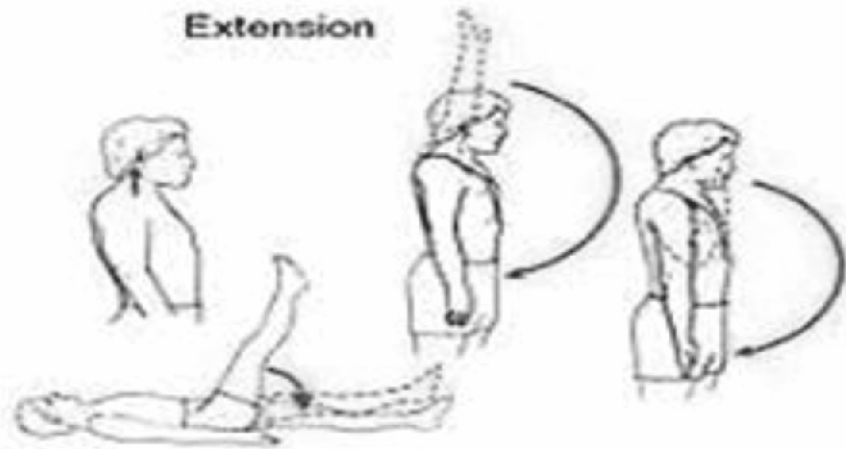


Fig - 9

Abduction:

- ☉ Abduction is movement of a body segment away from the midline of the body. (shown in fig.10)

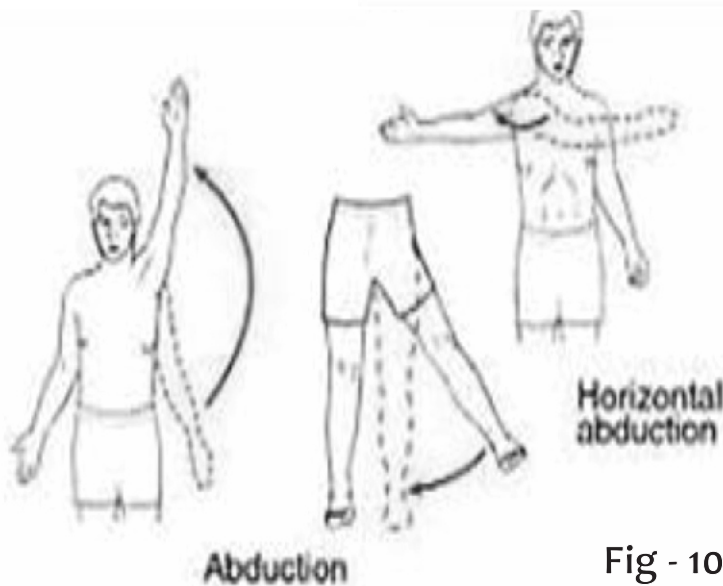


Fig - 10

Adduction:

- ☉ Adduction is the movement of a body part toward the body's midline

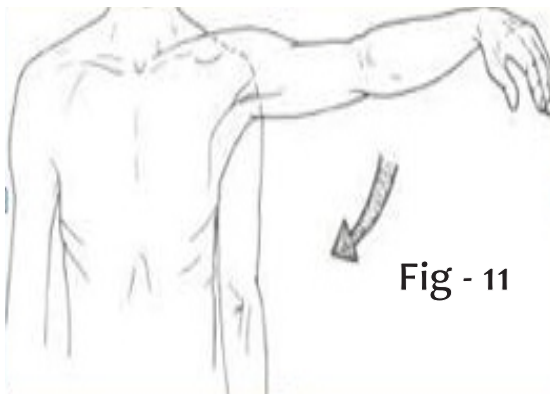


Fig - 11

Circumduction:

- ☉ Circumduction is a movement where joint is the pivot and the body segment moves in a combination of flexion, extension, abduction and adduction.

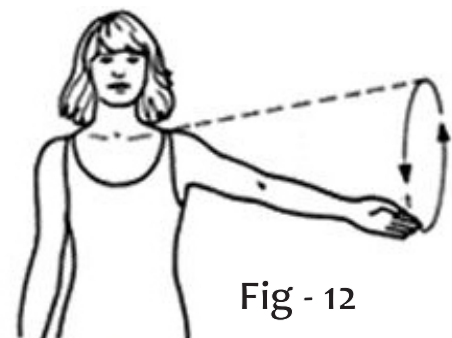


Fig - 12

Circumduction

Rotation:

- ☉ Rotation refers to pivoting or twisting movement.
- ☉ Rotation is further broken in to medial and lateral rotation.
- ☉ Medial rotation-the movement of a body segments where the front (anterior) of the segment rotates medially (inwards) towards the midline of the body.
- ☉ Lateral rotation- the movement of a body segments where the front (anterior) of the segment rotates laterally (outwards) away from the midline of the body. (Fig.12)

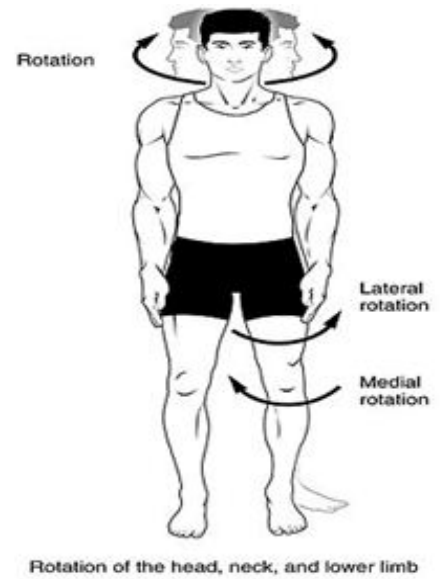


Fig - 13

Dorsi flexion

- ☉ Dorsiflexion is moving the top of the foot towards the shin or 'raising' the toes

Planter flexion

- ☉ Planter flexion is moving the top of the foot away from the shin or 'pointing' the toes.

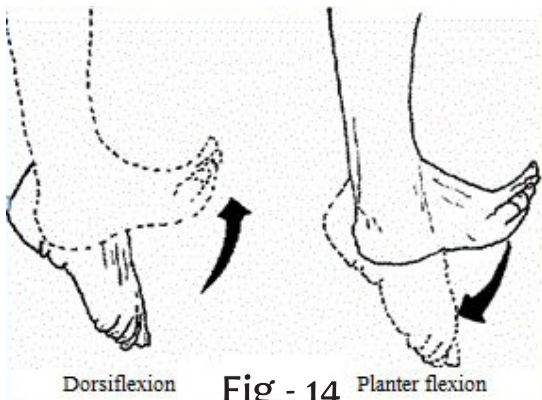


Fig - 14

Pronation:

- Hand:** movement so the palm of hand faces downwards and backward (posteriorly).
- Foot:** combination of eversion, dorsi flexion and abduction of the foot occurring at the same time. Fig - 16

Inversion:

- ☉ Inversion is the movement of the foot to bring the sole of the foot to face inward.

Eversion:

- ☉ Eversion is the movement of the foot to bring the sole of the foot to face outward.

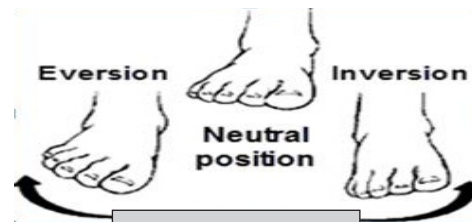
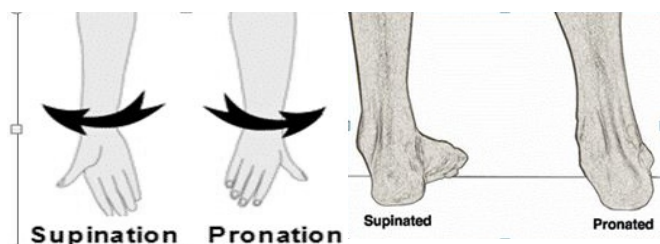


Fig - 15

Supination:

- ☉ **Hand:** movement so the palm of hand faces upwards and forward (anteriorly). (Fig.15)
- ☉ **Foot:** combination of inversion, plantar flexion and adduction of the foot occurring at the same time. (Fig. 16)

Fig - 16



Protraction:

☹️ Protraction is forward movement of the scapula that results in 'hunching the shoulders'.

Retraction:

☹️ Retraction is backward movement of the scapula as they pull together to 'square' the shoulders and push the chest out.

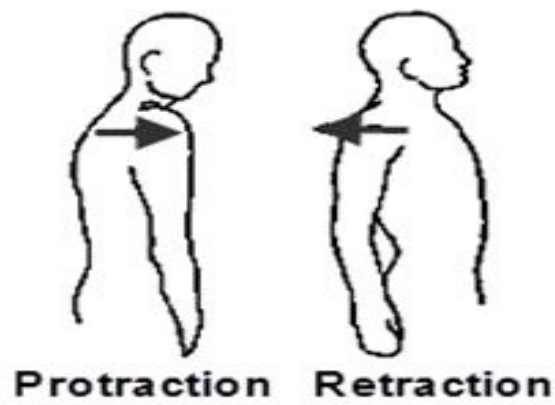


Fig - 17

Elevation:

☹️ Refers to the raising of the scapula to a more superior level (shrugging the shoulders).

Depression:

☹️ Refers to the scapula moving to a more inferior position as they are pulled downwards

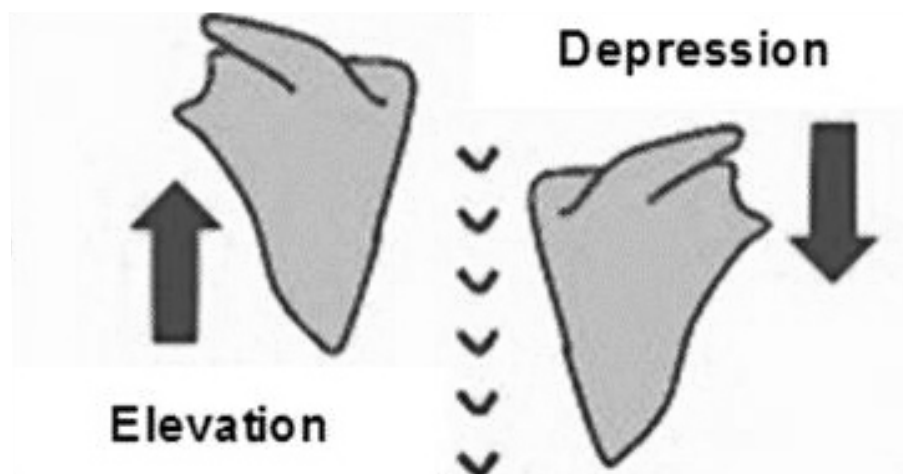


Fig - 18

Chapter - 8 (a)

Disability –

- ☺ Disability is an evolving concept, and that disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders full and effective participation in society on an equal basis with others'. (Preamble UNCRPD)
- ☺ Persons with disabilities **include** those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others'.(Article 1 UNCRPD)

Types of Disabilities: In the RPWD Act, 2016, the list has been expanded from 7-21 conditions and categorized as (i) Persons with disabilities (ii) Persons with benchmark disabilities(iii)Persons with disabilities having high need support.

- ☺ **Persons with disabilities:** 'Persons with disabilities include those who have **long-term** physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others'.
- ☺ **Persons with benchmark disabilities:** means a person with **not less than forty percent** of a specified disability where specified disability has not been defined in measurable terms and includes a person with disability where specified disability has been defined in measurable terms, as certified by the certifying authority.
- ☺ **Persons with disabilities having high need support:**Section 2 (t) of the Act says 'person with disability having high support needs' means a person with benchmark disability certified under clause [a] of sub-section 2 of section 58 who needs high support. Section 2 [I] stipulates that “high support” means an intensive support, physical, psychological and otherwise, which may be required by a person with benchmark disability for daily activities, to take independent and informed decision to access facilities and participating in all areas of life including education, employment, family and community life and treatment and therapy.

Specified disability:

1.Physical disability:

A.Locomotor disability :(a person's inability to execute distinctive activities associated with movement of self and objects resulting from affliction of musculoskeletal or nervous system or both), including-

- (a)"**Leprosy cured person**" means a person who has been cured of leprosy but is suffering from—
 - (I) Loss of sensation in hands or feet as well as loss of sensation and paresis in the eye and eye-lid but with no manifests deformity;
 - (ii) Manifest deformity and paresis but having sufficient mobility in their hands and feet to enable them to engage in normal economic activity;
 - (iii) extreme physical deformity as well as advanced age which prevents him/her from undertaking any gainful occupation, and the expression "leprosy cured" shall construed accordingly;

(b) "**Cerebral palsy**" means a Group of non-progressive neurological condition affecting body movements and muscle coordination, caused by damage to one or more specific areas of the brain, usually occurring before, during or shortly after birth;

(c) "**Dwarfism**" means a medical or genetic condition resulting in an adult height of 4 feet 10 inches (147 centimetres) or less;

(d) "**Muscular dystrophy**" means a group of hereditary genetic muscle disease that weakens the muscles that move the human body and persons with multiple dystrophies have incorrect and missing information in their genes, which prevents them from making the proteins they need for healthy muscles. It is characterised by progressive skeletal muscle weakness, defects in muscle proteins, and the death of muscle cells and tissue;

(e) "**Acid attack victims**" means a person disfigured due to violent assaults by throwing of acid or similar corrosive substance.

B. Visual disability:

(a) "**Blindness**" means a condition where a person has any of the following conditions, after best correction—

(i) Total absence of sight; or

(ii) Visual acuity less than 3/60 or less than 10/200 (Snellen) in the better eye with best possible correction; or

(iii) Limitation of the field of vision subtending an angle of less than 10 degree.

(b) "**low-vision**" means a condition where a person has any of the following conditions, namely:—

(i) Visual acuity not exceeding 6/18 or less than 20/60 up to 3/60 or up to 10/200 (Snellen) in the better eye with best possible corrections; or

(ii) Limitation of the field of vision subtending an angle of less than 40 degree up to 10 degree.

C. Hearing Impaired

(a) "Deaf" means persons having 70 DB hearing loss in speech frequencies in both ears;

(b) "Hard of hearing" means person having 60 DB to 70 DB hearing loss in speech frequencies in both ears;

D. Speech and Language Disability

Means a permanent disability arising out of conditions such as laryngectomy or aphasia affecting one or more components of speech and language due to organic or neurological causes.

2. Intellectual disability:

A condition characterised by significant limitation both in intellectual functioning (reasoning, learning, problem solving) and in adaptive behaviour which covers a range of every day, social and practical skills, including;

(a) **"specific learning disabilities"** means a heterogeneous group of conditions wherein there is a deficit in processing language, spoken or written, that may manifest itself as a difficulty to comprehend, speak, read, write, spell, or to do mathematical calculations and includes such conditions as perceptual disabilities, dyslexia, dysgraphia, dyscalculia, dyspraxia and developmental aphasia.

(b) **"autism spectrum disorder"** means a neuro-developmental condition typically appearing in the first three years of life that significantly affects a person's ability to communicate, understand relationships and relate to others, and is frequently associated with unusual or stereotypical rituals or behaviours.

3. Mental behaviour:

"Mental illness" means a substantial disorder of thinking, mood, perception, orientation or memory that grossly impairs judgment, behaviour, capacity to recognise reality or ability to meet the ordinary demands of life, but does not include retardation which is a condition of arrested or incomplete development of mind of a person, specially characterised by subnormality of intelligence.

4. Disability causes due to:

(a) Chronic neurological conditions, such as

(i) **"Multiple sclerosis"** means an inflammatory, nervous system disease in which the myelin sheaths around the axons of nerve cells of the brain and spinal cord are damaged, leading to demyelination and affecting the ability of nerve cells in the brain and spinal cord to communicate with each other;

(ii) **"Parkinson's disease"** means a progressive disease of the nervous system marked by tremor, muscular rigidity, and slow, imprecise movement, chiefly affecting middle-aged and elderly people associated with degeneration of the basal ganglia of the brain and a deficiency of the neurotransmitter dopamine.

5. Multiple Disabilities:

Multiple Disabilities (more than one of the above specified disabilities) including deaf blindness which means a condition in which a person may have combination of hearing and visual impairments causing severe communication, developmental, and educational problems.

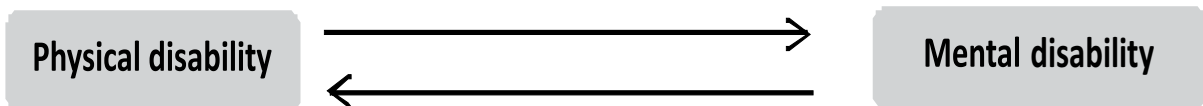
Primary disabling condition:

- ☹ It is long term dynamic condition that can fluctuate in severity during course of the life.
- ☹ The existence of a potentially disabling (primary) condition is a strong risk factor for certain secondary conditions.

Secondary disabling condition:

- ☹ It is a condition that is casually related to a disabling condition, i.e. occur as a result of primary disabling condition.
- ☹ It can be more disabling and either a pathology, an impairment, a functional limitation, or an additional disability.

For example:

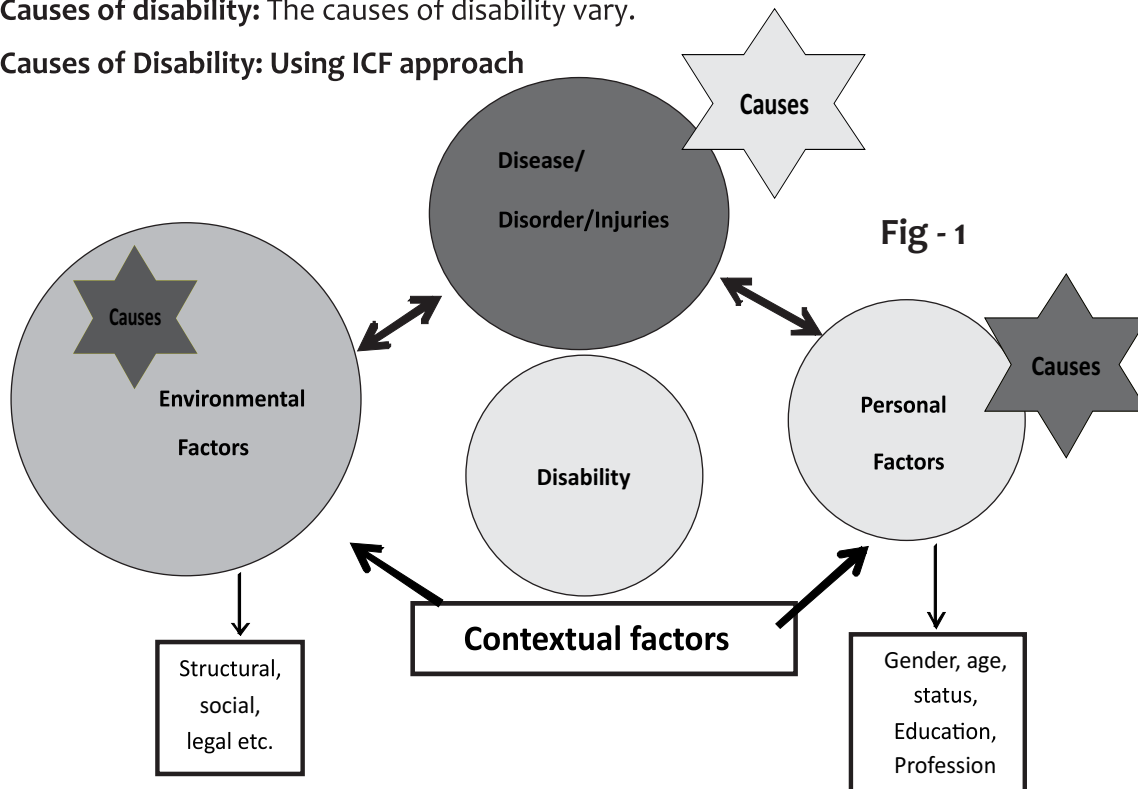


Chapter - 8 (b)

Causes of Disability

Causes of disability: The causes of disability vary.

Causes of Disability: Using ICF approach



Causes of disability: underlying causes

- ☹️ Congenital
- ☹️ Disease or infection
- ☹️ Trauma All Impairment -moderate to mild

Causes of disability: on the basis of birth

- ☹️ Prenatal (Before birth)
- ☹️ Natal (during birth)
- ☹️ Post-natal (after birth)Blindness

Impairment and impairment continuum:



- ☹️ Diagram indicates how disability prevalence can be seriously distorted if one adopts traditional 'core impairment' approach.

Chapter - 8 (c)

Prevention of Disabilities:

- ☹️ Actions aimed at eradicating, eliminating, or minimising the impact of disease and disability.
- ☹️ The concept of prevention is best defined in the context of levels, traditionally called primary, secondary and tertiary prevention.

Levels of prevention: (shown in fig.)

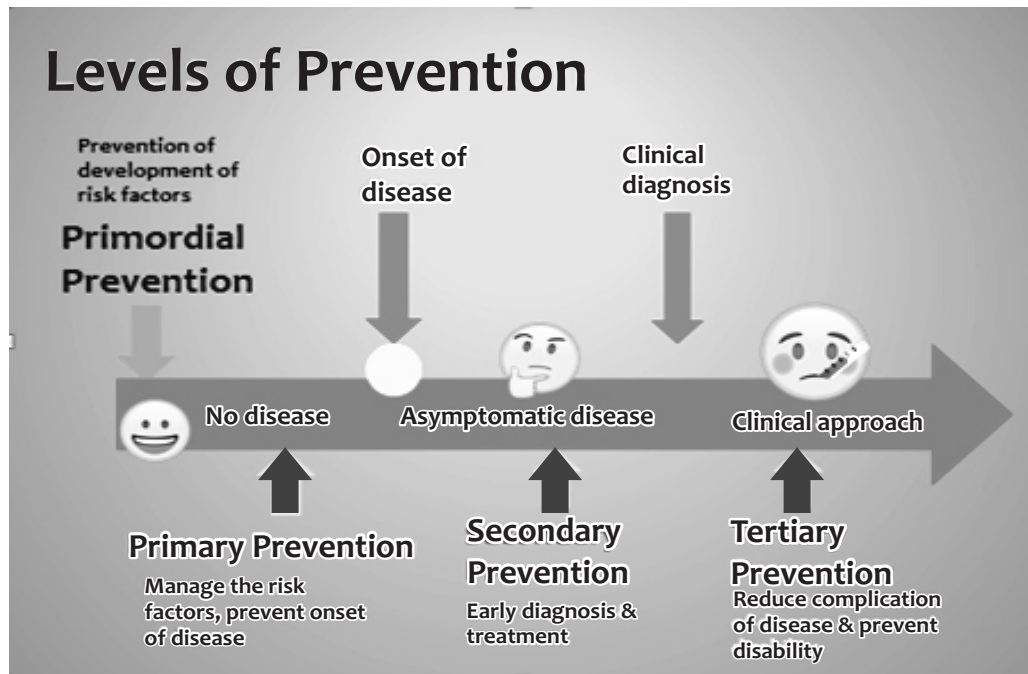


Fig - 1

Primordial Prevention:

- ☹️ Prevention development risk factors causing disease or disabilities.
- ☹️ Main intervention in primordial is through individual and mass education. (Example shown in fig.).

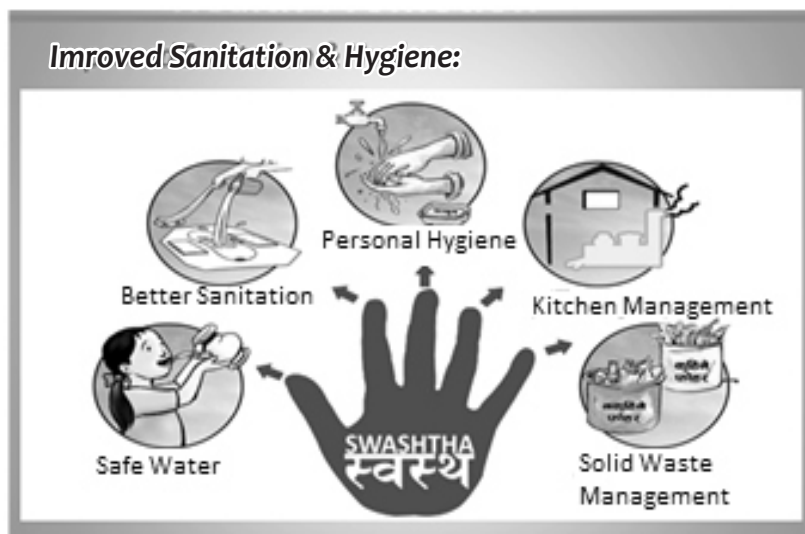


Fig - 2

Primary Prevention:

- ☹ It can be defined as the action taken prior to the onset of disease, which removes the possibilities that incidences of disease may occur.
- ☹ It signifies intervention in the pre-pathogenesis phase of a disease or health problems.
- ☹ Primary prevention may be accomplished by measures of 'health promotion' and 'specific protection'.

Secondary Prevention:

- ☹ It is defined as action which halts the progress of a disease at its initial stage and prevents complications.
- ☹ The specific interventions are: early diagnosis i.e. screening tests and case finding programs and adequate treatment.

Tertiary Prevention:

- ☹ It is used when the disease process has advanced beyond its early stages.
- ☹ It is defined as all the measures available to reduce or limit impairment and disabilities and to promote the patients' adjustment to permanent conditions.
- ☹ Intervention that should be accomplished in the stage of tertiary prevention is disability limitation and rehabilitation. (Shown in the fig.)



Fig - 3

Chapter - 9

Developmental milestones:

- ☉ It is an ability that is achieved by most children by a certain age.
- ☉ Developmental milestones can involve physical, social, emotional, cognitive and communication skills such as walking sharing with others expressing emotions recognizing familiar sounds and talking.
- ☉ By looking at different milestones, parents, healthcare professional and teacher are able to better understand children typically develop and keep tracking the developmental problems

Types of developmental milestones:

There are four main categories of developmental milestones.

1. Physical milestones:

Ø **Gross motor:** Gross motor skills are usually the first to develop and include sitting up, standing, crawling and walking.

2. Fine motor:

Fine motor skills involve Precise movement such as holding a pencil, grasping a spoon, drawing shapes, and picking up small objects

3. **Social and emotional milestones:** are centred on children gaining a better understanding of their own emotions and the emotions of others. These milestones also involve learning how to interact and play with other people.

4. **Communication and language milestones:** involve both language and nonverbal communication. A one-year-old learning how to say his first words and a five-year-old learning some of the basic rules of grammar are examples of important communication milestones.

Trivandrum Developmental Screening Chart (TDSC):

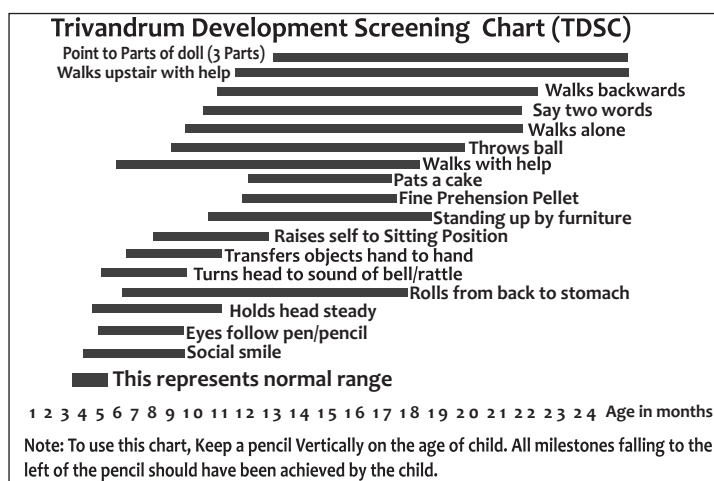


Fig - 1

CHILD DEVELOPMENT MILESTONES

	3 Months	6 Months	12 Months	2 Years	3 Years	5 Years
Gross motor	 Lifts head briefly	 Roll back to stomach & sit with support with arms	 Crawls and pull self to stand	 Can walk alone or support form 1 hand	 Can run	 Can climb large stairs
Fine motor	 Try to reach out with hands & hits nearby objects	 Can hold objects with whole hand	 Can hold objects with both hands & pass object between them	 Can make a simple tower	 Can do a simple puzzles	 Can throw & catch a ball, can copy simple shapes
Social skills	 Recognises mother and smile	 Responds to simple gestures	 Copy simple actions	 Starts to play with other children	 Play cooperatively with other children	 Plays group games, separates easily from mother
Hearing	 Stops moving at new sound	 Turns to look at sound	 Enjoys music	 Will turn & point to objects making sound	 Follow simple instructions	 Is curious & listen to explanations
Vision	 Looks at bright objects	 Enjoys bright and moving objects	 Is attracted by moving objects & tries to catch them	 Is curious and looks closely at objects	 Can sort objects	 Can recognise objects and places that are far away
Language	 Smile and make noise	 Repeat simple sounds-ahh,gaa	 Responds to name & can repeat words/sound	 Makes simple sentences of 2-3 words	 Can ask & answer simple questions	 Uses lots of language ,can tell stories & describe things
Self Care	 Suckles	 Eats semi-solid & crushed food	 Drinks from cup	 Eats with spoon	 Can undressed	 Helps with simple household task

Chapter - 10

Functional Classifications

Gross Motor Functional Classification (GMFCS):

- ☉ GMFCS looks at movements such as sitting, walking and use of mobility devices.
- ☉ It is helpful because it provides families and clinicians with:
 - Ø A clear description of a child's current motor functions.
 - Ø An idea of what equipment or mobility aids a child may need in the future.
- ☉ Generally a child or young person over the age of 5 years will not improve their GMFCS level. For example if a child classified at a level IV at the age of 6 then it is likely to use mobility aids throughout his life.

Gross Motor Functional Classification System-Extended & Revised (GMFCS -E & R)

- ☉ The GMFCS-E & R –includes the age band for youth 12 to 18 years of age and emphasized the concepts inherent in the World Health Organisation's International Classification of Functioning, Disability and Health (ICF).
- ☉ It encourages the users to be aware of the impact that environmental and personal factors may have children and youth.
- ☉ The descriptions of age band 6-12 years and 12 -18 years reflects impact of environmental and personal factors. For example environmental factors (distances from school and community) and personal factors (energy demands and social preferences).

GMFCS – E & R Gross Motor Function Classification System

Expanded and Revised

LEVEL I - Walks without Limitations

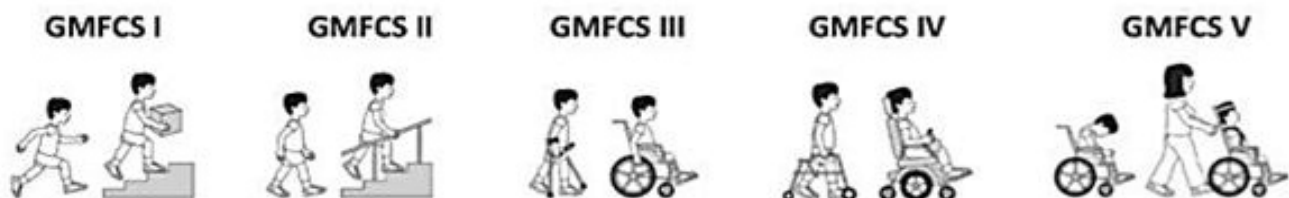
LEVEL II - Walks with Limitations

LEVEL III - Walks Using a Hand-Held Mobility Device

LEVEL IV - Self-Mobility with Limitations; May Use Powered Mobility

LEVEL V - Transported in a Manual Wheelchair

Fig - 1



Manual Ability Classification System (MACS):

- ☺ MACS level is determined based on knowledge child's actual performance in daily life.
- ☺ It is not done by conducting a specific assessment, but by asking parents /caretaker, who know the child and how that child performs typically.
- ☺ MACS is based on the use of both hands in activities, not an assessment of each hand separately.

MACS Levels				
Level I Handle objects easily and successfully.	Level II Handle most of object but some what reduced quality and / or speed of achievement.	Level III Handle objects with difficulties need help to prepare and / or modify activities	Level IV Handle a limited selection of easily managed objects in adopted situations.	Level V Does not handle object easily and has severely limited ability to perform even simple actions Requires total assistance.

Mini-MACS:

- ☺ Mini-MACS is an adaptation of MACS for the children of aged 1-4 years.
- ☺ Mini-MACS classify children's ability to handle objects that are relevant for their age and development as well as their need for support and assistance in such situations.
- ☺ Mini-MACS describes how children usually use their hands to handle objects, such as toys, in various setting .In other words, it describes what they ordinarily do, rather than what is know to be their best capacity.
- ☺ Mini-MACS classified the child's overall ability to handle objects, not the ability of each hand separately.
- ☺ To find out how a child can handle different objects in everyday life, itis necessary to ask parents /care taker how child's ability to handle objects and which situations. Again no need to do special testing.

Level I Handle objects easily and successfully.	Level II Handle most of object but some what reduced quality and / or speed of achievement.	Level III Handle objects with difficulties	Level IV Handle a limited selection of easily managed objects in simple actions.	Level V Does not handle object easily and has severely limited ability to perform even simple actions.
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Communication Function Classification System (CFCS):

- ☹ The communication Function Classification System (CFCS) provides five levels to describe everyday communication performance
- ☹ It is originally developed for using with individuals with cerebral palsy, now CFCS being used to describe communication performance of individuals with any disabilities.
- ☹ The CFCS provides a valid and reliable classification of communication performance and activity limitation that can be used for research and clinical purposes.

Communication Function Classification System

Level I-Effective sender and receiver with familiar and unfamiliar partners.

Level II- Effective, but slower with familiar and unfamiliar partners.

Level III-Effective with familiar and unfamiliar partners.

Level IV-Inconsistent with familiar partners.

Level V-Seldom effective with familiar partners.

← Most functional

← Least functional

- ☹ The CFCS is analogous and complementary to the GMFCS, MACS and EDACS.
- ☹ The CFCS follows the World Health Organization's (WHO's) International Classification of Functioning, Disability and Health (ICF).

Eating and Drinking Ability Classification System (EDACS):

- ☹ EDACS describes five distinct levels of ability using the key features of safety and efficiency.
- ☹ It is easy and can be used by clinicians and parents to determine present abilities of eating and drinking.

Eating and Drinking Ability Classification System (EDACS)

Level I : Eats and drinks safely and efficiently.

Level II : Eats and drinks safely but with some limitation to efficiently.

Level III : Eats and drinks with some limitations to safely: there may be limitations to efficiently.

Level IV : Eats and drinks with significant limitations to safely

Level V : Unable to eat and drink safely –tube feeding may be considered.

Common Disabling Conditions:

1. Arthrogyriposis Multiplex Congenita:

- ☹ Non progressive congenital disorder involving multiple rigid joints (usually symmetrical) leading to severe limitation in motion.
- ☹ Incidences occur in 1 in 3000 live births.
- ☹ Most contractures happen in the arms and the legs. They can also happen in jaw and spine.
- ☹ Children with arthrogyriposis may have other health problems, such as problems with nervous system, muscles, heart, kidneys or other organs.
- ☹ Each child with arthrogyriposis is different. In some children, the condition is mild. It affects only a few joints and these joints almost as much as normal movement .in other children the condition is more serious. It affects more joints and restricts their movements more.
- ☹ In extreme cases, arthrogyriposis nearly every joints. (See figure1)

Cause:

- ☹ Exact cause is unknown.
- ☹ Main cause of arthrogyriposis is fetal akinesia. This means the baby does not move around inside the womb as much as is typical.
- ☹ Starting in early pregnancy, moving helps a baby's joints, muscles and tendons develop. If a baby does not move much, these parts may not develop well, and extra tissues may form in the joints, making movement harder.

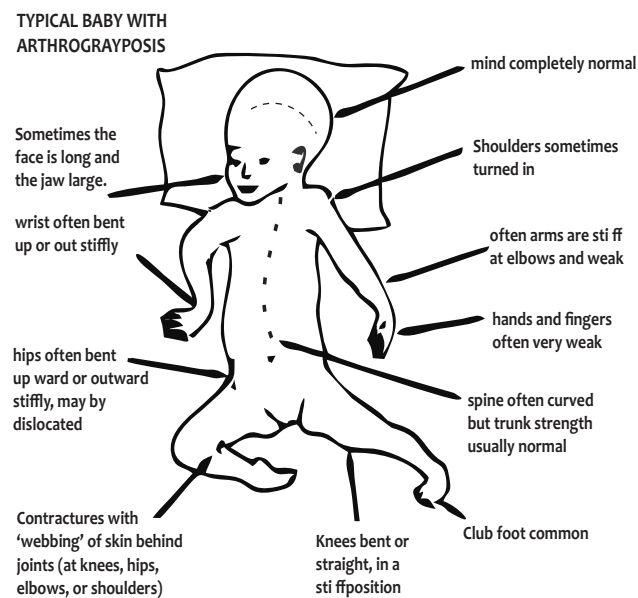


Fig - 1

Symptoms of arthrogyriposis:

- ☹ Children with arthrogyriposis are born with joints that have limited movement-
 - Ø Thin, weak (atrophy), stiff or missing muscles.
 - Ø Stiff joints due to extra tissues (fibrosis and fibrous ankylosis)
- ☹ Differences in the skin around their joints such as webbing.
- ☹ There is wide range of how children are affected, from mild (few contractures with nearly normal movement) to serious (many contractures with little or no movement).
- ☹ Arthrogyriposis is a feature of other, more complex conditions. Children may have other problems with their –

- Ø Nervous system
- Ø Muscles
- Ø Heart
- Ø Kidneys and other organs.
- Ø Differences in how their limbs, skull or face formed.

Management:

- ☺ The main goal of treatment for arthrogryposis is to help child's joints as normally as possible.
- ☺ Stretching exercises, exercises to improve range of motion and muscle strength.
- ☺ Focus given on to improve gross motor skills. This includes child to roll, crawl, stand, walk and play.
- ☺ Assistive may need in some cases for mobility.
- ☺ Splints and casts help to keep joints stretched and they prevent contractures.

Surgical intervention for arthrogryposis:

- Ø Surgery to cut into or through bone (osteotomy) to improve how joints line up. Surgeons may shorten or lengthen a bone or change its positions.
- Ø Surgery to lengthen or release muscles or tendons that prevent a joint from moving well.
- Ø Surgery to cut through a joint capsules (capsulotomy), if the capsule restricts the movements.
- Ø Surgery for spinal deformities, club foot and hip deformity.

2. Brittle Bone Disease:

- ☺ A child whose bone is very fragile and weak since birth and break repeatedly is known to have brittle bone disease.
- ☺ Some children may seem to be having no problems at birth and the bones begin to break later. (See figure 2)

Cause:

- ☺ Exact cause is unknown.
- ☺ Sometimes someone in the family may have similar condition.

BRITTLE BONE DISEASE

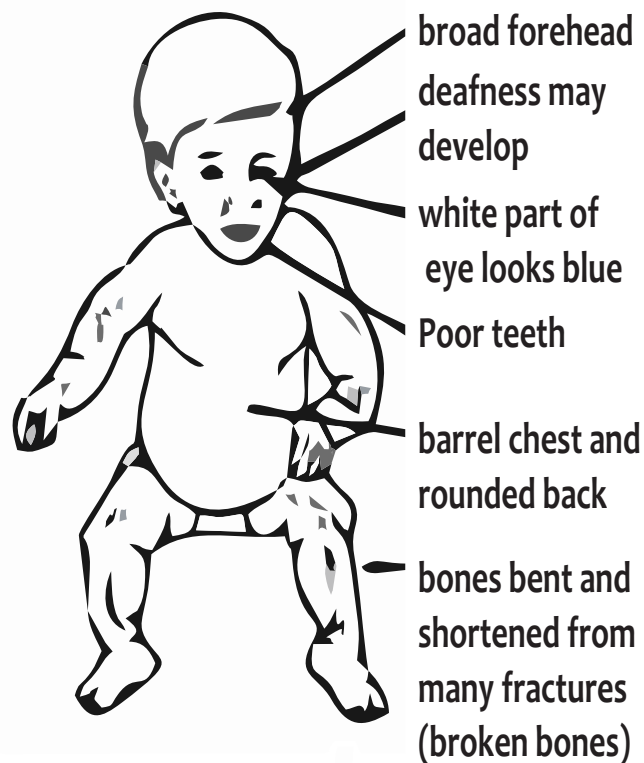


Fig - 2

Problem with Brittle bone disease:

- ☹ Most children can walk.
- ☹ In some cases due to repeated breaks bone gradually bends and makes walking difficult.
- ☹ Arm may also bend due to repeated breaks.
- ☹ Usually the breakage decreases as child reaches to his/her teens.
- ☹ Many children stay short because of the many broken and bend bones.
- ☹ Children get isolated from general social life due to restrictions of movements.

Management:

- ☹ There is no medicine to cure brittle bone disease.
- ☹ There are supportive therapies that help to reduce risk of broken bones and increase quality of life.
- ☹ Physical therapy to increase child's mobility and strength.
- ☹ Bisphosphonate medications to strengthen bones.
- ☹ Appropriate medication to reduce pain.
- ☹ Low impact exercises to help build bone.
- ☹ Mental health counselling to help issues with body image.
- ☹ Bone breaks may be treated same as other bone with plaster bandage or fracture brace.
- ☹ In some cases operation can be done.
- ☹ Appropriate assistive devices may be provided to protect limbs and prevent breaking up bones and helps child to walk and functionally independent.
- ☹ For mobility wheelchair may be provided to children with brittle bone disease.
- ☹ Children with brittle bone disease need support and opportunities to develop like others.
- ☹ Children should go to school and most do well.

3. Club Foot (Congenital Talipes Equinovarus):

- ☹ Clubfoot describes a range of foot abnormalities usually present at birth (congenital) in which infant's foot twisted out of shape or position.
- ☹ In club foot tissues connecting the muscles to the bone (tendons) are shorter than usual.
- ☹ Club foot is fairly common birth defect and usually an isolated problem otherwise healthy new born.
- ☹ Club foot can be mild or severe. About half of children with club foot have it in both feet. it will make it harder to walk normally, so generally recommended that the treatment be soon after birth.

Symptoms:

- ☹ The top of the foot is usually twisted downward and inward, increasing the arch and turning the heel inward.
- ☹ The foot may be turned so severely that it actually looks as it is upside down.
- ☹ The calf muscles in the affected leg are usually underdeveloped.(shown in figure)



Fig - 3
Left-Bilateral Right –
Unilateral

Classification:

- ☹ Club foot often broadly classified into two major groups –
 - Ø Isolated (idiopathic) clubfoot is most common form of the deformity and occurs in children who have no other medical problems.
 - Ø Nonisolated club foot occurs in various other health conditions or neuromuscular disorders, such as arthrogryposis and spina bifida.
- ☹ Regardless types and severity, club foot will not improve without treatment.
- ☹ A child with an untreated club foot will walk on the outer edge of the foot instead of the sole, develop painful calluses, be unable to wear shoes, and have lifelong painful feet that severely limit activity.
- ☹ Clubfoot that is not treated causes serious disability as the child grows.(shown in figure)

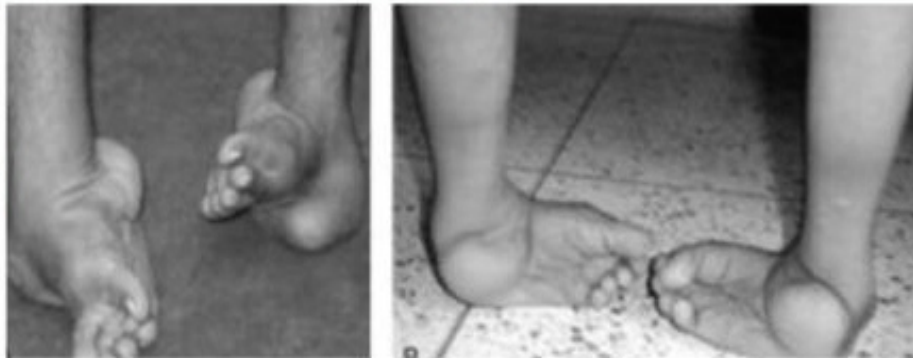


Fig - 4

Management:

- ☹ Intervention depends upon the age of the child and also foot easy to correct or not.
- ☹ Intervention should starts immediately after birth.

Manipulation and casting:

- ☹ Gentle stretching and manipulation into correct position and held in place with long-leg cast (toes to thigh.



Fig - 5

- ☹ Each week this process of stretching, re- positioning, and casting is repeated until the foot largely improved.
- ☹ For most infants this improvement takes about 6-8 weeks.
In Ponseti method long leg plaster casts are applied after the feet correctly positioned. (shown in the figure)

Achilles tenotomy:

- ☹ After the manipulation and casting period, most infants require a minor procedure to release continued tightness in Achilles tendon (heel cord).During this quick procedure (called a tenotomy), a very thin instrument use to cut the tendon.

- ☺ The cut is very small and does not require stitches. A new cast will be applied to the leg to protect the tendon as it heals.
- ☺ This usually takes about 3 weeks. By the time the cast is removed, Achilles tendon has regrown to the proper, longer length, and the clubfoot has been fully corrected.

Bracing:

- ☺ Clubfoot will recur even after successful correction.
- ☺ To ensure that the foot will permanently stay in correct position. A brace may need to keep foot in proper angle to maintain correction. (shown in figure) Steenbeek foot abduction brace (SFAB).

Surgery:

- ☺ Some children need surgical intervention to correct the foot. After surgery family members are taught to do exercises and appropriate appliances are usually given to maintain the correct position.



Fig - 6

4. Cleft lip and Cleft palate:

- ☺ A cleft is a gap or split in the upper lip and /or roof of the mouth (palate).
- ☺ It is present from birth.
- ☺ A gap is there because parts of the baby's face did not join together properly during development in the womb. (Shown in figure)

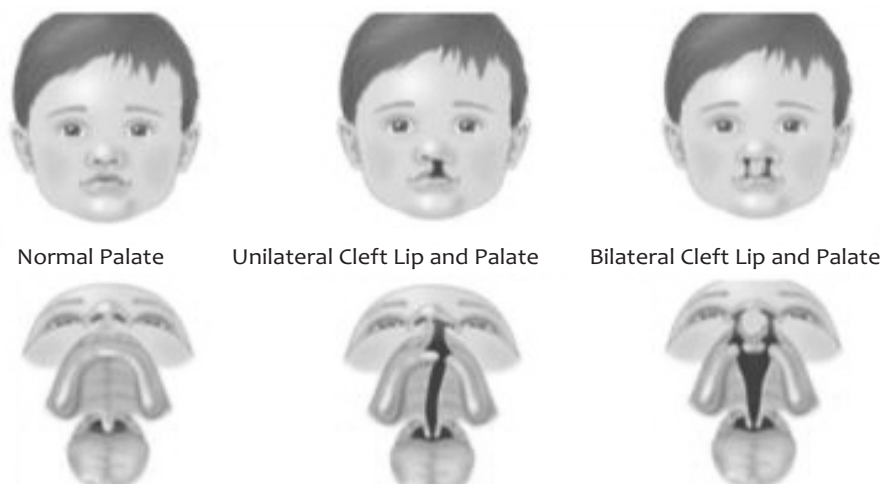


Fig - 7

Cause:

- ☺ In many instances the exact cause is not known.
- ☺ Poor nutrition and a lack of folic acid during pregnancy.
- ☺ Taking certain medicines in early pregnancy, such as anti-seizure medicines and steroids tablets.
- ☺ Somebody in the family (near or distance) having a similar condition or some problems in the genes.

Problems related Cleft lip and Cleft palate:

- ☹️ **Difficulties in feeding:** a baby with cleft palate may be unable to breastfeed or feed from normal bottle because they can't form seal with their mouth.
- ☹️ **Hearing problems:** Some babies with cleft lip are more vulnerable to ear infections and a build-up of fluid in their ears, which may affect their hearing.
- ☹️ **Dental problems:** In cleft lip and cleft palate, a child's teeth don't develop correctly and they may be at a higher risk of tooth decay.
- ☹️ **Speech problems:** if cleft palate isn't repaired, it can leads to speech problems such as unclear and nasal sounding speech when a child is older.

Management:

- ☹️ Any child with cleft lip and cleft palate usually need long term care plan that outlines the assessment and treatment as they grow –up.
- ☹️ **Surgery:** surgery carried out to correct cleft lip usually at the age of 3-6 months and an operation to repair cleft palate in performed at the age of 6-12 months.
- ☹️ **Feeding support:** Baby needs to keep proper positioning during breast feeding or need to feed with specially designed bottle.
- ☹️ **Monitoring hearing :** babies born with cleft palates have higher chance of glue ear, which may affect hearing.
- ☹️ **Stretching of lips** (as shown in figure - 8)
- ☹️ **Speech and language therapy :**babies born with cleft lip and cleft palates may need to monitor child's speech and language development throughout their child hood .child need to encourage doing some activities to help in developing better speech.(shown in figure - 9)
- ☹️ **Dental and orthodontic treatment:** maintaining healthy teeth and preventing cavities is very important for kids with cleft lip and palate. Kids with cleft lip and palate may begin orthodontic treatment as early as 6 years of age. It may start with palatal expansion, a process that makes the width of the palate normal. Later, it may involve braces to position the teeth.

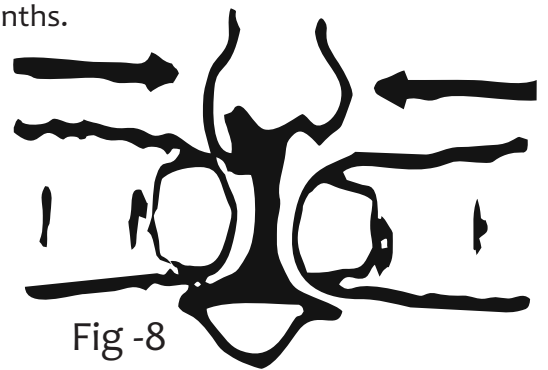


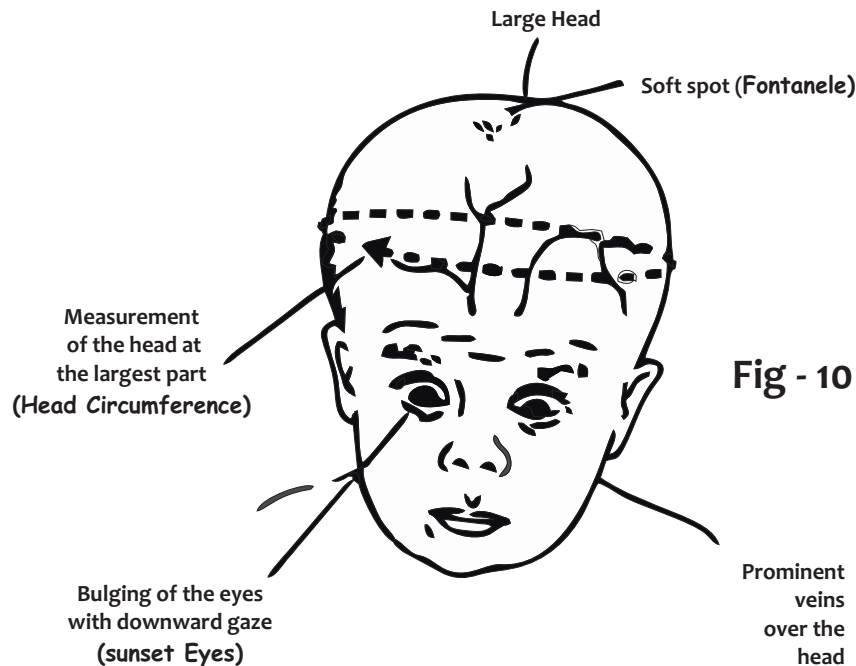
Fig -8



Fig - 9

5 .Hydrocephalus:

- ☺ Hydrocephalus is a build-up of fluid on the brain. The excess fluid puts pressure on the brain, which can damage it.
- ☺ It is most common in infants and older adults and characterised by enlargement of head.
- ☺ If left untreated, hydrocephalus can be fatal. (shown in figure)



Types of Hydrocephalus:

- ☺ There are three main types of Hydrocephalus-
 - Ø Congenital hydrocephalus: hydrocephalus that's present at birth.
 - Ø Acquired hydrocephalus: hydrocephalus that develops after birth.
 - Ø Normal pressure hydrocephalus: usually only develops in older people.

Other long term complications:

- Ø Learning problems
- Ø Impaired speech
- Ø Memory problems
- Ø Short attention span
- Ø Visual problems
- Ø Physical coordination
- Ø Epilepsy

Symptoms of Hydrocephalus:

- ☺ The damage to the brain can cause a wide range of symptoms, including-
 - Ø Headache
 - Ø Being sick
 - Ø Blurred vision
 - Ø Difficulty walking

Management:

- ☺ Hydrocephalus can usually be treated as using a shunt, thin tube that's surgically implanted in the brain and drains away the excess fluid.(shown in figure)
- ☺ Physical therapy: aims of treatment will vary according to the child's needs and age -
 - Ø Promoting achievement of physical milestones such as sitting, crawling and standing.
 - Ø Exercises to balance and coordination.
 - Ø Stretching exercises for tight muscles.
 - Ø Strengthening exercises for weak muscles.
 - Ø Gait training

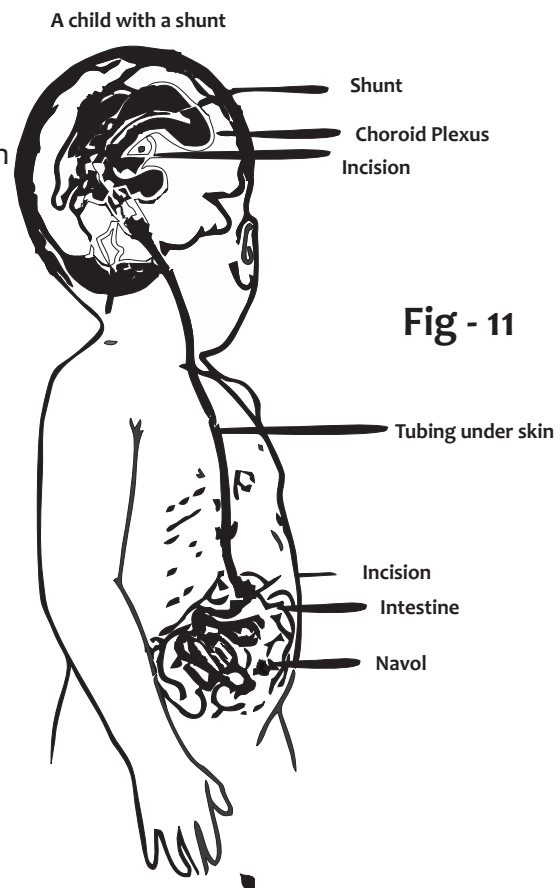


Fig - 11

6. Microcephaly:

- ☺ Microcephaly is a medical condition in which the circumference of the head is smaller than normal.
- ☺ Brain has not developed properly or has stopped growing.
- ☺ Microcephaly can be present at birth or it may develop in the first few years of life.
- ☺ Microcephaly is a rare condition. One baby in several thousands is born with microcephaly.
- ☺ The severity of microcephaly ranges from mild to severe.(shown in figure)

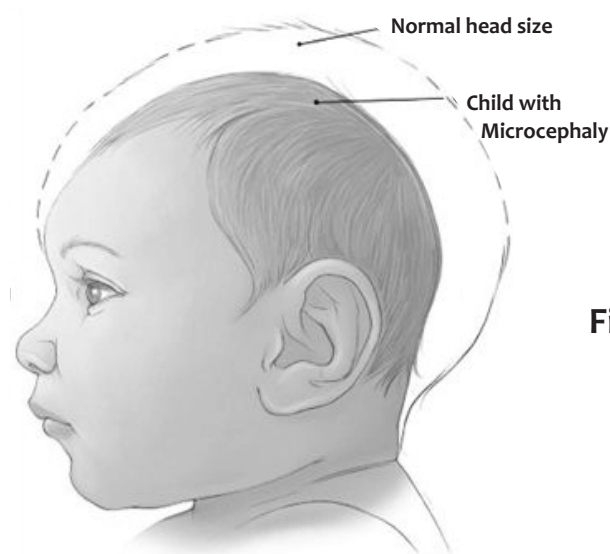


Fig - 12

Causes: There are many potential causes of microcephaly but often the cause remains unknown.

The most common causes include:

- ☺ Infections during pregnancy: toxoplasmosis (caused by a parasite found in undercooked meat), Rubella, Herpes, HIV, Syphilis, Zika.
- ☺ Exposure to toxic chemicals: maternal exposure to heavy metals like arsenic, mercury, alcohol, radiation and smoking.
- ☺ Pre and perinatal injuries to developing brain (hypoxia-ischemia and trauma).
- ☺ Genetic abnormalities such as Down syndrome.
- ☺ Severe malnutrition during fetal life.

Signs and Symptoms:

- ☺ Many babies born with microcephaly may demonstrate no other symptoms at birth but go on to develop –
 - Ø Epilepsy
 - Ø Cerebral palsy
 - Ø Learning disabilities
 - Ø Hearing loss and vision problems
- ☺ In some cases children with microcephaly are entirely normal.

Management:

- ☺ There is no cure for microcephaly, since there is no way to enlarge the brain and head.
- ☺ The treatment focuses on managing symptoms and any related conditions.
 - Ø Early intervention and stimulation and play activities to improve development of child.
 - Ø Aims to improve muscle strength, balance, and coordination.
 - Ø Occupational therapy, speech therapy and psychological counselling may be needed according to the symptoms.
 - Ø Family counselling and support for family also extremely important.

7. Spina Bifida:

- ☺ Spina bifida is a condition in which there is abnormal development of the back bone, spinal cord surrounding nerves, and the fluid-filled sac that surrounds the spinal cord.
- ☺ It is a congenital condition present before birth.
- ☺ This neurological condition can cause a portion of the spinal cord and the surrounding structures to develop outside, instead of inside the body.

Types of Spina Bifida: (shown in figure)

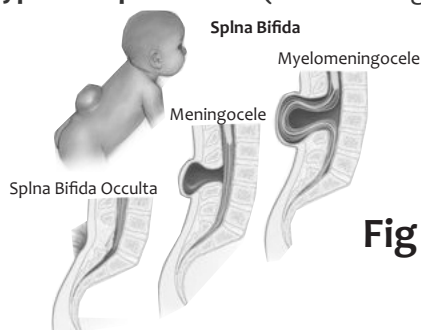


Fig - 13

☺ Spina bifida occulta:

- Ø Most common and mildest type of spina bifida.
- Ø There may be a small birthmark, dimple or tuft of hair on the skin where the spinal defect is.
- Ø Usually does not cause any problems and most of people are unaware of it.

☺ **Meningocele:**

- Ø A moderate form of spina bifida in which a fluid-filled sac is visible outside the back area.
- Ø The sac does not contain the spinal cord or nerves.

☺ **Myelomeningocele:**

- Ø Most severe form of spina bifida in which spinal cord and nerves develop outside the body and contained a fluid-filled sac that is visible outside of the back area .
- Ø A majority of babies with myelomeningocele will also have hydrocephalus.

Causes:

- ☺ The cause of spina bifida is unknown but number of factors can increase the risk of a baby developing the conditions, include-
 - Ø Low folic acid intake during pregnancy.
 - Ø Having family history of spina bifida.
 - Ø Medications –taking certain medicines during pregnancy has been linked to an increased risk of having a baby with spina bifida.

Management:

- ☺ The primary goal of managing spina bifida is to prevent infection and to preserve the spinal cord and nerves that are exposed outside of the body.
- ☺ Surgery –may be used to close the lesion and reduce the risk of infection.
- ☺ Orthopaedic surgery-children with spina bifida usually undergo operations for their legs and feet to improve mobility.
- ☺ Assistive devices-calipers, braces, walking aids or wheelchairs can be used for mobility as well as positioning devices to maintain proper position.
- ☺ Diet and enemas –used to manage bowel incontinence.
- ☺ Self-catheterisation and continence pads –may be required to manage urinary incontinence.
- ☺ Physical therapy –involved exercises to improve gait, coordination and balance.
- ☺ Maintain range of motion, strengthening of weak muscles and improve flexibility of tight muscles.
- ☺ Helps to attain age appropriate milestones, such as sitting up, crawling and walking.
- ☺ Occupational therapy, speech therapy may be needed in certain conditions.

Signs and symptoms:

- ☺ The effects of spina bifida vary according to the types, location and severity of condition.
- ☺ The problem associated with spina bifida include:
 - Ø Reduced sensation in the lower body, legs and feet, leading to the possibility of burns and pressure sores.
 - Ø Paralysis of lower body and legs, causing walking difficulties or inability to walk.
 - Ø Bladder problems-urinary incontinence, urinary tract infections etc.
 - Ø Bowel problems-bowel incontinence often leads to a period of constipation followed by episodes of diarrhoea or loose motion.
 - Ø Skin problems –reduced skin sensation leads to injuries, the skin become infected or an ulcer could develop.
 - Ø Learning difficulties.

8. Torticollis:

- ☺ Torticollis is a condition involving muscles of the neck that causes the head to tilt down.
- ☺ If condition has at birth, it is called congenital muscular torticollis. That is the most common type.
- ☺ If torticollis has been developed after birth then it is called acquired torticollis. It is associated with other serious medical conditions.

Congenital Muscular Torticollis affecting the right sternocleidomastoid muscle

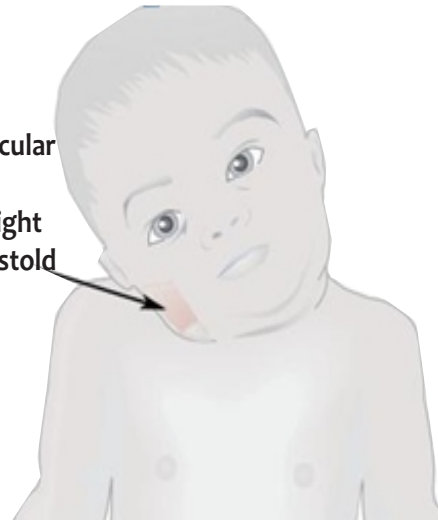


Fig - 14

Causes:

- ☺ Exact cause is unknown but it could be related to the cramping of a baby inside the uterus, or abnormal positioning (such as being in the breech position, where buttocks face the birth canal).
- ☺ The use of forceps or vacuum devices to deliver a baby during child birth also make a baby more likely to develop torticollis. All these factors put pressure on a baby's sternocleidomastoid muscle (SCM). Extra pressure can cause tighten the muscle and making it hard for a baby to turn his/her neck.

Symptoms:

- ☺ The baby's head tilts to one side with his/her chin pointed to other side.
- ☺ In about 75% of babies with torticollis, the right side is affected.
- ☺ Head does not turn side to side or up and down easily.
- ☺ Baby may have difficulty in breast feeding on one side or prefers to feed on one side only.
- ☺ Following complications a baby might get if left untreated-
 - Ø Less control of his/her head
 - Ø Limited reach on affected side and less tracking with eyes.
 - Ø Delayed in sitting and walking.
 - Ø Problem in feeding.
 - Ø Poor balance.
 - Ø Crooked crawling.
 - Ø Rolling on one side only.

Management:

- ☺ Treatment of torticollis includes observation, the use braces, exercise programs, traction and various operations.
- ☺ In case of surgical intervention, operation up to age of 12 years produces good results.
- ☺ Latest studies suggest that age is not the most important factor when determining the optimal time for surgery.
- ☺ Early intervention for torticollis gives good result including stretching exercise and tummy time (encourage baby to lying on stomach).
- ☺ Give plenty of time for tummy. At least 15 minutes 4 times a day.
- ☺ Stretching and positioning exercises-
 - Ø Side bending (for right torticollis) - hold this position for 30 seconds, as tolerated by the baby. Repeat 2-4 times. Do this exercise 3-4 times a day. (Shown in fig.)

Ø Rotation (head turning) -Place left hand on child's left shoulder. Cup child's head with the right hand. Use your left hand to hold child's chin. Slowly turn child's nose to right shoulder. Hold for 30 seconds and repeat 2-3 times. 3-4 times a day. (Shown in fig.)



Fig - 15

Ø Positioning for the play-playing while lying on his/her side (side line). This position allow gravity to do some work of stretching the neck and bringing the hands to the midline.

Ø Bringing hands to the middle is an important step for feeding, hand eye coordination, and other areas of child development. (shown in fig.)



Fig - 16

Ø Playing on stomach- this helps to learn to control head movements. . (Shown in fig.)

Ø Carrying the child – Hold the child facing away from you, in a side-lying, with child's ear resting against your right forearm. Carry the child in this position as much as possible. This can be used as a position for stretching of tight muscles if child doesn't tolerate the side-bending stretch on back.



Fig - 17



Fig - 18

9. Rickets:

- Rickets is a condition that affects bone development in children.
- It causes the bones to become soft and weak, which can lead to bone deformities.(figure)

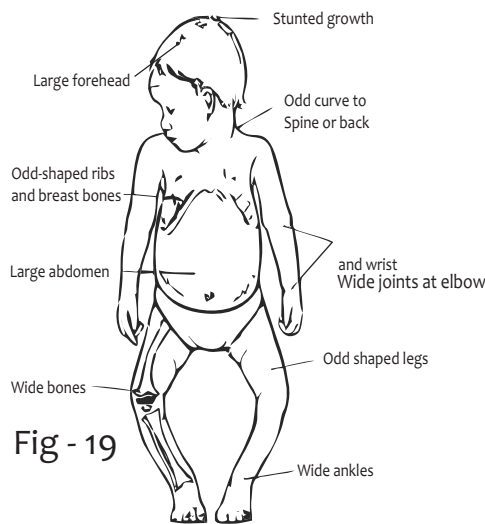


Fig - 19

Risk factors for rickets:

Rickets risk factors include-

- ☺ Premature birth (low level of vitamin calcium and phosphorus).
- ☺ Infants born to vitamin D deficient mothers.
- ☺ Limited sun exposure.
- ☺ Nutrition-Low intake of calcium, phosphorus and Vitamin D.
- ☺ Kidney diseases that affect calcium and phosphorus absorption.
- ☺ Skin colour – dark skin does not react as strongly to sunlight as lighter skin, so it produces less vitaminD.

Causes:

- ☺ Rickets usually occur because of a lack of vitamin D or calcium, although it can also be caused by a genetic defect or another health condition.

Signs and Symptoms: the signs and symptoms of Rickets include-

- ☺ **Pain**-the bones affected by the rickets can be sore and painful, so child may be reluctant to walk or may tire easily, the child's walk may look different (waddling).
- ☺ **Skeletal deformities**-thickening of the ankles, wrists and knees, bowed legs, soft skull bones and rarely bending of spine.
- ☺ **Poor growth and development** – if the skeleton does not grow and develop properly, child will be shorter than average.
- ☺ **Fragile bones**-in severe cases, the bone become weaker and more prone to fractures.
- ☺ **Dental problems** - including weak enamel, delayed teeth coming through and risk of cavities.

Management:

As most cases of rickets are caused by a vitamin D and Calcium deficiency, it is usually treated by increasing child's intake of vitamin D and calcium.

- ☺ Physical therapy:
- ☺ Focus given on improving posture, strength and coordination of the body following disruption of the normal musculoskeletal development.
- ☺ Assistive devices - braces and calipers given to prevent deformities.

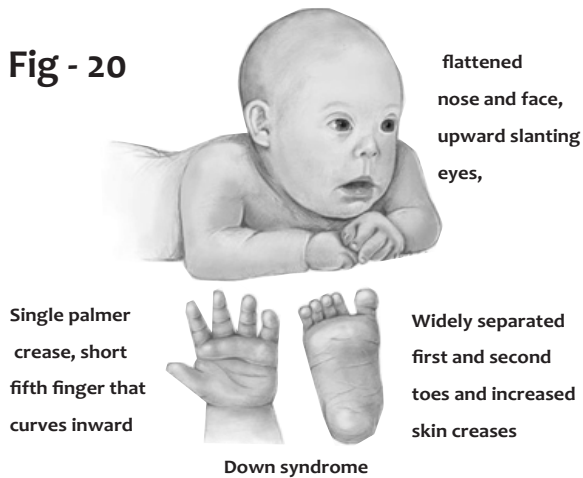
10. Down syndrome:

- ☺ Down syndrome is a genetic condition that results when there is an extra copy of a specific chromosome, chromosome 21.
- ☺ It is not an illness but a term that describes the features resulting from this change.
- ☺ The extra chromosome can affect the physical features, intellect, and overall development of an individual.
- ☺ It also increases the livelihood of some health problems.

Causes:

- ☺ Down syndrome happens when there is an extra copy of genetic material on all or part of the 21st chromosome.
- ☺ Every cell in the body contains genes that are grouped along chromosomes in the nucleus. There are normally 46 chromosomes in each cell, 23 inherited from the mother and 23 from the father.
- ☺ When some or all of a person's cells have an extra full or partial, copy of chromosome 21, the result is down syndrome. (shown in figure)

Fig - 20



Symptoms:

- ☺ Down syndrome is not a disease, so it may be more appropriate to refer to features or characteristics, rather than symptoms.
- ☺ People with Down syndrome often have distinct physical features, unique health issues, and variability in cognitive development.
- ☺ **Developmental delayed:**
 - Ø Children with Down syndrome often reach developmental milestones later than their peers.
 - Ø There may be delayed in acquiring speech.
 - Ø Fine motor skill may also be delayed. They can take time to develop after gross motor skills have been acquired.
 - Ø On average ,a child with Down syndrome will:
 1. Sit at 11 months
 2. Crawl at 17 months
 3. Walk at 26 months
- ☺ **Physical features:** Physical characteristics include-
 - Ø Eyes that have an upward slant, oblique fissures, epicanthic skin folds on the inner corner, and white spots on the iris.
 - Ø Low muscle tone
 - Ø Small stature and short neck
 - Ø Flat nasal bridge
 - Ø Single, deep creases across the centre of the palm
 - Ø Protruding tongue
 - Ø Large space between large and second toe.
 - Ø There may be problems with attention, poor judgement and impulsive behaviour
- ☺ **Health issues:** Sometimes there are general health problems that can affect any organ or bodily functions.

Around half of all people with Down syndrome have a congenital heart defect.

 - Ø There may also be risk of respiratory problems, hearing difficulties, epilepsy and thyroid conditions.

Management:

- ☺ Early intervention can help the individuals maximize their potential and prepare them to take an active role in the community.
- ☺ Physical therapy:
 - ∅ The goal of Physiotherapy is to enable an individual to achieve maximum functional independence for improved quality of life.
 - ∅ Improving strength
 - ∅ Improving developmental skills –achieve gross motor and fine motor skills.
- ∅ Improving body positioning, balance and coordination.

11. Muscular dystrophy:

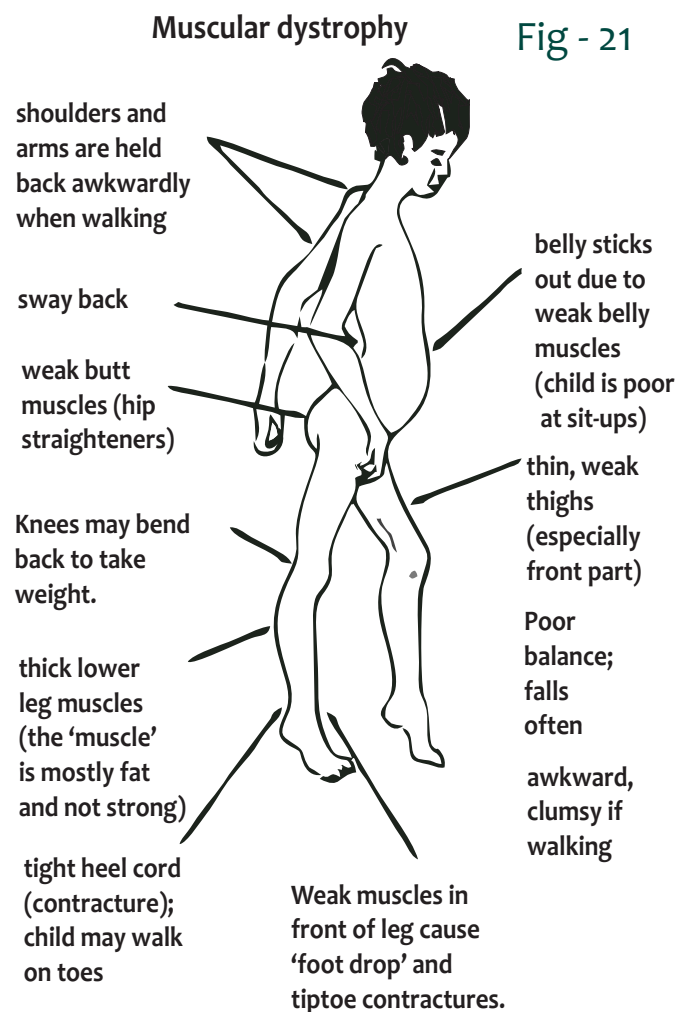
- ☺ The muscular dystrophies (MD) are a group of genetic conditions that gradually cause the muscles to weaken, leading to an increasing level of disability.
- ☺ MD is a progressive condition, which means it gets worse overtime. It often begins by affecting a particular group of muscles, before affecting the muscles more widely.

Causes:

- ☺ MD is caused by changes in the genes responsible for the structures and functioning of muscles in the body.
- ☺ The changes in genes that cause changes in the muscles fibres that interfere with the muscle's ability to function. Overtime, this causes increasing disability.
- ☺ These are genetic conditions can be inherited or an individual may be the first one in their family affected.

Symptoms:

- ☺ Muscles - abnormality in walking, flacid muscles, muscle weakness, loss of muscle tone and permanent shortening of muscles.
- ☺ Developmental –delayed developmental milestones or learning disability.
- ☺ Others –heart problems, constantly walking on tip toe, constipation, difficulties in swallowing, fatigue, spinal deformities and shallow breathing.



Management:

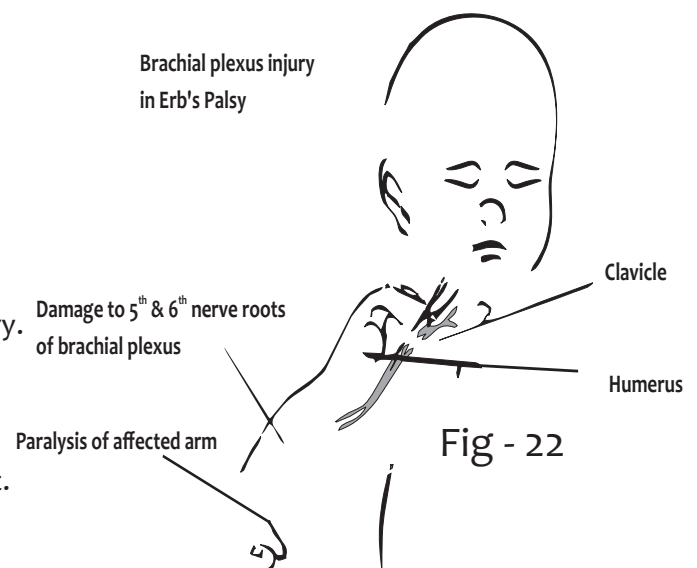
- ☹️ Currently, there is no cure for muscular dystrophy but medications and various therapies help slow the progression of the disease and keep the mobile for the longest possible time.
- ☹️ Medications-certain medications to increase muscle strength and slow progression of conditions and heart medications.
- ☹️ Physical therapy:
 - Ø Range of motion exercises and stretching exercises.
 - Ø Breathing exercises -
 - Ø Braces-prevent muscle shorting and deformities.
 - Ø Mobility devices-canes wheelchairs and walkers can help for mobility.
- ☹️ Surgery: in some cases surgery may be need to correct deformities.

12. Erb's palsy:

- ☹️ Erb's palsy is a condition characterized by weakness or paralysis of the arm. Also known as brachial plexus birth palsy, Erb's palsy often occurs during an abnormal or difficulty in child birth. (Shown in figure)
- ☹️ Erb's palsy typically caused when an infant's neck is stretched to one side during delivery, causing temporary or permanent nerve damage

Causes and risk factors:

- ☹️ The most common cause of Erb's palsy is excessive pulling or stretching of infant's head and shoulder during delivery.
- ☹️ This birth injury can also result from excessive pulling on the shoulders during a head first delivery, or by pressure on the infant's raise arms during a feet first delivery. This typically occurs when the head is “stuck” in the birth canal, requiring the caretaker to pull harder to get the baby out.



- ☹️ The risk of a child developing Erb's palsy nearly triples if they develop shoulder dystocia during birth. This is when the infant's head is delivered; both of the shoulders get stuck inside the mother's womb.
- ☹️ Other risk factors for Erb's palsy includes-
 - Ø Using extraction tools during delivery
 - Ø Large infant size
 - Ø Labour lasting over an hour
 - Ø Excessive maternal weight gain

Symptoms:

- ☺ The symptoms of Erb's palsy vary depending upon types and severity of paralysis.
 - Ø Weakness in one arm
 - Ø Arm is bent at elbow and held against gravity.
 - Ø Decreased grip strength in hand of the affected side
 - Ø Numbness in the arm.
 - Ø Impaired circulatory, muscular and nervous development
 - Ø Partial or total paralysis of arm.

Management:

- ☺ During the first 6 months treatment are directed specifically at prevention of deformity.
- ☺ Exercise therapy given to maintain range of motion and improve muscle strength.
- ☺ Parents must be taught to play an active role in maintaining range of motion and keeping functioning muscles fit.
 - Ø Activities and exercises to promote recovery of movement and muscle strength.
 - Ø Exercises to maintain range of motion in joints to prevent stiffness and pain.
 - Ø Sensory stimulation to promote increased awareness of the arms
 - Ø Provision of splints to prevent secondary complications and maximise functions.
 - Ø Educating parents for appropriate handling and positioning of the child and home exercise programs to maximise the child's potential for recovery.
 - Ø Refers to other rehabilitation specialists for further management.
- ☺ Surgical intervention may be considered in certain cases including nerve repair and nerve grafting etc.

12. Global Development Delay (GDD):

- ☺ The term Global developmental delay or GDD is used when a child shows delay in several areas of development, and this has continued for at least six months.
- ☺ The delayed may be in-
 - Ø Gross motor developments or big movements such as walking or sitting.
 - Ø Fine motor or small movements such as holding a pencil or toys.
 - Ø Speech and language development.
 - Ø Thinking, understanding and learning.
 - Ø How they relate to other people and make friends and regulate their own emotions.
 - Ø Activities of daily living such as going to toilet and going to school.

- ☹️ Global development delayed is fairly common. Sometimes, just happens to no obvious reason, and eventually children catch up and develop normally along with children of their age. But at other times, the delays are the signs of more serious conditions.

Causes:

- ☹️ Premature delivery.
- ☹️ Lack of oxygen immediately after birth.
- ☹️ Intake of certain drugs by mother during pregnancy such as alcohol or drugs.
- ☹️ Excessive bleeding during pregnancy.
- ☹️ Genetic abnormalities such as Down syndrome.
- ☹️ Visual problems.
- ☹️ Speech and hearing problems.
- ☹️ Injuries to brain during pregnancy.
- ☹️ Malnutrition .
- ☹️ Infections.

Management:

- ☹️ Ideally child will be supported by multi-disciplinary team that includes-
- ☹️ Physical therapist helps for improvement of gross motor skills like sitting, walking etc.
- ☹️ Occupational therapist.
- ☹️ Speech and language therapist.
- ☹️ Assistive devices.
- ☹️ Special educators.
- ☹️ Clinical psychologist.

Chapter - 12

Rehabilitation and SMARTI Goals:

Habilitation:

- ☺ Habilitation focuses on helping child or a family attain, keep or improve skills and functioning of daily living.
- ☺ Habilitation services include physical, occupational, and speech –language therapy, various treatments related to pain management and audiology and other services that are offered in both hospital and outpatient locations.
- ☺ The benefits of these therapies can include, for example, improve socialization skills, which reduces development delays for the children with developmental disabilities and older people with certain disabilities can also benefit, for example, from therapies that prevent muscle loss and thus mobility, or that increase fine motor coordination so that independent living tasks such as dressing and bathing are easier

Rehabilitation:

- ☺ Rehabilitation refers to regaining skills, abilities, or knowledge that may have been lost or compromised as a result of acquiring a disability or due to a change in one's disability or circumstances.
- ☺ Rehabilitation benefits covered by a health plan/rehabilitation plan by specialist physician or health care professional or rehabilitation professional to manage child's care over time. Examples of covered services you might need include physical, occupational, and speech-language therapy, cognitive therapy, recreational therapy, and psychological and behavioural evaluation.
- ☺ UNCRPD article 26 (Habilitation and Rehabilitation) outlines measures states parties should undertake to ensure people with disabilities are able to access health related rehabilitation including:appropriate measures including through peer support, to enable persons with disabilities to attain and maintain their maximum independence, full physical, mental, social and vocational ability, and full inclusion and participation in all aspects of life.
- ☺ According to **World report on disability** the term “**Rehabilitation**” covers both types intervention.
- ☺ Rehabilitation targets improvement in individual functioning –say, by improving a person's ability to eat and drink independently.
- ☺ Rehabilitation also includes making changes to the individual's environment –for example installing a toilet handrail.

- ☺ Rehabilitation reduces the impact of a broad range of health conditions.
- ☺ Rehabilitation involves identification of a person's problems and needs, relating the problems to relevant factors of the person and the environment, defining rehabilitation goals, planning and implementing the measures, and assessing the effects (shown in figure).

The Rehabilitation Process-

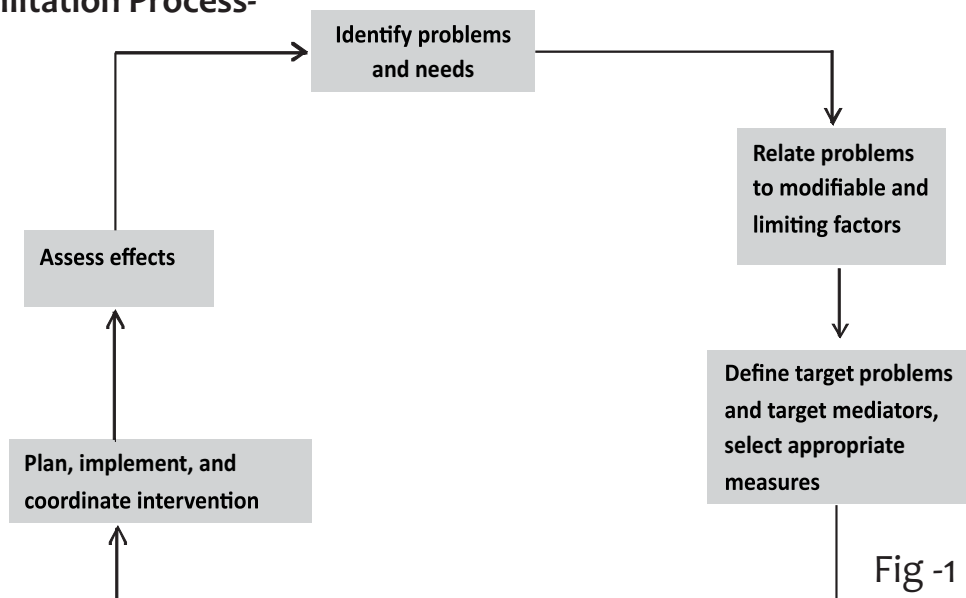


Fig -1

Modified Version of Rehabilitation process (source WHO)

- ☺ Educating people with disabilities is essential for developing knowledge and skills for self-help, care, management, and decision-making. People with disabilities and their families experience better health and functioning when they are partners in rehabilitation.
- ☺ Rehabilitation –provided along a continuum of care ranging from hospital care to rehabilitation in community and can improve health outcomes, reduce costs by shortening hospital stays, reduce disability and quality of life.
- ☺ Rehabilitation need not be expensive.
- ☺ Rehabilitation is cross-sectoral and may be carried out by health professionals in conjunction with specialists in education, employment, social welfare, and other fields. Rehabilitation is cross-sectoral and may be carried out by health professionals in conjunction with specialists in education, employment, social welfare, and other fields.
- ☺ In resource-poor contexts it may involve non-specialist workers-for example, community-based rehabilitation workers in addition to family, friends and community groups.
- ☺ Rehabilitation that begins early produces better functional outcomes for almost all health conditions associated with disability. The effectiveness of early intervention is particularly marked for children with, or at risk of, developmental delays and has been proven to increase educational and developmental gains.

Rehabilitation 2030: A Call for Action

- ☺ There is substantial and ever-increasing unmet need for rehabilitation worldwide, which is particularly profound in low and middle income countries.
- ☺ The availability of accessible and affordable rehabilitation is necessary for many people with health conditions to remain as independent as possible, to participate in education, to be economically productive, and fulfil meaningful life roles.
- ☺ The magnitude and scope of unmet rehabilitation needs signals an urgent need for concerted and coordinated global action by all stakeholders. (Shown in figure)
- ☺ Bringing stakeholders together in the **Rehabilitation 2030: A Call for Action** meeting provided an invaluable opportunity for discussing the strategic direction for coordinated action and establishing joint commitments to raise the profile of rehabilitation as a health strategy relevant to the whole population, across the continuum care.

SMARTI Goals

S-Specific-(do not be ambiguous)

- ☺ Well defined.
- ☺ Clear to anyone who has basic knowledge of the project.

M - Measurable – (give a time frame)

- ☺ Plan the goals that can be obtained
- ☺ Time Frame to achieve your goal.

A-Achievable-(aggressive but fits your capabilities).

- ☺ Focuses on the importance of your goal and what you can do to make it achievable.
- ☺ May require new skills and changing attitudes

R≡HABILITATION

———— 2030 ————

a call for action

Fig -2 (Source-WHO)

R-Realistic -(consider your abilities and your time frame)

- ☺ Within the availability of resources, knowledge and time

T-Timely -(short term so that you do not lose focus then long term as you achieve short term)

- ☺ Enough time to achieve the goal
- ☺ Not too much time, which can affect the project performance

I-Inspiring-(I will –indicate confidence and eliminate doubt)

- ☺ Be energised and inspired by prospect of the accomplishing this goal
- ☺ Your values, priorities and sense of orientation are your inspirations

Chapter - 13

Basic therapy techniques:

Handling and Positioning: Handling:

- ☺ Handling is a way of supporting and guiding a child so that his/her movement become normal.

Goals of handling:

- ☺ To elicit normal muscle tone.
- ☺ To facilitate normal movement patterns.
- ☺ To facilitate upright positions with normal posture.

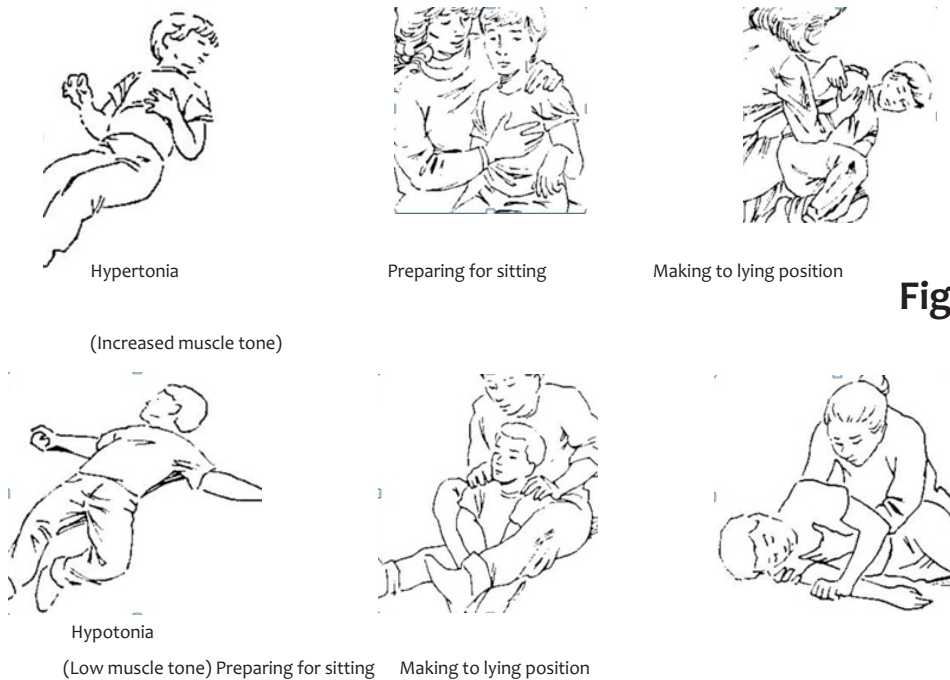


Fig -1

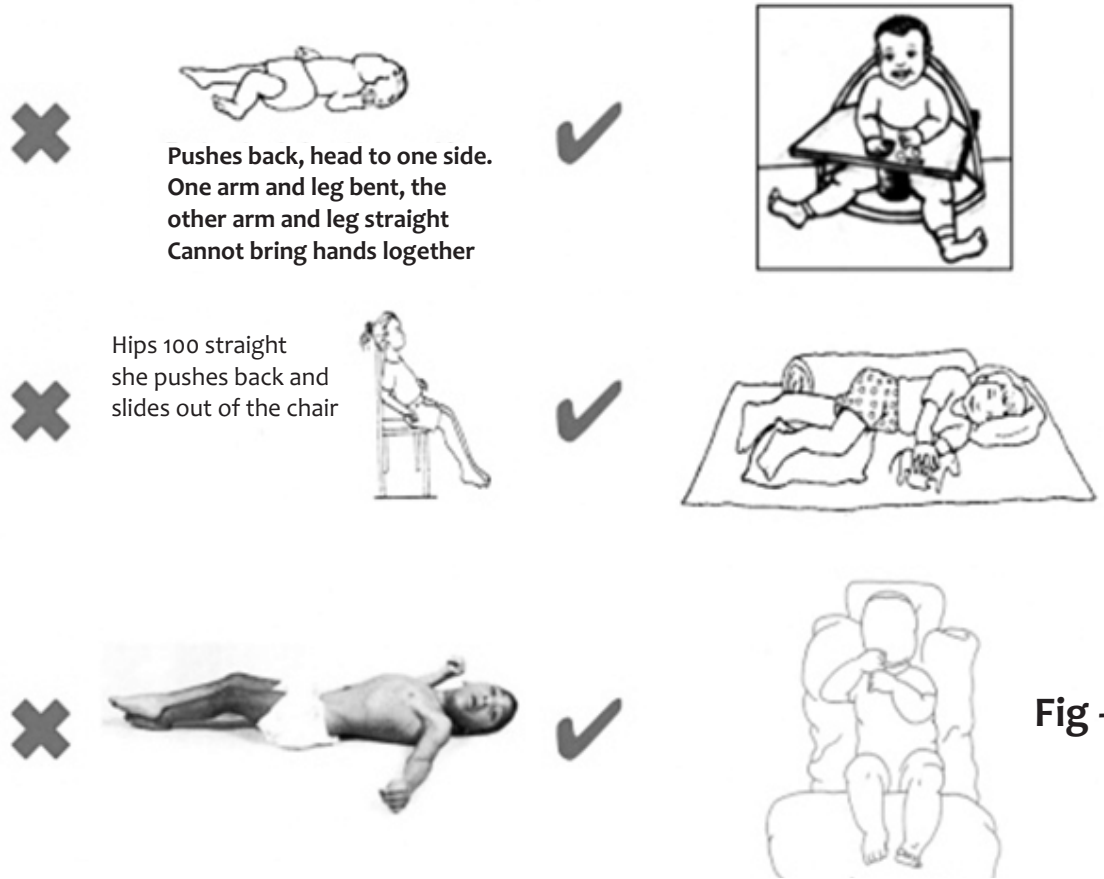
Positioning:

- ☺ The positioning aim of enabling them to experience and develop more normal ways of moving and prevent secondary complications.

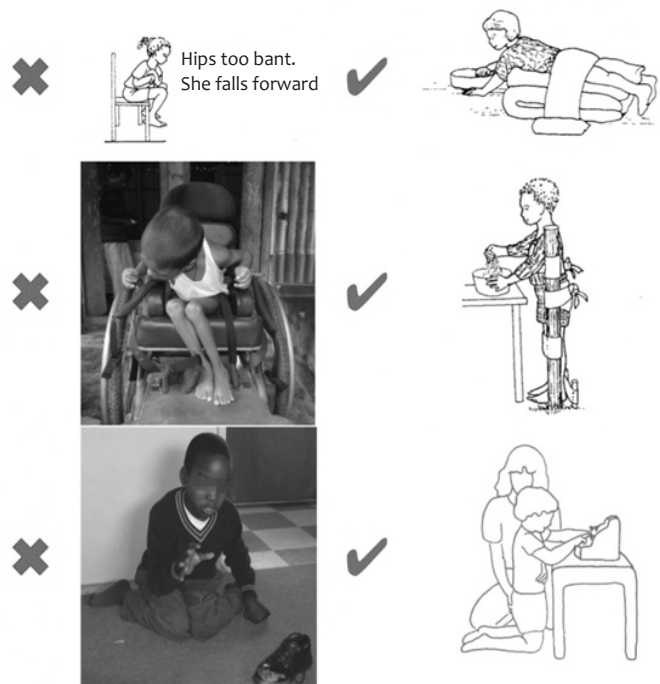
Goals of Positioning:

- ☺ To maintain tone.
- ☺ To maintain body alignment and prevent deformities.
- ☺ To maintain stabilization of body parts.
- ☺ Provide weight bearing experiences .
- ☺ Facilitate body's various functional systems i.e. circulatory, digestive and respiratory systems etc.
- ☺ To promote active participation in meaning full activities.
- ☺ To allow mobility.

If child is habitually in an abnormally straight or extended position in lying (shown in figure below)



If child is habitually in an abnormally bend or flexed position in sitting (shown in figure below)



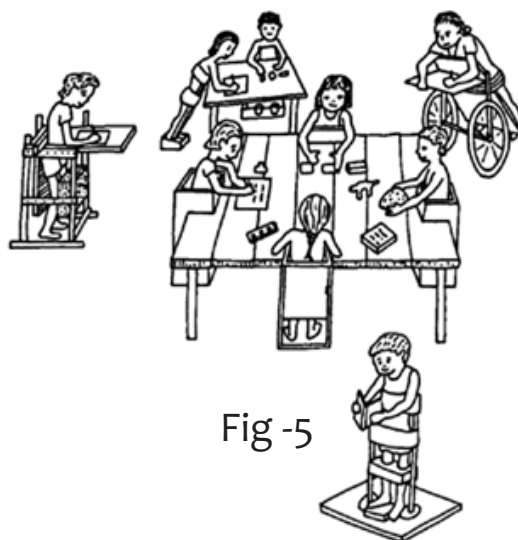
Equipment for positioning: For Sitting

(Shown in the figure)



For standing :

(shown in the figure)



Problems with poor handling and positioning:

- Ø Will hinder children's functional abilities for their development.
- Ø Will make more difficult to carry and handle the child everyday.
- Ø Can cause problems such as :
 - Pressure sores.
 - Contractures.
 - Deformities.



Fig -6

Stretching exercises-

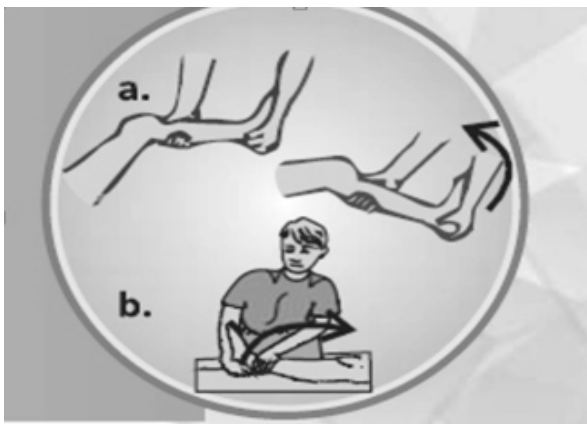
Fig -7



Hamstring stretching for knee flexor tightness



Quadriceps stretching for knee extensor tightness



Adductor stretching to prevent scissoring



Tendoachillis (TA) stretching to prevent tip toe walking

Strengthening exercises:

- ☺ Children with disabilities can increase strength and improve range of motion
- ☺ Increased strength can lead to improvements in muscle functions, such as walking and transferring etc.

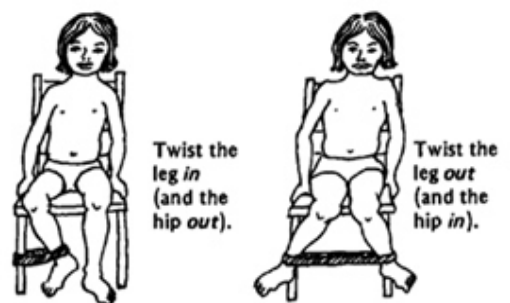
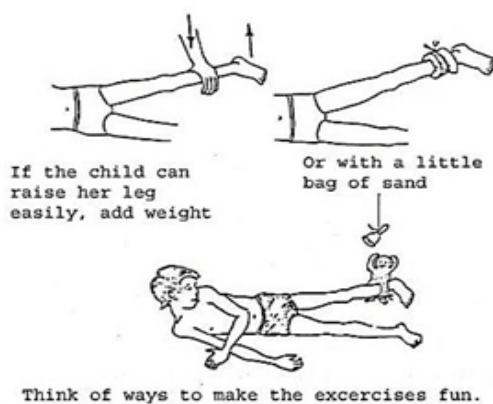


Fig -8 This child is doing range-of-motion and strengthening exercises at the same time.

Range of motion exercises:

- ☉ Range –of –motion (ROM) exercises are regularly repeated exercises that straighten or bend one or more joints of the body and move them in all the directions that a joint normally moves.
- ☉ The main purpose of these exercises is to keep the joints flexible.
- ☉ ROM exercise can help prevent joints stiffness, contractures and deformities.

Types of Range of motion exercises

☉ Active:

- ∅ The child able to perform exercise independently

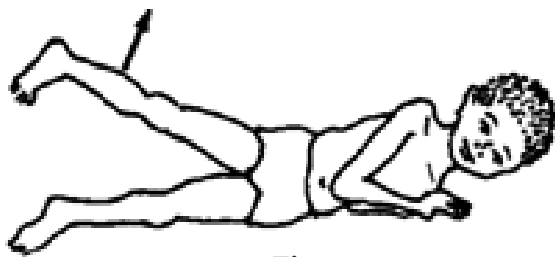


Fig -9

☉ Passive:

- ∅ If child cannot move limb at all, you can do it for him

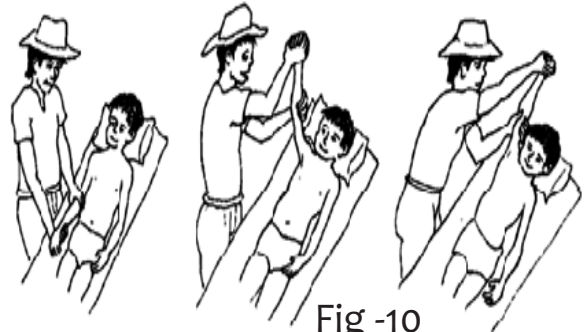


Fig -10

☉ Active assisted:

- ∅ If child able to move part a little then need someone's help to complete the movement



Fig -11

Chapter - 14

Assistive Devices:

Types of assistive devices:

- ☺ Orthotic
- ☺ Prosthetic
- ☺ Mobility devices
- ☺ Developmental aids

Orthotic devices:

An external support for weak or deformed part of the body-Calipers braces and splints etc.

Functions of Orthosis:

- ☺ **Supportive**-To support the weak part of the body-in polio.
- ☺ **Preventive**-To avoid further deformity of the limb and spine-in cerebral palsy.
- ☺ **Corrective**-to improve the present condition of the deformity-in club foot.

Impairment Level	Assistive Devices
Lower limb	Orthosis
Foot	Foot Orthosis
Ankle Foot	Ankle Foot Orthosis (AFO)
Knee	Knee Orthosis (KO)
Knee Ankle Foot	Knee Ankle Foot Orthosis (KAFO)
Hip	Hip Knee Ankle Foot Orthosis (HKAFO)
Upper limb	Orthosis
Hand	Hand Orthosis (HO)
Wrist hand	Wrist Hand Orthosis (WHO)
Elbow Wrist Hand	Elbow Wrist Hand Orthosis (EWHO)
Shoulder Elbow Wrist Hand	Shoulder Orthosis
Spine	Spinal Orthosis
Cervical	Cervical Orthosis (CO)
Head Cervical	Head Cervical Orthosis (HCO)
Head Cervical Thoracic	Head Cervical Thoracic Orthosis (HCTO)
Lumbar –Sacral	Lumbar –Sacral Orthosis (LSO)
Thoracic-Lumbar –Sacral	Thoracic-Lumbar –Sacral (TLSO)

Lower limb Orthosis:

Foot Orthosis (FO): (figure.1)

Conditions: Flat foot, corn on the foot and Claw toes.

Fig: 1



Ankle Foot Orthosis (AFO): (figure.2)

(figure.2)

Conditions:

- ☺ Neurological foot, stroke,
- ☺ Polio, cerebral palsy,
- ☺ Club foot, Equinus foot,
- ☺ Foot drop, foot injury

Features:

- ☺ Static and Dynamic with ankle joint.



Fig: 2



Fig: 3

Knee Orthosis (KO): (figure.3)

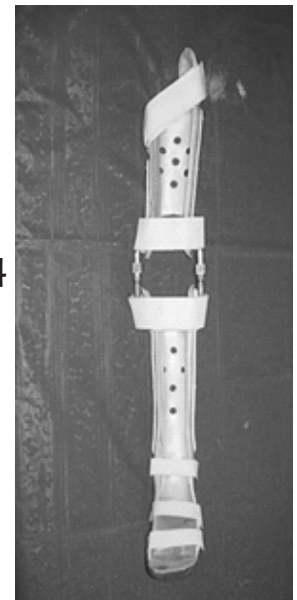
Condition:

- ☺ Knee Osteoarthritis,
- ☺ Polio, Cerebral palsy,
- ☺ Knock knee,
- ☺ Rickets,
- ☺ Knee injuries,
- ☺ Weakness of knee ligament

Features:

- ☺ It is with fixed knee,
- ☺ it is with free knee

Fig: 4



Knee Ankle Foot Orthosis (KAFO): (figure.4)

Conditions:

- ☺ Polio,
- ☺ Tibia/Femur bone fracture(Weight relieving Orthos
- ☺ Stroke,
- ☺ Paraplegia,
- ☺ Cerebral Palsy

Features:

- ☺ Fixed,
- ☺ With Knee joint and Ankle joint for better mobility



Fig: 5

Hip Knee Ankle Foot Orthosis (HKAFO):

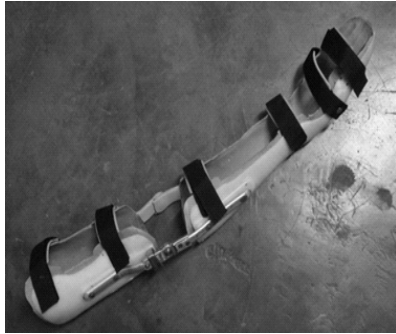
Conditions:

- ☺ Polio,
- ☺ Above knee injury,
- ☺ Paraplegia

Upper limb Orthosis:

Hand, Finger and Wrist Orthosis:

Hand Splint: Fig -6



Conditions:

- ☹ Stroke,
- ☹ Hand Injury,
- ☹ Burn contracture,
- ☹ Claw hand,
- ☹ Erb's palsy,
- ☹ Fractures

Forearm wrist hand splint:

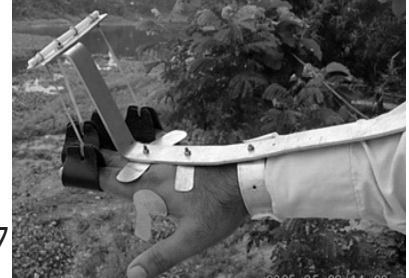


Fig -7

Elbow Orthosis Fig -8



Shoulder & Arm Orthosis:



Fig -9

Cervical Orthosis Conditions::

- ☹ Cervical Spondylosis
- ☹ Cervical Injury
- ☹ Prolapse intervertebral disc (PID)

Features:

- ☹ Soft
- ☹ Hard
- ☹ Height adjustable



Fig -10

Head Cervical Orthosis:

Conditions:

- ☹ Cervical Spondylosis
- ☹ Cervical and head Injury
- ☹ Prolapse intervertebral disc (PID)

Features:

- ☹ Soft
- ☹ Hard
- ☹ Height adjustable

Fig -11

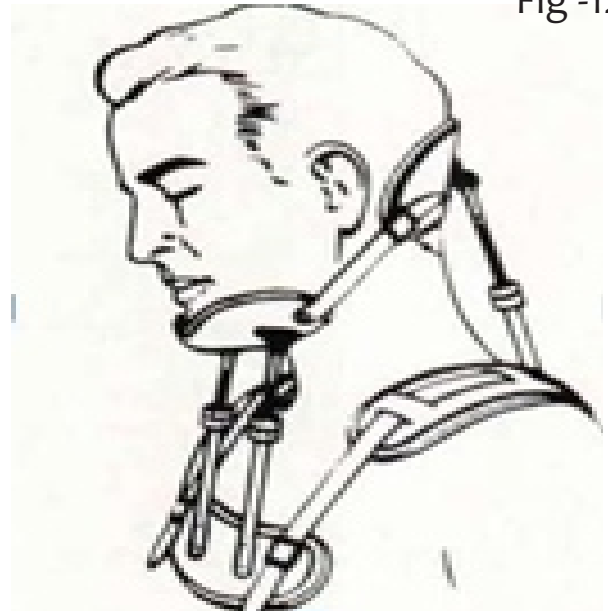


Head Cervical Thoracic Orthosis (HCTO):

Conditions:

- ☹ Cervical and upper thoracic trauma
- ☹ Post-operative
- ☹ Degenerative disc disease

Fig -12



Lumbo-Sacral Orthosis (LSO):

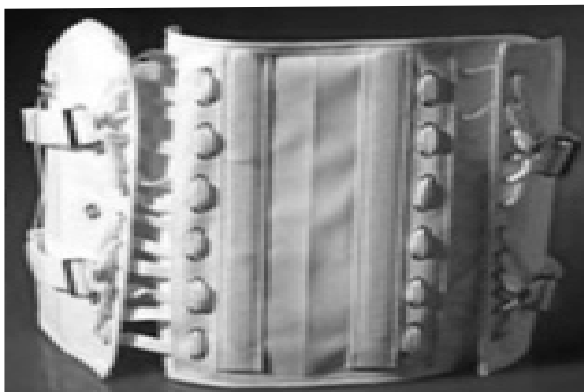
Conditions:

- ☹ Low back Pain
- ☹ Prolapse intervertebral disc (PID)
- ☹ Injury
- ☹ Degenerative disc disease
- ☹ Lumbar fracture
- ☹ Stenosis

Features:

- ☹ Soft
- ☹ Rigid

Fig -13



Thoracic-lumbar-Sacral Orthosis (TLSO):

Conditions:

- ☹ Post-operative stabilisation
- ☹ Injury
- ☹ Prolapse intervertebral disc (PID)
- ☹ Spinal deformity(Scoliosis/Kyphosis)
- ☹ Spondylosis
- ☹ Spinal fracture

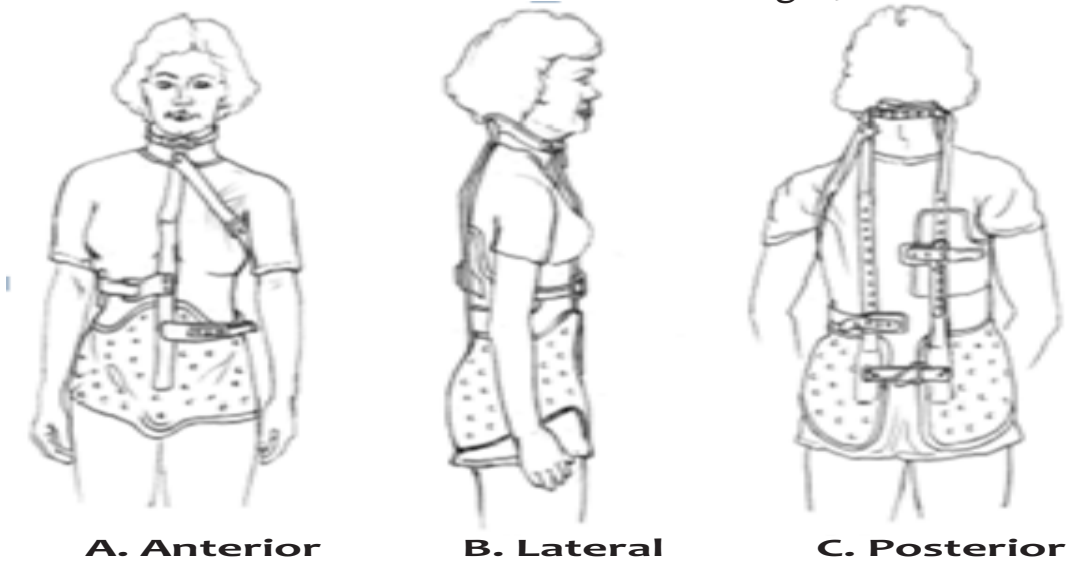
Fig -14



Cervical-Thoracic-Lumber-Sacral Orthosis: (Milwaukee Brace) Conditions:

- ☹ Idiopathic or flexible congenital Scoliosis
- ☹ Neuromuscular scoliosis

Fig -15



Prosthesis:

- ☹ Prosthesis is an artificial device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions.
- ☹ Prosthesis is intended to restore the normal functions of missing body parts.

Below Knee Prosthesis:



Fig -16

Above Knee Prosthesis:



Fig -17

Hip Disarticulation Prosthesis:



Fig -18

Above Elbow Prosthesis:



Fig -19

Mobility Devices:

- ☺ These are the assistive devices, which assist a person to be mobile, who cannot walk independently or have difficulties in walking.

Fig -20



Types of Mobility Devices:

- ☺ Walking aids
- ☺ Wheel chair

Walking aids:

- ☺ These are aids which assist a person to walk independently, who have difficulty in walking.
- ☺ These are-
 - Ø Sticks/Canes
 - Ø Crutches
 - Ø Tripod/Quadripod
 - Ø Walker



Fig -21

14.13 Shown here are (A) standard wooden cane, (B) adjustable aluminum cane, and (C) adjustable offset cane.

Canes:

- ☺ Canes may be either of wood or metal which curved or straight hand pieces.
- ☺ The metal ones are adjustable.
- ☺ Persons should hold the cane opposite to involved limb.
- ☺ Canes and involved limb advance together followed by uninvolved one.

White canes: These are designed especially for assisting people who are visually impaired.

Crutches:

- ☺ Crutches are used to reduce weight bearing on one leg or both legs or give additional support where balance is impaired and strength is inadequate.

Types:

- ☺ Auxillary crutches
- ☺ Elbow crutches/Forearm crutche
- ☺ Forearm platform crutches

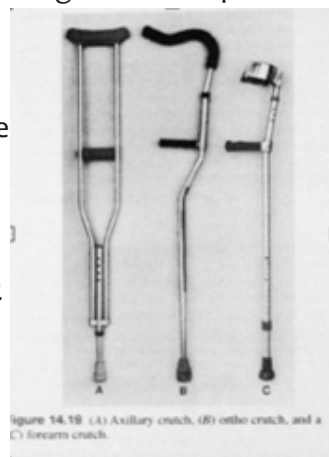


Fig -22

Forearm platform crutches

Figure 14.18 (A) Axillary crutch, (B) ortho crutch, and (C) forearm crutch.



Fig -23

Measurement of Crutch Length:

- Ø If person's height is known, subtract 16 inches from height, resulting values approximates the length of axillary pad to the crutch tip.
- Ø If person's height is uncertain, in supine position from the axillary fold (crease of arm pit) to a point approximately 6-8 inches lateral to person's heel. This value represents overall crutch length.
- Ø To determine the hand piece height, with the person's arm held close to his/her side measure from the anterior axillary fold to the trochanter or ulnar axillary crease. Use this value to position hand piece by measuring down from the centre of axillary pads 1.5 to 2 inches or three fingers widths.
- Ø Confirm the fit with the person standing with head and trunk erect. Shoulder relaxed and level, feet flat on the floor and knee slightly flexed. The crutch tips should be 2-4 inches lateral and 4-6 inches anterior to the toes of the forefoot. The elbow should be flexed approximately 15 -25 degrees when hand piece grasped with the wrist in a neutral position.

Measurement of Cane Length:

- Ø Determine the length of cane with the person standing or supine.
- Ø Ensure the hand grip of the cane is level of the greater trochanter or ulnar crease of the wrist when arm is straight down to the side.
- Ø With the cane parallel to the femur and tibia, ensure that the tip of the cane is on the floor or at bottom of the heel of the shoe.
- Ø Confirm fit with the person standing. There should be approximately 20-30 degrees of elbow flexion when person grasps the hand piece and positions the aid for ambulation.
- Ø To position for ambulation, the tip of the cane is placed forward approximately 4-5 inches and laterally to the forefoot approximately 2-4 inches with the cane of the stronger side of the body.

Measurement of Walker:

- Ø Determine the length of Walker with the person standing or supine.
- Ø Ensure the hand grip of the Walker is level of the greater trochanter or ulnar crease of the wrist when arm is straight down to the side.
- Ø Ensure that the feet of the walker are resting on the floor or even with the heel shoes with the hips and knees straight.



Tripods or Quadripods:

Fig -24

Frames and Walker:

- ☺ These are the walking aids which are used in locomotor training in the initial phase of rehabilitation with wider base support.

Types:

- ☺ Simple walker.
- ☺ Folding walkers-can be carried.
- ☺ Rolling walker-for ataxic.
- ☺ Reciprocal walker –each side moves independently.

Fig -25



Reverse walker:

- ☺ Reverse walkers are designed to make walking less energy consuming and improve rhythm and timing.
- ☺ All rear walker wheels have a ratchet mechanism, which prevent backward walker movement as the users step forward.

Fig -26



Developmental aids /Positioning devices:

- ☺ Any device which helps a child to achieve developmental stones is called Developmental aid.
- ☺ It must provide support but also allow the child enough freedom to move and explore.

Types of developmental aids:

- ☺ Prone board
- ☺ Corner seat
- ☺ Special chair
- ☺ Standing frame

Prone board:

- ☺ A prone board is a wedge used on the floor for development of a child's head control.

Fig -27



Functional activities with prone board:

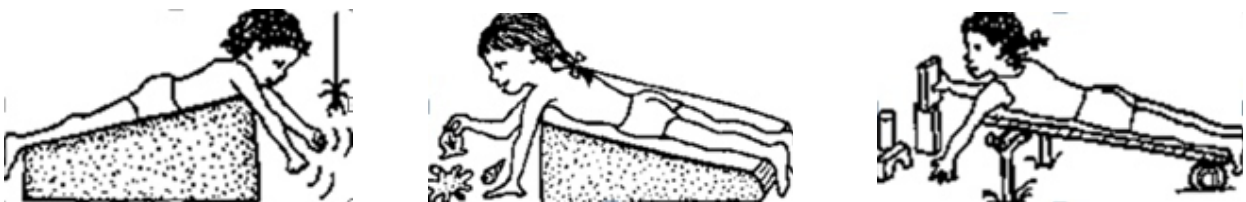


Fig -28

Corner seat:

- ☺ A seat is made for a child to sit on the floor.
- ☺ It is useful for the child to develop sitting balance and a good position to use hands.

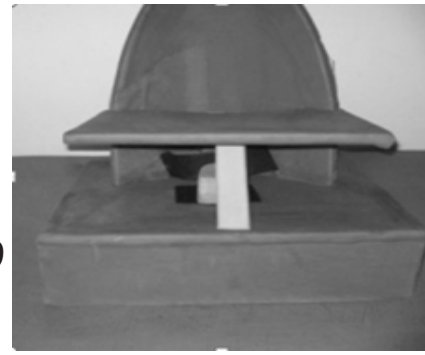


Fig -29

Functional activities with corner seat:



Special Chair:

- ☺ A special chair is to allow a child to sit comfortable with good posture.
- ☺ Usually the best special seat is one that provides the least amount of the support needed to help the child to do the most for him/her.

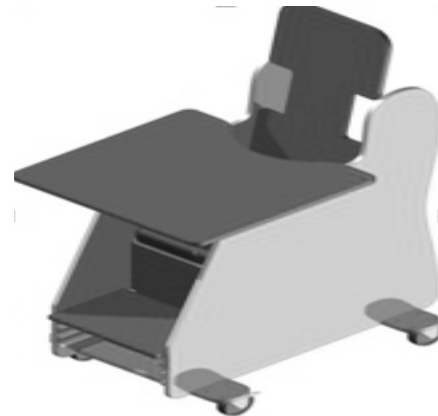


Fig -31

Functions:

- ☺ Helps a child sit in a good position which creates opportunities to explore and develop in other areas i.e. fine motor, social etc.
- ☺ Helps reduce spasticity by weight bearing.
- ☺ Helps in maintaining alignment and preventing muscle contractures and deformities.
- ☺ May facilitate postural control which is essential for sitting balance.
- ☺ Helps improvement in Social, mental skills and arm functions.
- ☺ Improve breathing.
- ☺ Encourage feeding and improve digestion.

Types of supportive seat:

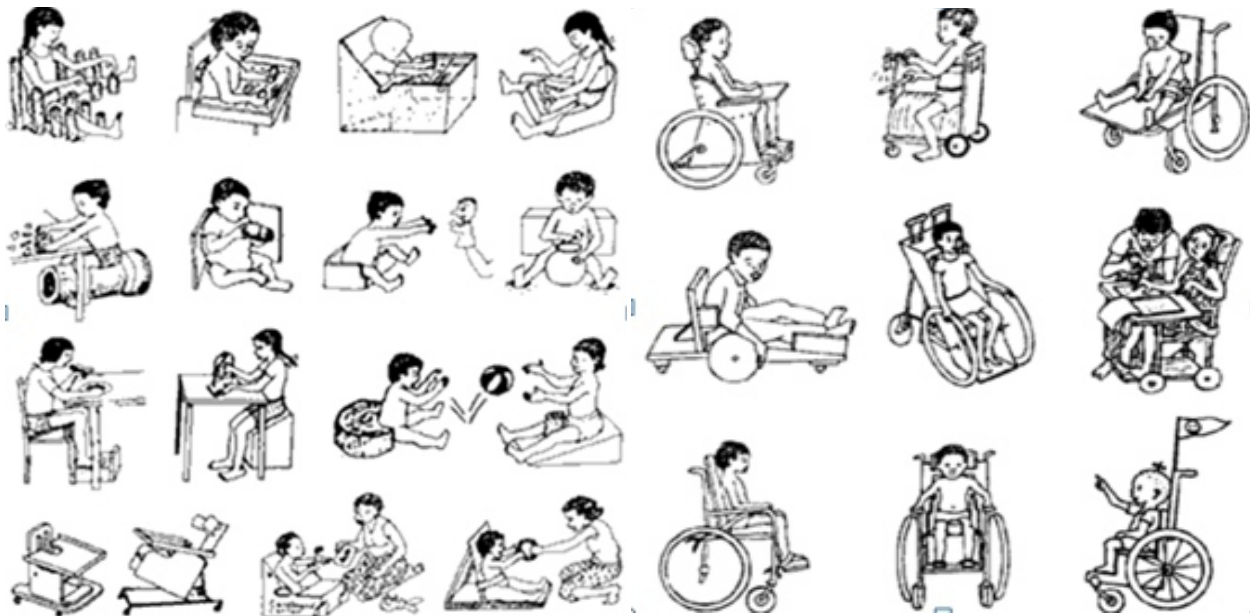


Fig -32

Standing frame:

- ☺ A standing frame is used to allow someone to stand for short period when they would not be able to stand.

Benefits of Standing frame:

- ☺ It improves head and trunk control.
- ☺ Allows weight bearing through legs.
- ☺ Stretches muscles and may prevent deformities.
- ☺ Reduces spascity.
- ☺ Reduces risk of pressure sores.
- ☺ Improves respiratory function.
- ☺ Improves upper limb function.
- ☺ Improves eye contact.
- ☺ Helps for communication skills.
- ☺ Helps digestion.



Fig -33

Different types of Standing frame:

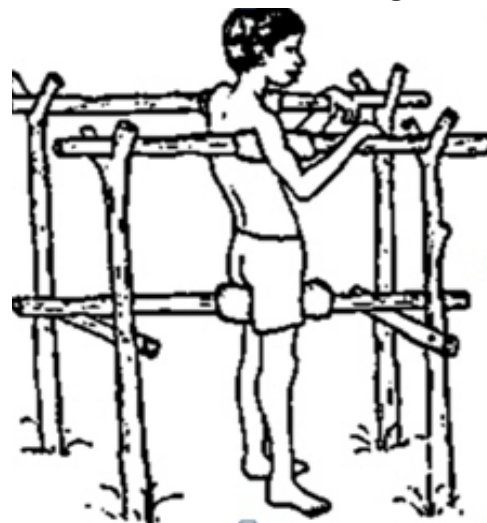
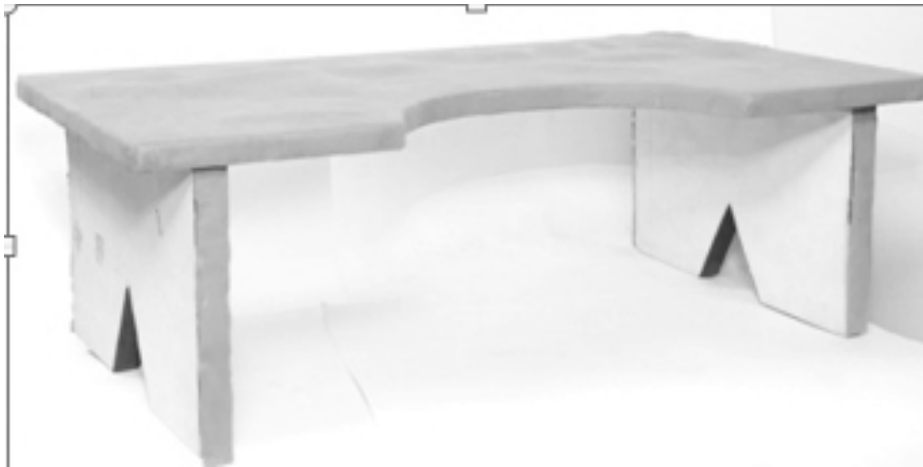


Fig -34



Fig -35

Other aids:



Floor table

Fig -36



Scooter board

Fig -37

Chapter - 15

Adaptive devices:

☺ Adaptive devices that are used to assist with completing activities of daily living. Bathing, dressing, grooming, feeding and toileting are self-care activities that are including in the spectrum of activities of daily living.

Importance of Adaptive devices:

- ☺ Increase independence.
- ☺ Increase self-esteem.
- ☺ Decrease burden .

Different types of Adaptive devices:

Eating and drinking

- Rocker knives
- Roller knives
- Universal cuffs
- Plate guards
- Non-skid dishes



Dressing

- Long-handled shoe horn / Sock aid
- Dressing stick
- Reacher
- Buttonhook/zipper pulls
- Elastic laces
- Pull-on clothes, Velcro closures, button extenders
- Clip-on earrings,



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