Unit 11: Cerebral Palsy

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Cerebral Palsy

DEFINITION

- A nonprogressive, permanent disorder that affects muscle movement, postural/tone development, and motor skills.
- This neuromuscular impairment is the most common movement disorder in children.
  - Most common cause of *dysarthria* in children.
- People with cerebral palsy have motor abilities that are characterized as typically weak, paralyzed, and/or uncoordinated.
- Has several **classifications**— (1) *By the extremities affected*, (2) *by neuromuscular characteristics*, and (3) *by severity of the disorder*.

ETIOLOGY

- Cerebral Palsy is the result of damage or abnormal development in certain parts of the brain governing movement.
- The causes of this condition could possibly occur in 3 different periods:
  - ***Prenatal*** - Disease or metabolic problems of the mother before birth.
    - Example(s): Being exposed to Toxoplasmosis, rubella (German measles), cytomegalovirus, and herpes.
  - ***Perinatal*** - Occurrences at the time of birth.
    - Example(s): Damage by trauma to the brain during the birth process, Cord Coil, Premature separation of the placenta, Delayed birth process.
  - ***Postnatal*** - Occurrences after birth.
    - Example(s): Damage by trauma caused by car accidents or falls at a very early age.

Spastic	Due to damage in the *Motor Cortex*, and *Pyramidal Tracts* of the brain. Damages to these areas may be due to: - **Prenatal brain hemorrhage or infection** - **Lack of oxygen to the brain during birth** - **Brain trauma or infection after birth**

Dyskinetic/Athetoid	Due to damage to the *Basal Ganglia* and *Cerebellum*. Damages to these areas may be caused by: - **Infections, such as meningitis** - **Trauma to the developing brain** - **Lack of oxygen to the developing brain**
Ataxic	Due to brain injury to the *Cerebellum*. These injuries can be caused by: - **Infections in the Womb** - **Loss of oxygen from placental failure or breech birth** - **Head trauma during or after birth** - **Brain hemorrhaging from fetal stroke**
Hypotonic	Most commonly due to brain injury to the *Cerebellum*. These injuries can be caused by: - **Excessively pulling on the child's head, neck, or shoulders** - **Failure to detect and/or treat maternal infection** - **Failure to detect fetal distress such as lack of oxygen (hypoxia)** - **Failure to detect umbilical cord complications** - **Failure to perform a necessary C-section** - **Improper use of forceps or vacuum delivery**
Mixed	Caused by brain damage, leading to various motor control centers of the developing brain being injured. These motor control centers are the *motor cortex*, *pyramidal tracts*, *basal ganglia*, and *cerebellum*. This can be caused by: - **Infections before or after birth** - **Lack of oxygen at birth (hypoxia)** - **Stroke suffered during birth** - **Toxic poisoning such as methylmercury** - **Traumatic head injury in first years of life**

PREVALENCE & INCIDENCE

- Cerebral palsy is a leading cause of disability in children, often causing significant limitations in their daily lives.
- Globally, this is the most prevalent disorder, striking both children and adults.

- There are roughly between 2 and 5 cases diagnosed per 1,000 births.
- Having twins increases the chance of cerebral palsy by a factor of five compared to a single birth.
- Increased incidence of CP with spastic diplegia.
- In 5000 infants, 1,200 to 1,500 preschool children are diagnosed with CP each year.
- Cerebral Palsy is more common in males than in females, especially where Kernicterus is involved.
- Here is a paraphrase of the sentence:
- The Philippines appears to have a particularly high prevalence of cerebral palsy. Estimates suggest that CP affects 1-2% of the population, which is significantly more than the number of people with polio, spinal lesions, and other movement disorders combined.
- Delays in cognitive development and below-average intelligence have been seen in 50% to 75% of children with CP.
- Around half of children with cerebral palsy experience seizures. This seems to be even more common in children who have spastic types of CP.

SIGNS, SYMPTOMS, PATHOMECHANICS

➢ Cerebral Palsy manifests itself typically during infancy or preschool years. In general, the signs and symptoms of this condition depend on the severity of the individual's brain injury and any co-occurring disorders that may possibly present.

	Signs and Symptoms		
	Manifestations of the disease as perceived by…		
Types	**Medical Professionals**	**Parents or Significant Others**	**Patient Experience**
SPASTIC	- **Hypertonicity**; *Stiff, inflexible muscles and joints.* - Jerky, abrupt, rigid, and slow, labored movements. - Presence of involuntary movements. - Trouble walking. - Issues controlling fine motor skills. - Exaggerated reflexes.		
DYSKINETIC/ ATHETOID	- **Hypotonia**; loosened muscles. - **Hypertonia**; stiffened muscles. - ***These cause muscle tone fluctuation.**		

<table>
<tr><td rowspan="2"></td><td colspan="3">- Involuntary movements.
- Tremors.
- Poor posture.
- Unsteadiness.
- Twisting of the torso.
- Slow, writhing movements.
- Grimacing or drooling.</td></tr>
<tr><td></td><td>- Involuntary movements are noticed at around 9 months or older.
- Involuntary movements typically disappear when the child is asleep.</td><td>- Movements alternate from slow and painful to fast and rapid.
- Involuntary movement increases when tired or stressed.</td></tr>
<tr><td>ATAXIC</td><td colspan="3">- Problems with balance and coordination.
Imprecise motor skills
- Trouble walking, with balance, and depth perception causing unsteady movements and for the child to walk with feet wide apart.
- Issues with depth perception.
- Tremors and shakiness.
- Difficulty making quick movements.
- Difficulties with precise finger movements.
- Breathy sounds and monotone voice when speaking.
- Slow eye movements.
- Hearing and vision problems in some cases.</td></tr>
<tr><td>HYPOTONIC</td><td colspan="3">- Hypotonic Muscles; loosened muscles.
- Poor head control.
- Delayed gross/fine motor skills.</td></tr>
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<tr><td></td><td colspan="3">- Difficulty breathing.
- Flexible ligaments and joints.
- Poor balance and stability.
- Impaired mobility.
- Difficulty swallowing or chewing.
- Clumsiness.</td></tr>
<tr><td></td><td></td><td>- Difficulty sitting/standing unassisted.</td><td>- Exhaustion</td></tr>
<tr><td>MIXED</td><td colspan="3">Most common symptoms:
- Abnormal reflexes
- Exaggerated, jerky movements
- Issues with coordination
- Poor posture
- Tremors or shakiness</td></tr>
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➢ **PATHOMECHANICS OF THE CONDITION**

The pathomechanics of cerebral palsy involve the disruption of normal brain development or function, typically due to injury or abnormalities occurring pre–, peri–, or postnatal periods. Factors such as prenatal infections, genetic vulnerabilities, birth complications, prematurity, and brain trauma can contribute to the pathomechanics of cerebral palsy. The specific areas of the brain affected and the extent of the damage vary among individuals, resulting in a spectrum of symptoms and functional limitations. This is a nonprogressive condition which affects individuals throughout their lifespan. As this condition is non-progressive, it means that although it doesn't progress into a worse condition, the needs of the individual does start to rise as the time passes which brings about challenges.

➢ **STRUCTURAL AND ANATOMICAL CHANGES RELATED TO THE CONDITION**

- Brain Structure
  - **In *Athetotic CP* groups**, it is indicated that more diffuse and severe involvement of the deep gray matter and white matter structures, compared to the spastic type.
  - **In *Spastic CP* groups**, significant changes were limited to the splenium of the corpus callosum, thalamus and the periventricular deep white matter.
- Skeletal Structures

        - **In *Spastic CP groups***, the shafts of the bones are observed to thin due to the increased muscle tone while the metaphyses often appear enlarged.
        - In general, one of the legs may appear longer which could be attributed to growth disparities.

    - Muscular Structures
        - General atrophy of muscles and joints due to motor difficulties and lack of movement.

POSSIBLE SPEECH-LANGUAGE PROBLEMS ASSOCIATED WITH THE CONDITION

Apraxia	This is a motor disorder that impacts the ability to produce speech sounds. Cerebral palsy can cause problems with muscle control, making it hard to produce certain sounds.
Spastic Dysarthria	Dysarthria is a motor disorder that impacts the ability to speak clearly. This type of dysarthria is common among those with cerebral palsy. It is caused by muscle spasms that make it hard to produce clear speech sounds.
Dysphonia	A voice disorder that refers to difficulty producing sounds due to abnormalities in the vocal folds or surrounding structures. It can cause hoarseness, breathiness, or pitch problems. Cerebral Palsy can cause difficulties with the muscles used for breathing, which can lead to problems with the voice.
Dysphagia	This is a swallowing disorder that can make it hard to swallow liquids or solid foods. Dysphagia can also cause choking or aspirating (breathing in) liquids or food. This can lead to respiratory infections or pneumonia.
Articulation	Patients with CP may experience poor oral-motor control and muscle weakness in the face and throat. These conditions affect a child's ability to make sounds and form syllables.
Fluency	Fluency disorders, such as stuttering, can occur in individuals with cerebral palsy due to difficulties with motor coordination and muscle control. These individuals may experience interruptions in the smooth flow of speech, resulting in hesitations, repetitions, or prolongations of sounds, syllables, or words.
Cognitive-Communication Disorders	Difficulty with communication skills involving perception, memory, problem-solving, and organization. Individuals with cerebral palsy may experience challenges in understanding and using language

	effectively due to cognitive limitations, impacting their ability to communicate, comprehend, and participate in social interactions.

TYPES, COURSE, & PROGNOSIS

Types	**1. Spastic Cerebral Palsy** (**Spasticity**) - Most common form - 77% of all cases - Hypertonicity of flexor muscles results in stiff, inflexible muscles and joints - Jerky, abrupt, rigid, and slow, labored movements - Damage to the brain's motor cortex and pyramidal tracts, which control voluntary movement and relay signals to muscles. - Damage on one side of the brain affects movement on the opposite side of the body. - Spastic CP, though common, can be challenging to manage due to its impact on muscle tone and movement, potentially leading to ongoing medical needs. **2. Athetoid** (**Dyskinetic or Non-Spastic**) **Cerebral Palsy** - 2.6% of all individuals with CP - Slow, writhing, “worm-like,” continuous, and involuntary movements of the extremities - Fluctuating muscle tone - Damage to the basal ganglia and/or cerebellum, responsible for balance, coordination, and voluntary movement - Athetoid cerebral palsy is considered extrapyramidal—extrapyramidal tracts in the brain regulate involuntary reflexes and movement signaled by the basal ganglia and cerebellum. **3. Ataxic Cerebral Palsy** (**Ataxia**) - 2.4% of all individuals with CP - Impaired ability to coordinate movements and maintain balance - Damage to the cerebellum, the brain region responsible for coordinating movement. - Tremors and reduced muscle tone, leading to difficulties with balance and coordination **4. Hypotonic Cerebral Palsy** - 2.6% of all cases

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- Low muscle tone that causes loss of strength and firmness, resulting in floppy muscles
- Instability and floppiness in muscles can cause a child to miss developmental milestones such as crawling, standing, or walking
- Flexible joints and ligaments, lack of head control. loose muscles, poor balance and stability

5. Mixed Cerebral Palsy
- 15.4% of all cases
- Most common combination is spasticity and athetoid
</td></tr>
<tr><td>Classifications</td><td>Hemiplegia - only one side (arm and leg) of the body is affected
Paraplegia - only legs are affected
Monoplegia - only one limb is affected; rare
Triplegia - only three limbs are affected; rare
Diplegia/Double Hemiplegia - all four limbs, legs are more affected or one side is affected more than the other
Quadriplegia - all four limbs are affected</td></tr>
<tr><td>Gross Motor Function Classification System (GMFCS)</td><td>The Gross Motor Function Classification System (GMFCS) is a way to categorize how well children with cerebral palsy can move. It uses a scale of 1 to 5 to describe their ability to sit, walk, and use wheelchairs.

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<tr><td>Level I</td><td>Able to walk without limitations; by age two, they can sit independently, and by age six, they can navigate curbs and stairs without railings.</td></tr>
<tr><td>Level II</td><td>Can walk with some limitations; might use handheld mobility devices or wheelchairs for longer distances.</td></tr>
<tr><td>Level III</td><td>Primarily walks with handheld mobility devices indoors but uses wheelchairs for community travel and longer distances.</td></tr>
<tr><td>Level IV</td><td>Can walk with some limitations; might use handheld mobility devices or</td></tr>
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	<table><tr><td></td><td>wheelchairs for longer distances.</td></tr><tr><td>Level V</td><td>Severe movement limitations; requires power wheelchair for mobility and complete assistance for most activities.</td></tr></table>
Outcome if Left Treated and/or Untreated	Cerebral palsy is not a progressive disorder, which means it does not improve or worsen over time. However, as a child gets older, some symptoms might become more or less visible.

HEALTHCARE RESOURCES AVAILABLE FOR INDIVIDUALS WITH CEREBRAL PALSY

Physical Therapy	● It involves exercises and activities that can maintain or improve muscle strength, balance, and movement. ● A physical therapist helps the child learn skills such as sitting, walking, or using a wheelchair.
Occupational Therapy	● This type of therapy helps a child learn to do everyday activities such as dressing and going to school.
Recreational Therapy	● Participating in art programs, cultural activities, and sports can help improve a child's physical and intellectual skills.
Speech and Language Therapy	● A speech therapist can help a child learn to speak more clearly, help with swallowing problems, and teach new ways to communicate, such as by using sign language or a special communication device.

Orthotic Devices	● Braces, splints, and casts can be placed on the affected limbs and can improve movement and balance. ● Other devices that can help with movement and posture include wheelchairs, rolling walkers, and powered scooters.
Orthopedic Surgery	● A child may need surgery if symptoms are severe. For instance, surgery can lengthen stiff, tightly contracted muscles. ● A surgeon can also place arms or legs in better positions or correct or improve an abnormally curved spine.
Assistive Devices and Technologies	● These include special computer-based communication machines, Velcro-fastened shoes, or crutches, which can help make daily life easier.
Medicines	● Certain medications can relax stiff or overactive muscles and reduce abnormal movement. ● They may be taken by mouth, injected into affected muscles, or infused into the fluid surrounding the spinal cord through a pump implanted near the spinal cord. For children who have cerebral palsy and epilepsy (seizures), standard epileptic medications should be considered, but these medications may also have negative effects on the developing brain.

SLP THERAPY & MEDICAL PRECAUTIONS

Under SLP Therapy	
Improve Communication	● Strengthening muscles used for speaking ● Improving oral motor skills ● Enhancing understanding of speech and language ● Addressing swallowing difficulties

Lead to Better	● Articulation and pronunciation ● Fluency ● Language development ● Speech volume and control ● Chewing and swallowing ● Socialization and self-esteem
Materials/Equipments	● **Tools**: Tongue placement aids, chew toys, straws, picture boards, books, etc ● **Assistive Devices**: Tablets, computers, AAC devices, body language boards, etc
Medical Precautions	
Actions to protect oneself and client from harm (<u>SAFE</u>)	**Safety** - prioritize the safety of the client by assessing risks and implementing measures to prevent accidents or injuries during therapy sessions **Adaptation** - modify therapy activities, materials, and approaches to suit the unique needs and abilities of the client, ensuring safe and effective participation **Flexibility** - remain flexible and responsive to the individual's changing abilities and challenges during therapy, adjusting interventions as needed to maintain safety and promote progress **Environment** - create a safe therapy environment by removing obstacles, providing appropriate seating and support, and ensuring sufficient space for movement and activities
Preventive measures before, during, and after therapy	**<u>Before</u>** ● **Assessment and Evaluation**: Conduct a thorough assessment of the client's medical history, communication and swallowing abilities, cognitive functioning, and any relevant environmental factors.

	● **Risk Assessment**: Identify potential risks and safety concerns related to the client's condition, such as mobility limitations, sensory sensitivities, or swallowing difficulties. ● **Communication with Caregivers**: Communicate with the client's caregivers or family members to gather relevant information about the client's needs, preferences, and any specific safety considerations. Collaborate with the client and their caregivers to develop a comprehensive treatment plan that addresses their goals, needs, and safety concerns. **<u>During</u>** ● **Proper Positioning**: Use appropriate positioning techniques to support the client's stability and comfort during therapy activities. Provide assistive devices or adaptive equipment as needed to optimize positioning. ● **Assistance and Support**: Offer physical support and assistance as needed to help the client engage in therapy tasks while minimizing the risk of injury or discomfort. **<u>After</u>** ● **Follow-Up Care**: Provide recommendations for follow-up care or additional support as needed, including referrals to other healthcare professionals or specialists. ● **Home Program**: Develop a home program that includes exercises, strategies, and activities for the client to continue working on their goals between therapy sessions.

THE HEALTHCARE TEAM FOR CEREBRAL PALSY MANAGEMENT

Physical Therapist	● Physical therapists help manage spasticity, improve posture, and teach adaptive techniques to facilitate daily activities and independence.
Occupational Therapist	● An occupational therapist helps individuals with cerebral palsy develop the skills needed for activities of daily living (ADLs), such as self-care, feeding, dressing, and fine motor tasks. They may provide assistive devices, adaptive equipment, and environmental modifications to promote independence and participation in meaningful activities.
Speech-Language Pathologist	● For individuals with cerebral palsy, SLPs address speech articulation, language development, fluency, voice quality, and cognitive-communication abilities. They also assess and manage swallowing difficulties (dysphagia) to ensure safe and efficient eating and drinking.
Nutrition/Dietitian	● For individuals with cerebral palsy, nutritionists address feeding difficulties, ensure adequate nutrition and hydration, and manage issues related to swallowing difficulties, gastrointestinal problems, and nutritional deficiencies.
Pediatrician	● A pediatrician plays a central role in coordinating medical care, monitoring growth and development, and managing associated medical conditions. They provide regular health assessments, monitor medication management, address concerns related to growth, nutrition, and overall well-being, and coordinate referrals to other specialists as needed.
Developmental Specialist	● For individuals with cerebral palsy, developmental specialists assess cognitive, social, emotional, and behavioral aspects of development, provide early intervention services, and collaborate with other team members to support holistic development and quality of life.

SUPPORT SYSTEMS IN THE PHILIPPINES FOR PEOPLE WITH CEREBRAL PALSY

PCPI (*Philippine Cerebral Palsy Incorporated*)	● Founded in 1956 ● It is a non-stock and non-profit foundation dedicated to the treatment and alleviation of CP and related motor disorders in the Philippines and envisions a better future for the CP individual by advocating and championing for their rights as differently-abled yet productive members of their communities and the society. ● It is the authority and leading institution at the forefront of providing superior multidisciplinary care and management of individuals with CP and other motor-related disabilities regardless of race, creed, color, economic and social standing.
CPAP (*Cerebral Palsied Association of the Philippines*)	● **Founded by**: Rodrigo "Peewee" R. Kapunan (Spastic Quadriplegic) ● **Established**: September 22, 1993 (Registered with SEC) ● Non-profit organization for Persons With Cerebral Palsy (PWCP) ● Priority Project: Advocacy Public Awareness Campaign **Goals**: ● Encourage CP individuals and their families to leave their homes and participate in society. ● Educate PWCP on their rights and responsibilities as members of society. ● Raise awareness and sensitivity towards the issues, concerns, and needs of PWCP.

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