CRRN –Pediatric Rehabilitation

Presented By:

Rose Brungardt, RN-BSN-MS-MN-CRRN
Clinical Consultant, MileStone Healthcare

Disclaimer: The information provided in this presentation is subject to revision based upon future updates and clarifications by ARN and other Leaders in Pediatric Rehabilitation. Please consult with available resources.

I have no financial relationships to disclose; no conflicts of interests to disclose; and will not promote any commercial products or services. Thank You.

Purpose of Presentation

- **The intent of this presentation is to review/discuss the concepts of Pediatric Rehabilitation including the developmental theories/developmental challenges, major conditions/diagnoses, as well as the role of nurses, caregivers/family members and community.**

Primary Presentation Resource:

ARN. <u>The Specialty Practice of Rehabilitation Nursing – 8th Edition.</u> Chapter 14 – Pediatric Rehabilitation (2019)

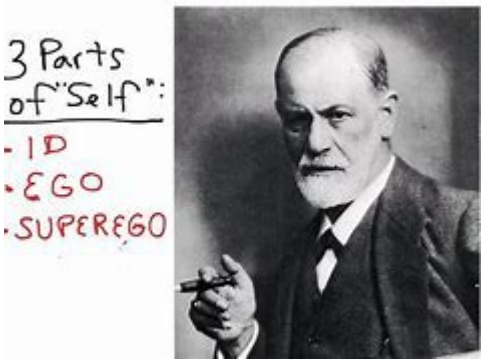
Child Development

- Pediatric rehab nurses must know the general principles of developmental theorists as well as developmental milestones.
- A basic understanding of growth and development enables the nurse to recognize the needs of each pediatric patient and provide appropriate quality care, thus ensuring “Best Practice.”
- Assessment of the pediatric patient’s developmental stages assists the nurse/interdisciplinary team in developing a “patient-centered comprehensive plan of care” inclusive of expectations by patient/ family and community.
- Human growth and development are orderly processes that begin at conception and continue until death

Growth & Development Theories

Sigmund Freud / Intrapsychic / Psychoanalytic:

- **Psyche includes:**
  - -- Id (desires, wants, needs)
  - -- Ego (reality, realistic)
  - -- Superego (conscience, moral compass)



https://www.bing.com/images/search

- **Psychosexual Development:**
  - -- Oral (Infancy / 0 -12 months)
  - -- Anal (Toddler / 12 – 36 months)
  - -- Phallic (Pre School / 3 - 5 years)
  - -- Latent & Genital (School Age / 5 – 12 years) **

** Some resources divide these into two separate groups

MILESTONE HEALTHCARE
a H2 Company

ORAL

Infant achieves gratification through oral activities such as feeding, thumb sucking and babbling

0-2 years old

ANAL

2-3 years old

The chid learns to respond to some of the demands of society (such as bowel and bladder control)

PHALLIC

The child learns to realize the differences btween males and females and becomes aware of sexuality

3-7 years old

LATENCY

The child continues his or her development but sexual urges are relatively quiet

7-11 years old

GENITAL

The growing adolescencent shakes off old dependencies andlearns to deal maturely with opposite sex

11-Adult

Growth & Development Theories

Sigmund Freud / Intrapsychic / Psychoanalytic (continue):

- **Description:**

  -- "Conflict between individuals' natural instincts and society's restrictions on them experienced in childhood influence by the individuals' adult personality."

  -- "Children are thought to progress through four stages of psychosexual development."

NOTE: Sigmund Freud was an Austrian neurologist and the founder of psychoanalysis, a clinical method for treating psychopathology through dialogue between a patient and a psychoanalyst.

Growth & Development Theories

VeryWell - https://www.bing.com/images/search

Social Learning Theory (Erikson):

Growth & Development Theories

Social Learning Theory (Erikson - continued):

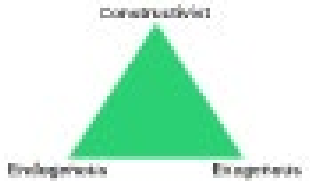
- **Description:**

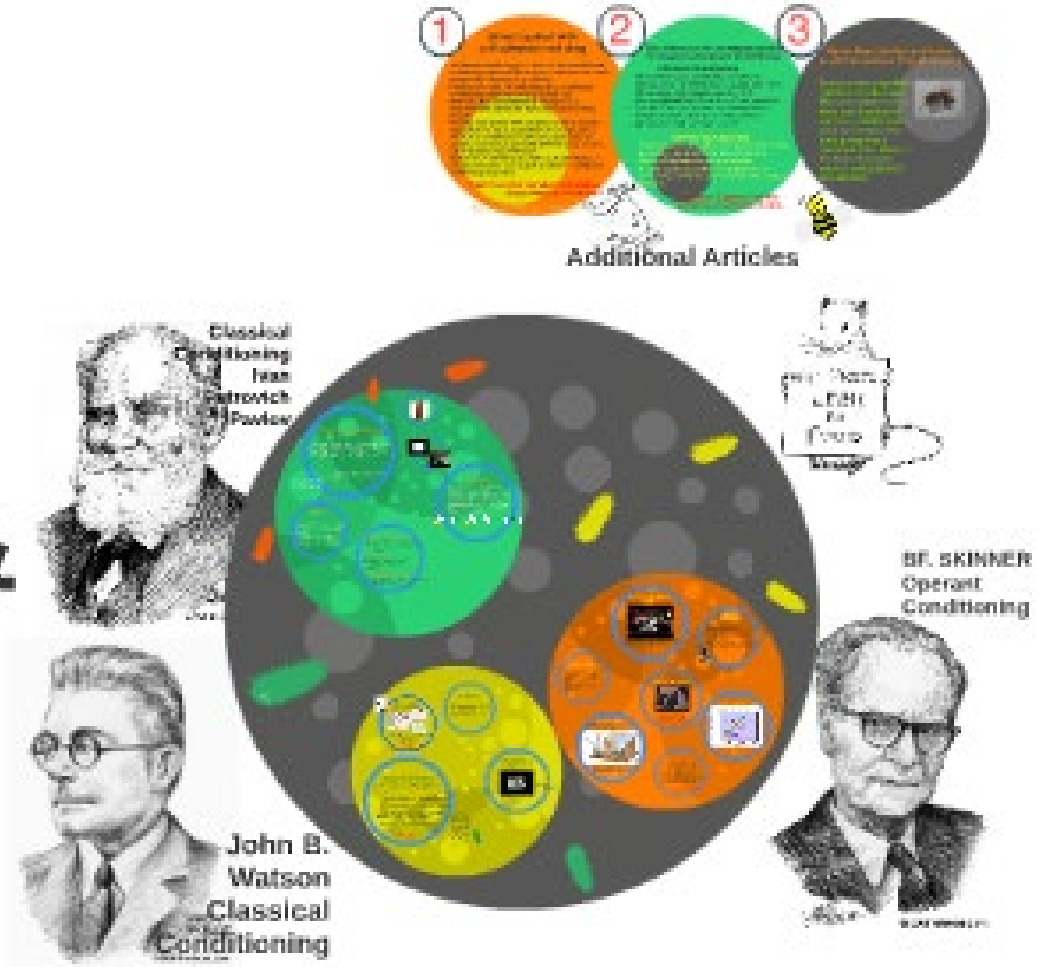
  -- **"**The **i**nteraction between parents/caretakers and child is essential to healthy psychological growth."

  -- " Each phase of normal development requires the individual to accomplish age-appropriate development tasks through each phase of the eight phases."

NOTE: Erik Erikson, developmental psychologist and psychoanalyst, known for his theory on psychological development of human beings. He may be most famous for coining the phrase ***identity crisis***.

Learning Theory: Pavlov Watson & Skinner





Growth & Development Theories

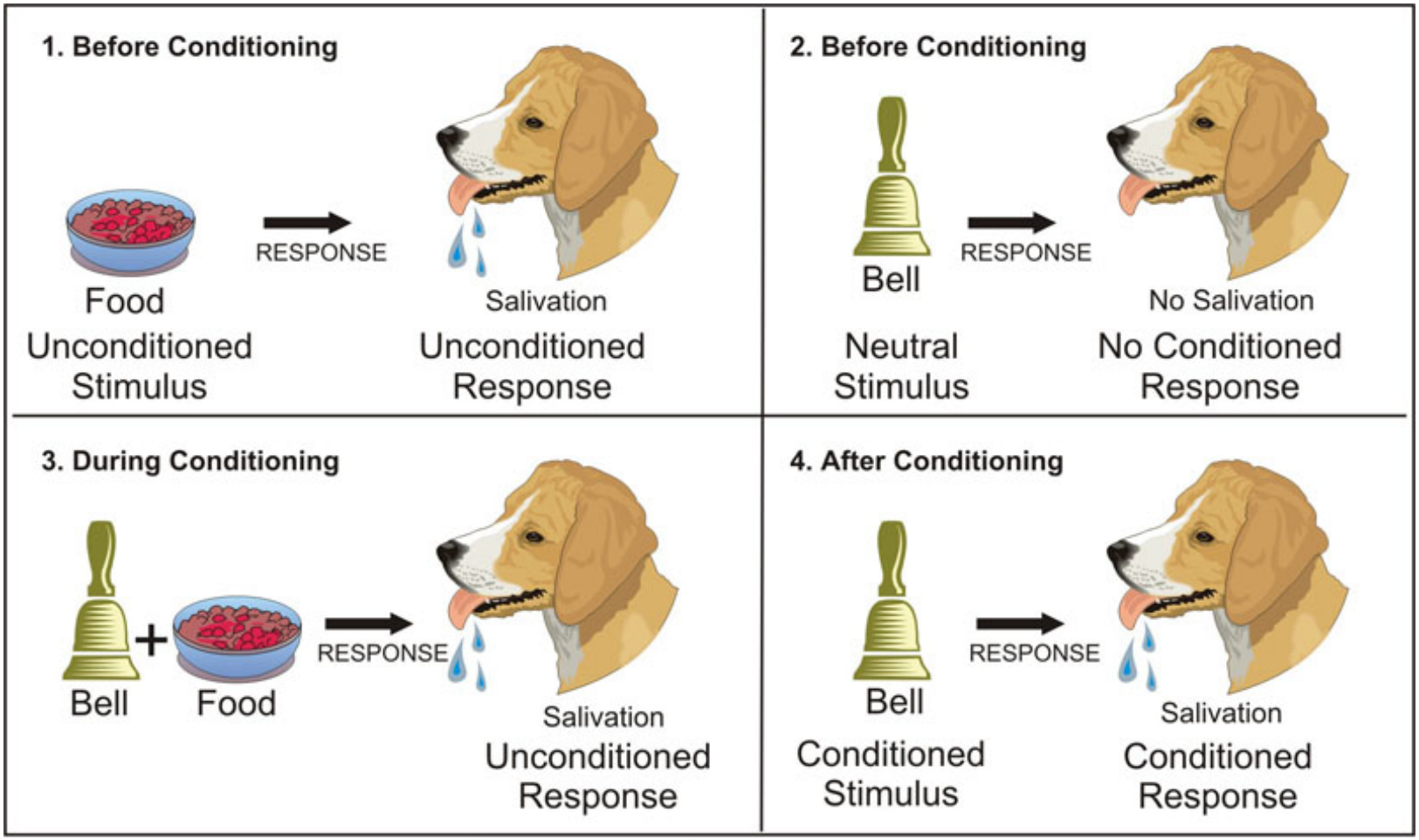
Behavioral Learning Theories:

- **Ivan Pavlov** - Classical Conditioning Theory

  -- Pavlov conditioned his dogs to associate the sound of a bell with food. Eventually, the animals would drool in response to the ring of a bell, even when no reward was available.

  -- Pavlov discovered that the salivary response was a learned response. Anything the dogs learned to associate with food triggered the same response.

  -- Pavlov believed that all nervous activity was based on the principals of excitation and inhibition



Classical Conditioning

- https://www.bing.com/images/search

Growth & Development Theories

Behavioral Learning Theories (continued):

- **John Watson –** Founder of Behaviorist Theory

  -- Best known for establishing the Psychological School of Behaviorism.

  -- His theories, research, and work were influential to the field of psychology, and he helped pioneer "The Behaviorism Psychology Movement."

  -- **He was the first to claim that human behavior consisted of specific stimuli that resulted in specific responses**.

Growth & Development Theories

Behavioral Learning Theories (continued):

- **B.F Skinner –** Operant Conditioning

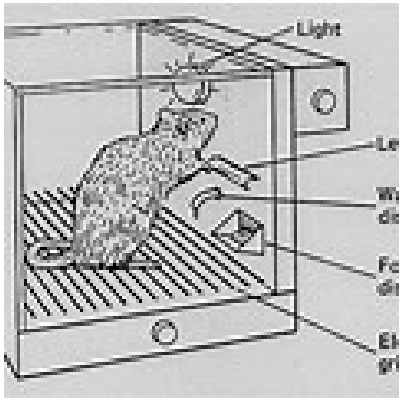
-- Operant Conditioning consists of changing behavior by the use of reinforcement which is given after a desired response is achieved.

-- He believed that children learn language through Operant Conditioning (i.e. children receive “rewards” for using language in a functional manner).

-- Skinner coined the term Operant Conditioning as a branch of Watson’s Classical Conditioning and studied it by conducting experiments using animals, namely rats, placing them in what he called the "Skinner Box."

Growth & Development Theories

- B.F. Skinner demonstrated the effectiveness of positive reinforcement through his experiment with the Skinner boxes and hungry rats. Inside the box was a lever and when it was accidentally pressed by the rats, as they moved around inside, food would be dispensed into a container beside the lever. The rats then learned that by pressing the lever, they would receive food and would automatically go straight to the lever once put inside the box.



https://www.bing.com/images/search

Growth & Development Theories

Summary - Behaviorisms

- Individual's development influenced by stimulus-response interaction.

- Individual's behavior is shaped through consistency of responding.

- Two attributes of human brain: flexibility and plasticity – allow a developmentally significant variety of adaptive sequences.

- https://www.bing.com/images/search

Growth & Development Theories

Cognitive Theory:

- **Jean Piaget – Cognitive**

  -- Motor activity involving ***concrete objects*** results in development of mental functioning.

  -- Children move through four general periods of cognitive development in the same sequence although not according to the same timetable.

Sensorimotor →

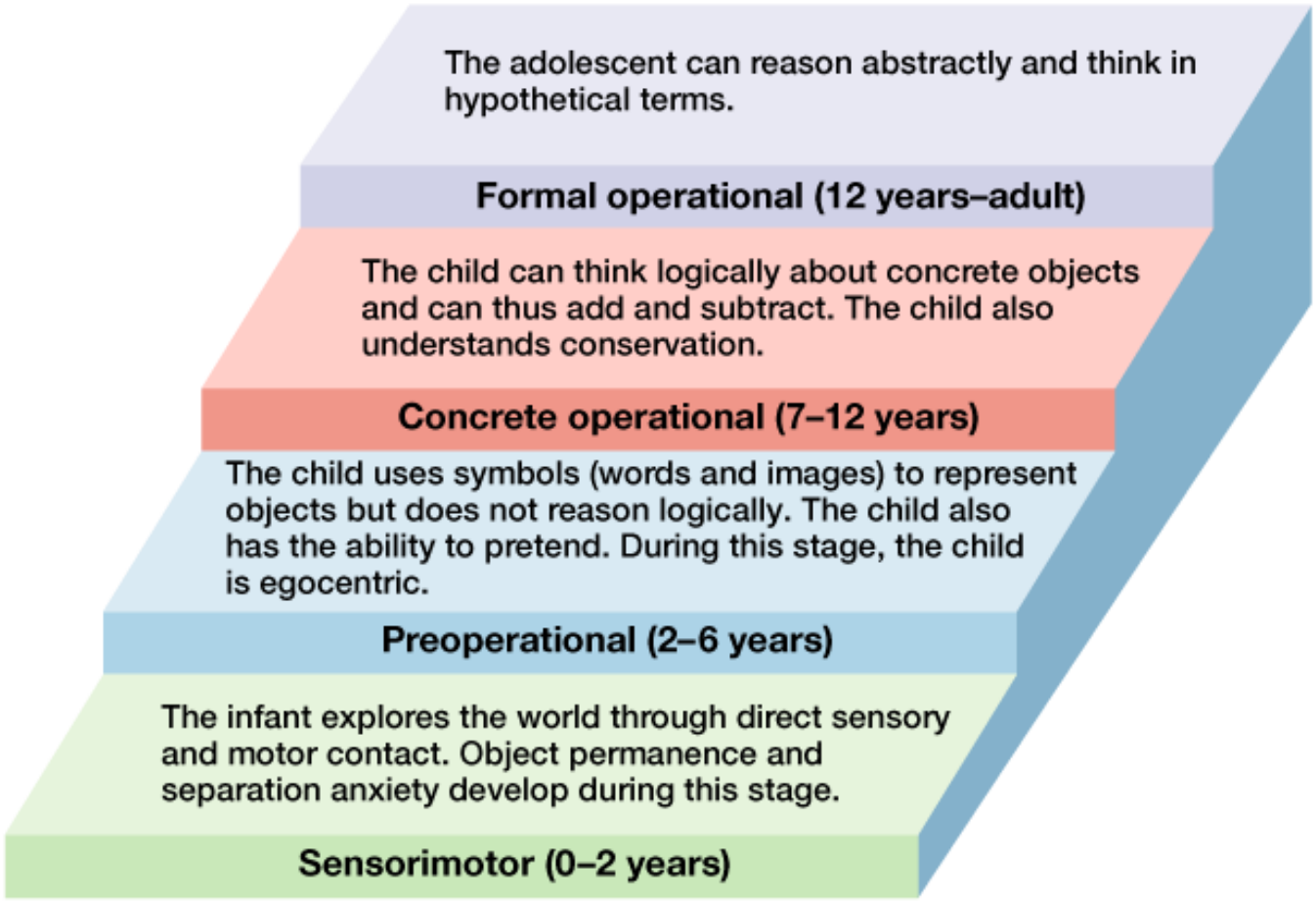
Pre Operational →

Concrete Operational →

Formal Operational

Piaget's Stages of Development

www.boundless.com



Other Theorists

- **Abraham Maslow: Physiological Human Needs and other resources refer to his Motivational Theory:**

  Listed in five layers with the most important being *physiological human needs* (air, water, food, sex)

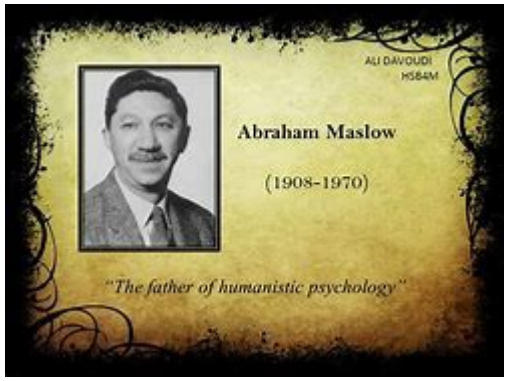
  Followed by:

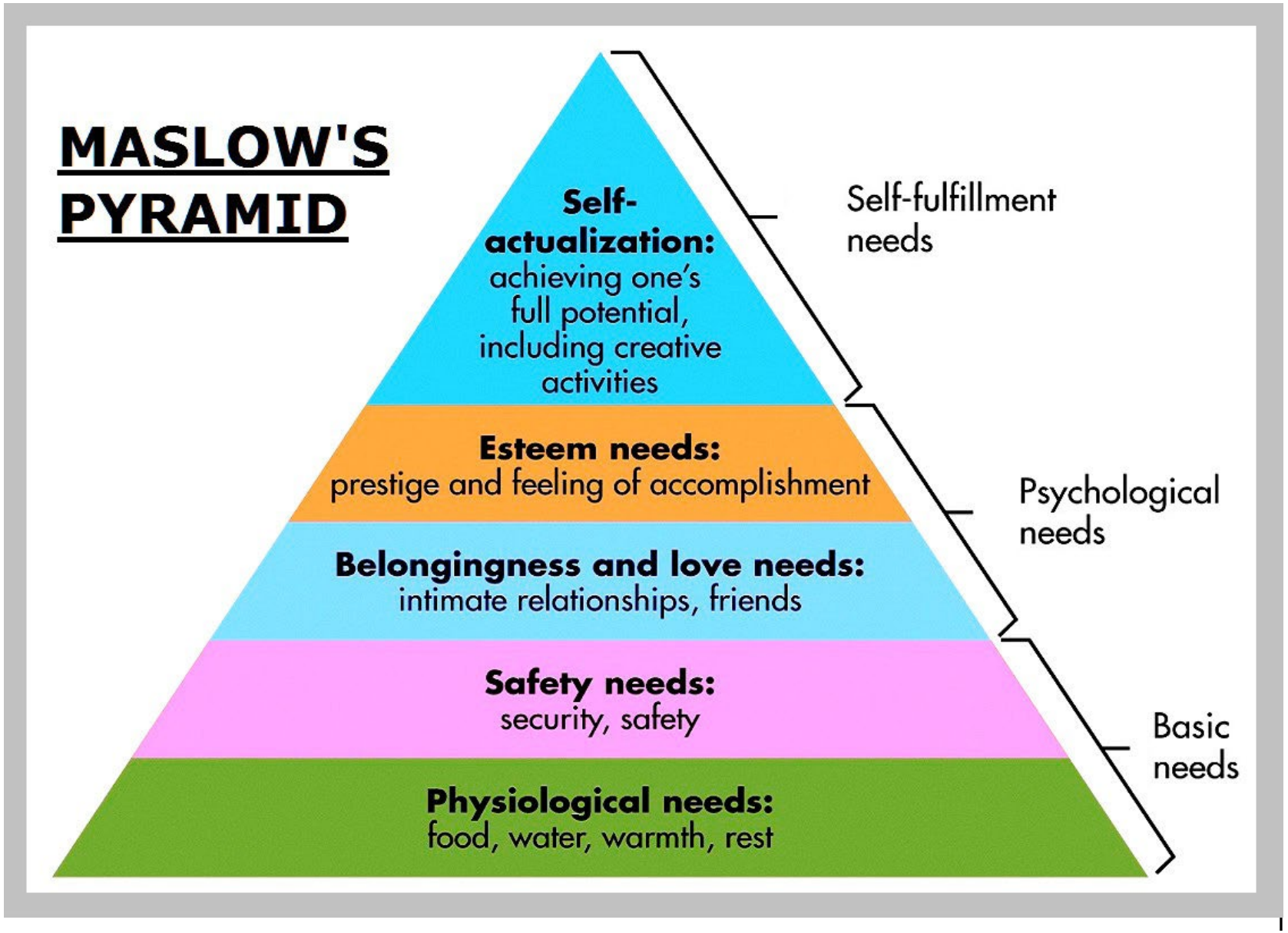
  safety & security

  belonging & love/affection

  esteem & self-respect

  self-actualization





- www.shminhe.com

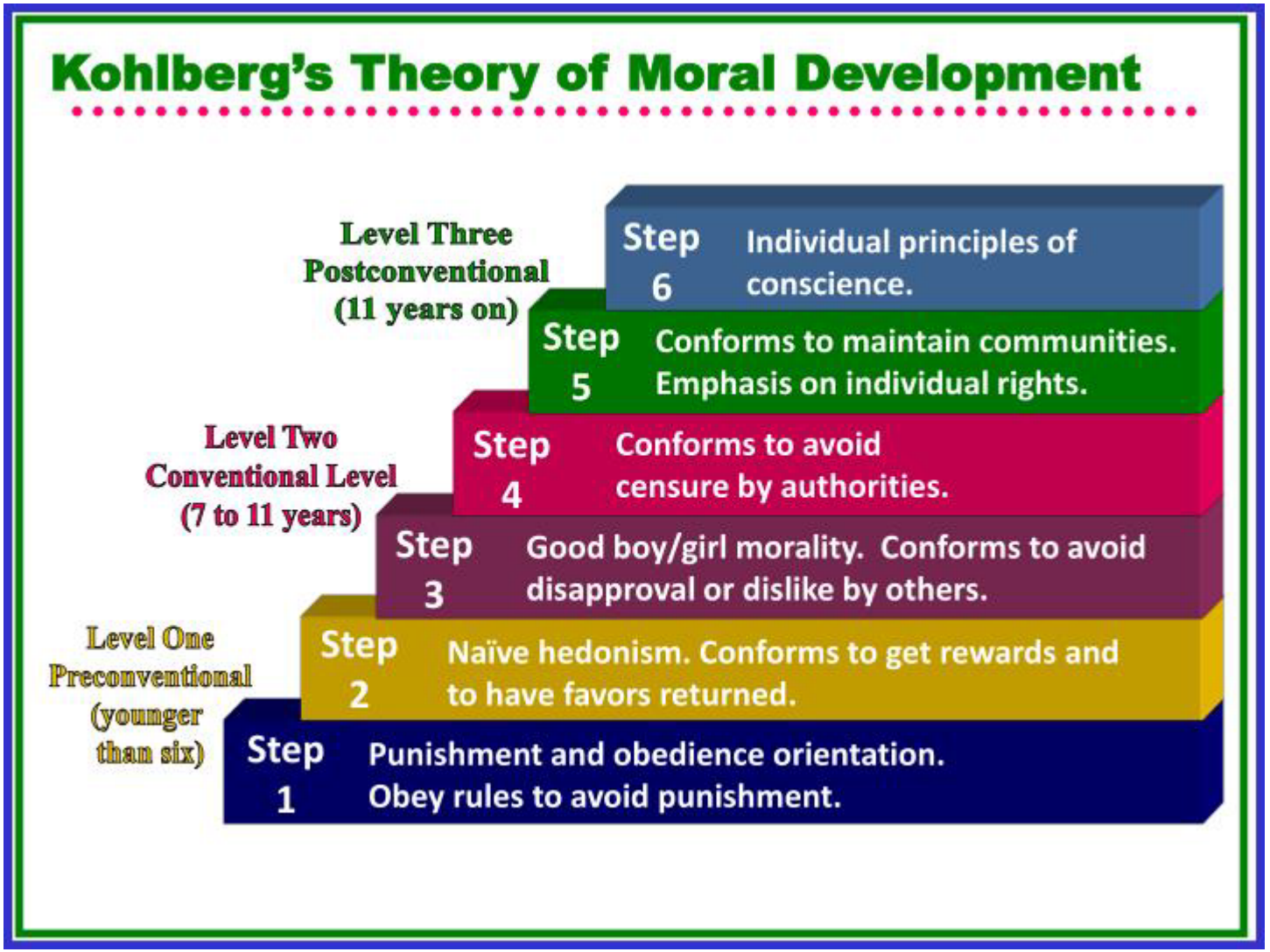
Other Theorists

- **Lawrence Kohlberg's Theory – Moral Development:**

  -- Proposes that there are ***three levels of moral development***, with each level split into stages:

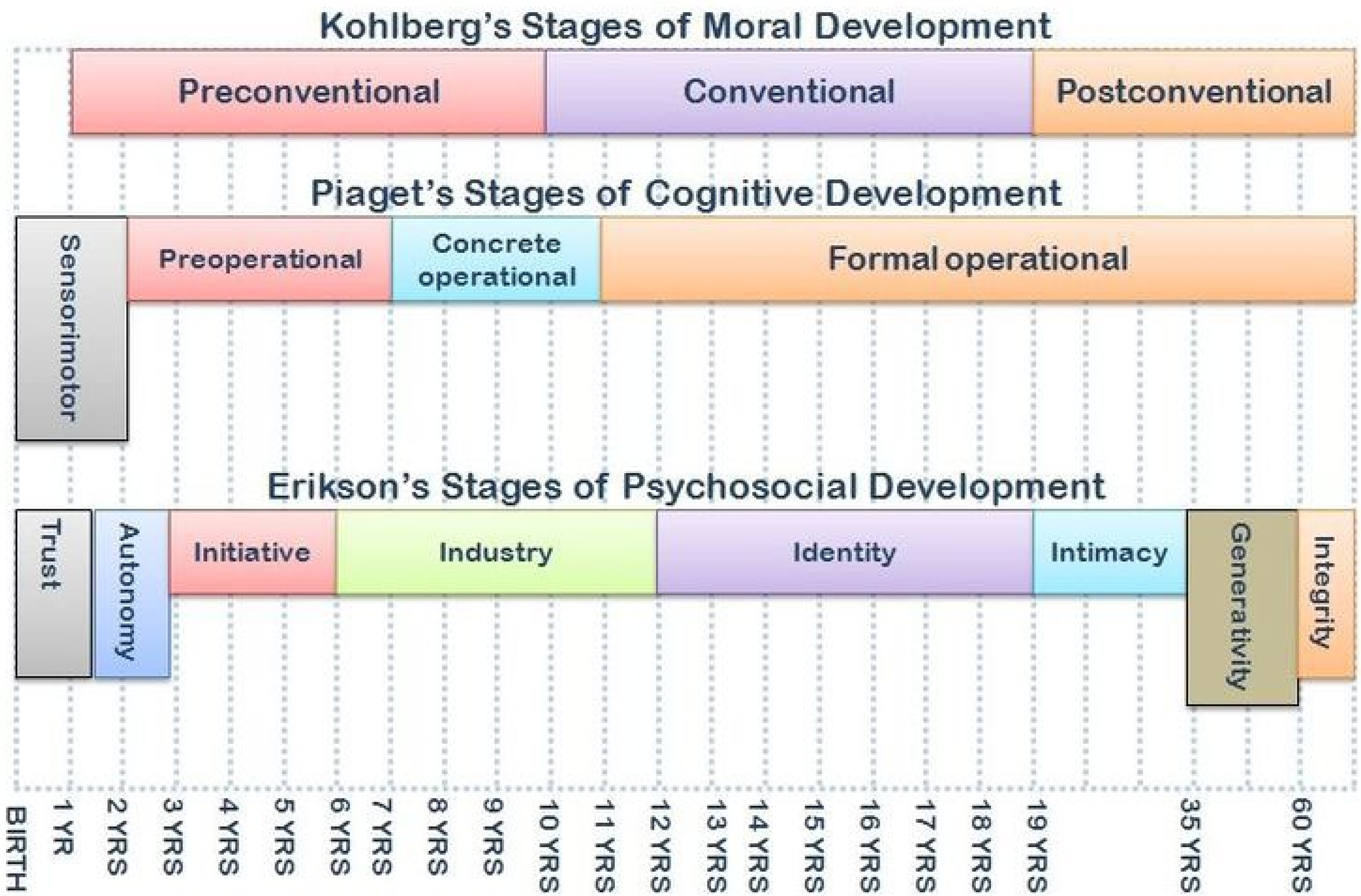
- *Preconventional Morality*
- *Conventional Morality*
- *Postconventional Morality*

-- Kohlberg suggests that people move through these stages in a fixed order, and that **moral understanding is linked to cognitive development.**



- https://www.bing.com/search

STAGE THEORIES OF KOHLBERG, PIAGET AND ERIKSON



- www.pinterest.com

Stages of Motor Development

Age/ Month	Motor Control Development *Nelson 2011 & Medbridge*
3	Lift head up from prone position; bring hands together
4	Support chest up on two hands prone
5	Balance on one arm & reach with other
6	Roll supine to prone; begins passing things from one hand to another
8	Sit unsupported
10	Crawl and pull to stand
12	Walk with support; play “patty cake”; throws things
14	Walk without support

Stages of Motor Development

Age/ Years	Motor Control Development ***Nelson 2011 & Medbridge***
2	Walks up stairs - both feet on one step; walks backwards; Runs; turn doorknobs; unbuttons/unzips large fasteners
3	Walks up stairs - alternating feet; stands on one foot; puts on shoes; uses scissors; pedals tricycle
4	Runs smoothly; hops on one foot & jumps; dresses self
5 **School Age** **Adolescent**	Walks down stairs - alternating feet; skips; opens lock with key; catches bounced ball; bathes self. Hand preference displayed; knows right from left; night-time bladder control by 7 years. Fine motor coordination; sexual maturation

Stages of Cognitive Development

Age/ Months	Cognitive Development – Infants & Toddlers *CDC – Website Accessed 12.2021 & Medbridge*
2	Pays attention to faces; begins to follow objects with eyes
6	Looks around; brings things to mouth; shows curiosity - tries to get things that are out of reach
12	Finds hidden things; looks at right picture when named; copies gestures; follows simple directions: “pick up toy”
18	Knows familiar items – telephone, brush, spoon; points to get attention of others; points to own body parts; scribbles on own; follows 1-step verbal commands (“sit down”)
24	Begins to sort shapes/colors; plays simple games; builds towers of four or more blocks; follows 2-step command (“pick up your shoes and put them in closet”)
36	Works toys with buttons, levers, moving parts; plays make-believe (dolls, animals, people), understands what 2 means; copies circle with pen/pencil; turns book pages.

Additional Development Milestones

CDC & Medbridge

- **Newborn:** Gains 5-7 oz / week; head circumference = 2cm > chest circumference; sleeps 16 hours / day.
- **Infancy / 2 Months:** Gains 1 oz / day; head circumference grows 2 cm / month through 3 months. **NOTE:** Rapid head growth.
- **Infancy / 4 Months:** Gains 6 – 8 oz per week (0-6 months); height increases one inch / month; head circumference grows 1 cm per month (to age 12 months)
- **6 Months:** Birth weight doubles by 4-6 months; begin introduction of solid foods; first tooth (5-6 months)
- **9 Months:** Weight gain 3-4 oz / week; height increases half inch per month (from 6-12 months); begin finger foods.
- **12 Months:** Weight triples birth weight; height increases by 50%; chest circumference equals head circumference; appetite decreases as growth demands decrease; may introduce whole milk.

Additional Development Milestones

CDC & Medbridge

- **15 Months:** Usually off the bottle; uses spoon with little spilling; good vision with depth perception; reactive to whispering and localizes sounds; follows 1-step command.
- **18 Months:** Should have 12 teeth; feeds self; 10-15 word vocabulary; follows 2-step command.
- **24 Months:** Complete set of 20 primary teeth (by 3 years); weighs four times birth weight; height is half of adult height; OK to stop measuring head circumference. After 2 years of age, chest circumference > head circumference.
- **30 – 36 Months:** Sleeps 10–12 hours/day; has 2nd set of molars; 3-4 word sentences; answers simple questions; follows 3-step command.
- **48 Months:** **L**anguage includes ~ 1500 words, stuttering normal until age 4; recognizes coins; knows what to do when cold, hungry & tired.

Family Centered Care

Importance of Family

- Pediatric patient's primary source of support is "THE FAMILY."
- Family members do not always have the same opinion & there may differences regarding pediatric patient's treatment program.
- Cultural sensitively and culturally appropriate care must be considered when caring for the pediatric patient.
- Ongoing education must be provided for family members as well as information on access to support services and available resources.
- An ***interdisciplinary team approach to "Family-Centered Care"*** inclusive of pediatric patient and family is critical to the success of the pediatric patient's treatment program.
- **Maximizing independence is a key concept in pediatric rehabilitation and may include functional, cognitive, emotional, social rehab modalities.**

Family Centered Care

- There are **three primary roles** that families play in the pediatric patient's rehab program:

-- **Advocate:** Families are front and center in advocating for quality rehab care. They also help identify deficiencies in health care services, and their feedback in quality measurement surveys can lead to positive changes

-- **Collaborator:** Families know their child's health history and other relevant information, such as sleep patterns, diet, and what comforts the child. As key decision-makers in the child's life, family members should be partners in developing the "Comprehensive Patient-Centered Plan of Care."

-- **Comforter:** No matter how gentle and child-focused the rehab pediatric team is, nothing brings more comfort when a child is hurting or stressed than having family nearby.

Walden University -Pediatric Nurse Practitioner's Program; www.waldenu.edu

Pediatric Rehab Nurse

Role of Nurses in Pediatric Rehabilitation:

- Pediatric rehab nurses play an important role in supporting the child and family during his/her rehabilitation program.
- The nurse's overall goal is to ***work collaboratively with the interdisciplinary team*** to maximize the potential of children to become contributing members of their families and society.
- The admission assessment should include an educational needs assessment (strengths and weaknesses of family) to better understand barriers and facilitators of the rehabilitation process.

NOTE: Patients/families who are ready/motivated to participate in rehab tend to demonstrate better outcomes than those who are reluctant.

Pediatric Rehab Nurse

Role of Nurses in Pediatric Rehabilitation (continued):

- Rehab nurses that work in a pediatric setting must provide care for the child, who has sustained an acquired condition, in a developmentally appropriate manner.

- According to the resources, the ***most common acquired conditions*** seen in children & adolescents in the rehab setting are:
  - -- Traumatic Brain Injuries (TBIs)
  - -- Cerebral Vascular Accidents / Strokes
  - -- Spinal Cord Dysfunctions / Injuries
  - -- Burns

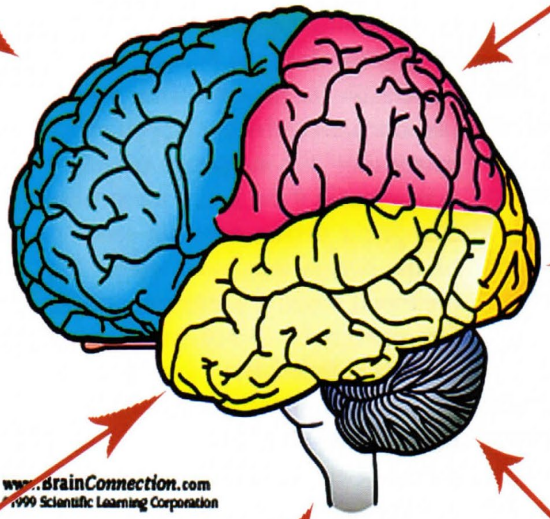
TRAUMATIC BRAIN INJURY

Traumatic Brain Injuries

- **TBI – Definition**: Non-degenerative insult to brain leading to temporary of permanent impairment of cognitive, physical, and psychosocial functions with associated diminished or altered state of consciousness.
- **Clinical Manifestations:** Can vary depending on site of injury, child's age, developmental level, and extent of damage to brain.
- **Deficits:** May not be immediately apparent in children and may unfold over time because the pediatric brain is still developing.
- **Leading Cause of Death:** Children ages 0-4years; and, Adolescents ages 15-19 years.
- **Incidence Rate:** Higher in boys than girls across all age groups; BUT, girls have higher concussion rates than boys in sports that are played by both.

MILESTONE HEALTHCARE
a H2 Company

Brain & Behavior Relationships



Frontal Lobe

Initiation
Problem-solving
Judgment
Inhibition of behavior
Planning/Anticipation
Self-monitoring
Motor planning
Personality/Emotions
Awareness of abilities/Limits
Organization
Attention/Concentration
Mental flexibility
Speaking

Parietal Lobe

Sense of touch
Differentiation of size, color, shape
Spatial perception
Visual perception

Occipital Lobe

Vision

Temporal Lobe

Memory
Hearing
Understanding language
Organization & sequencing

Cerebellum

Balance
Coordination
Skilled motor activity

Brain stem

Breathing
Heart rate
Arousal/Consciousness
Sleep/Wake functions
Attention/Concentration

Traumatic Brain Injuries (continued)

- Infants & toddlers are most prone to falls and non-accidental traumas. Non-accidental injuries have greater rates of morbidity & mortality across all level of injury.

- **Abusive head trauma** has become leading cause of death in infants & toddlers (i.e. **Shaken Baby Syndrome - SBS**). These children present with injuries requiring neurosurgical management and other surgical interventions – tracheotomy and feeding tube.

- **SBS** involves violent shaking producing acceleration--deceleration within brain cavity; non-accidental trauma accounts for ~ 24% of TBIs in children under two years of age; peak age is 6 – 24 months; males > females; most survivors have severe brain damage, neuro-developmental abnormalities, learning disabilities, behavior disorders, impaired motor & cognitive skills, seizures, etc.

Traumatic Brain Injuries (continued)

- **Infant's Vulnerability Due To**:
  -- Heavy head; weak neck muscles; larger intracranial space; and,
  -- Size & strength difference between victim and offender.

- **Mechanism of Brain Injury:**
  -- Shaking occurs
  -- Destruction of brain tissue
  -- Immediate swelling of brain tissue
  -- Increased pressure within skull
  -- Compression of blood vessels
  -- Decreased oxygen supply & nutrients to brain

- Cortes, Cindy. "Overview of Pediatric Nursing." MEDBRIDGE –Accessed12/2021

Traumatic Brain Injuries (continued)

- In school age children & adolescents, most common causes of TBI:
  - -- Motor Vehicle Accidents (MVA) – Automobile accounts for largest number of deaths from unintentional injury;

    Leading cause of death in 5 to 24 year old;

    Second leading cause of death in 1 to 4 year old.
  - -- Sports-related head injuries
  - -- Assaults.

Traumatic Brain Injuries (continued)

Classifications of TBI:

- **Mild TBI**:
  - -- Loss of consciousness for less than 30 minutes;
  - -- Initial GCS or Pediatric GCS 13-15 after 30 minutes of injury onset.
  - -- Post-traumatic amnesia for not more than 24 hours.
  - -- Symptoms of headache, fatigue, balance & sleep disturbances.

- **Uncomplicated Mild TBI:**
  - -- No overt neuro-imaging findings.

- **Complicated Mild TBI:**
  - -- Intracranial abnormalities seen on CT scan or MRI (bruising or collection of blood in brain).

Traumatic Brain Injuries (continued)

- **Moderate TBI**:
  - -- Loss of consciousness
  - -- Post-traumatic amnesia for 1-24 hours
  - -- GCS of 9-12
  - -- Clinical manifestations may include vomiting, cognitive deficits, language impairments, difficulty eating & swallowing.
- **Severe TBI**:
  - -- Loss of consciousness for more than 24 hours
  - -- Post-traumatic amnesia for more than 7 days
  - -- GCS of 3-8
  - -- Clinical manifestations may include elevated ICP, loss of gag reflex, bradycardia & altered breathing pattern.

Traumatic Brain Injuries (continued)

- **Concussion**:

  -- Most common pediatric TBI.

  -- May cause temporary disruption in neurological function.

  -- **Most common complaint after concussion is headache.**

  -- Other symptoms may include cognitive challenges, sleep disturbances and fatigue.

  -- Most children recover quickly and return to baseline; some may experience post-concussion syndrome.

Traumatic Brain Injuries (continued)

TBI Treatment:

-- **Initial Stabilization**: Adequate oxygenation & maintaining cerebral perfusion – medical management / treatment

-- **Long-Term Rehabilitation**:

PT & OT: Restore strength, maximize mobility and self care skills & reintegrate child into home, school / community.

SLP: Assist with cognition, speech difficulties, memory deficits, short attention spans, ineffective problem solving and lack of overall executive functioning.

Swallowing difficulties may require use of feeding tubes & later thickened, pureed, & mechanical soft diets.

TEAM: Adhere to behavioral program to address behavioral deficits, impulsivity, aggression and personality changes.

Traumatic Brain Injuries (continued)

Long-Term Rehabilitation:

Nursing:

-- Provide ongoing psychosocial support to patient and family; caregiver burden can create psychological and emotional stress which may affect child's recovery.

-- Parents may develop relationship strain, which can adversely affect overall function of the family. Provide support for family by allowing expression of feelings and referring family to support groups and other services.

CEREBRAL VASCULAR ACCIDENT / STROKE

Cerebral Vascular Accidents

- **CVA / Stroke – Definition**: Interruption in blood flow to an area of the brain; caused by a ruptured blood vessel or blood clot. This interruption in perfusion causes brain cells to begin to die, which can cause temporary or permanent brain damage.

- **Clinical Manifestations:** Similar to those in adults: sudden onset; vomiting; unilateral weakness; paralysis or numbness; confusion; slurred speech, impaired vision. Some may present with new-onset seizures followed by paralysis and weakness.

- ***Children & teenagers who experience hemorrhagic strokes may report that they are having "the worst headache of my life."***

Cerebral Vascular Accidents

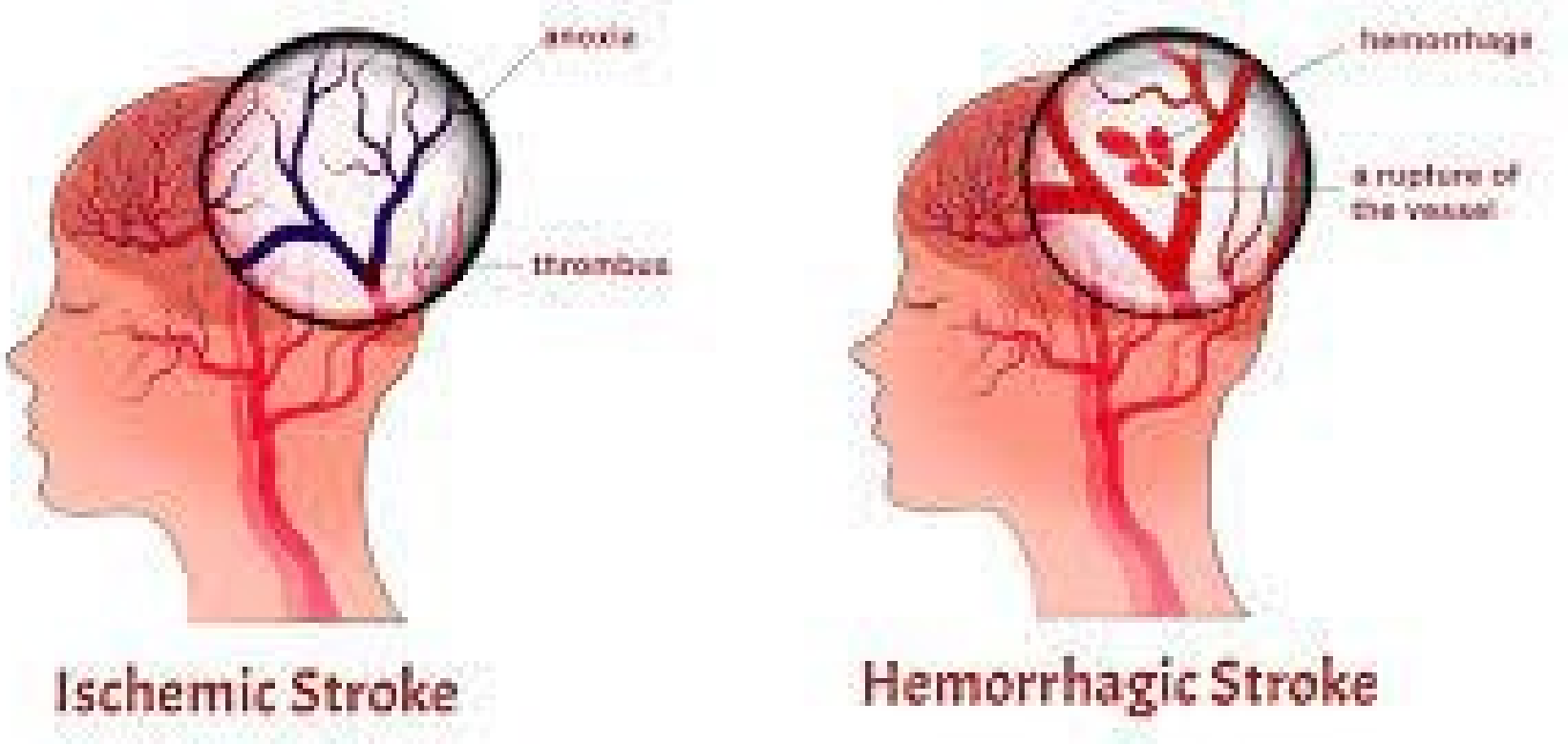
(continued)

- **Deficits:** Newborns and infants may have less evidence of stroke until they reach age 4-6 months.

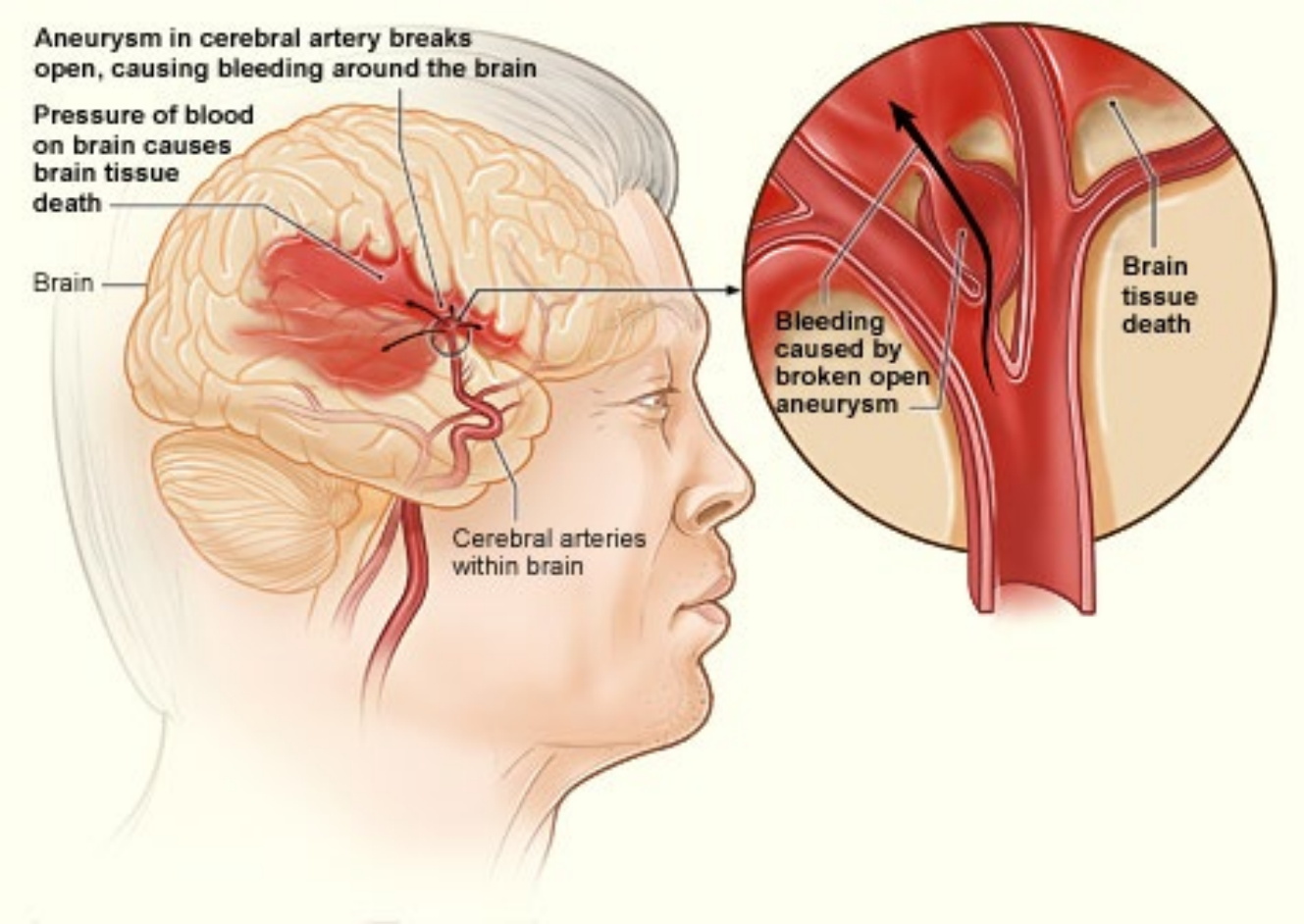
- **Leading Cause of Death:** 6th leading cause of death in children & affects ~ 12 in 100,000 younger than 18 years of age.

- **Incidence Rate/Increased Risk:** Certain pediatric groups have increased risk of Stroke (congenital heart defects, sickle cell anemia and clotting disorders).

Two Types of Stroke



- **Kent, Robert. CVA: Pathology, Rehabilitation & Medical Complications (12/10/2021)**



- **Kent, Robert. CVA: Pathology, Rehabilitation & Medical Complications (12/10/2021)**

Cerebral Vascular Accidents

(continued)

CVA/Stroke Treatment:

Acute Phase:

-- Supportive measures provided/designed to minimize brain injury and restore brain tissue perfusion.

-- **Use of thrombolytic drugs not recommended** for routine use (i.e. pediatric stroke guidelines).

-- **Safety of mechanical interventions designed to re-canalize cerebral arteries has not been established for pediatric patients.**

-- For Ischemic Strokes, anti-thrombotic medications are used to prevent development of new blood clots (anticoagulant – heparin; antiplatelet – aspirin).

Cerebral Vascular Accidents

(continued)

Long-Term Rehabilitation:

PT: Focus on modalities to improve strength, ROM, transferring from bed to W/C, and gross motor functions.

OT: Focus on modalities for maximizing fine motor skills and ADLs. Collaborate with nursing on bowel/bladder program.

NOTE: Constraint-Induced Movement Therapy (restraint of less impaired limb for period of time) has been shown to improve muscle strength in upper extremities of children after a Stroke.

SLP: Assist with cognition, speech difficulties, memory deficits, short attention spans, and ineffective problem solving.

TEAM: Adhere to behavioral program to address behavioral deficits, impulsivity, difficulty following directions, and impaired executive functioning.

Cerebral Vascular Accidents

(continued)

Long-Term Rehabilitation:

Nursing:

Provide ongoing psychosocial support for patient and family which is critical in helping them manage the long-term effects of Stroke.

Develop a comprehensive person-centered plan of care which includes the family's specific needs.

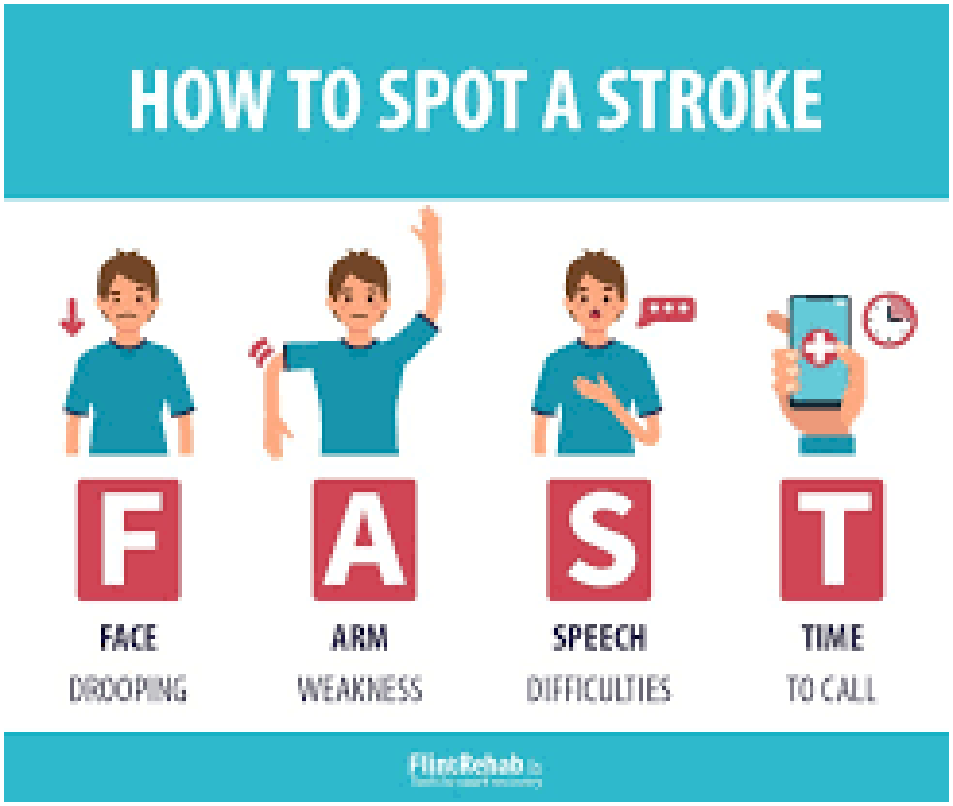
Engage support groups to educate family on what to expect and how to best support the patient.

Include counselors to assist older children with coping, managing depression, anger, and poor body image related to their condition.

Cerebral Vascular Accidents

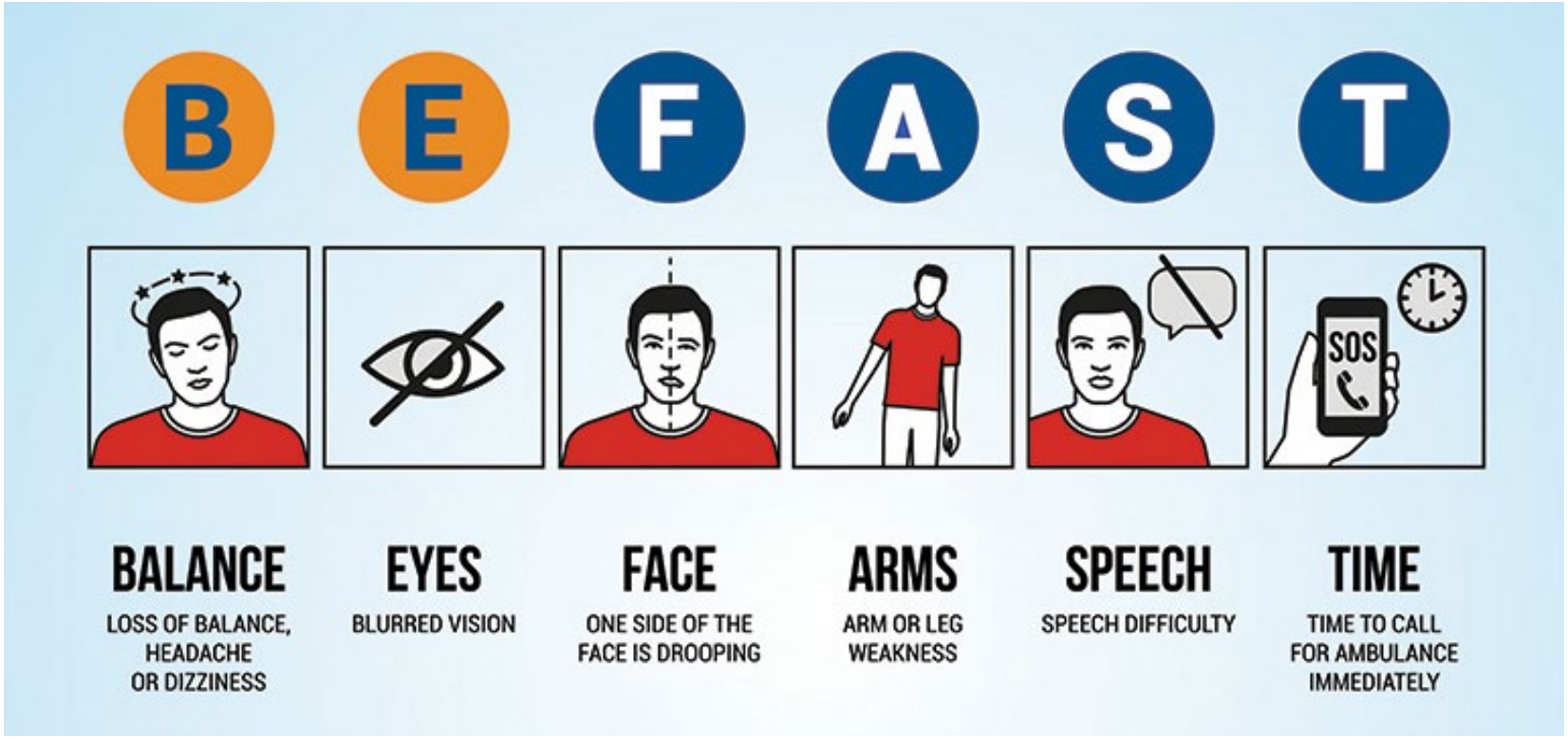
(continued)

Provide education for patient & family: "Warning Signs of Stroke"



Cerebral Vascular Accidents

(continued) – Updated Warning Signs



SPINAL CORD DYSFUNCTION

SPINAL CORD DYSFUNCTION

- **Spinal Cord Dysfunction - Definition**: Traumatic or acquired insult to the spinal cord resulting in alterations or complete disruption of normal motor, sensory, and autonomic function.

- **Clinical Manifestations:** Body systems affected may include muscular/skeletal, neurological, metabolic, cardiovascular, respiratory, gastrointestinal, genitourinary, and integument. In addition, there may be spasticity and pain.

- Cortes, Cindy. "Overview of Pediatric Nursing." MEDBRIDGE –Accessed12/2021

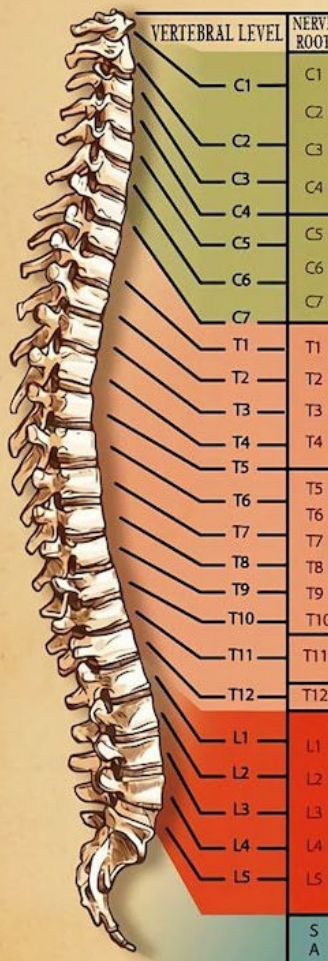
SPINAL CORD DYSFUNCTION

(continued)

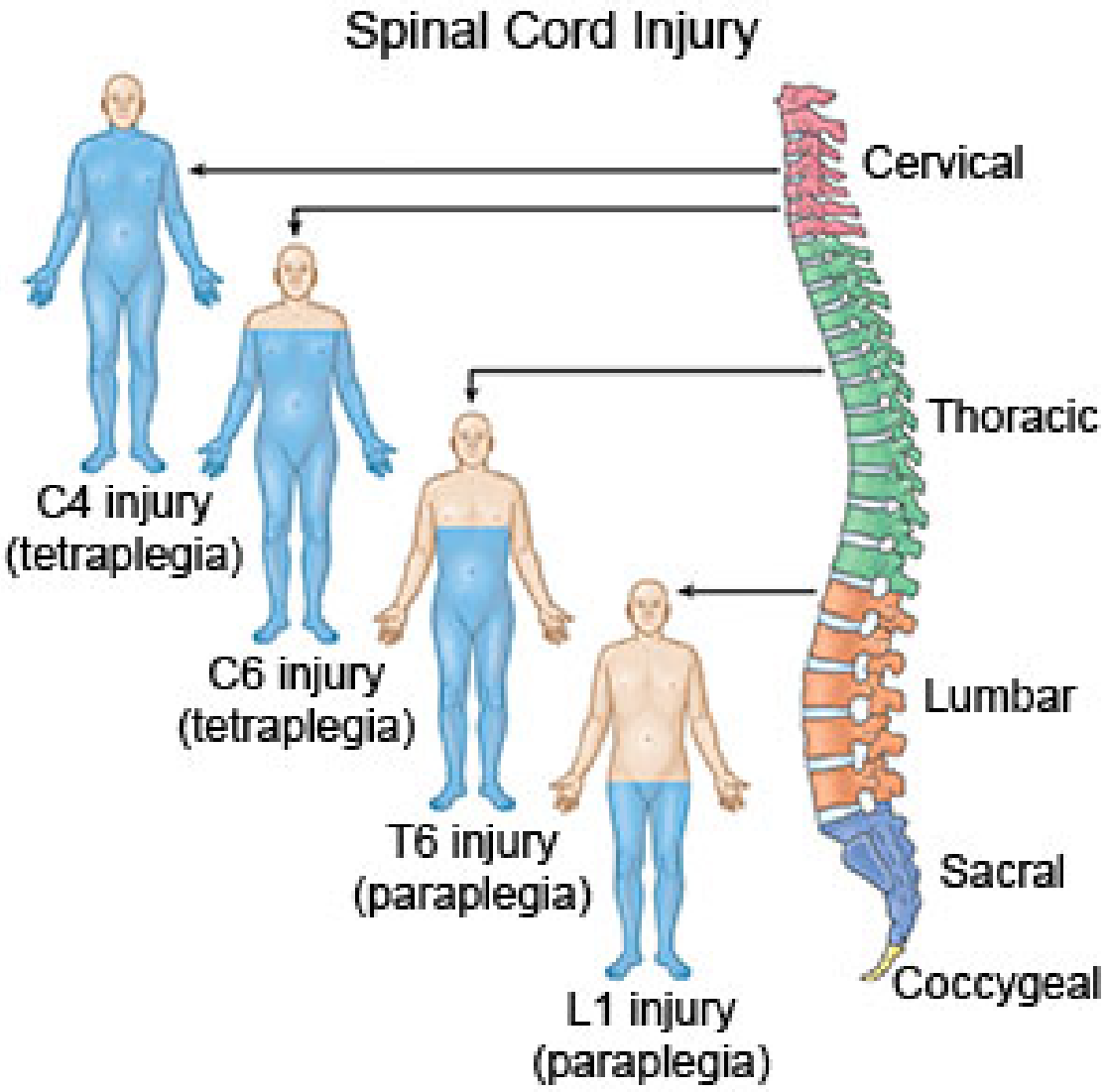
- **Deficits:** Extent and location of injury (spinal cord level) determines the severity of symptoms. Common assessment findings include loss of sensation, loss of motor function, weakness, and abnormal reflexes. The "American Spinal Injury Association Impairment Scale" is often used to classify the extent of injury:

- **Mortality Rate:** Less than 5% and most commonly occurs in children who experience motor vehicle accidents (traumatic brain injury and upper cervical spine injuries).

SPINAL NERVE FUNCTION



VERTEBRAL LEVEL	NERVE ROOT	INNERVATION	POSSIBLE SYMPTOMS
C1	C1	Intracranial Blood Vessels • Eyes • Lacrimal Gland • Parotid Gland • Scalp • Base of Skull • Neck Muscles • Diaphragm	Headaches • Migraine Headaches • Dizziness • Sinus Problems • Allergies • Head Colds • Fatigue • Vision Problems • Runny Nose • Sore Throat • Stiff Neck • Cough • Croup • Arm Pain • Hand and Finger Numbness or Tingling • Asthma • Heart Conditions • High Blood Pressure
C2	C2		
C3	C3		
C4	C4		
C5	C5	• Neck Muscles • Shoulders • Elbows • Arms • Wrists • Hands • Fingers • Esophagus • Heart • Lungs • Chest	
C6	C6		
C7	C7		
T1	T1	Arms • Esophagus • Heart • Lungs • Chest • Larynx • Trachea	Wrist, Hand and Finger Numbness or Pain • Middle Back Pain • Congestion • Difficulty Breathing • Asthma • High Blood Pressure • Heart Conditions • Bronchitis • Pneumonia • Gallbladder Conditions • Jaundice • Liver Conditions • Stomach Problems • Ulcers • Gastritis • Kidney Problems
T2	T2		
T3	T3		
T4	T4		
T5	T5	Gallbladder • Liver • Diaphragm • Stomach • Pancreas • Spleen • Kidneys • Small Intestine • Appendix • Adrenals	
T6	T6		
T7	T7		
T8	T8		
T9	T9		
T10	T10		
T11	T11	Small Intestines • Colon • us	
T12	T12	Uterus • Colon • Buttocks	
L1	L1	Large Intestines • Buttocks • Groin • Reproductive Organs • Colon • Thighs • Knees • Legs • Feet	Constipation • Colitis • Diarrhea • Gas Pain • Irritable Bowel • Bladder Problems • Menstrual Problems • Low Back Pain • Pain or Numbness in Legs
L2	L2		
L3	L3		
L4	L4		
L5	L5		
	SACRAL	Buttocks • Reproductive Organs • Bladder • Prostate Gland • Legs • Ankles • Feet • Toes	Constipation • Diarrhea • Bladder Problems • Menstrual Problems • Lower Back Pain • Pain or Numbness in Legs


Spinal Cord Injury
Cervical
Thoracic
Lumbar
Sacral
Coccygeal
C4 injury
(tetraplegia)
C6 injury
(tetraplegia)
T6 injury
(paraplegia)
L1 injury
(paraplegia)

SPINAL CORD DYSFUNCTION

(continued)

- **Incidence Rate:** SCIs are rare in pediatric patients and are approximately 2% of total SCIs annually.

-- Overall, males have a higher incidence of SCI than females (1.5 – 1).

-- Cervical spine injuries more common in children younger than 8 years of age due to large head-to-body ratio.

-- Thoracic-lumbar spine injuries more common in children 8 years of age and older.

-- **60% to75% of SCIs occur in the neck area; 20% affect the chest & upper back; 5% to 20% involve the lower back.**

https://www.orthobullets.com/spine/2068/pediatric-spinal-cord-injury

Spinal Cord Injury | Boston Children's Hospital (childrenshospital.org)

SPINAL CORD DYSFUNCTION
(continued)

Causes:

MVA = 38% (major cause in pediatric patients)
Falls = 30.5%
Violence/Abuse = 13.5%
Sports = 9%
Other = 9%

Acquired:

Transverse Myelitis (immune-mediated CNS disorder)
Spinal Cord Tumor (rare in children)
Birth Trauma (most common cause of infant SCI)

Cortes, Cindy. "Overview of Pediatric Nursing." MEDBRIDGE –Accessed12/2021

SPINAL CORD DYSFUNCTION
(continued)

- **Treatment:** **Immediately after SCI, patient treated for spinal shock**. This may result in temporary loss of sensation and motor function which may return to normal once swelling subsides (i.e. TX modalities: corticosteroids, mechanical ventilator, feeding tube; foley catheter).

  An **interdisciplinary team approach is KEY** to the patient's recovery from the SCI which begins with the development of the "Comprehensive Patient Centered POC."

- **Recovery:** **Requires long-term hospitalization & rehabilitation.** Tends to be better in children than adults because of the flexibility of the spine for children (**which tends to decrease with age).**

SPINAL CORD DYSFUNCTION
(continued)

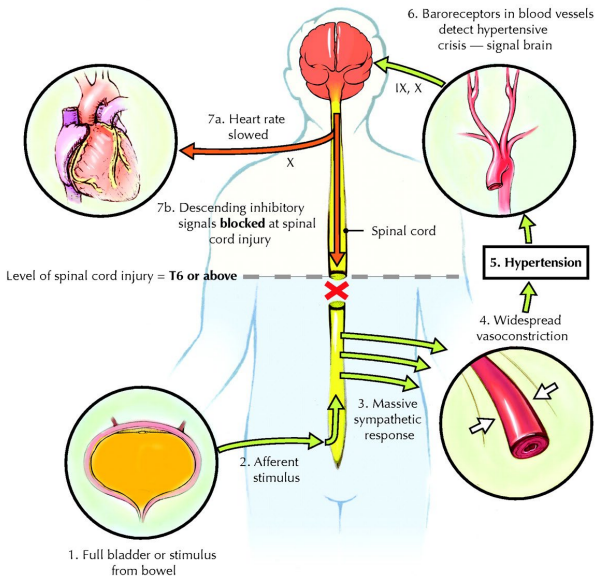
- **Rehabilitation Focus – Interdisciplinary Team:**
  -- Improve muscle strength for performance of mobility skills;
  -- Develop core strength for performance of ADLs;
  -- **Prevent long-term complications:**
  Scoliosis which may occur in children when SCI occurs before age of 12 years (before child's growth spurt).
  Joint Contractures (stretching and passive ROM essential)
  Bowel Dysfunction (chronic constipation & incontinence) & **Bladder Dysfunction** (retention, UTIs)
  Depression (early identification of at-risk youth followed by prompt referral and intervention is critical)
  Family Psycho-Social (ongoing support, education, referral)

SCI – Medical Emergency

Autonomic Dysreflexia (SCI at T-6 or Above)

Triggers:

- Full bladder or UTI
- Fecal Impaction
- Pressure Area/Skin
- Restrictive Clothing



Presentation: T-6 or above Vasodilation	Presentation: Below T-6 Vasoconstriction
o Elevated BP – Rapid/Severe o Flushed Face o Headache o Distended Neck Veins o Increased Sweating o Decreased Heart Rate	Pale Skin Cool Skin No Sweating

BURNS

BURNS (continued)

- **Leading cause of unintentional death and injury in children younger than fourteen (14) years.**
- Five percent (5%) of burns considered severe or moderate and necessitate hospitalization (specialized burn center to improve long-term outcomes).
- **Most burns occur at home and are preventable.** Children under age of five (5) are naturally curious and have limited ability to recognize potentially dangerous situations.
- **SCALDS from hot liquids** (soup, tea, coffee, boiling water, hot milk) account for majority of burns in children under age of five (5); upper body (head, neck and trunk) most commonly burned.
- **Older children tend to be injured by flame burns**, which have a higher mortality rate than scalds.

BURNS (continued)

- **Immediately after burn, prompt fluid resuscitation** is warranted to prevent burn shock and possible death.
- Burns can cause disfiguring scars and physical deformities as well as psychological effects (depression, anxiety, altered body image, social withdrawal).
- **Burns can be caused by intentional abuse**; most common are scalds and contact burns (hot liquids, hair straightening irons, cigarettes, radiators); immersion burns in hot water are common on the buttocks and genitals (defined borders); burns may be bilateral with symmetrical patterns.
- ***Clinicians should suspect intentional burn injury when it is reported as being self-inflicted, history of previous burn, or explanation that does not fit burn injury.***
- ***Parents may also report a triggering event such as child soiling self before sustaining injury.***

BURNS (continued)

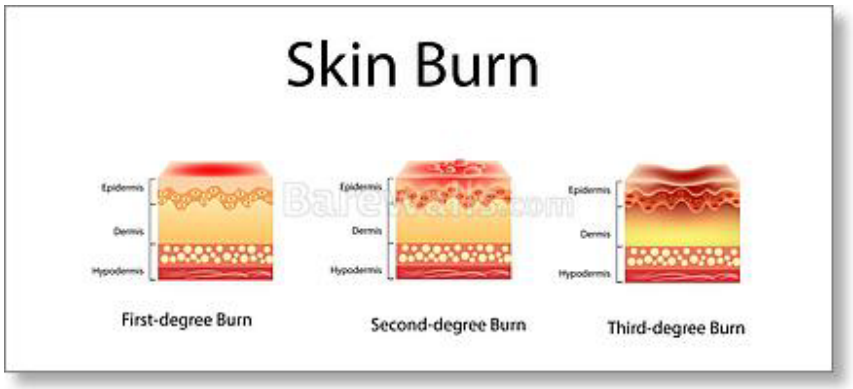
- Classified based upon body surface area involved & depth of burn:

  -- ***1st Degree (Epidermis):*** Erythematous, blanches to touch, may be painful, heals spontaneously, no scarring.

  -- ***2nd Degree (Superficial Partial Thickness):*** Blanches to touch, blisters, painful, heals spontaneously, low risk of scarring.

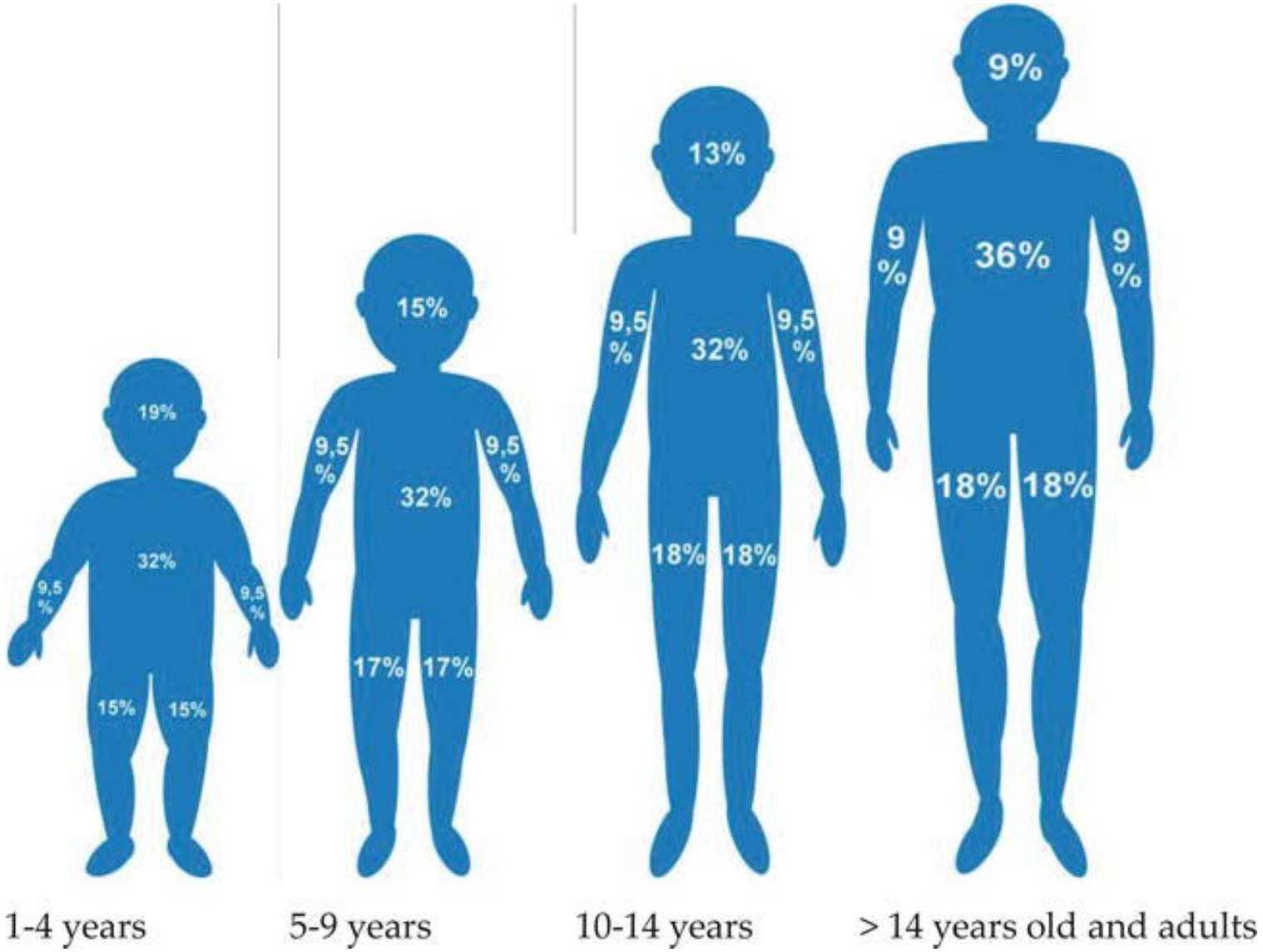
  -- ***2nd Degree (Deep Partial Thickness):*** Does not blanch, appears pale with large blisters, may be painful or reduced sensation, will not heal spontaneously, moderate/high risk scarring.

  -- **3rd Degree:** No blisters, appears white, black or cherry red; no sensation, requires surgery for healing, will scar.



bwc56963312 Barewalls

BURNS: Rule of Nines



BURNS (continued)

Multi-System Involvement:

- Cardiovascular
- Respiratory
- Gastrointestinal
- Renal
- Hepatic
- Neuromuscular
- Immune System
- Integumentary
- Nutritional
- Thermal Regulation

Complications:

- Skeletal Muscle Catabolism
- Infections (UTI, Pneumonia; Wound / Cellulitis)
- Contractures
- Functional Deficits
- Hypertrophic Scars
- Disfiguring Scars
- Psychological (depression, stress, anxiety, altered self image, social withdrawal)

SPINA BIFIDA

SPINA BIFIDA (continued)

- **Congenital condition that affects the spine and occurs when the neural tube does not close all the way.**
- Neural tube is the structure in a developing embryo that eventually becomes the baby's brain, spinal cord & tissues that enclose them.
- Causes physical & intellectual disabilities; ranges from mild->severe.
- Severity of condition depends upon nerve involvement, size & location of opening and whether spinal cord involved.
- **Annually, ~ 1500 babies born with Spina Bifida; highest incidence in Hispanic population**.
- Management of condition includes corrective surgery, bowel/bladder training, shunt placement & rehabilitation.

SPINA BIFIDA (continued)

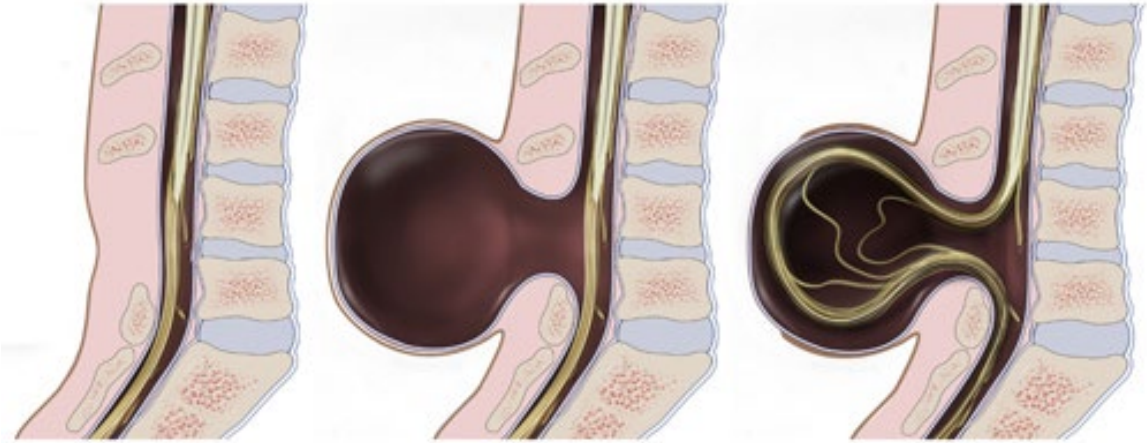
- Most types of Spina Bifida diagnosed during pregnancy or shortly after birth.
- *Non-invasive "Prenatal Screening"* includes:

  -- Ultrasound

  -- Blood testing for alpha-fetoprotein (AFP)
- *Invasive screening* – "**Amniocentesis"** to test for high levels of AFP; **carries high risk for mother & baby.**
- After baby born, *presence of dimple or hairy patch of skin on baby's back* –> further diagnostic testing to confirm Spina Bifida (MRI, CT).
- ***Current Guidelines***: Women should take ***400 micrograms of folic acid daily***, even if they are not currently planning to conceive.

SPINA BIFIDA (continued)

- **Types of Spina Bifida:**



Spina bifida occulta Meningocele Myelomeningocele

SPINA BIFIDA (continued)

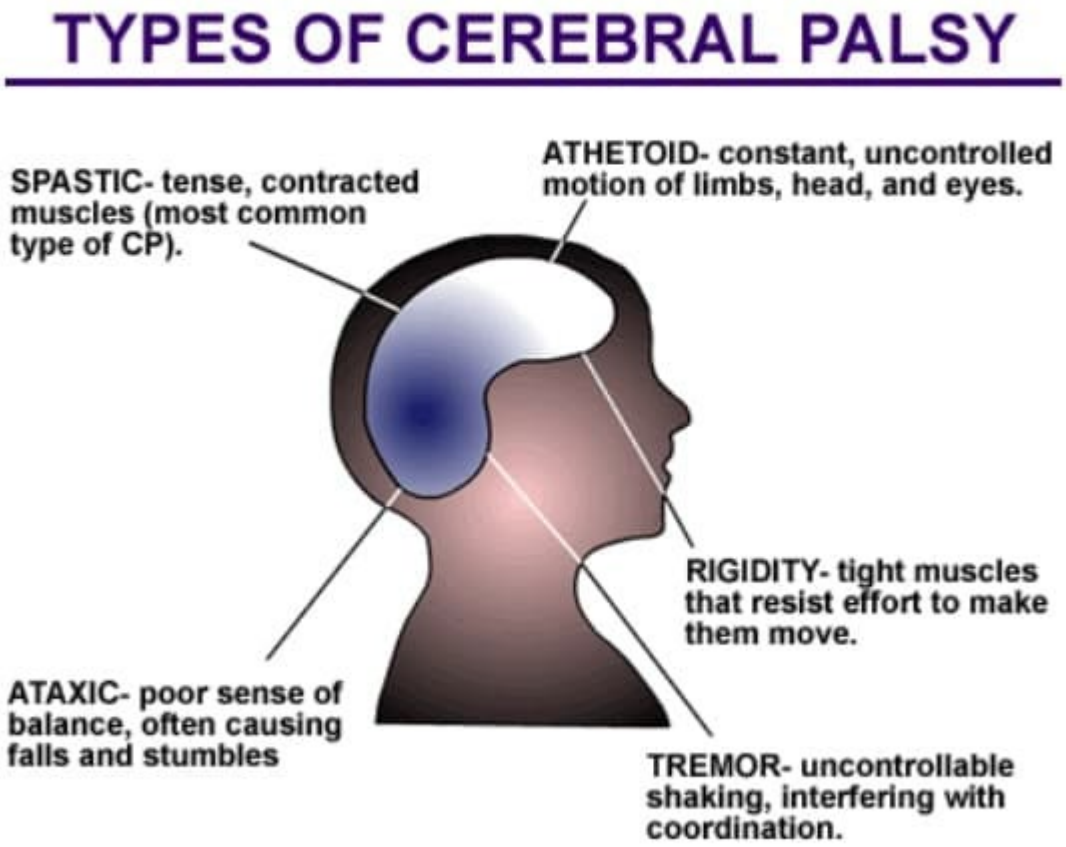
- **Spina Bifida Occulta:** Mildest type & usually does not cause any disabilities; sometimes called “Hidden Spina Bifida” - small gap in the spine; NO opening or sac on the back; spinal cord & nerves usually normal. Often, not discovered until late childhood/adulthood.
- **Spina Bifida Meningocele**. Sac of fluid comes through an opening in the baby’s back; spinal cord is NOT in this sac; usually little or no nerve damage; may cause minor disabilities.
- **Spina Bifida Myelomeningocele:** Most serious type; sac of fluid comes through an opening in baby’s back. Part of the spinal cord & nerves are in this sac and are damaged causing moderate to severe disabilities (paralysis, bowel/bladder issues, hydrocephalus).
- https://www.cdc.gov/ncbddd/spinabifida/facts.html

SPINA BIFIDA

- **Treatment – Initial Stabilization:** Varies among Healthcare Providers. Children with open Myelomeningocele often undergo brain and spine surgeries, before 1st birthday.
- Hydrocephalus common complication; typically requires ventricular peritoneal shut to drain excess cerebral spinal fluid from brain.
- **Long-Term Rehabilitation:** Address functional deficits, mobility problems, bladder incontinence (intermittent catherization), constipation vs. intractable fecal incontinence (bowel program), pressure ulcers/skin injuries, long term psychosocial needs.
- **NOTE: Healthcare providers should avoid latex since many patients with Spina Bifida develop latex sensitivity.**

CEREBRAL PALSY

http://www.livingwithcerebralpalsy.com/images/default258.gif



CEREBRAL PALSY

- **Cerebral Palsy (CP) is a neuromuscular condition caused by damage to the developing brain (brain damage may occur between conception and first year of child's life).**
- Exact cause not know; lack of oxygen to brain related to birthing conditions is thought to be a less common cause.
- **Spastic CP is the most common type (80% with CP).** Functional effects vary greatly (stiff muscles, exaggerated reflexes, rigidity, developmental delays - sitting up or crawling, etc.) and may include cognitive delays and learning disabilities. Common comorbities: blindness, deafness, abnormal touch perception, epilepsy.
- **Acquired CP usually associated with a head injury or infection (i.e. meningitis that occurs more than 28 days after birth).**

CEREBRAL PALSY (continued)

- **General Movement Assessment:** Involves measuring movement that occurs spontaneously among those less than 4 months of age and appears to be the more accurate test for CP. Once diagnosed as CP, may require MRI & CT to determine cause.
- **No cure for CP**, early intervention using an interdisciplinary approach increases child's long-term independence addressing problems with chewing, sucking, swallowing, communication, fine motor skills / finger dexterity, gross motor skills / walking & transferring, use of adaptive equipment & orthotics / wheelchairs, walkers, braces, managing pain / stiffness – botulinum toxin injections, baclofen pump insertion, etc.
- **Psychosocial needs** of patient/family must be addressed early – positive body image; sex education must begin early and focus on boundaries (distinguish between "good" and "bad" touch).

DOWN SYNDROME

DOWN SYNDROME

- ***Chromosomal Condition***, also known as ***Trisomy 21 (presence of all or part of a 3rd copy of chromosome 21).***
- Genetic disorder **affects one in every 700 babies born each year.** Additional genetic material changes course of development and causes clinical manifestations associated with Down Syndrome.
- Although parents of affected child typically do not have any genetic abnormalities, the probability of this condition increases from 0.1% in 20 year old mothers to 3% in mothers over 45 years of age.
- Diagnosis: Prenatal Screening – maternal serum tests for AFP and neural tube defects. Positive results may be followed by invasive tests (amniocentesis or chorionic villus sampling). At birth – Karyotype / chromosomal analysis confirms diagnosis.

Physical Features

- Excess skin at the nape of the neck
- Separated joints between the bones of the skull (sutures)
- Small ears
- Small mouth
- Wide, short hands with short fingers
- White spots on the colored part of the eye (Brushfield spots)

DOWN SYNDROME (continued)

- ***No cure for Down Syndrome***. Individualized multidisciplinary team approach to meet the needs of the child and family is paramount.
- **Therapy should be started early** to improve balance, coordination, and posture and as child grows older to prevent obesity and cardiovascular related health problems.
- **Aquatic therapy** helpful to build core strength.
- **Community based exercise program** may also be beneficial for older children to decrease obesity and improve social participation.
- **Speech therapy** may be needed to improve language function and speech problems related to **large tongue and hypotonia.**

Resources - Summary

- **ARN Website**

  -- The Specialty Practice of Rehabilitation Nursing: A Core Curriculum, 8th edition (2019)

  -- CATs (Competency Assessment Tests)

  -- CRRN Flashcards

  -- PRN Online Course (20 CEU)

  -- Online CRRN Practice Test

  -- CRRN Tips & Tricks Webinar

  -- CRRN Review: A Knowledge Check

Resources - Summary

- **Additional Websites – Practice Questions:**

https://www.test-questions.com/crrn-exam-questions-01.php

www.rehabclassworks.com

https://www.testprepreview.com/crrn.htm

https//www.mometrix.com/academy/crrn-practice-test

www.mo-media.com/crrn

- Thanks goes to ALL our Health Care Teams
- We are living through a Historic Pandemic.
- By working together, we will get through this.
- Continue to protect yourself and loved ones.

If you have any questions, you are welcome to contact me:

Rose Brungardt
RBrungardt@MileStoneHealth.com

Thank You.