Stroke

1. **A general term for acute brain damage caused by disease of the blood vessels.**
2. **A stroke occurs when the blood supply to the part of the brain is suddenly interrupted (ischemic) or when a blood vessel in the brain bursts, spilling blood into the spaces surrounding the brain cells (hemorrhagic).**
3. **Brain cells die when they no longer receive oxygen and nutrients from the blood or when sudden bleeding into or around the brain damages them. These damaged cells can linger in a compromised state for several hours.**
4. **With timely treatment, these cells can be saved.**
    a. Onset is rapid
    b. Produces focal injury
    c. Causes damage to brain cells
    d. Three (3) ways tissue-damage occurs:
        i. Bio-chemical changes
        ii. Autolysis
        iii. Edema
5. **Two (2) types of strokes**
    a. Ischemic stroke 87%
        i. Focal areas of the brain receive diminished or no blood supply due to vessel occlusion (DRY).
        ii. Cryptogenic stroke (CS)
            1) Defined as cerebral ischemia of obscure or unknown origin
            2) The cause of CS remains undetermined because the event is transitory or reversible.
    b. Hemorrhagic stroke 13%
        i. Spontaneous rupture of cerebral blood vessels
        ii. Resulting in blood entering the brain tissue or arachnoid space. (WET)

6. Activity: stroke symptoms

a. _____
b. _____
c. _____
d. _____
e. _____
f. _____
g. THINK (FAST):
    i. F _____
    ii. A _____
    iii. S _____
    iv. T _____

7. **Facts about stroke**
    a. 5th leading cause of death in Western countries; primary cause of serious disability. (death ratio 1:20)
    b. Two million brain-cells die every minute during stroke, increasing risk of
        i. Permanent brain damage
        ii. Disability
        iii. Death
    c. More than 795,000 people have a stroke each year in the United States. (610,000 new and 185,000 recurring).
    d. A stroke occurs every 40 seconds. About 610,000 of these are first or new strokes.
    e. About 185,000 strokes (nearly one of four) are in people who have had a previous stroke.
    f. One American dies from stroke every 4 minutes. Although stroke risk increases with age, strokes can—and do—occur at any age. In 2009, 34% of people hospitalized for stroke were younger than 65 years.
    g. Elderly and African Americans are at the highest risk.
        i. African Americans have almost twice the risk of first-ever stroke compared with whites.
        ii. African Americans have a higher prevalence of stroke risk factors:
            1) ↑ B/P: The rate of high blood pressure in African Americans is among the highest in the world.
            2) Diabetes mellitus
            3) Obesity
            4) Poor dietary habits
            5) Physical inactivity
        iii. African Americans as a group are less likely to receive or ask for information on how to decrease, prevent, or manage stroke.

8. **American Stroke Association has found:**
    a. 55 % of all strokes occur in women.
    b. 60% of all deaths occur in women.
    c. Children (6 out 100,000 per year)
    d. The fact that risk goes up with age and that women live longer than men accounts for a large portion of that difference.
    e. 25 % of people who recover from their first stroke will have another stroke within 5 years.
    f. The "Stroke Belt" Southeastern US 11 states:
        i. MS #1
        ii. IN
        iii. TN
        iv. KY

v. VA
vi. NC
vii. SC
viii. GA
ix. AL
x. AR
xi. LA

9. Children and stroke

a. Childhood stroke occurs between 1 month and 18 years.
b. About 6 cases /100,000 children per year
c. Top 10 causes of death in children in US
d. In-utero stroke-perinatal and prenatal
e. Those that have within first month of life at risk for CP
f. Causes:
    i. Cryptogenic
    ii. Birth defects
    iii. Infections
    iv. Trauma
    v. Blood disorder

10. Activity: stroke risk factors

Risk Factor	Unable to Change	Able to Change	If you can change the risk factor, how would you do it?
Age			
Blood Pressure			
Weight			
Ethnicity			
Family history			
Lifestyle (smoking, passive smoking, alcohol, illicit drugs, and inactivity)			
Diabetes mellitus			
Metabolic syndrome			
Coronary artery disease (CAD) and heart failure (HF)			
Cholesterol			

CRP			
Gender			
Sleep Apnea			

11. Classifications of ischemic strokes 87%

Classification	Characteristics
TRANSIENT ISCHEMIC ATTACK (TIA)	Episode of temporary focal dysfunction of vascular onset
	Rapid onset
	Duration varies from 1-15 minutes (No longer than 24 hours)
	No residual deficits Of the approximately 50,000 Americans who have a TIA each year, about one-third will have an acute stroke sometime in the future
CEREBRAL THROMBUS (42%)	Caused by atherosclerotic plagues, which cause the blood vessels to narrow. Can also lead to a tear of a weakened wall
	Triggering of the clotting process, leading to narrowing of blood vessels
CEREBRAL EMBOLISM (25%)	Traveling clot, usually originating from thrombi in the heart or aortic arch
	Becomes jammed in the cerebral vessels and obstructs blood flow
LACUNAR INFARCT (35%)	Thrombotic occlusion in the small deep cerebral arteries
	Produces small lesions, oval, which pit and are deep within the brain
	Usually develops in the pons or thalamic pathways
	Purely motor or purely sensory deficits
(<5%) REVERSIBLE ISCHEMIC NEUROLOGICAL DEFICIT	Episode of temporary focal dysfunction of vascular origin
	Time of onset varies. Takes days to resolve
	No residual deficits after 2 weeks
SYSTEMIC HYPO-PERFUSION	Small distal cerebral arteries not receiving adequate blood flow
	Cardiac pump failure or hypovolemia are the cause of this event

12. Classification of hemorrhagic strokes – 13%

Classification	Description

SUBARACHNOID HEMMORRHAGE 3%	Occurs when there is spontaneous rupture of the cerebral vessels and blood enters the subarachnoid space surrounding the brain Since the CSF flows throughout the cranium, within the spaces of the brain, subarachnoid hemorrhage can lead to extensive damage throughout the brain. In fact, subarachnoid hemorrhage is the deadliest of all strokes
INTRACEREBRAL HEMMORRHAGE 10%	Rupture of small, deep vessels of the brain, releasing blood directly into the brain

13. Left-brain stroke vs. right-brain stroke

Left Brain	Right Brain
Right hemiparesis or hemiplegia	Left hemiparesis or hemiplegia
Right homonymous hemianopsia	Left homonymous hemianopsia
Impaired ability to think analytically	Impaired judgment/perception
Difficulty sequencing and preplanning	Distractible – short attention span
Lack of initiation	Impulsive and disinhibited
Impaired recognition	Poor follow through on tasks
Cautious, anxious, hesitant	Labile
Low frustration tolerance	Unrealistic
Inability to interpret symbols	Anosognosia (denial of deficits)
Inability to do mathematical calculations	Inability to perceive performance errors
Does better with demonstration than verbal instruction	Does better with verbal instruction than gestures
Impaired communication	Able to communicate
Broca's aphasia	Somatognosia (body parts)
Wernicke's aphasia	Left neglect
Global aphasia	Reading comprehension
Speech apraxia	Speed and time distortions
Dysarthria	Music dysfunction
Left/Right discrimination	

a. Possible consequences of both sides
    i. Neurogenic bladder and bowel (uninhibited)
    ii. Dysphagia
    iii. Fatigue
    iv. Seizures
b. Psychosocial alterations
    i. Depression # 1
    ii. Dependence in activities of daily living (ADLs)
    iii. Decreased self-esteem
    iv. Altered role performance
    v. Sexual dysfunction
    vi. Change in social and leisure activities

vii. Decreased financial earning and/or decreased vocational/volunteer capacity

Physical Consequences	Behavioral Consequences	Cognitive Consequences
Seizures	Mood swings-temper flare	Short and long-term
Motor- paralysis, weakness	ups' ↓frustration tolerance	memory deficits
spasticity flaccidity	Agitation and aggression	Slowness of thinking and
Double vision or low vision	Personality changes	expressing thoughts
Loss of or change in smell,	Depression and/or anxiety	Denial of disability
taste, hearing vision	Difficulty with emotional	(Anosognosia)
Cranial nerve impairment	control	Problems with reading,
Swallowing disorders	Lacks anger management	writing and math skills
Bowel and bladder issues	Egocentricity	Difficulty maintaining
Sexuality- Hyper/hypo	Inability to self-monitor	attention and concentration
Headaches/other pain	responses	Impairments of perception,
Fatigue/sleep disturbances	Lack of motivation	communication, reasoning,
Balance problems and	Difficulty relating to others	problem solving, planning,
coordination	Delusions/mania	sequencing, and judgment

14. Medical treatments:

a. 63 percent of American reside an hours' drive from the top stroke-care centers.
b. Around one third of Americans lives nearly one hour drive away from primary stroke center (2015, American Stroke Association {ASA})

i. Medication is the most common treatment for stroke.

ii. The most popular classes of drugs used to prevent or treat stroke are:

1) Anti-thrombotics (anti-platelet agents and anticoagulants)

a) Acetylsalicylic acid {ASA} (Aspirin)

b) Warfarin (Coumadin™)

c) Heparin (Hep-Lock)

2) Thrombolytics ex alteplase (tPA™): Thrombolytic therapy cannot be used until the doctor can confidently diagnose the patient as suffering from an ischemic stroke because this treatment might increase bleeding and could make a hemorrhagic stroke worse.

a) Thrombolytics ex tPA™ must be given within 4.5 hours of onset of symptoms

b) Patients over age 80.

c) Patients taking blood-thinning drugs (anticoagulants),

d) Patients with a history of stroke and diabetes mellitus

3) Neuro-protective agents example:

4) Nimodipine {Nymalize} (calcium channel blocker)

5) Have been shown to decrease the risk of the neuro-logical damage that results from subarachnoid hemorrhage

15. Surgery

a. Prevent strokes

b. There are prominent types of surgery for stroke prevention/treatment:
    i. Carotid endarterectomy
    ii. Thrombectomy / Stents
    iii. Extracranial / Intracranial (EC/IC) bypass
    iv. Craniotomy with hematoma evacuation
    v. Coiling for hemorrhagic strokes

c. Treat acute stroke.
    i. Treatment of brain aneurysms that cause subarachnoid hemorrhage is a technique called clipping.
    ii. Repair vascular damage or malformations in and around the brain.

B. Rehabilitation of Stroke

1. **Assessment of medical stability**
2. **Co-morbidities that may impact rehabilitation**
3. **What are the deficits resulting from the stroke?**
4. **Assessment is a team process.**
5. **What are the immediate needs?**
6. **What is the family support system?**
7. **Residual deficits to consider**
    a. Hemiparesis / Hemiplegia
    b. Balance & coordination
    c. Mobility & gait
    d. Language deficits
    e. Neglect concerns
    f. Visual disturbances
    g. Swallowing
    h. Pain / Numbness
    i. Cognition
        i. Rule learning
        ii. Attention
        iii. Motivation
    j. Memory
    k. Safety concerns
    l. Bowel & bladder
    m. Emotional lability
    n. Depression (80% will have some depression)
        i. Neuro / Endocrine involved
        ii. Needs to be treated
    o. Spasticity
    p. Modified Ashworth Scale
        i. Often more severe in upper extremity

ii. Painful
iii. Impact on ADLs
iv. Treatment / Prevention
    1) Medications:
        a) Onabotulinumtoxin A (Botox)
        b) Baclofen (Lioresal)
    2) Electrical stim
    3) Hippotherapy
    4) Biofeedback

8. Readmissions:

a. Urinary-tract infection (UTI)
b. Aspiration pneumonia
c. Electrolytes (E-Lytes) imbalances
d. Falls & cardiac events

9. Therapy approaches

a. Neuro-developmental treatment (NDT)
b. Proprioceptive neuro-muscular facilitation (PNF)
c. Constraint-induced movement therapy (CIMT)
d. Neuro-integrative functional rehabilitation and habilitation (IFRAH)

10. Quick 5-point neuro check

a. Behavior
    i. Affect
    ii. Irritability
    iii. Restlessness
b. Speech
    i. Appropriateness
    ii. Slurring
c. Orientation
    i. Person
    ii. Place
    iii. Time
    iv. Situation
d. Arousability
    i. Spontaneous
    ii. To voice
    iii. To touch
e. Pupils

i. Widen
ii. Constricted
iii. Fixed

C. Resources:

1. **National Stroke Association: www.stroke.org 800-787-6537 Magazine – Stroke Smart**
2. **American Stroke Association: www.strokeassociation.org**
3. **888-4-Stroke Magazine – Stroke Connection**
4. **National Institute of Neurological Disorder and Stroke: www.ninds.nih.gov**
5. **Paralysis Resource Guide www.paralysis.org 800-539-7309**
6. **Fast Video – YouTube online**