Human Trafficking in Alabama: Resources for Healthcare Workers to Identify and Combat Human Trafficking

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Trauma and Neurobiology A Short Course

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Nursing Goals and Objectives

- Understand the normal emotional and behavioral impact of trauma on health and memory from the nursing perspective
- Use the evidence-based therapeutic trauma informed approaches in nursing practice

Nature vs. Nurture

- Life experiences influence brain maturation, as well as how the mind achieves mental health
- Countless studies have been able to demonstrate that nature depends on nurture
- Every interaction we have with others shapes the architecture of our brains

Nature vs. Nurture

- This is especially true for the developing brain, which doesn't fully develop until approximately 25 to 29!

A Review: The Brain Structures

- The Brain Stem
  - Basic vital life functions such as breathing, heartbeat, and blood pressure (Medulla Oblongata), motor control and sensory analysis (Pons), and vision, hearing, eye movement, and body movement (Midbrain) and secretes hormones – adrenalin / epinephrine

A Review: The Brain Structures

- The Limbic System
  - Amygdala – memory, emotion, and fear
  - Thalamus – controls all sensory information
  - Hypothalmus – controls homeostasis, emotion, thirst, hunger, circadian rhythms, and control of the autonomic nervous system (both sympathetic and parasympathetic)

A Review: The Brain Structures

- Hippocampus- converting short term memory to more permanent memory, and for recalling spatial relationships in the world about us

A Review: The Brain Structures

- Cerebellum – Associated with regulation and coordination of movement, posture, and balance
- Cerebrum
  - Frontal Lobe- associated with reasoning, planning, parts of speech, movement, emotions, and problem solving

A Review: The Brain Structures

- Parietal Lobe- associated with movement, orientation, recognition, perception of stimuli
- Occipital Lobe- associated with visual processing
- Temporal Lobe- associated with perception and recognition of auditory stimuli, memory, and speech

Primal Fear – A Threat To Safety

- Sympathetic nervous system does an excellent job of rapidly preparing you to deal with FEAR
  - An increased breathing rate, heart rate and B/P, release of glucose and fatty acids
  - Sensory memory becomes sharper

Primal Fear – A Threat To Safety

- 5 senses keener
- Less sensitive to pain
- Other hormones shut down blood flow to extremities, stunt growth, stop reproduction, compromise immune function

Hypocampus Pituitary Adrenal Axis

- The periventricular nucleus of the hypothalamus, which contains neuroendocrine neurons that synthesize and secrete vasopressin and corticotrophin-releasing hormones (CRH)

Hypocampus Pituitary Adrenal Axis

- These two peptides regulate the anterior lobe of the pituitary gland
- In particular, CRH and vasopressin stimulate the secretion of Adreno-Cortico-Tropic Hormone (ACTH) from the kidney adrenal gland

Hypocampus Pituitary Adrenal Axis

- In response to stimulation of ACTH on the adrenal cortex, glucocorticoid hormones increase (mainly cortisol in humans)
- Glucocorticoids (cortisol) in turn act back on the hypothalamus and pituitary (to suppress CRH and ACTH production) in a negative feedback cycle

Brain Response to Threat

- Freezing - The dissociative response to danger and fear
  - Unable to fight or run away, also called Tonic Immobility, studied in animals extensively, less so with humans
- Flight - Escaping the danger
- Fight - Trying to defeat, remove or contain the danger

Brain Response to Threat

- Tend or befriend (A new theory that suggests the person may survive by a strategy that does not use either of the other approaches)
- Surrender
  (Speck and Ropero-Miller, 2011)
- All followed by a return to homeostasis, even if elevated

The Symptoms of Acute Stress Disorder

- Dissociation (3 or more)
  - Numbing, detachment
  - De-realization
  - De-personalization
  - Amnesia

The Symptoms of Acute Stress Disorder

- Re-experiencing the trauma through 5 senses
  - Anxiety or arousal
  - Avoidance of reminders

Stress and Memory

- Chronic over-secretion of stress hormones adversely affects brain function - MEMORY
  - Damages hippocampus in limbic brain
  - Affects learning
  - Culprits “glucocorticoids”
    - Steroids from adrenal glands during stress

Stress and Memory

- Cortisol in brain remains longer than adrenalin and continues to affect the brain cells

Stress and Memory

- Stress hormones divert blood glucose to exercising muscles
  - Therefore the amount of glucose – hence energy – that reaches the brain's hippocampus diminishes
  - Long term – diversion of blood glucose increases uptake to adipose (fat cells) = obesity

Stress and Memory

- This creates an energy crisis in the hippocampus which compromises its ability to create new memories
  - Language assigns value to emotion

Memory and Retrieval

- Cortisol affects memory formation and retrieval
- Severe crisis creates confusion and inability to explain events succinctly
  - The mind is blank
  - Police are allowed 2 days off after a shooting

Memory and Retrieval

- Victims are expected to tell all upon report
- Chronic
  - Crisis removes entire memory for some
  - Medical history "I don't remember much about my childhood"

Back to Former Self… Really?

- Autonomic nervous system includes the sympathetic and the parasympathetic, creating homeostasis
- Sympathetic system jumps into action quickly
  - Hyperactive sympathetic system is hard to shut down
  - Constant cortisol bathes the brain

Back to Former Self… Really?

- Parasympathetic nervous system slowly releases to calm
  - Hard to override the sympathetic nervous system

Traumatic Responses Alter

- Physiology
  - ↑ Heart rate
  - ↑ Respirations
  - Dilated pupils
  - Dry mouth

Traumatic Responses Alter

- Affective (mood and emotion) responses
  - Fear
  - Helplessness
  - Horror

Traumatic Responses Alter

- Cognitive (Thought) Processing
  - Memory – fragmented, out of sequence
  - Time Distortion
  - Splitting of affective and cognitive elements of the experience (the narrative of the event is separated from the emotions)
- …Leading to behavioral and interpersonal changes

Traumatic Hormonal Shifts Alter

- Epigenetic influence
  - Cell regulation influenced by external factors e.g., stress hormones

Traumatic Hormonal Shifts Alter

- DNA telemere
  - Shortens the telemere (controls cell aging)
  - Genetic or stress hormones

Long-Term Effects on Brain

- Diminished growth of left hemisphere = depression
- Limbic system irritability = panic and post-traumatic stress disorders
- Hippocampus and limbic abnormalities = dissociative disorders and memory impairments
- Impairment between brain hemispheres = (linked to) ADHD

Traumatic Event Subjectivity

- Nature and magnitude of the trauma
- Pre-trauma functioning
- Age of trauma (including pre-conception)
- Continued disruption or toxic stress in life
- Support systems
- Personality type and coping styles
- RESILIENCE

Nursing Intervention Framework Trauma Informed Care

- Safety
- Trustworthiness and transparency
- Collaboration and mutuality
- Empowerment
- Voice and choice
- Peer support
- Resilience and strengths based
- Inclusiveness and shared purpose
- Cultural, historical and gender issues
- Change process

The Biophysiology of Trauma

- Trauma is often at the root of human suffering
- Trauma wounds shape our perception of the world, and the wound erases our innocence, shatters our spirits, and blocks our ability to trust others

The Biophysiology of Trauma

- **Nurses revisiting the bio-psycho-social and spiritual impact of trauma have the opportunity to create clinically reasoned and emotionally safe environments for their patients**
- **There is more work to do…**

Thank You

- **Questions?**
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Thank you!