COVID-19 and Brain Health: Enhancing the Resilience to Stress Ratio

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Greg Fricchione MD Disclosure

With respect to the following presentation, there has been no relevant (direct or indirect) financial relationship between the party listed above (and/or spouse/partner) and any for-profit company which could be considered a conflict of interest.
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Pandemics: Health Care Emergencies
Morganstein et al, 2017 (Ch 18); Textbook of Disaster Psychiatry; Ursano et al, 2017

COVID-19 & Stress
• Pandemics have a global reach of mass destruction and historically have been more devastating than any other type of disaster.
• In the past decade prior to COVID-19, outbreaks of SARS, H1N1 “swine flu”, MERS, Ebola and Zika resulted in significant concern throughout the international community.
• All caused significant morbidity and mortality and represented significant threats to global health security and highlighted the mental health issues that are relevant to a pandemic outbreak.
• So people all over the world are rightfully nervous about this mysterious and wily microbe and the awful suffering it has caused.
• American Psychological Association Stress in America Survey: 60-70% worried about contracting it...
• So the important issue of restoring and preserving brain health and how we can maintain wellness and resilience in the face of such a foe are priorities for clinical medicine and public health.  

The health of our communities depends on this.

The Brain Health<->Brain Failure Continuum

• This continuum applies to the brain as it does to the lungs, heart, kidneys etc.
• Some COVID-19 + people are on one end of the spectrum presenting with no brain symptoms. They show BRAIN HEALTH.
• Others are all the way on the other end of the continuum and show BRAIN FAILURE.
Brain Failure

• The normal brain is designed to sense its environment, analyze the information that comes in and then effect a motor response decision that will help the individual survive and thrive.
• The healthy brain maintains its physiology within a normal range while securing its needed attachments to food, reproduction, social objects and future objects.
• The brain fails when this functioning breaks down for neuromedical and neuropsychiatric reasons.

COVID-19 and the Brain

• SARS-CoV-2 like SARS and MERS can cause delirium, agitation, and altered consciousness, as well as symptoms of depression, anxiety, and insomnia.
• Not surprising, given severity of illness and fact that those suffering from complications are frequently older and have underlying vulnerabilities (NCDs).
• The COVID-19 ICU: “The Delirium Factory” (Khan et al, 2020: 74% ICU delirium for a week or more; a/w ventilator)
• Loss of smell and loss of taste
• Headache
• Stroke
• Seizure
• Motivation and Movement changes: Miller Fisher’s “mesencephalofrontal disconnection syndrome”.

Chronic Neuropsychiatric Viral Brain Failure Challenges

- Viral causes of encephalitis (HSV-1,2,6,8; VZV: enteroviruses, EBV; Adenovirus)
- **HIV Encephalopathy**
- Past: *Encephalitis Lethargica*; Post encephalitic Parkinsonism
- “Mental fog” and fatigue → severe subacute encephalopathy requiring lengthy rehab in patients after long ventilator treatment for COVID-19 ARDS. May result in chronic encephalopathy (dementia).
- In current COVID-19 pandemic, clinicians should be alert to possibility of long term chronic neurodegenerative states we call dementias.
- Time will tell...

Mental Health Pandemic?

- Clinicians should be alert to high rates of common mental disorders. "The Mental Health Pandemic": isolation and loneliness; unemployment, food and shelter insecurity and socioeconomic stress add to health concerns...
- Psychotic decompensations in the SMI.
- Symptoms of grief, depression, anxiety, PTSD and insomnia.
- Suicide risk: separation and loss, unemployment, family strife, civic unrest
- Parental stress about children
- Stress related illnesses in patients, families and caregivers (burnout and moral injury, compassion fatigue and secondary PTSD)
Risk, Morbidity and Mortality

- ~97 million Americans (43% of adults) at higher risk of illness from COVID-19. (Raifman and Raifman, 2020)
- Racial/ethnic risk disparities are considered sequelae of social or structural determinants of health. **BIPOC at extreme COVID-19 risk**....
- **MetS** conditions more common and serious in black Americans and have earlier onset. Rate of DM is 66 % higher and HTN is 49 % higher in black Americans than in white Americans.
- High-stress groups are susceptible to cytokine storm + decreased viral defense (CTRA) (Cole et al, 2016) and have a 45% higher chance of having MetS than adults in the low-stress groups. (Kuo et al 2019)
- NYC: Death rate per 100,000 population: 209.4 for African-Americans, 195.3 for Hispanics/Latinos, 107.7 for whites, and 90.8 for Asians.
- A **double immunological hit** due to the CTRA when facing a viral pandemic?

The Stress Story

Stress is what the brain does to itself and other parts of the body when a stressor is perceived as a **separation** threat or challenge or even an **attachment** opportunity.

1st stress= separation anxiety

**Separation Stress:** 1) SNS>PNS; 2) HPA; 3) IRS and neurogenic neuroinflammation

**Holmes Rahe Life Stress Unit Scale:** 8 of first 11 are separation stressors.

3 Types: Normal---Tolerable--Toxic
People cannot escape their evolutionary heritage, which was best described by the great English psychiatrist John Bowlby who gave us modern attachment theory:

"Man’s environment of evolutionary adaptiveness is always one of secure base attachment."
Stress Response Systems

Neuropsychopharmacology Reviews advance online publication 31 August 2016.
doi:10.1038/npp.2016.146

Your brain & stress

(Vertes-Dodson) (McEwen et al, Neuropsychopharmacology (2016) 41, 3-23)

COVID-19 Mental Health Forum Series
Your mitochondria & stress

(Zhang & Hood, 2016)

Important features and lessons learned from prior pandemic outbreaks (Morganstein et al., 2017)

- Increase health protective & response behaviors
- Hire for risk communication
- Hire for safety communication
- Public education for threat management & recovery
- Facilitate community-directed efforts
- Psychological first aid
- Care for first responders to maintain their function & workplace presence
- Adequate medical personnel to sustain effective care interventions
- Mental health surveillance
• Surge that would decimate hospital bed capacity, ICU bed capacity, ventilator supply. Need to “flatten the curve”.

• Social isolation (SEPARATION) effects

• Side Effects:
  1. People staying at home, dying at home
  2. Lack of PPE
  3. Creative ventilator strategies
  4. Critical care ethics discussions and policies
  5. Need for decompressing crowded hospitals → field hospitals
  6. High risk COVID-19 patients often at high risk for psychiatric and substance abuse disorders and problems of living, including homelessness

The Three-hit Concept of Vulnerability and Resilience: towards understanding adaptation to early-life adversity outcome.
**Resilience: 10 Themes**

*Southwick and Charney, 2018*

- Resilient Role Models
- Positive Emotions
- Emotional Regulation
- Active, rather than passive coping
- Social Support
- Cognitive Flexibility
- Spirituality
- Moral Code that typically includes altruism
- Meaning and Purpose
- Training in Managing Challenges-physical, psychological, spiritual

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**Arnsten: Nat Neurosci. 2015 October; 18(10): 1376–1385**
Benson-Henry Institute for Mind Body Medicine
Stress Management and Resilience Training (SMART) Program

Mind Body Medicine Equation

\[
\text{Stress (separation threats)} \quad \frac{\text{Resiliency (attachment solutions)}}{\text{Load}} = \text{Allostatic Load} \quad \rightarrow \quad \text{Vulnerability to Illness}
\]

- relaxation response
- mindfulness
- social support/pro-sociality
- cognitive skills
- positive psychology
- spiritual connectedness
- exercise/mindful exercise
- nutrition/low glycemic diet
- sleep hygiene
- healthy habits

Session 1: The SMART Program
- Session 2: The RR-Relaxation Response
- Session 3: Mindful Awareness & Acceptance-Mindfulness
- Session 4: Components of Stress and Resilience-Separation Stress; Social Connection and Pro-social Behavior
- Session 5: Automatic Thoughts-Cognitive Skills
- Session 6: Building a Positive Perspective-Positive Psychology
- Session 7: Healing States of Mind-Belief and Consciously Positive Expectation-Spiritual Connection
- Session 8: Staying Resilient-Exercise and Nutrition and Sleep Hygiene and Humor
Brain Health Promotion and Illness Prevention Solutions

BHI SMART Program:

a) **S/R=Vulnerability** to all illnesses and ability to change gene expression that might improve immune balance and help reduce risk of viral illnesses. McCance Center is working on a BRAIN HEALTH INDEX.

b) In the COVID pandemic, we have delivered this health promotion and illness prevention program to **patients, families and to frontline clinicians and staff** throughout Mass General Brigham because we are all at risk if we don’t have self care ways to reduce stress and improve our immune balance and resilience.

c) **Scaling up via virtual telehealth; remote physiological monitoring; smart phone apps.**
Requests From Health Care Professionals to Their Organization During the Coronavirus Disease 2019 Pandemic  (Shanafelt et al, 2020)

- **Hear me** --Listen to and act on health care professionals’ expert perspective and frontline experience and understand and address their concerns to the extent that organizations and leaders are able
- **Protect me**--Reduce the risk of health care professionals acquiring the infection and/or being a portal of transmission to family members
- **Prepare me**--Provide the training and support that allows provision of high-quality care to patients
- **Support me**--Provide support that acknowledges human limitations in a time of extreme work hours, uncertainty, and intense exposure to critically ill patients
- **Care for me**--Provide holistic support for the individual and their family should they need to be quarantined

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<th>BHI Frontline Clinician Program Preliminary Outcomes Overview (n=101)</th>
<th>Baseline, M (SD)</th>
<th>Follow-Up, M (SD)</th>
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Surviving and Thriving in the Time of COVID-19  (after Kiser and Bernacki, 2020)

“Burnout”: emotional exhaustion (culture of endurance), poor personal sense of accomplishment, depersonalization.

- **Prioritize self-care**: cultivate the core features of stress management and human resilience in order to contribute to your community.
- **Maintain commitment to your values**: enhance attention to your eulogy values. (“Moral Injury”)
- **Reduce job pressures**: You can’t do it alone so set reasonable limits on expectations from colleagues and patients and set ground rules for working together relying more on collective capacity.
- **Seek out and maintain your attachments**: the most important component---your environment of evolutionary adaptedness is secure attachment!
- **https://www.massgeneral.org/psychiatry/guide-to-mental-health-resources/**

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**Edith Wharton: From “Backward Glance”**

“In spite of illness, in spite even of the arch-enemy sorrow, one can remain alive long past the usual date of disintegration if one is unafraid of change, insatiable in intellectual curiosity, interested in big things, and happy in small ways.”
Reinhold Niebuhr: From *The Irony of American History*

“Nothing which is true or beautiful or good makes complete sense in any immediate context of history; therefore, we must be saved by *faith*.”