IN A COVID WORLD

How do we Proceed?

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PANDEMIC QUESTIONS

▶ What happened?
▶ Who was effected and why?
▶ What is happening now?
▶ Why is it not over?
▶ How long will it go on?
▶ What can we do to make it better
▶ Will it ever be the way it used to be?
WHAT HAPPENED?

- **Late 2019**
- **December 12, 2019**
  - A cluster of patients in Wuhan, Hubei Province, China begin to experience shortness of breath and fever.
- **December 31, 2019**
  - The World Health Organization China Country Office is informed of a number cases of pneumonia of unknown etiology (unknown cause) detected in Wuhan, Hubei Province. All cases connected to the Huanan Seafood Wholesale Market in Wuhan.

TIMELINE
Early 2020

January 20, 2020
- CDC confirms the first U.S. laboratory-confirmed case of COVID-19 in the U.S. from samples taken on January 18 in Washington state.

January 22, 2020

February 11, 2020
- The World Health Organization announces the official name for the disease that is causing the 2019 novel coronavirus outbreak: COVID-19. The new name of this disease is an abbreviated version of coronavirus disease 2019.

February 26, 2020
- CDC’s Dr. Nancy Messonnier, Incident Manager for the COVID-19 Response, holds a telebriefing. During the telebriefing she braces the U.S. for the eventual community spread of the novel coronavirus and states that the “disruption to everyday life may be severe.”

March 11, 2020

March 31, 2020
- At a White House Press Briefing, Dr. Anthony Fauci and Dr. Deborah Brix announce that 100,000 to 240,000 deaths in the U.S. are expected even if social distancing and public health measures are perfectly enacted.
December 11, 2020

January 7, 2021
One year anniversary of CDC COVID-19 pandemic response.

February 21, 2021
U.S. COVID-19 death toll surpasses 500,000.

May, 2022
Covid-19 deaths exceed 1,000,000

October 29, 2021
New CDC study provides further evidence that COVID-19 vaccines offer higher protection than previous COVID-19 infection.

November 26, 2021
World Health Organization classifies a new variant, Omicron, as a variant of concern after it was first reported by scientists in South Africa. The variant has several mutations in the spike protein that concern scientists around the world.

May 16, 2022
US Covid 19 excess deaths reach 1,000,000 lives lost
For severe COVID-19 pneumonia with respiratory failure, cutaneous vasculitis is linked to small vessel thromboembolic disease. This pattern could be partly due to thrombosis of small and large vessels in situ due to severe illness, hypoxaemia, and RNAemia in some severe cases. The pattern might also be linked to diffuse embolism from the pulmonary venular, left heart, and arterial emboli dislodgement from thrombi. Cutaneous disease in patients with severe COVID-19 might be linked to type I IFN disablement and elevations in multiple proinflammatory cytokines. IFN=interferon.

LONG COVID: WHAT IS POST-COVID SYNDROME?

(Mehandru & Merad, 2022)
MULTI-ORGAN COMPLICATIONS

Chronic inflammation results in the sustained production of pro-inflammatory cytokines and reactive oxygen species (ROS) which are released into the surrounding tissue and bloodstream.

PULMONARY INJURY FROM COVID-19
Endothelial damage triggers the activation of fibroblasts, which deposit collagen and fibronectin resulting in fibrotic changes.

Endothelial injury, complement activation, platelet activation, and platelet-leukocyte interactions, release of pro-inflammatory cytokines, disruption of normal coagulant pathways, and hypoxia may result in the development of a prolonged hyperinflammatory and hypercoagulable state, increasing the risk of thrombosis.

(Crook et al., 2021)

ENDOTHELIAL INJURY

In the heart: (A) chronic inflammation of cardiomyocytes can result in myositis and cause cardiomyocytes death. (B) Dysfunction of the afferent autonomic nervous system can cause complications such as postural orthostatic tachycardia syndrome. (C) Prolonged inflammation and cellular damage prompts fibroblasts to secrete extracellular matrix molecules and collagen, resulting in fibrosis. (D) Fibrotic changes are accompanied by an increase in cardiac fibromyoblasts, while damage to desmosomal proteins results in reduced cell-to-cell adhesion.

MYOCARDIAL INJURY FROM COVID -19
NEUROLOGICAL INJURY FROM COVID-19

In the central nervous system: (A) The long term immune response activates glial cells which chronically damage neurons. (B) Hyperinflammatory and hypercoagulable states lead to an increased risk of thrombotic events. (C) Blood-brain barrier damage and dysregulation results in pathological permeability, allowing blood derived substances and leukocytes to infiltrate the brain parenchyma. (D) Chronic inflammation in the brainstem may cause autonomic dysfunction. (E) The effects of long Covid in the brain can lead to cognitive impairment.

(Crook et al., 2021)
IDD POPULATION IS HIGHLY VULNERABLE

Findings support the contention of this population experiencing a disproportionate burden during the COVID-19 pandemic, reflecting historical inequities in access to healthcare and other human rights violations which are now protected under the United Nations Convention on the Rights of Persons with Disabilities.

IDD POPULATION IS A MEDICALLY UNDERSERVED POPULATION

(Linehan et al., 2022)
IF I HAVE NATURAL IMMUNITY DO I STILL NEED A COVID VACCINE?

- The U.S. Centers for Disease Control and Prevention (CDC) released a report on Oct. 29, 2021, that says getting vaccinated for the coronavirus when you’ve already had COVID-19 significantly enhances your immune protection and further reduces your risk of reinfection.
- A study published in August 2021 indicates that if you had COVID-19 before and are not vaccinated, your risk of getting re-infected is more than two times higher than for those who got vaccinated after having COVID-19.
- Another study published on Nov. 5, 2021, by the U.S. Centers for Disease Control and Prevention (CDC) looked at adults hospitalized for COVID-like sickness between January and September 2021. This study found that the chances of these adults testing positive for COVID-19 were 5.49 times higher in unvaccinated people who had COVID-19 in the past than they were for those who had been vaccinated for COVID and had not had an infection before.
- A study from the CDC in September 2021 showed that roughly one-third of those with COVID-19 cases in the study had no apparent natural immunity.

WHERE ARE WE IN MAY 2022?
HOW DO WE KNOW IF WE ARE TESTING ADEQUATELY?

https://coronavirus.jhu.edu/testing/testing-positivity

WHAT CAN WE DO?

At this time, for people aged 2 years or older—including passengers and workers—CDC recommends properly wearing a well-fitting mask or respirator over the nose and mouth in indoor areas of public transportation (such as airplanes, trains, buses, ferries) and transportation hubs (such as airports, stations, and seaports).
WHAT CAN WE DO?

What Prevention Steps Should You Take Based on Your COVID-19 Community Level?

- Low
  - Stay up to date with COVID-19 vaccines
  - Get tested if you have symptoms

- Medium
  - If you are at high risk for severe illness, talk to your healthcare provider about whether you need to wear a mask and take other precautions
  - Stay up to date with COVID-19 vaccines
  - Get tested if you have symptoms

- High
  - Wear a mask indoors in public
  - Stay up to date with COVID-19 vaccines
  - Get tested if you have symptoms
  - Additional precautions may be needed for people at high risk for severe illness

VACCINATION

Approved or Authorized Vaccines

Three COVID-19 vaccines are authorized or approved for use in the United States to prevent COVID-19. Pfizer-BioNTech or Moderna are COVID-19 mRNA vaccines and are preferred. You may get Johnson & Johnson’s Janssen COVID-19 vaccine in some situations.

Pfizer-BioNTech  Moderna  Johnson & Johnson’s Janssen
WHAT MAKES SOMEONE AT A HIGHER RISK FOR MORE SERIOUS SYMPTOMS OF COVID-19?

- 65 years old or older
- Obesity or being overweight
- Pregnancy
- Chronic kidney disease
- Diabetes
- Having a condition or receiving treatment that weakens or suppresses your immune system
- Heart or circulatory conditions such as heart failure, coronary artery disease, Chronic lung diseases cardiomyopathies, and possibly high blood pressure (hypertension)
- Including COPD (chronic obstructive pulmonary disease), asthma (moderate to severe), interstitial lung disease, cystic fibrosis, and pulmonary hypertension
- Sickle cell disease
- Neurodevelopmental disorders such as cerebral palsy
- Having a medical device (for example, tracheostomy, gastrostomy, or positive pressure ventilation [not related to COVID-19])

OUTPATIENT:

Bebtelovimab: This is a mAb for adults and children 12 years or older (weighing at least 88 pounds) who have tested positive for COVID-19, have mild to moderate symptoms, are not in the hospital, and are at high risk for serious COVID-19. Bebtelovimab must be given within 7 days after the first symptoms of COVID-19 appear.

INPATIENT:

Baricitinib (Olumiant®)
Tolcilizumab (Actemra®)

MONOCLONAL ANTIBODY (MAB) TREATMENTS
HOW DO I QUALIFY FOR PAXLOVID OR LAGEVRIOS?
You may be eligible for oral antiviral treatment if you:
▶ Are at high risk of getting more serious symptoms
▶ Have tested positive for COVID-19
▶ Are not in the hospital but have mild to moderate symptoms for 5 days or less
▶ Paxlovid and Lagevrio require a prescription from a healthcare professional. You must have tested positive for COVID-19 and your symptoms must have started no later than within the last 5 days. To be eligible for Lagevrio, you must be at least 18 years of age. To be eligible for Paxlovid, you must be at least 12 years of age and weigh at least 88 pounds.

ORAL AGENTS

WILL THERE BE MORE NEW CORONAVIRUS VARIANTS?
Yes. As long as the coronavirus spreads through the population, mutations will continue to happen, and the delta and omicron variant families continue to evolve.
MAYBE WE CAN HOPE FOR ANTIGENIC DRIFT

The same novel strain of flu first introduced in 1918 appears to be the direct ancestor of every seasonal and pandemic flu we’ve had over the past century

(Roos, 2021)

REFERENCES

COVID: ORAL EFFECTS ON INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

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COVID-19 and the mouth

- COVID-19 is a respiratory disease caused by the SARS-CoV-2 virus
- SARS-CoV-2 enters bloodstream through ACE2 receptors
- ACE2 receptors highly present in oral cavity
- Increased in presence of oral disease
- Poor dental health linked to chronic medical conditions → increased risk for COVID-19 infection

Study on hospitalized patients

- “…an association between poor periodontal health and severity of COVID-19 illness”
- 128 patients hospitalized due to COVID-19
- Those with poor oral health more likely to:
  - Need care in ICU setting
  - Experience more severe symptoms of COVID-19
  - Be at risk for death

Machado et al, 2022
Risk factors for oral findings

- Increased severity of COVID-19 disease
- Older age
- Male = female
- Poor oral hygiene
- Underlying systemic disease
- Deficient immune status

Why are we seeing an increase in oral disease?

- Behavioral changes due to stress/changes in routine
- Increased snacking
- Decreased oral hygiene
- Decreased dental visits for treatment and evaluation
- Increase in immune deficiency
What are we NOT seeing?

• Many oral symptoms are not related to COVID
  • pain
  • bleeding
  • oral lesions
• Symptoms of COVID infection and care regimens increase predisposition towards oral disease

Common oral diseases

PERIODONTAL DISEASE  DENTAL CARIES  ORAL CANCER
Periodontal disease

- Complications of COVID increased in presence of periodontal disease
- ACE2 and TMPRSS2 enzyme in gingival tissues
- Increase in cytokines in COVID and periodontitis
- IL-6 and other interleukin overexpression in COVID and periodontitis
- Periodontal bacteria introduced into pulmonary system (natural or via intubation)
  - Favorable conditions for infection through tissue damage or accelerated cellular senescence

Dental caries

- Increased stress → increased cortisol production
  - Change in oral environment factors
  - Xerostomia
  - Increased medication use
- Increased mouth breathing from mask use
- Changes in diet
  - Increased snacking frequency
  - Increased carbohydrate intake
- Decreases in oral hygiene
- Decreased dental office visits
Oral cancer

- 3% of all cancers in U.S.
- Approximately 53,000 annually
- Squamous cell → rapid spread
- Likely reduced frequency in IDD

- Overall, approx. 10 million missed cancer screenings in 2020
  - Later diagnosis
  - Later start of treatment
  - Decreased research

Bankhead et al, 2022

Xerostomia

- Affects up to 43%
- Exacerbated by other causes
  - Medications
  - Autoimmune disease
  - Chemotherapy
  - Radiotherapy
  - Other medical conditions

- Keep mouth moist
  - Fluoride
  - Oral hygiene
Bruxism

• What is bruxism?

• Prevalence
  • Up to 40% in neurotypical children (10% in adults)

• Associated risk factors:
  • Local factors
  • Psychological
  • Neurological
  • Systemic and genetic

• Incidence up to 70% in Down s., CP
• Effects of bruxism

Bruxism and COVID

• Increased stress from isolation and change in routine
• Increased frustration
• Decreased mental health follow-up
• Increase in disordered sleep
• Increased snacking
• Decreased dental visits
• Return to pre-COVID routine
Oral pathology and COVID

- A. candidiasis
- B. angular cheilitis
- C. enanthem of cheek
- D. soft palate lesions, xerostomia
- E. aphthous ulceration
- F. hemorrhagic lesions of tongue

Villarroel-Dorrego et al, 2021

Oral pathology and COVID

- A. migratory glossitis
- B. caviar tongue
- C. pseudomembranous candidiasis
- D. leukoplakia
- E. pseudomembranous candidiasis
- F. erythematous candidiasis

Villarroel-Dorrego et al, 2021
Safety in the dental office

- Fewer patients in waiting areas, mask use
- Patient screenings before arrival
- HEPA filtration and UVC light systems
- Pre-treatment oral swab
- PPE and surface disinfection
- High-speed suction units