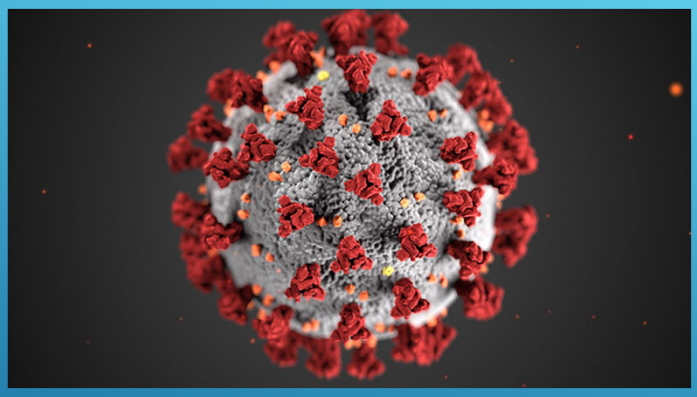
IN A COVID WORLD

How do we Proceed?

Dr. John J. Nevins

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?

TIMELINE

- **Late 2019**
- **December 12, 2019**
- A cluster of patients in Wuhan, Hubei Providence, 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 2020

- 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**
- The World Health Organization confirms human-to-human spread of the novel coronavirus.
- **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.

TIMELINE

- **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**
- The World Health Organization declares COVID-19 a pandemic.
- **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.

TIMELINE

- **December 11, 2020**
- Food and Drug Administration issues an Emergency Use Authorization (EUA) for the first COVID-19 vaccine – the Pfizer-BioNTech COVID-19 vaccine.
- **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

TIMELINE

- **October 29, 2021**

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

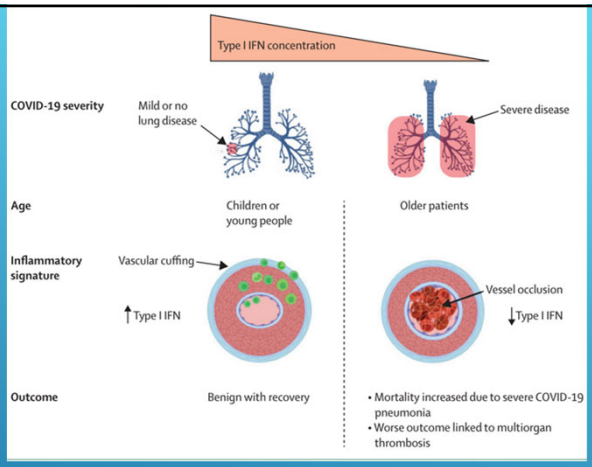
- **November 26, 2021**

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

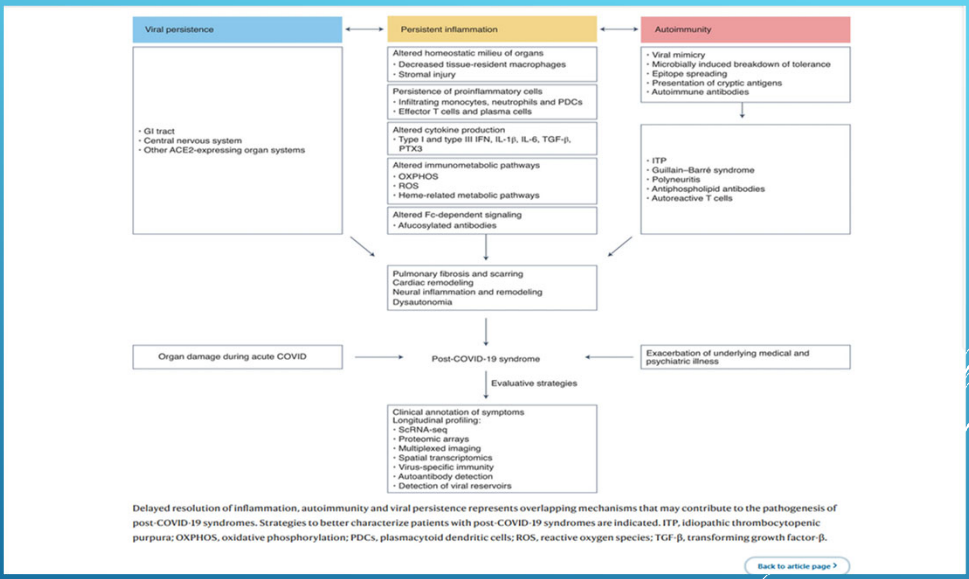
For severe COVID-19 pneumonia with respiratory failure, cutaneous vasculitis is linked to small vessel thromboembolic disease. This pattern could be partly due to thrombosis of small and large vessels in situ due to severe illness, hypoxaemia, and RNAaemia in some severe cases. The pattern might also 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.



PATTERNS OF DISEASE

(DA SILVA ET AL., 2021)

LONG COVID: WHAT IS POST-COVID SYNDROME?



(Mehandru & Merad, 2022)

MULTI-ORGAN COMPLICATIONS

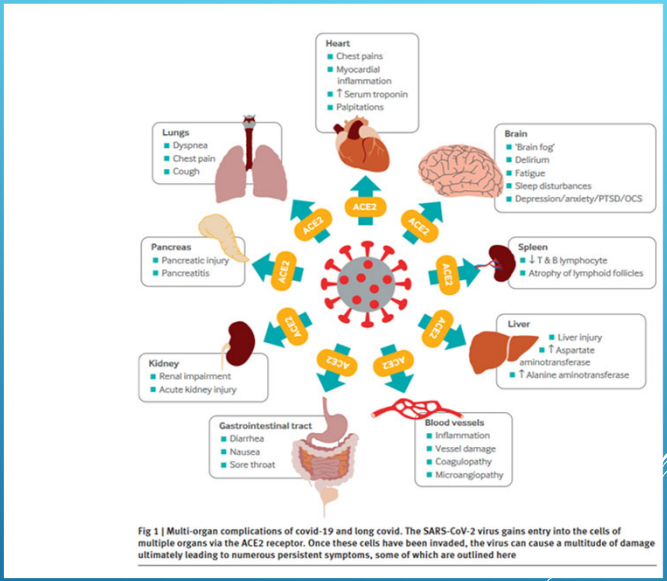
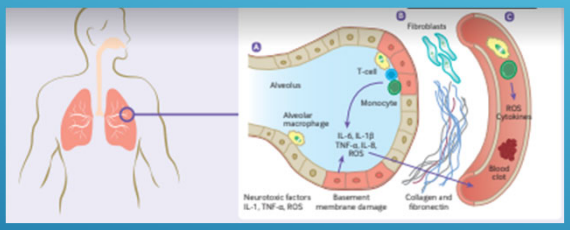


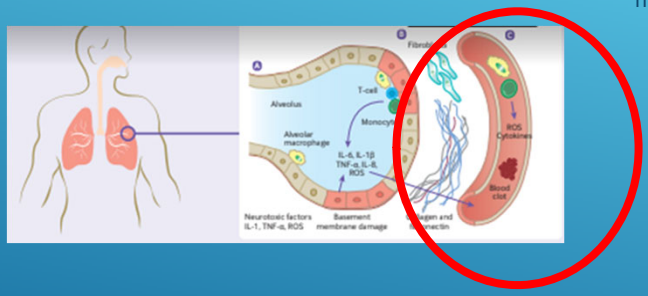
Fig 1 | Multi-organ complications of covid-19 and long covid. The SARS-CoV-2 virus gains entry into the cells of multiple organs via the ACE2 receptor. Once these cells have been invaded, the virus can cause a multitude of damage ultimately leading to numerous persistent symptoms, some of which are outlined here

(Crook et al., 2021)



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



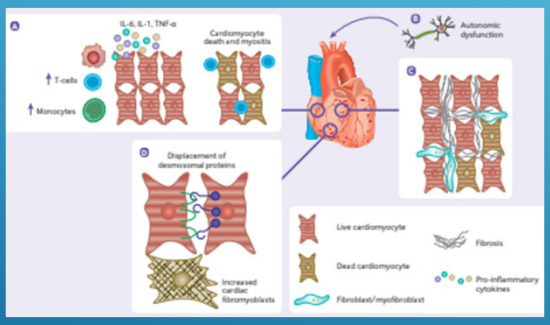
ENDOTHELIAL INJURY

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.

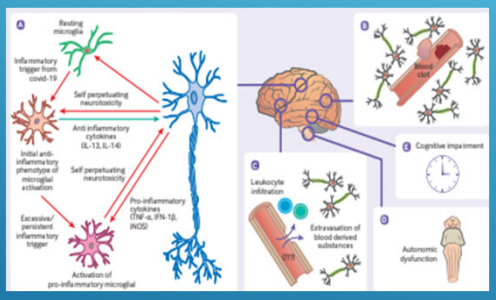
(Crook et al., 2021)

MYOCARDIAL INJURY FROM COVID -19



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.

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)

SY
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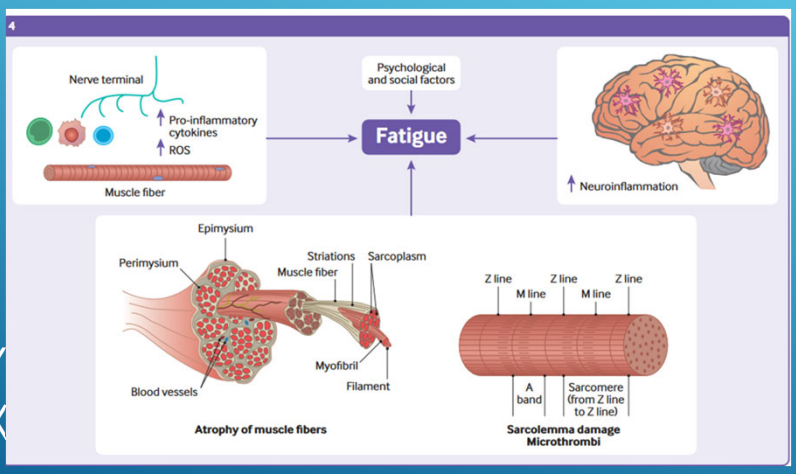
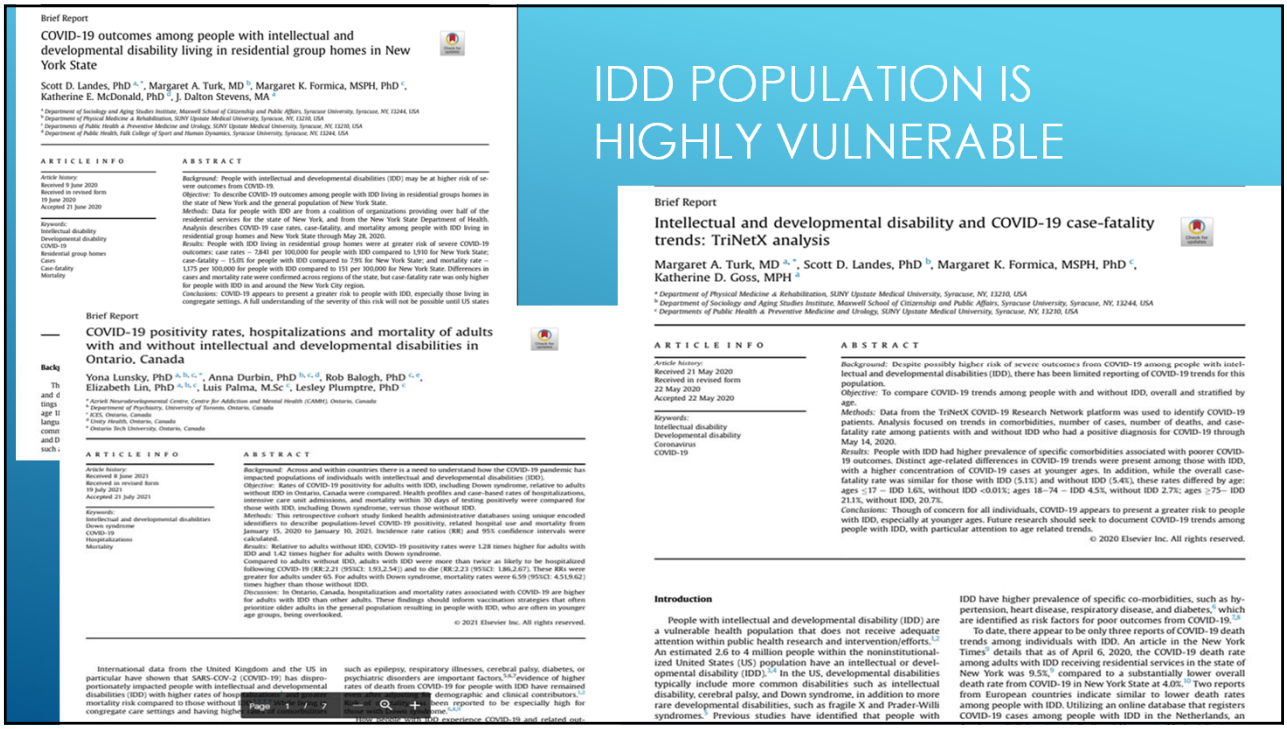


(Crook et al., 2021)



Brief Report

COVID-19 outcomes among people with intellectual and developmental disability living in residential group homes in New York State

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ABSTRACT

Background: People with intellectual and developmental disabilities (IDD) may be at higher risk of severe outcomes from COVID-19.
Objective: To describe COVID-19 outcomes among people with IDD living in residential groups homes in the state of New York and the general population of New York State.
Methods: Data for people with IDD are from a coalition of organizations providing over half of the residential services for the state of New York, and from the New York State Department of Health. Analysis describes COVID-19 case rates, case-fatality, and mortality among people with IDD living in residential group homes and New York State through May 28, 2020.
Results: People with IDD living in residential group homes were at greater risk of severe COVID-19 outcomes: case rates – 7,841 per 100,000 for people with IDD compared to 1,910 for New York State; case-fatality – 15.0% for people with IDD compared to 7.9% for New York State; and mortality rate – 1,175 per 100,000 for people with IDD compared to 151 per 100,000 for New York State. Differences in cases and mortality rate were confirmed across regions of the state, but case-fatality rate was only higher for people with IDD in and around the New York City region.
Conclusions: COVID-19 appears to present a greater risk to people with IDD, especially those living in congregate settings. A full understanding of the severity of this risk will not be possible until US states

Brief Report

COVID-19 positivity rates, hospitalizations and mortality of adults with and without intellectual and developmental disabilities in Ontario, Canada

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Keywords:
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ABSTRACT

Background: Across and within countries there is a need to understand how the COVID-19 pandemic has impacted populations of individuals with intellectual and developmental disabilities (IDD).
Objective: Rates of COVID-19 positivity for adults with IDD, including Down syndrome, relative to adults without IDD in Ontario, Canada were compared. Health profiles and case-based rates of hospitalizations, intensive care unit admissions, and mortality within 30 days of testing positively were compared for those with IDD, including Down syndrome, versus those without IDD.
Methods: This retrospective cohort study linked health administrative databases using unique encoded identifiers to describe population-level COVID-19 positivity, related hospital use and mortality from January 15, 2020 to January 10, 2021. Incidence rate ratios (RR) and 95% confidence intervals were calculated.
Results: Relative to adults without IDD, COVID-19 positivity rates were 1.28 times higher for adults with IDD and 1.42 times higher for adults with Down syndrome.
Compared to adults without IDD, adults with IDD were more than twice as likely to be hospitalized following COVID-19 (RR:2.21 (95%CI: 1.93,2.54)) and to die (RR:2.23 (95%CI: 1.86,2.67). These RRs were greater for adults under 65. For adults with Down syndrome, mortality rates were 6.59 (95%CI: 4.51,9.62) times higher than those without IDD.
Discussion: In Ontario, Canada, hospitalization and mortality rates associated with COVID-19 are higher for adults with IDD than other adults. These findings should inform vaccination strategies that often prioritize older adults in the general population resulting in people with IDD, who are often in younger age groups, being overlooked.

International data from the United Kingdom and the US in particular have shown that SARS-COV-2 (COVID-19) has disproportionately impacted people with intellectual and developmental disabilities (IDD) with higher rates of hospi… mortality risk compared to those without I… congregate care settings and having highe… such as epilepsy, respiratory illnesses, cerebral palsy, diabetes, or psychiatric disorders are important factors.[3,4,5] evidence of higher rates of death from COVID-19 for people with IDD have remained … demographic and clinical contributors.[3,6] … been reported to be especially high for … those … Down syndrome.[4,5,7] … how people with IDD experience COVID-19 and related out…

Page 1 / 7

IDD POPULATION IS HIGHLY VULNERABLE

Brief Report

Intellectual and developmental disability and COVID-19 case-fatality trends: TriNetX analysis

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ABSTRACT

Background: Despite possibly higher risk of severe outcomes from COVID-19 among people with intellectual and developmental disabilities (IDD), there has been limited reporting of COVID-19 trends for this population.
Objective: To compare COVID-19 trends among people with and without IDD, overall and stratified by age.
Methods: Data from the TriNetX COVID-19 Research Network platform was used to identify COVID-19 patients. Analysis focused on trends in comorbidities, number of cases, number of deaths, and case-fatality rate among patients with and without IDD who had a positive diagnosis for COVID-19 through May 14, 2020.
Results: People with IDD had higher prevalence of specific comorbidities associated with poorer COVID-19 outcomes. Distinct age-related differences in COVID-19 trends were present among those with IDD, with a higher concentration of COVID-19 cases at younger ages. In addition, while the overall case-fatality rate was similar for those with IDD (5.1%) and without IDD (5.4%), these rates differed by age: ages ≤17 – IDD 1.6%, without IDD <0.01%; ages 18–74 – IDD 4.5%, without IDD 2.7%; ages ≥75– IDD 21.1%, without IDD, 20.7%.
Conclusions: Though of concern for all individuals, COVID-19 appears to present a greater risk to people with IDD, especially at younger ages. Future research should seek to document COVID-19 trends among people with IDD, with particular attention to age related trends.

Introduction

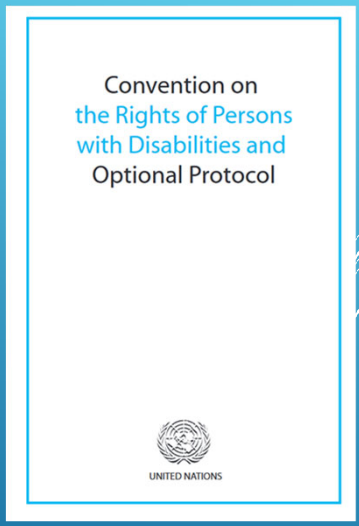
People with intellectual and developmental disability (IDD) are a vulnerable health population that does not receive adequate attention within public health research and intervention/efforts.[1,2] An estimated 2.6 to 4 million people within the noninstitutionalized United States (US) population have an intellectual or developmental disability (IDD).[3,4] In the US, developmental disabilities typically include more common disabilities such as intellectual disability, cerebral palsy, and Down syndrome, in addition to more rare developmental disabilities, such as fragile X and Prader-Willi syndromes.[3] Previous studies have identified that people with IDD have higher prevalence of specific co-morbidities, such as hypertension, heart disease, respiratory disease, and diabetes,[5] which are identified as risk factors for poor outcomes from COVID-19.[3,6]

To date, there appear to be only three reports of COVID-19 death trends among individuals with IDD. An article in the New York Times[5] details that as of April 6, 2020, the COVID-19 death rate among adults with IDD receiving residential services in the state of New York was 9.5%,[5] compared to a substantially lower overall death rate from COVID-19 in New York State at 4.0%.[10] Two reports from European countries indicate similar to lower death rates among people with IDD. Utilizing an online database that registers COVID-19 cases among people with IDD in the Netherlands, an

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)

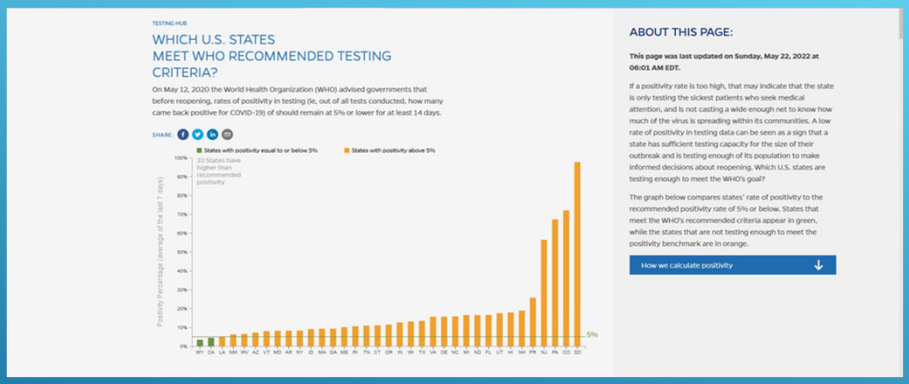


IF I HAVE NATURAL IMMUNITY DO I STILL NEED A COVID VACCINE?

- 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.

https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/covid-natural-immunity-what-you-need-to-know

WHERE ARE WE IN MAY 2022?

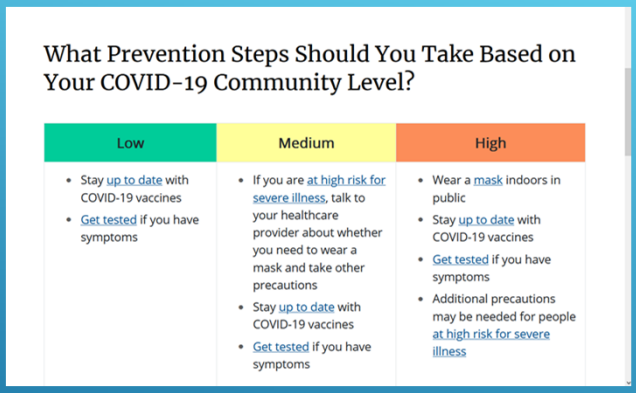


HOW DO WE KNOW IF WE ARE TESTING ADEQUATELY?

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

WHAT CAN WE DO?

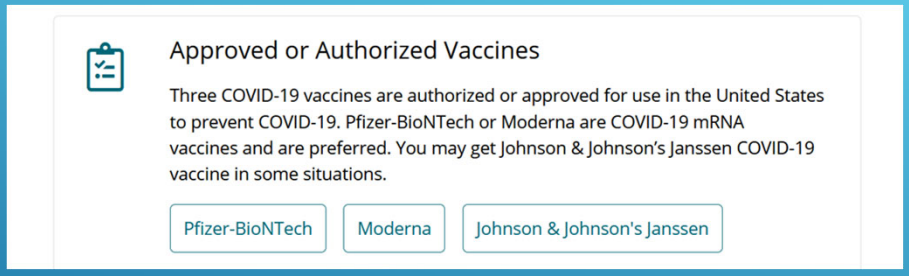
- At this time, for people aged 2 years or older—including passengers and workers—CDC recommends properly wearing a well-fitting mask or respirator over the nose and mouth in indoor areas of public transportation (such as airplanes, trains, buses, ferries) and transportation hubs (such as airports, stations,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



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

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

WHAT CAN WE DO?



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

VACCINATION

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])

MONOCLONAL ANTIBODY (MAB) TREATMENTS

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®)

ORAL AGENTS

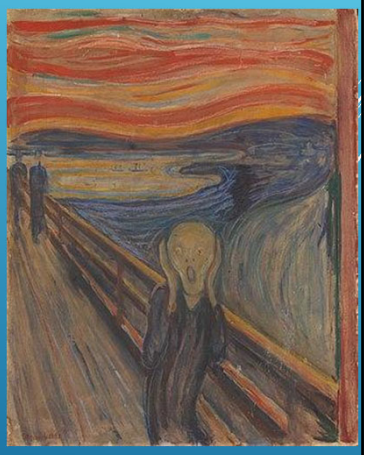
HOW DO I QUALIFY FOR PAXLOVID OR LAGEVRIO?

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.

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)

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COVID:
ORAL EFFECTS ON INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

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May 24, 2022

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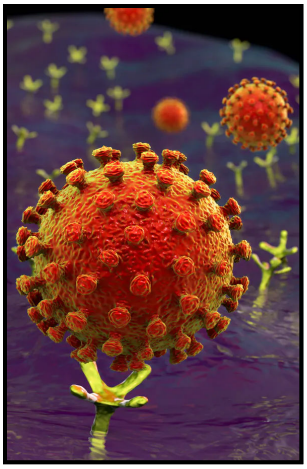
COVID-19 and the mouth

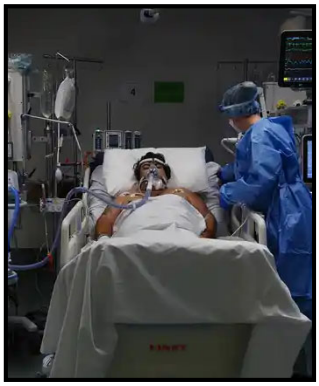
- COVID-19 is a respiratory disease caused by the SARS-CoV-2 virus
- SARS-CoV-2 enters bloodstream through ACE2 receptors
- ACE2 receptors highly present in oral cavity
- Increased in presence of oral disease
- Poor dental health linked to chronic medical conditions → increased risk for COVID-19 infection



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

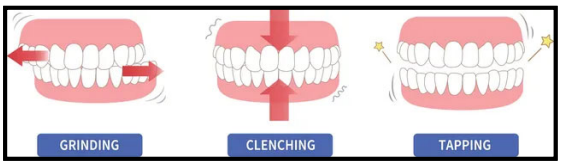
Xerostomia

- 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



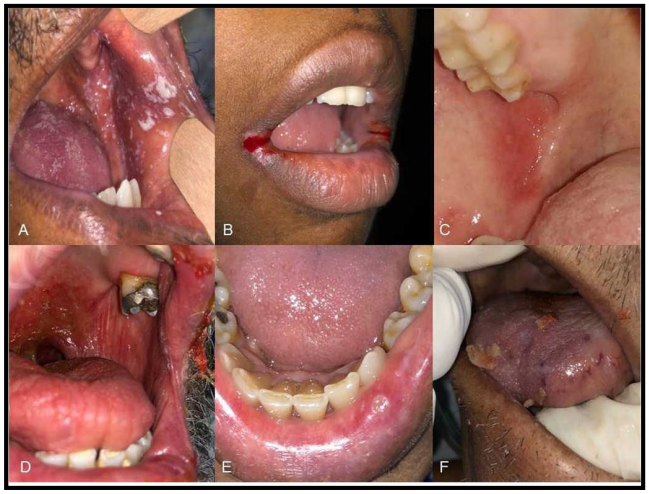
Bruxism and COVID

- 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