



MADRID, SPAIN

Advancing Community Health and Well-being  
by Addressing Inequity in the Practice of Medicine

**October 6, 2022**

Hotel Riu Plaza España  
C/ Gran Via, 84 - 28013  
Madrid, Spain

Jointly provided by:

Healthfirst, SOMOS Community Care, and Albert Einstein College of Medicine — Montefiore Medical Center





## Bridging the Digital Divide to Promote Digital Health Equity



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**Assistant Professor of Medicine, Mayo Clinic College of Medicine**

October 6, 2022



@DrLaPrincess



@FAITH4HEART

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### Purpose and Objectives

<b>PURPOSE</b>	<i>To present the impact of the rapid digital transformation of healthcare on the digital divide and potential strategies to promote digital health equity</i>
<b>OBJECTIVES</b>	<ol style="list-style-type: none"><li>1. Summarize the framework for digital health equity including digital determinants of health</li><li>2. Explore iterative design processes to develop and implement culturally-appropriate, community-based digital health interventions for diverse populations</li><li>3. Apply a patient-centered, sociodemographic-focused approach to promote digital health equity in clinical practice, public health and research</li></ol>
<b>FINANCIAL DISCLOSURE</b>	<b>Relevant Financial Relationships</b> – None <b>Research</b> - National Institutes of Health, Centers for Disease Control and Prevention, American Heart Association <b>Off-Label/Investigational Uses</b> – None



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## Who am I?



- Cardiologist and Physician-scientist; Mayo Clinic Department of Cardiovascular Medicine, Rochester, MN
- **Clinical focus:** Prevention, Cardiac Rehabilitation
- **Research Focus:**
  - Community-based participatory research approaches
  - Digital health interventions in diverse populations
  - Social determinants of health



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## At the heart of the community: How can we bridge the digital divide to improve their health outcomes?



**Mrs. W, 76 y.o. retired office clerk with CAD (s/p recent PCI to RCA), cardiologist offered virtual cardiac rehab as she lives in rural area**



**Mrs. P, 65 y.o. retired educator with hypertension and sedentary lifestyle, physician suggested use of faith-based mobile lifestyle app**



Mayo Clinic Center for Translational Sciences Activities and used with permission from patient personal photograph collection.

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## Why focus on CVD disparities in women?



- CVD leading cause of death for women
  - African American women, **highest CVD mortality** rate of all women
    - higher rates of fatal CAD than White women (HR, 1.63; 95% CI, 1.02–2.62)
- Lower **socioeconomic status** → worse CVD outcomes, strongest association in women
  - Women 4-8% more likely to live in poverty vs. men; racial/ethnic minority vulnerability
- **Significant disparities** in cardiac rehabilitation participation
  - African-American women have lowest rates of referral and completion



Tsao CW, et al. *Circulation*. 2022;145(8):e153-e639.  
Mehta LS, et al. *Circulation*. 2021;144:e251-e269  
Bambs C, et al. *Circulation*. 2011;123(8):850-7.

Mathews L, Brewer LC. *J Cardiopulm Rehabil Prev*. 2021;41(6):375-382.

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## Societal influences on Health Inequities

- Medical mistrust from historical research atrocities
- Segregated health care
  - (e.g. COVID-19 testing and vaccine access, under-resourced facilities)
- Racism/discrimination
- Criminal injustice



Cooper LA, Crews DC. *J Clin Invest*. 2020;130(10):5033-5035.  
Jones BL, et al. *J Racial Ethn Health Disparities*. 2017;4(4):735-745.  
Cooper LA, et al. *Am J Public Health*. 2015; 105(Suppl 3):S374-S376.

Adapted from EMPACT, University of Minnesota, <http://empactconsortium.com>

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## Recognizing the social determinants of health to advance health equity



“conditions in the environments where people are born, live, learn, work, play, worship, and age”



“identify disparities, design and implement evidence-based interventions to reduce them, invest in equity measurement, incentivize achievement”



Powell-Wiley TM. *Circ Res*. 2022;130(5):782-799.  
Matheny M, et al. *National Academy of Medicine*, 2019.

Nundy S, et al. *JAMA*. 2022;327(6):521-522.

Healthy People 2030, U.S. Department of Health and Human Services, Office of Disease Prevention and Health.

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## What about the Digital Environment?: Digital determinants of health

**“conditions in the digital environment that affect a wide range of health, functioning, and quality of life outcomes and risks.”**

- Includes access to technological tools, digital literacy, broadband internet
- Operates at the individual, interpersonal, community, and societal levels

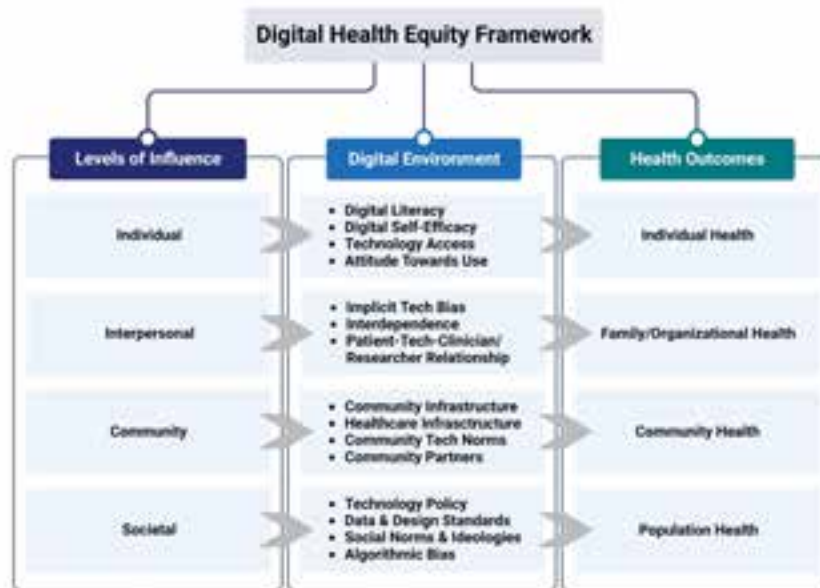


Richardson S, et al. A framework for digital health equity. *NPJ Digit Med*. 2022;5(1):119.  
Digital Equity Action Plan, Seattle, WA, 2016

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## Framework for digital health equity



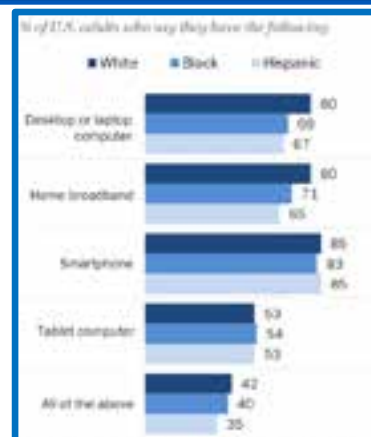
Adapted from Richardson S, et al. *NPJ Digit Med.* 2022;5(1):119. Adedinsewo DA, Brewer LC (senior). Mayo Clinic Proceedings. *Under review.*

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## Digital inequities: The Digital Divide

**“widening inequalities between disadvantaged persons who do not have access to digital technologies or the internet and the more privileged individuals who do”**

- Black and Hispanic adults in U.S. are less likely than White adults to have a traditional computer, home broadband



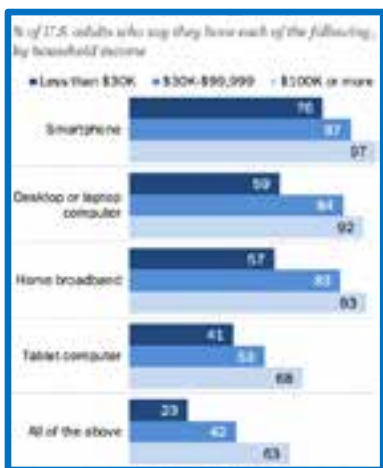
Pew Research Center. 2021

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## Digital inequities: The Digital Divide

- U.S. adults with lower incomes have lower levels of technology adoption
- Doubling of U.S. adults with lower incomes who rely on their smartphones for internet access



Pew Research Center, 2021

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## Digital inequities: Digital Redlining

“policies and practices that result in differential access to telecommunications services and infrastructure experienced by minoritized people and those in low-income communities”

- Consequence of **decisions made by regulators and companies** who shape access to technology
  - growing expression of structural inequities and racism
- Poor neighborhoods often **isolated from technological infrastructure** of health care advances
  - Disparities across AT&T 21-state broadband fiber networks network
  - Prioritized network upgrades to affluent areas, leaving lower income communities with outdated technologies



**AT&T's Digital Redlining**  
**Leaving Communities**  
**Behind for Profit**  
 OCTOBER 2022



Ray R, et al. *J Health Polit Policy Law*. 2017;42(5):901-924.  
 Merid B, et al. *Circulation*. 2021;144(12):913-915.  
 National Digital Inclusion Alliance. Accessed September 6, 2022.

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## Back to the Future: Achieving Health Equity Through Health Informatics and Digital Health

- Misinformed innovations can perpetuate health and health care disparities for under-resourced populations



### Pokémon Go Digital Redlining in Neighborhoods of Color



Importance of community engagement and purposefully designing culturally relevant and meaningful interventions

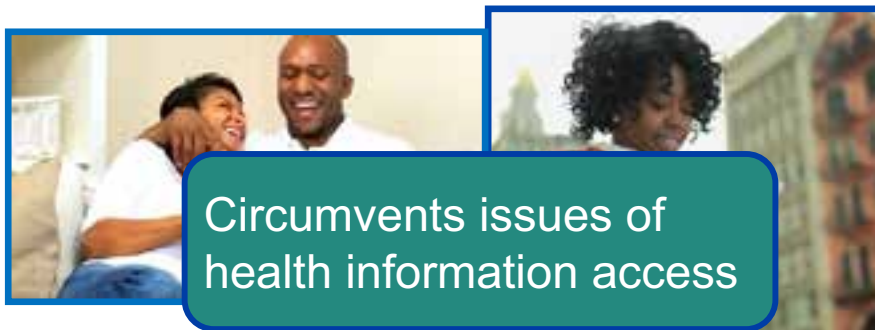


Brewer LC, et al. *JMIR Mhealth Uhealth*. 2020; 8(1):e14512.

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## African-Americans and mobile technology use

- Identical smartphone ownership as White individuals (80% vs. 82%)
- Rely heavily on mobile devices to search for health information
  - Health and wellness topics, most common
- Low representation in mobile health (mHealth) research



Pew Research Center. 2018. Mobile Fact Sheet.  
James DC, et al. *Telemed J E Health*. 2017;23(5):351-364.  
James DC & Harville C. *Prev Chronic Dis*. 2016;13:E156.

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## Telehealth: The Double-Edged Sword

- COVID-19 pandemic forced **rapid digitization of health care** and deployment of telehealth
- Marginalized communities experience **undue barriers to accessing health care** through virtual care technologies
  - Patient portals, remote patient monitoring
- Holds promise to ↑ **access** to and deliver convenient, effective **patient-centered care**
  - not only “virtual” version of in-person visit



Shaw J, Brewer LC, Veinot T. *JMIR Form Res.* 2021;5(4):e23233.  
Gergen Barnett K, et al. *J Gen Intern Med.* 2022;37(11):2845-2848.  
Richardson S, et al. *NPJ Digit Med.* 2022;5(1):119.

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## Reviewing the DDOH: Mrs. W, 76 y.o. retired office clerk



**No home broadband access, no PC/laptop**



**Low digital literacy**



### Levels of Influence

**Individual:** Technology access, Digital literacy/self-efficacy

**Interpersonal:** Patient-Tech-Clinician relationship

**Community:** Infrastructure

**Societal:** Tech Policy



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## Reviewing the DDOH: Mrs. P, 65 y.o. retired educator



**Mistrust of digital health tools, privacy concerns**



**Church support network**



### Levels of Influence

**Individual:** Attitudes Towards Use

**Interpersonal:** Implicit Tech Bias, Patient-Tech-Clinician relationship

**Community:** Community Tech Norms

**Societal:** Social Norms & Ideologies



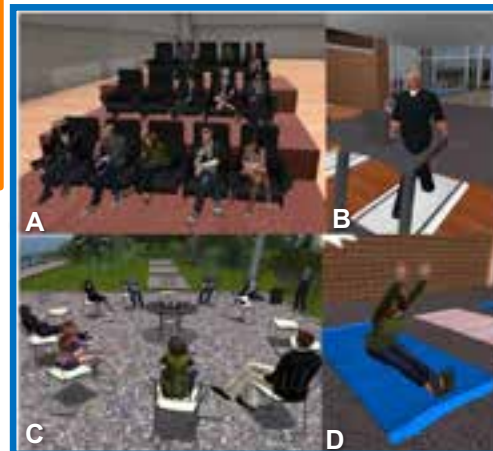
## Bridging the Digital Divide: Virtual World-based Cardiac Rehab

### ORIGINAL INVESTIGATION

### A Community-Informed Virtual World-Based Cardiac Rehabilitation Program as an Extension of Center-Based Cardiac Rehabilitation

MIXED-METHODS ANALYSIS OF A MULTICENTER PILOT STUDY

- Alternative means for patients to engage in CR through VW technology (Second Life©), **circumvents access barriers**
- Designed with **input from Mayo Clinic patient and family advisory groups** at community-wide support groups for patients with CVD
- High patient acceptability and **clinically relevant improvements in CV health** (physical activity, lipids, weight)



A. Lecture hall, 8-week health education  
 B. Patient using treadmill at fitness center  
 C. Peer support group patio (social hour)  
 D. Patient participating in yoga at fitness center

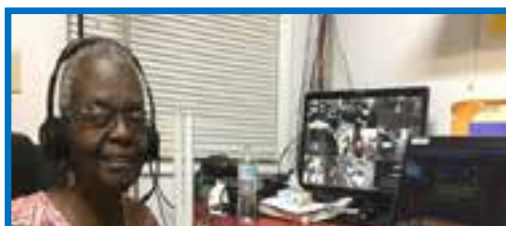




GLOBAL HEALTH REPORT: SURGERY AND INTERVENTIONS

## Novel Virtual World-Based Cardiac Rehabilitation Program to Broaden Access to Underserved Populations

A Patient Perspective



### Levels of Influence

**Individual:** Provided laptop, digital health navigator

**Interpersonal:** Cardiologist tracking progress through telehealth

**Community:** Accessed internet at church

**Societal:** Advocating for broadband internet in rural areas



Content VG, Brewer LC (senior). *JACC Case Rep.* 2022;4(14):911-914.

©2019 MFMER | 3868227-19

## FAITH! (Fostering African-American Improvement in Total Health) CV Health and Wellness Program

- 1<sup>st</sup> community-academic partnership with Mayo Clinic Rochester, African-American church congregations for **CV health promotion**
- 1<sup>st</sup> community-based intervention using American Heart Association **Life's Simple 7 (LS7)** framework to target the **social determinants of health** in African-Americans

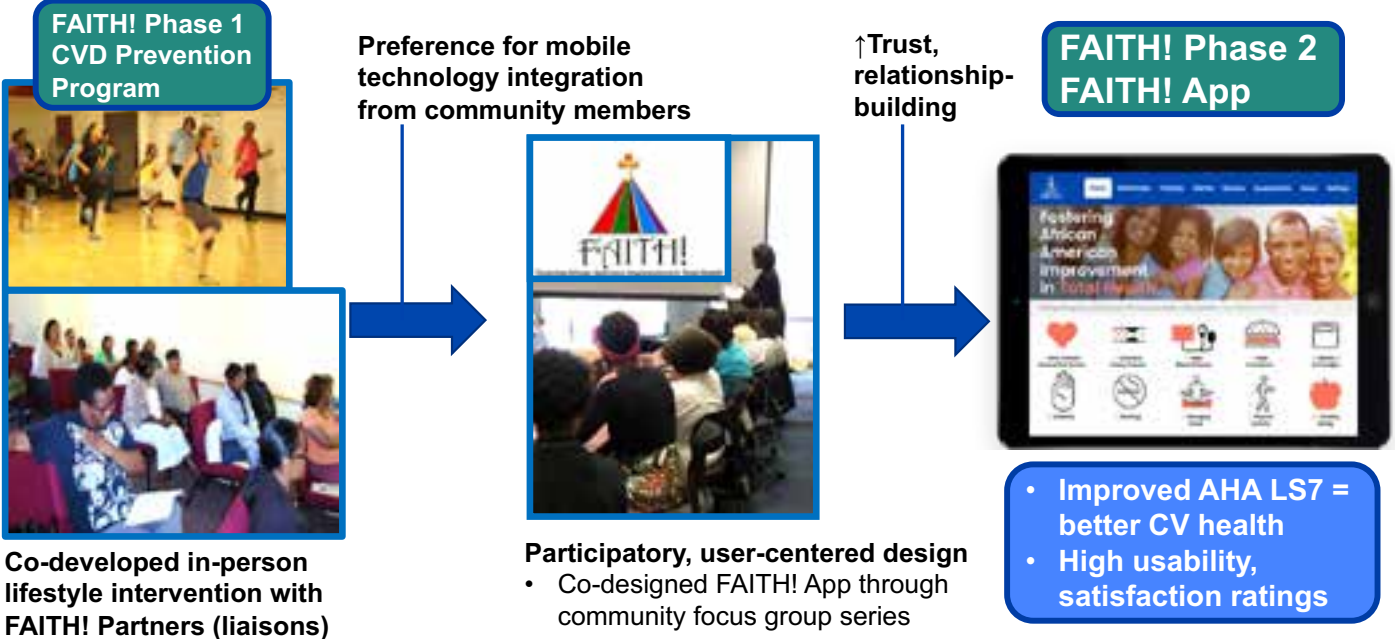


Brewer LC, et al. *J Racial Ethn Health Disparities.* 2017;4(2):269-281.  
Brewer LC, et al. *Journal of Health Psychology.* 2017:1359105317695878.  
Elgazzar R, et al. *PLoS ONE.* 2020;15(9): e0238374.

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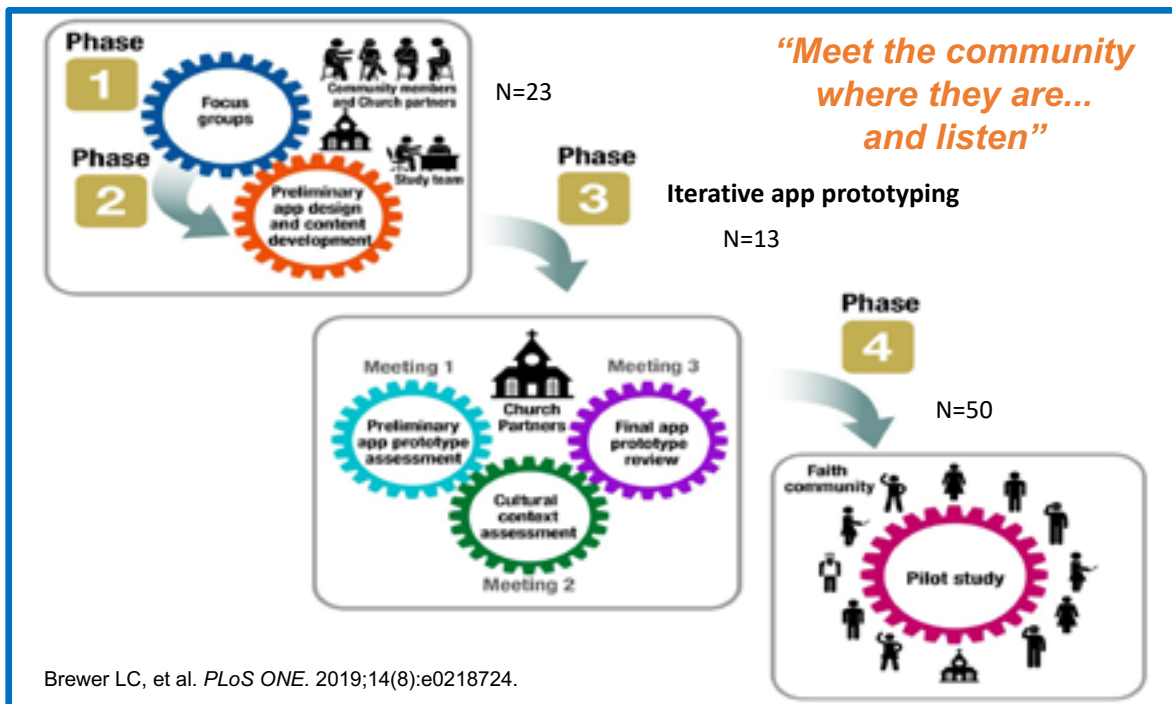


# “Community-driven digitization: FAITH! Program



MAYO CLINIC  
 Brewer LC, et al. *J Racial Ethn Health Disparities*. 2017;4(2):269-281.  
 Brewer LC, et al. *PLoS One*. 2019;14(8):e0218724.  
 Brewer LC, et al. *J Gen Intern Med*. 2019;34(8):1376-1378.

# Mixed methods: 4-phase formative research process



Brewer LC, et al. *PLoS ONE*. 2019;14(8):e0218724.



## Participatory design process



## FAITH!, there's an App for that!



**Motivational Testimonials**

**Spiritual Messaging**

**5 African-American churches  
10-week intervention**

**Recipes**



**Education Modules**



**Sharing Board**

**Tracking Feature**



Brewer LC, et al. *JMIR Research Protocols*. 2018;7:e31.  
Brewer LC, et al. *JMIR Mhealth Uhealth*. 2020;8(1):e14512.



## FAITH! App Pilot Study Results: Improved CVH, LS7 Composite Score

Mean (SD), unless otherwise noted	Baseline	Final	P-value
<b>CVH Factors</b>			
Systolic BP (mmHg)	133.3 (18.9)	127.1 (19.3)	<b>0.002</b>
Diastolic BP (mmHg)	82.8 (10.3)	77.1 (12.0)	<b>0.0004</b>
<b>BP control</b>			
BP <140/90 (mmHg)			<b>0.005</b>
BP <130/80 (mmHg)			<b>0.008</b>
Total cholesterol (mg/dL)			0.21
Glucose, fasting (mg/dL)			0.81
<b>CVH Behaviors</b>			
Fruit/vegetable intake (servings/day)	3.4 (1.4)	4.5 (1.8)	<b>&lt;0.0001</b>
Moderate physical activity (minutes/week) <sup>1</sup>	35 (0, 110)	75 (25, 188)	<b>0.04</b>
Current cigarette smoking <sup>2</sup>	1/45 (2.2%)	1/45 (2.2%)	1.0
BMI (kg/m <sup>2</sup> )	33.1 (7.3)	33.0 (7.1)	0.58
<b>LS7 Composite Score</b>	<b>8.3 (2.2)</b>	<b>9.0 (2.1)</b>	<b>0.05</b>

98% study retention at 28-weeks post-intervention

<sup>1</sup>Median (IQR, 25th, 75th percentile), <sup>2</sup>N (%)



Brewer LC, et al. *Circulation*. 2018;137(Suppl 1).  
Brewer LC, et al. *J Gen Intern Med*. 2019;34(8):1376-1378.

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## FAITH! App Formative Evaluation: Post-intervention focus groups

- **Overall impression:**
  - high usability, satisfaction ratings
  - facilitated healthy behavioral change through cultural tailoring, education modules, social networking
- **Suggestions for improvement:**
  - streamlining app self-monitoring features
  - prompts to encourage app use
  - personalization based on individual's cardiovascular risk



2 focus groups (N=9)  
Rochester, (n=4),  
Minneapolis-St. Paul (n=5)

Interventions guided by formative data → ↑ effectiveness



Brewer LC, Patten CA (senior), et al. *JMIR Formative Research*. 2020;4(11):e21450.  
Elgazzar R, Nolan TS, Joseph JJ, et al. *PLoS ONE*. 2020;15(9): e0238374.  
Cyriac J, Brewer LC (senior), et al. *JMIR mHealth UHealth*. 2021; 9 (11):e28024.

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## FAITH! Trial: Community-based CVH promotion

- **Design:** Cluster randomized trial, delayed intervention
- **Setting:** 16 African-American churches in Rochester, Minneapolis-St. Paul, MN
- **Participants:** 85 congregants, 71% women
  - Eligibility criteria: Suboptimal CVH behaviors
- **Intervention:** Community-refined FAITH! App
  - Theory-driven, individually-tailored messaging based on LS7
- **Outcomes at 6 months:**
  - **Primary:** Change in LS7 composite score and individual LS7 indicators



\*Funded by NIH/National Institute on Minority Health and Health Disparities (R21 MD013490-01), American Heart Association-Amos Medical Faculty Development Program (19AMFDP35040005). Brewer LC, et al. *Circulation*. 2022 Jul 19;146(3):175-190.



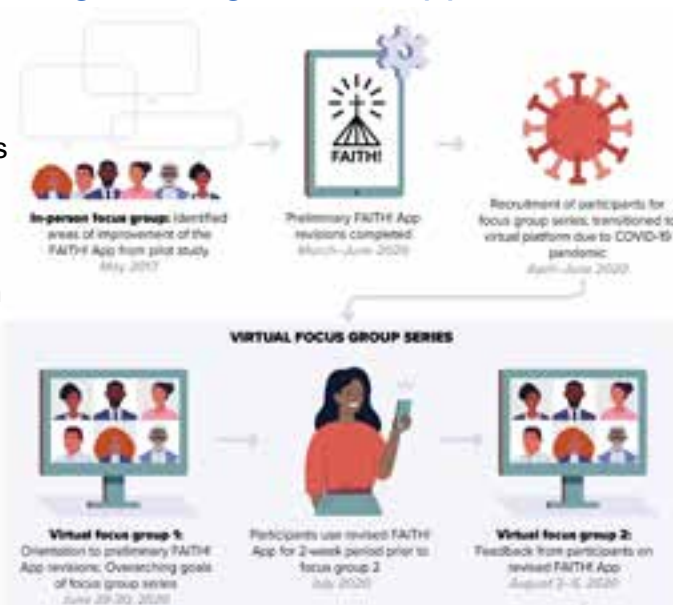
National Institutes on Minority Health and Health Disparities



American Heart Association

## Virtual Community Engagement: Refining existing FAITH! App features

- **Rationale:** Elicit specific feedback on FAITH! App prototype, proposed revisions to AHA LS7 focus
- **Design:** Focus group series, 3 iterative sessions
- **Participants/Setting:** African-American adult congregants
  - **N=15, 5/group (100% of recruitment goal)**
  - Mean age (SD) 56.9 (12.3) years, 87% women



Brewer LC, et al. *Digital Health*. 2022;8:20552076221110537.



# FAITH! App Refinement: What's New?

FAITH! App homepage education modules icons

## A. Preliminary prototype layout



## B. Refined layout with community input



Mentee, Jissy Cyriac, MD PGY-3, Mayo IM Residency



Brewer LC, et al. *Digital Health*. 2022;8:20552076221110537.

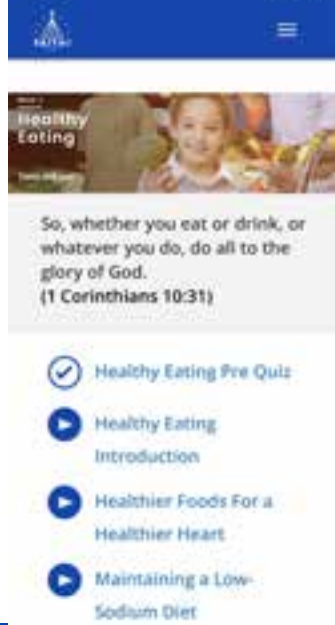
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# FAITH! App Screenshots: What's New?

## A. Dashboard



## B. Education module



## C. Diet tracking



## D. Sharing Board



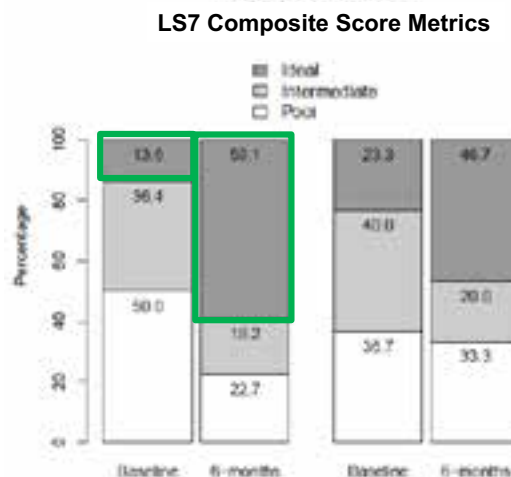
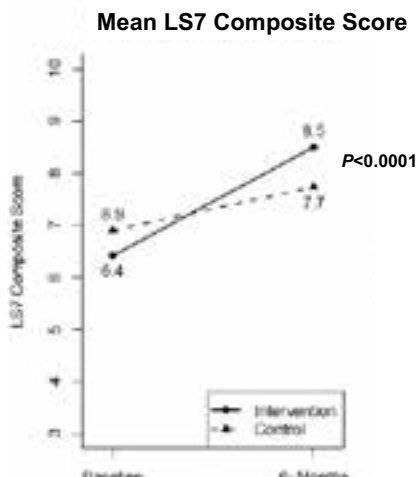
Brewer LC, et al. *Circulation*. 2022 Jul 19;146(3):175-190.

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## Preliminary Results: Mean LS7 composite score and metrics, baseline and 6-months post-intervention



**LS7 components:**  
 % intermediate/ideal  
 (Intervention *within-group*,  
 baseline vs. 6-months)  
**Diet:** 32% vs. 68%  
 $P = 0.003$   
**PA:** 59% vs. 85%  
 $P = 0.02$



**Refined FAITH! App potentially efficacious mHealth tool to promote ideal CVH among African-Americans**



Brewer LC, et al. *Circulation*. 2022 Jul 19;146(3):175-190.

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## Reviewing the DDOH: Mrs. P, 65 y.o. retired educator



**Mistrust of digital health tools, privacy concerns**



**Church support network**



### Levels of Influence

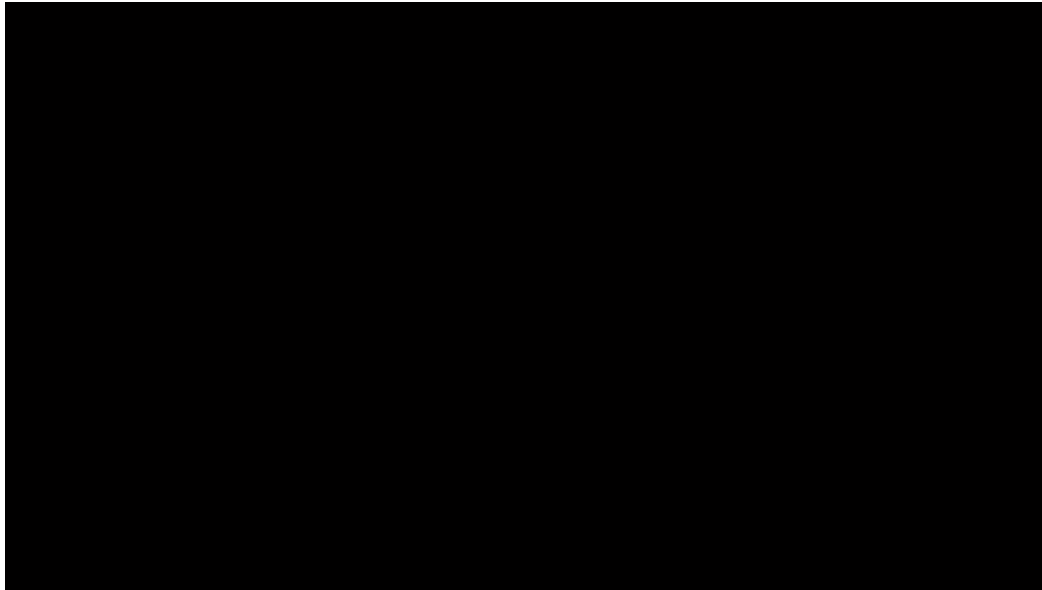
- Individual:** Trust-building through community engagement
- Interpersonal:** Physician recognized potential of digital health tool
- Community:** Church partnerships to access digital health tool
- Societal:** Culturally tailored, faith-based intervention



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## For the people: FAITH! participant testimonials



Mayo Clinic Department of Cardiovascular Medicine  
Brewer LC, et al. *JMIR Formative Research*. 2020;4(11):e21450.

\*Funded by NIH Office of Research on Women's Health (K12 HD065987-07), National Center for Advancing Translational Sciences (KL2.TR002379)<sup>20-33</sup>

## Applying the Digital Health Social Justice Guide

- Ask these 5 questions to promote digital health equity in design or evaluation of digital health research
  - FAITH! highlighted as a *Real World Example*



Figueroa CA, et al. *Front Digit Health*. 2022;4:807886.



## Focusing on Digital Health Equity: Key Recommendations

Domains	Elements of digital health equity	Recommendations
Individual	<ul style="list-style-type: none"><li>Digital literacy</li><li>Interest</li><li>Readiness</li></ul>	<ul style="list-style-type: none"><li>Focus on usability and relevance</li></ul>
Family and home	<ul style="list-style-type: none"><li>Caregiver and family support</li><li>Private and secure space</li></ul>	<ul style="list-style-type: none"><li>Design for multiple contexts</li><li>Blend digital and human support</li></ul>
Community	<ul style="list-style-type: none"><li>Trusted partners (eg, community organizations)</li><li>Digital capacity and infrastructure needs</li></ul>	<ul style="list-style-type: none"><li>Codesign with community</li><li>Develop reciprocal relationships</li></ul>
Services (including health care)	<ul style="list-style-type: none"><li>Digital training</li><li>Technical assistance</li><li>Linguistically and culturally concordant staff</li></ul>	<ul style="list-style-type: none"><li>Implement and evaluate in clinical settings</li></ul>
Policy	<ul style="list-style-type: none"><li>Broadband internet</li><li>Devices</li><li>Accessibility standards</li><li>Reimbursement</li></ul>	<ul style="list-style-type: none"><li>Improve connectivity</li><li>Improve accessibility</li><li>Utilize value-based payment system</li></ul>



Lyles CR, et al. JAMA. 2021;326(18):1795-1796.

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Summary: “Meet people where they are” in the community, culturally or digitally to advance health equity



### Take Home Points:

1. Addressing the **digital determinants of health** will narrow and ultimately close the digital divide
2. User-centered or **participatory design** is key to development of **culturally relevant and meaningful digital health interventions**
3. Community engagement **builds trust** with underserved, marginalized communities



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Thank you for your attention!

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**[@FAITH4HEART](https://twitter.com/FAITH4HEART)**



# Confronting Systemic Racism and Bias in Medicine

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ASSOCIATE CHAIR OF DIVERSITY, EQUITY AND INCLUSION,  
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ASSOCIATE PROFESSOR, ALBERT EINSTEIN SCHOOL OF  
MEDICINE  
OCTOBER 6, 2022



## Purpose and Objectives

### PURPOSE

- To provide a historical overview of the racial injustice which has occurred in medicine, and to discuss the ways that we can undo some of these injustices

### OBJECTIVES

- To summarize the history racial injustice in medicine
- To illustrate examples of racism in medicine with cases
- To examine ways in which one can combat racism and bias in medicine

### FINANCIAL DISCLOSURE

*Salary Support from Neurocrine until 11/21 as a Site-PI for the CAHtalyt Study  
Salary Support T1D Exchange QI Collaborative as Co-I for the Connected/Smart Pen Study*



# Montefiore Medicine in focus.

## Montefiore Health System

10 hospitals in 4 counties  
 35,000+ employees  
 7,175 physicians  
 33% of the region's hospital encounters  
 3,127 total beds

- ▶ A state-of-the-art ambulatory surgical/specialty campus
- ▶ 215-site ambulatory network spanning the full spectrum of services:
  - Comprehensive continuum care
  - Rehabilitation
  - Skilled nursing facilities
  - Home health agencies
  - A school of nursing
- ▶ New York State's first hospital-based off-campus emergency department

CARING FOR **1.1 MILLION** UNIQUE PATIENTS EACH YEAR  
 -2019 Data

7,025,742 ambulatory visits  
 546,318 emergency department visits  
 10,161 births  
 150,326 discharges

## Albert Einstein College of Medicine

2,007 Faculty including  
 1,205 Einstein faculty employed by MHS  
 724 Medical students  
 158 PhD students  
 108 MD/PhD students  
 265 Postdoctoral research fellows

4.4% class of 2022 acceptance rate

### RESEARCH

- ▶ 1,800 full-time faculty members
- ▶ 3,292 papers published
- ▶ \$178M in research funding from NIH
- ▶ 380+ NIH grants

Named Top 50 Best Medical School for Research in the country by U.S. News and World Report

70 projects in 51 countries involving 85 students and 66 faculty annually

8 NIH Health and Human Services designated centers  
 8 centers of excellence  
 3 programs of distinction  
 Global Health Center specialty program

## Why Montefiore Einstein stands apart and stands ahead

- ▶ Montefiore's medical specialties ranked as top 5% in the nation by U.S. News and World Report
- ▶ Children's Hospital at Montefiore (CHAM) recognized as one of "America's Best Children's Hospitals" by U.S. News and World Report
- ▶ Albert Einstein College of Medicine ranked a top 50 "Best Medical School for Research in the Country, 2020" by U.S. News and World Report

- ▶ The National Institutes of Health (NIH) awarded Einstein \$178M+ in research funding in 2019, placing Einstein 34th among 142 schools of medicine
- ▶ 380+ NIH-funded grants awarded to Einstein
- ▶ 700+ clinical trials
- ▶ CMO is the first organization of its kind (part of a medical enterprise, population health focus) in NYC to achieve three-year unconditional NCCAB accreditation for Utilization Management, Case Management and Credentialing
- ▶ Only CMS Integrated Care for Kids Awardee in New York State Management and Credentialing

## The largest network in the Bronx, Westchester and the Hudson Valley



- ◆ Campuses
- Ⓜ Hospitals
- ◆ Advanced primary care centers
- Special care
- ▲ Nutrition
- Dental
- Behavioral health and substance abuse disorders
- School health
- ▲ Clinical affiliations

## What is Race – biological or social?



Race is a social construct used to group people. Race was constructed as a hierarchical human-grouping system, generating racial classifications to identify, distinguish and marginalize some groups across nations, regions and the world. Race divides human populations into groups, often based on physical appearance, social factors and cultural backgrounds.

<https://www.genome.gov/genetics-glossary/Race>



<https://www.nationalgeographic.com/magazine/sue/april-2018>



<https://www.nationalgeographic.org/video/these-twins-show-race-social-construct/>



## What is racism – individual vs. structural?

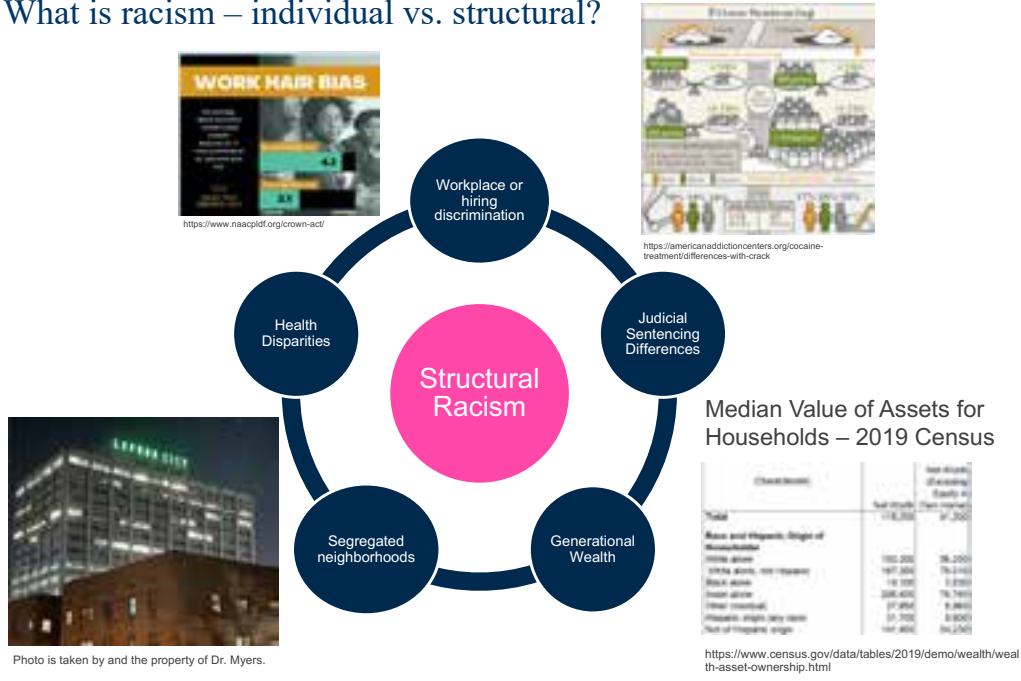


Photo is taken by and the property of Dr. Myers.

Journal of Black Studies 2021, Vol. 52(7) 716–735  
 National Bureau of Economic Research; 2021 Jul 26.  
 Annu. Rev. Public Health 2019. 40:105–25  
<https://www.nytimes.com/1970/09/30/archives/us-releases-details-of-its-housing-discrimination-charges-against.html>  
<https://projects.newsday.com/long-island/real-estate-discrimination-history/>



## Where we started.....

- First slaves come to the US in 1619
- Indentured servitude -> slavery
- *Slave Codes*

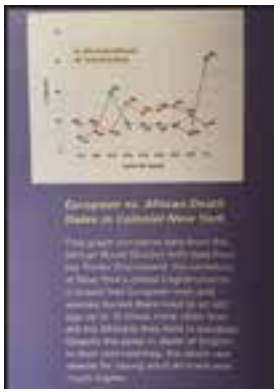


Photo is taken by and the property of Dr. Myers at the African Burial Ground Monument in NYC.

<http://www.pbs.org/wgbh/aia/part1/1p268.html>  
<http://www.pbs.org/wgbh/aia/part2/2h62.html>

## Our Black maternal health crisis is an American tragedy

APR 13, 2021 • 4 MIN READ

Susan R. Bailey, MD  
 Past President

Over the remarkable advancements we have made across nearly every aspect of health care in the last quarter-century, it is shocking that women in the U.S. are more likely to suffer a pregnancy-related death today than in the 1990s. The danger is even greater for women of color: Black women are at least three times more likely than white women to die as a result of pregnancy-related complications such as illness than risk is as three times greater.

<https://www.ama-assn.org/about/leadership/our-black-maternal-health-crisis-american-tragedy>

## Provisional COVID-19 Age-Adjusted Death Rates, by Race and Ethnicity — United States, 2020–2021

Table 1. Changes in age-adjusted death rates\* with COVID-19 as underlying cause, by race/ethnicity† — United States, 2020–2021

Race/Ethnicity	2020		2021		% Change in age-adjusted death rates (95% CI)
	Rate	95% CI	Rate	95% CI	
All	19.0	18.2	18.2	17.5	-10.0% (-10.5% to -9.5%)
White	18.0	17.2	17.2	16.5	-4.4% (-4.9% to -3.9%)
Black	58.0	57.2	56.2	55.5	-4.3% (-4.8% to -3.8%)
Hispanic	28.0	27.2	26.2	25.5	-9.3% (-9.8% to -8.8%)
Other	28.0	27.2	26.2	25.5	-9.3% (-9.8% to -8.8%)
Asian	12.0	11.2	11.2	10.5	-11.7% (-12.2% to -11.2%)
Multiethnic††	28.0	27.2	26.2	25.5	-9.3% (-9.8% to -8.8%)
Total	19.0	18.2	18.2	17.5	-10.0% (-10.5% to -9.5%)

Abbreviations: CI, confidence interval; COVID-19, coronavirus disease 2019; ICD-10, International Classification of Diseases, 10th Revision; NA, not available.

\*Age-adjusted death rates are based on the 2019 U.S. standard population.

†Includes all races and ethnicities.

††Includes all races and ethnicities.

Weekly / April 29, 2022 / 71(17);601-605





## Medical Injustice 1800s: Dr. Marion Simms, the father of Ob/Gyn



### Fact check: Father of modern gynecology performed experiments on enslaved Black women

usatoday.com

Published 1:44 pm EDT June 19, 2020 | Updated 11:56 am EDT June 19, 2020



<https://www.usatoday.com/story/news/factcheck/2020/06/19/fact-check-j-marion-sims-did-medical-experiments-black-female-slaves/3202541001/>

J Med Ethics. 1993 Mar;19(1):28-31

### New York: James Marion Sims statue removed from Central Park



<https://www.bbc.com/news/world-us-canada-43804725>

Modern day cases of racism in medicine: a look back over the past 100 years....





## Medical Injustice 1950s: Henrietta Lacks



- An African-American woman whose cancer cells are the source of the **HeLa** cell line, the first immortalized human cell line and one of the most important cell lines in medical research BUT she never gave consent.

<https://www.baltimoremagazine.com/section/health/henrietta-lacks-family-finally-gets-a-say-in-her-genome-research>  
[https://en.wikipedia.org/wiki/Henrietta\\_Lacks](https://en.wikipedia.org/wiki/Henrietta_Lacks)

## Terre Haute Experiment

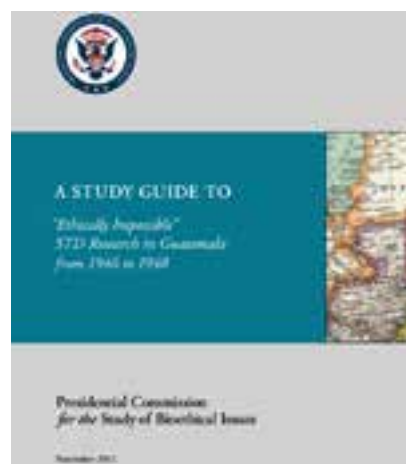
The New York Times

### Lapses by American Leaders Seen in Syphilis Tests

By Donald G. McNeil Jr.  
Nov. 14, 2011

The highest medical and legal officials of the American government and experts at Harvard and other top medical schools approved venereal disease experiments on people in the 1940s, which led to the deliberate infection of Guatemalan prisoners and mental patients with syphilis to test penicillin, a White House bioethics panel reported Tuesday.

<https://www.nytimes.com/2011/09/14/health/14syphilis.html>



[https://bioethicsarchive.georgetown.edu/pcsbi/sites/default/files/StudyGuide\\_EthicallyImpossible\\_508\\_Nov26.pdf](https://bioethicsarchive.georgetown.edu/pcsbi/sites/default/files/StudyGuide_EthicallyImpossible_508_Nov26.pdf)



## Guatemala Experiment

HEALTH

### The U.S. Doctor Who Infected 1,300 Guatemalan Patients With STDs

By Sarah Zhang | 4/08/15 1:00PM |

<https://gizmodo.com/the-u-s-doctor-who-infected-1-300-guatemalan-patients-1696095744>

Although we gave medicines and supplies to the institution the patients were not aware of it and it would have meant nothing even though the patients had been mentally fit and cognizant of the fact.<sup>24</sup>

The institute's staff was so small that the group of experimental workers appreciably increased the amount of a physician's time given to each inmate. As reported earlier, cigarettes were a most valuable, even indispensable, adjunct to the whole program. . . . The patients would often attempt to make numerous trips past the physicians, for blood letting, cisternal puncture or examination, just to augment their supply of tobacco.<sup>25</sup>

American Journal of Public Health | February 2013, Vol 103, No. 2

### Federal Judge Dismisses Suit Against Johns Hopkins, Rockefeller Foundation Over 'Nonconsensual Human Medical Experiments' in Guatemala

A federal court judge granted a summary judgment in favor of Johns Hopkins University and the Rockefeller Foundation, finding they administered the drug under supervision for the alleged research—preventing both organizations from being liable for the alleged nonconsensual experiments in Guatemala on the basis of the U.S. Supreme Court's decision in *Heckler v. Mathews*. The plaintiffs, Robert J. Smith of the U.S. House of Representatives, Adria Placencia, and the American and British Medical Journal, Journal of the American Medical Association, and the American Medical Association.

April 22, 2022 at 04:28 PM

<https://www.law.com/2022/04/22/federal-judge-dismisses-suit-against-johns-hopkins-rockefeller-foundation-over-nonconsensual-human-medical-experiments-in-guatemala/#:~:text=The%20plaintiffs%2C%20a%20class%20of,their%20professors%2C%20physicians%20and%20researchers.>

## The Tuskegee Experiment



[https://www.youtube.com/watch?v=11A-YP24QwA&feature=player\\_profilepage](https://www.youtube.com/watch?v=11A-YP24QwA&feature=player_profilepage)

In 1974, a \$10 million-dollar settlement is awarded to survivors and their heirs.

In 2004, CDC funds \$10 million-dollar cooperative agreement to continue work at Tuskegee University National Center for Bioethics in Research and Health Care.

1997

1974

2004

In 1997 President Clinton issued an apology to the survivors.





## Using race to define norms: CTE compensation variability for NFL Players

### How 'race-norming' was built into the NFL concussion settlement

The NFL and lawyers for former players blame the controversial practice on doctors. But both sides negotiated a settlement that guaranteed race would affect payouts — and defended the practice long after concerns were raised.

Language (Percent)	White (Percent)	Black (Percent)	Hispanic/Latino (Percent)	African-American (Percent)	Concussion average (NFL 1st-4th)	Concussion average (NFL 5th-6th)
Basic Training Fee	24	34	22	35	10	11
Concussion Payout	14	26	11	24	24	26
BIAA CTE	9	16	7	14	12	13

<https://www.washingtonpost.com/sports/2021/08/02/race-norming-nfl-concussion-settlement/>

Table: Measurable Social Determinants of Brain Health for New Normative Approaches

Determinant	Characteristic
Activity and environment	Country of origin, age of immigration, reason for immigration, familiarity with leading environment
Language	Primary language, English language proficiency, multilingualism
Education	Total years of education, parents' total years of education, education quality, school characteristics, country of education
Literacy	Ability to read, write, count and health literacy
Psychosocial stress	Perceived discrimination, early-life adversity, minority threat
Occupation*	Occupational complexity and prestige, occupational stability, occupational stress
Economic and financial status*	Household income, financial strain, housing and food security, access to health care
Sociodemographic characteristics*	Urban/rural residence, neighborhood characteristics, social cohesion

\*Measured at middle and current.

\*Measured at childhood, middle, and current.

JAMA Neurol. 2021;78(4):377-378.

## Methods to Dismantle Racism in Medicine





## Anti-racism curriculum/trainings



Component	Score
<b>For all sessions</b>	
At least one structural competence learning goal is present	Yes / No
Health disparities (ie, racial/ethnic health disparities) are discussed and accompanied by evidence-based explanations for why these disparities exist, not automatically attributed to genetics/biology	Yes / No
Race is acknowledged as a social construct and is <b>not</b> considered a risk factor for disease. Structural/social determinants of health, including racism, may be discussed as a risk factor	Yes / No
Structural and social determinants of health are mentioned as part of patient case histories	Yes / No
Solutions for structural or social contributors are discussed when discussing patient assessments and plans, take direction from patients, and go beyond exclusively referring to other disciplines, the social work	Yes / No
<b>Does your session have patient cases that reference race/ethnicity/social orientation/culture/identity/ability?</b>	Yes / No
Race/ethnicity/social orientation/cultural identifier is <b>quoted</b> from summary statements unless strong evidence in literature exists for reference to clinical decision-making or improved patient outcomes for this clinical situation	Yes / No
Patient cases portray patients, providers, and learners across a wide spectrum of diversity including but not limited to a variety of races/ethnicities and multiracial couples/backgrounds, religious beliefs, non-binary gender identities, non-heterosexual identities, diverse language speakers, differently-abled individuals, etc.	Yes / No
Minority patients are <b>not</b> given pathologies stereotypically associated with their race/ethnicity. For example, avoid "gay man with HIV."	Yes / No
Minority patients are <b>not</b> exclusively given unhealthy behaviors, but instead given a variety of healthy and unhealthy behaviors	Yes / No
Assumptions about patients' beliefs based on their ethnicity/race are <b>avoided</b> without first inquiring to elicit those beliefs. Questions about beliefs are <b>not</b> limited to patients from racial/ethnic minority groups only	Yes / No
Practices of provider implicit bias and/or potential for microaggressions is acknowledged and responses to these are reviewed	Yes / No
<b>Does your session reference patient behaviors?</b>	Yes / No
Upstream structural and social factors affecting patients' behaviors are explored and cited. Examples of patient behaviors requiring this exploration include, but are not limited to, non-adherence, missed appointments, frequent emergency room visits, poor diet, lack of exercise, or substance use	Yes / No
When health behaviors are listed as "risk factors" for disease, they are contextualized in terms of structural and social determinants of health	Yes / No
Health behaviors are not used as adjectives to describe patients. For example, "homeless man" is replaced with "man experiencing homelessness" and "drug abuser" is replaced with "individual with substance use disorder"	Yes / No
<b>Does your session have images of both patients, providers or providers?</b>	Yes / No
Images used in curricular materials depict diverse patients, providers and learners	Yes / No



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Rubric: courtesy of Drs. Shani Scott and Iman Hassan, do not reproduce without permission: [https://einsteinmed.co1.qualtrics.com/jfe/form/SV\\_1U3maeK8CwM3kqi](https://einsteinmed.co1.qualtrics.com/jfe/form/SV_1U3maeK8CwM3kqi)



## Anti-racism curriculum/trainings

**Struggles and Tensions in Antiracism Education in Medical School: Lessons Learned**  
 Academic Medicine: December 2020 - Volume 95 - Issue 125 - p S163-S168

- Differential needs and experiences of BIPOC and Whites
- Address issues of racism within medical education as well as in medical care
- Accountability in medical education

Innovation Report

### Addressing Race, Culture, and Structural Inequality in Medical Education: A Guide for Revising Teaching Cases

Aparna Krishnan, MPH, Molly Rubinowitz, MD, MPH, Ariana Ziminsky, Stephen M. Scott, MD, MPH, and Katherine C. Chretien, MD

#### Rationale and evidence for case editors

- Students must be exposed to alternative worldviews of minority patients that move beyond reductionist views and empathy for diversity within white groups
- Medical education must address inequalities
- Structural competencies skills are best learned when demonstrated in practice. The structural content in which students are asked to incorporate into the disease narrative is the most important risk factor, offered to those already associated with the student's knowledge
- Race and class of case is not necessarily a biological risk factor. However, the social context of health can be a risk factor, which has led to certain health behaviors, disease prevalence, and health outcomes being inherently associated with certain race and culture
- While it is critical to learn how to understand medical equity and offering opportunities with people of different race and culture, these provider-patient communication factors should be taught and discussed because they are directly related and best to improve health outcomes. Not because a patient is a member of a racial/ethnic group for which clinicians need to be able to identify and best to improve patient health which can not be done structurally, but used for identifying and best to improve health outcomes

Acad Med. 2019;94:550-555





## Lessons Learned

- Summary of Lessons Learned to Date
  - Structural racism can impact social determinants of health (i.e., housing, employment) by marginalizing the non-dominant groups of people
  - There are still ramifications of the discriminatory nature of medical school enrollment and matriculation
  - Medical research needs continued safeguards to protect marginalized populations from *experimentation*
  - Race should not be used to create “norms” for measurements and diagnoses, as it is a social construct – not biological

## Summary

- Race is a social construct which has haphazardly been used to classify people. Be mindful of how you incorporate race into your clinical decision making.
- Structural racism is composed of factors which lead to a dominant versus marginalized grouping of people. This is where anti-racism needs to be tackled.
- For those who are not marginalized there are several ways to help: allyship, sponsorship and participating in anti-racism teachings.



Montefiore

EINSTEIN  
Albert Einstein College of Medicine

Thank you to my colleagues:

**Dr. Allison Stark, Sponsor and Vice President and Chief Medical Officer of the Montefiore Care Management Organization**

Dr. Yaron Tomer, Chair, Division of Medicine

Dr. Jill Crandall, Division Chief, Endocrinology

Drs. Iman Hassan and Shani Scott, Leaders in the Development of Anti-racism Curriculum in Medical Education

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# Citizenship as a Social Determinant of Health: Health Access and Utilization with Immigrant Populations

Errol L. Pierre, MPA, DBA

October 6, 2022



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## Purpose and Objectives

### PURPOSE

*Discuss the connections between immigration and healthcare*

### OBJECTIVES

- Discuss historical context of connections between immigration and healthcare
- Share recent literature on the topic
- Quantify impacts of immigration status on healthcare by using the Public Charge regulation as a Natural Experiment
- Discuss avenues for increased access and utilization for immigrant populations

### FINANCIAL DISCLOSURE

*I do not have any financial disclosures to share*

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# Agenda

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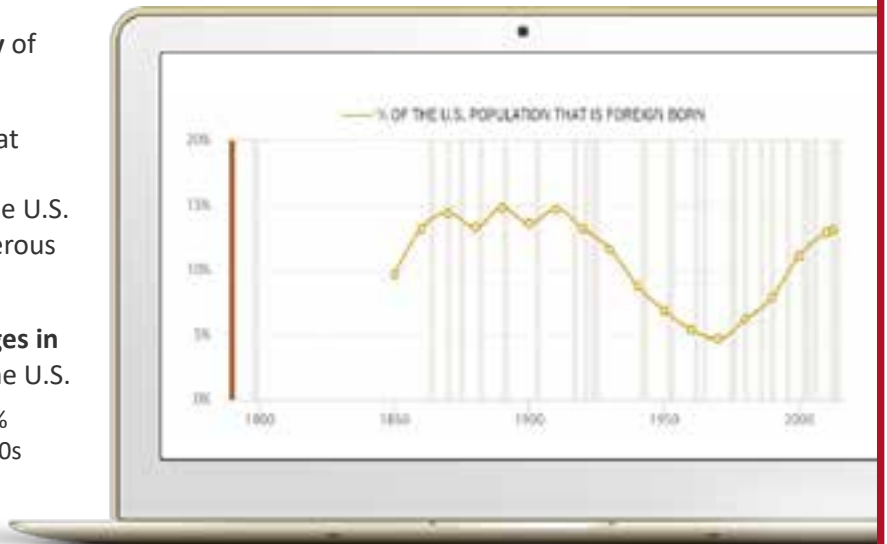


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## Immigration in America

- **Wide diversity of race and ethnicity** of foreign-born non-citizens in the U.S.
- **Various laws have been enacted** that impact the ability for immigrant populations to enter or remain in the U.S. as well as the ability to access numerous governmental healthcare programs
- Such laws have led to **various changes in the percentage of non-citizens** in the U.S.
  - Non-citizens have ranged from 5-15% of the total population since the 1800s
  - Example of one such law is the Public Charge



U.S. Census Bureau. "Historical Census Statistics on Foreign-Born Population of the United States: 1850-2000"

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## Citizenship Status in America

- **Undocumented Persons:** Individuals who either overstay a visa or enter the United States without proper inspection at a port of entry
- **Refugees:** Individuals who permanently reside in the United States after leaving their country of origin to escape war, persecution, or a natural disaster
- **Non-Permanent Residents:** Individuals admitted for a specific period of time, including tourists, students, diplomats, and crewpersons (visa holders)
- **Permanent Residents:** Individuals who have green cards and are lawfully admitted for permanent residency in the United States
- **Naturalized Citizens:** U.S. citizens granted lawful permanent resident status after meeting the requirements established by Congress in the Immigration and Nationality Act
- **U.S. Citizens:** Individuals, by birth or through citizenship of a parent, who have the right to live and work in the United States and to receive federal assistance

Source: McAlvanah & Siwulec, 1978

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## Social Determinants of Health



### Literature Review

- **Growing focus from healthcare experts on the social determinants of health**, defined as “the factors apart from medical care that can be influenced by social policies and shape health in powerful ways” (*Braveman & Gottlieb, 2014*)
- **Health outcomes and disease burden is attributed to the conditions in which people live, work, and are born** (*Marmot, 2017; Gurewich, Garg, & Kressin, 2020*)
- Evidence shows **investments into childhood development, economic opportunities, and education** would do more for improving health outcomes and extending life than simply providing medical care (*Wilensky, 2016*)

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## Citizenship Status as a Social Determinant of Health

- **The United States launched a 2030 Healthy People initiative focused on five key areas of social determinants:** economic stability, education, social and community context, health and healthcare, and neighborhood and built environment  
*(U.S. Department of Health and Human Services, 2020)*
- **Citizenship status may have a profound effect on a person’s health and ability to secure health services**  
*(Castaneda et al., 2015)*
- Despite the likely effect on healthcare access and quality, **citizenship status is currently missing from the list of key SDOH** *(Marmot & Allen, 2014)*



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## Citizenship Status as a Social Determinant of Health

*Specific examples from research:*

### Systemic Racism & Bias

False mythologies promoted by influential policy experts exert that black and Hispanic non-citizens “respond only weakly to chances to get ahead through education and work,” suggesting that both ethnic groups seek to stay in their current socioeconomic statuses and do not seek a better life  
*(Mead, 2020)*

### Language & Chronic Conditions

- The prevalence of chronic diseases like diabetes and hypertension can be associated with restrictive immigration and healthcare policies *(Hall & Cuellar, 2016)*
- Language barriers add further hurdles to immigrants seeking coverage, as seen in lower enrollment rates in public programs and higher uninsured rates among Asian immigrants *(DeNavas-Walt et al., 2014)*

### Access to Care

Older immigrants that newly arrive in the United States are the least likely to have coverage or access to social security, as they face more structural barriers than many others in seeking care *(Choi, 2006)*

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## Historical Context: Citizenship Status & Health Policy



Pre 1776 – 1865

### 1781 – Articles of Confederation

Citizenship first gets linked to access to public benefit and equal protection under the law  
*(Daniels, 2002)*



1865 – 1920

### 1865 – 13<sup>th</sup> Amendment

1892 – Chinese Exclusion Act  
**Immigration Act of 1882** creates “Public Charge” & Diseases  
*(Lee, 2002; CIS, 2019)*



1920 – 1965

### Social Security Act of 1935

**Immigration Act of 1924**  
Immigrants went from 13% to 5% of the population. Despite vaccines, associating immigrants with disease persisted



1965 – 1986

### Immigration & Nationality Act of 1965

**Medicaid & Medicare**  
Eligibility rules for non-citizens create barriers



1986 – 2016

### Immigration Reform Act of 1986

**Personal Responsibility and Work Opportunity Reconciliation Act of 1993**  
**Affordable Care Act of 2010**

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## Present Day: Citizenship Status & Health Policy

### 2016 – 2020: The Trump Administration

- Within five days of taking office in 2017, President Trump executed various executive orders seeking to dramatically change the U.S. immigration system *(Pierce & Selee, 2017)*
- On August 14, 2019, the Trump administration released its draft rule changes to the Public Charge, which redefined the term as “an alien who receives one or more public benefits for more than 12 months, in total, within any 36-month period *(U.S. Citizenship and Immigration Services, 2020)*
- Despite the COVID-19 pandemic, which has led to high unemployment, Medicaid enrollment in California continued to shrink; Policy experts believe the linkage between health coverage and immigration status caused these detrimental effects *(Bluth & Hart, 2020)*

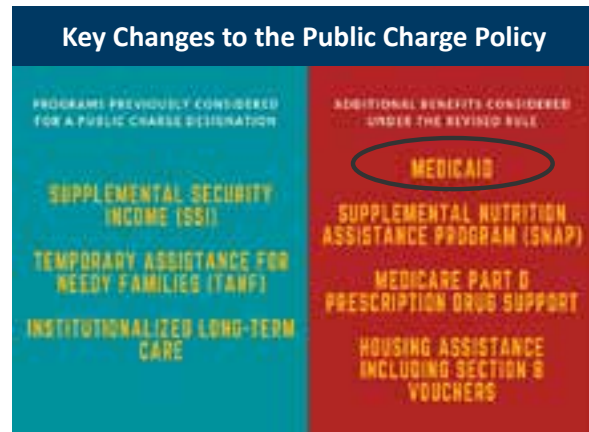
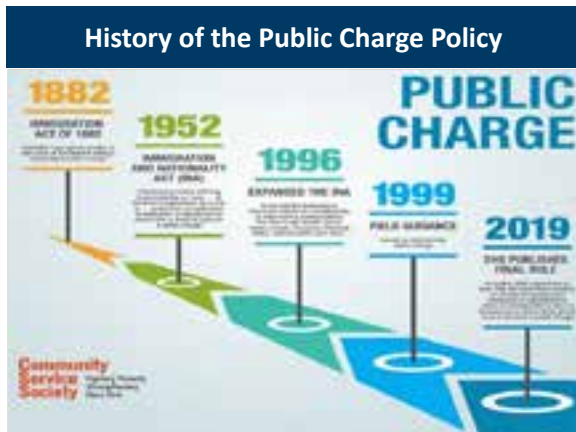
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# What is the Public Charge Policy?

**Public charge** is a term used to refer to an individual who is likely to become primarily dependent on the government for subsistence, as demonstrated by the receipt of various public benefits. Those deemed to be a Public Charge may be denied visas or permission to enter the country due to their disabilities or lack of economic resources. In August 2019, the Trump Administration changed the criteria used in Public Charge determinations. (Department of Homeland Security, 2019)



Source: Hepper, D., (2019), A Broader Definition of Public Charge Will Harm Millions of Families. Federal Policy, News. Children's Institute.

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## Research Question: *Is Citizenship Status a Social Determinant of Health?*

### Hypothesis Development

#### ENROLLMENT

**H1:** Non-citizens are more likely to disenroll from Medicaid or the Essential Plan than are U.S. citizens.

- **H2:** Compared with U.S. citizens, non-citizens are more likely to disenroll from Medicaid or the Essential Plan following *implementation* of the revised Public Charge rule.
- **H3:** Non-permanent residents are more likely to disenroll from Medicaid or the Essential Plan than are permanent residents after *implementation* of the revised Public Charge.

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## Research Question: *Is Citizenship Status a Social Determinant of Health?*

### Hypothesis Development

#### UTILIZATION

**H4:** U.S. citizens use more healthcare services than non-citizens.

- **H5:** Compared with U.S. citizens, non-citizens are more likely to use healthcare services following the *announcement* of the revised Public Charge rule.
- **H6:** Compared with U.S. citizens, non-citizens are less likely to use healthcare services following *implementation* of the revised Public Charge rule.
- **H7:** On average, the healthcare costs of non-citizens are lower than the healthcare costs of U.S. citizens.

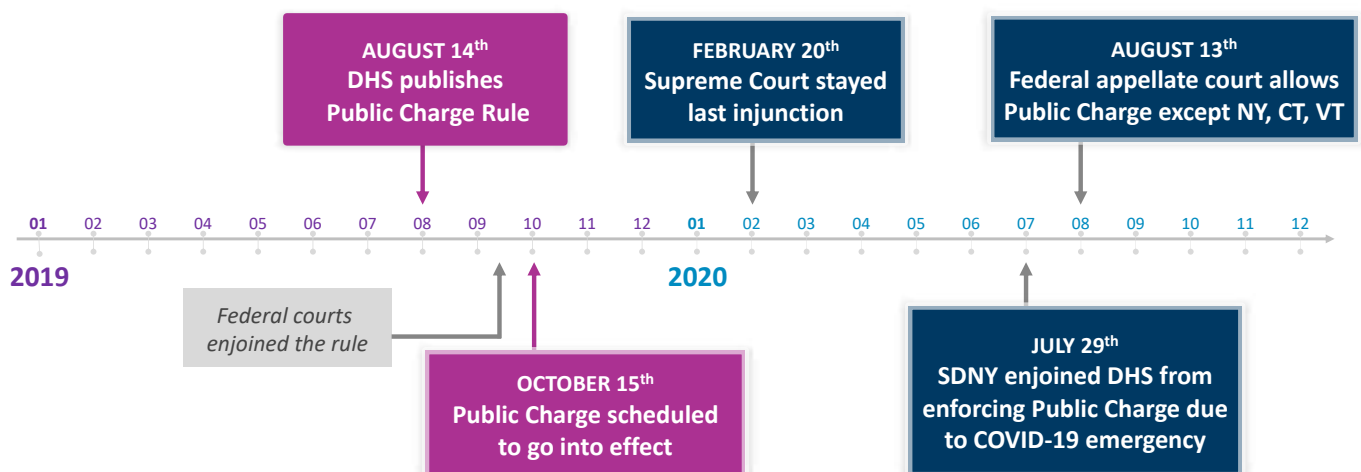
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## Public Charge Timeline

= Measured treatments

### From Proposed Rule to Implementation



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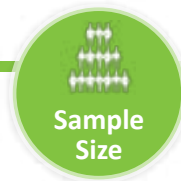




## Data

- **Data Source:** Sample from the large non-profit health plan in New York City
- **Study Period:** 18-month study period from August 1, 2018, through February 20, 2020
- **Health Plans:** Medicaid & Essential Plan
- **Eligible Observations:** Individuals with at least 6 months of coverage during the 18-month study period

Citizenship Description	Male	Female	Total
U.S. Citizen	147,160 (44.14%)	186,213 (55.85%)	333,373 (41.89%)
Naturalized Citizen	19,634 (41.96%)	27,158 (58.03%)	46,792 (5.88%)
Permanent Resident	101,216 (44.23%)	127,609 (55.76%)	228,825 (28.76%)
Non-Permanent Resident	3,931 (30.67%)	8,887 (69.33%)	12,818 (1.60%)
Missing	71,664 (41.21%)	102,232 (58.79%)	173,896 (21.85%)
<b>Total</b>	<b>343,605 (43.18%)</b>	<b>452,099 (56.81%)</b>	<b>795,704 (100%)</b>



**Sample Size**  
Medicaid-eligible  
18-64



**Timeframe**  
August 2018 through  
February 2020



**Citizenship Status**  
U.S Citizens  
Naturalized Citizens  
Permanent Residents  
Non-Permanent Residents



**Utilization Data**  
Primary Care  
Specialist Care  
Emergency Room

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## Research Design: Natural Experiment

A **Natural Experiment** leverages the announcement and implementation of the Public Charge rule to determine the differences in both Medicaid enrollment and healthcare utilization based on citizenship status.

- The Public Charge is not governed or controlled by this research study, as such, it can be used as a natural experiment (*Leatherdale, 2017*)

**Difference-in-Differences Hazard Model** is used to observe differences in healthcare coverage and usage before and after the enactment of the policy change to ensure that other time-dependent trends do not impact the results

- Public health researchers commonly use this method to eliminate the threat of inaccurate conclusions arising from potential changes in behavior (*Dimick & Ryan, 2014*)



**Dependent Variables**

Medicaid Enrollment  
& Utilization



**Independent Variable**

Citizenship Status



**Explanatory Variables**

Age, Charlson Index, Gender, Health Plan, Language, Month, Race, "After Announcement" & "After Implementation"



**Regression Analysis**

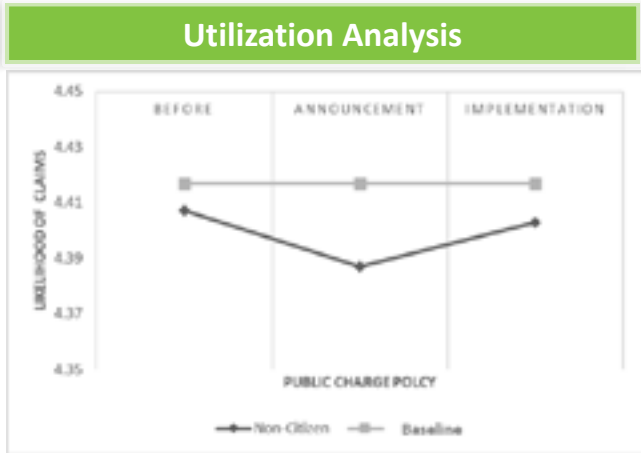
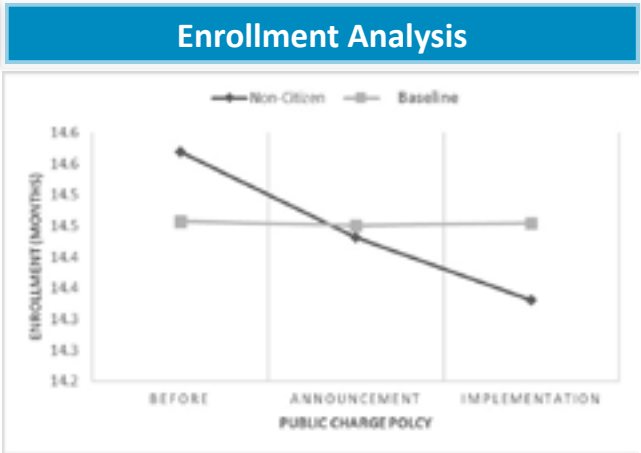
Differences in Difference

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# Differences-in-Differences Analysis



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# Research Results





# Results – Enrollment

Observations from Data Analysis in RStudio

## Disenrollment by Citizenship Status

**H1: Non-citizens are more likely to disenroll from Medicaid or the Essential Plan than are U.S. citizens**

Predictors	Disenrolled	
	Estimates	p
Intercept	14.458***	<0.001
Age	0.022***	<0.001
Gender (Male)	-0.601***	<0.001
Charlson Index	0.309***	<0.001
Non-Citizen	0.111***	<0.001
Observations	2,365,498	
R <sup>2</sup>	0.036	

U.S. citizens disenroll at a 10.5%\* higher rate than non-citizens.  
Thus, H1 is not supported.

\*Odds ratio calculation:  $Exp(-0.111)-1 = -10.5\%$



# Results – Enrollment

Observations from Data Analysis in RStudio

## Disenrollment by Citizenship Status – Implementation of Public Charge

**H2: Compared with U.S. citizens, non-citizens are more likely to disenroll from Medicaid or the Essential Plan following implementation of the revised Public Charge rule.**

Predictors	Disenrolled	
	Estimates	p
Intercept	14.450***	<0.001
Age	0.022***	<0.001
Gender (Male)	-0.601***	<0.001
Charlson Index	0.309***	<0.001
Race/Ethnicity (Asian)	0.618***	<0.001
Race/Ethnicity (Black)	-0.231***	<0.001
Race/Ethnicity (Hispanic)	0.975***	<0.001
Non-Citizen	0.046 **	0.005
Non-Citizen - After Announcement	-0.026	0.348
Non-Citizen - After Implementation	-0.124***	<0.001
Observations	2,365,498	
R <sup>2</sup>	0.036	

Non-citizens disenroll at an 8.1%\* higher rate than U.S. citizens after implementation of the Public Charge.  
Thus, H2 is supported.

\*Odds ratio calculation:  $Exp(-0.046 + 0.124)-1 = 8.1\%$

p<0.05 \*\*p<0.01 \*\*\*p<0.001





## Results – Enrollment

Observations from Data Analysis in RStudio

### Disenrollment by Non-citizens – Implementation of Public Charge

**H3: Non-permanent residents are more likely to disenroll from Medicaid or the Essential Plan than are permanent residents after implementation of the revised Public Charge.**

Predictors	Disenrolled	
	Estimates	p
(Intercept)	-27.768***	<0.001
Age	-0.025***	<0.001
Gender (Male)	0.670***	<0.001
Asian	-0.659***	<0.001
Black	0.572***	<0.001
Hispanic	-1.067***	<0.001
Charlson Index	-0.271***	<0.001
Non-Permanent Resident	1.466***	<0.001
Permanent Resident - After Announcement	20.768***	<0.001
Non-Permanent Resident - After Announcement	20.344***	<0.001
Permanent Resident - After Implementation	20.714***	<0.0001
Non-Permanent Resident - After Implementation	20.682***	<0.001
Observations	954,378	
R <sup>2</sup>	0.249	

p<0.05 \*\*p<0.01 \*\*\*p<0.001

Non-permanent residents disenroll at a 333% higher rate than permanent residents after implementation of the Public Charge.

Thus, H3 is supported.

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## Results – Utilization

Observations from Data Analysis in RStudio

### Utilization by Citizenship Status

**H4: U.S. citizens use more healthcare services than non-citizens.**

Predictors	Utilization	
	Estimates	p
Intercept	4.417***	<0.001
Age	-0.008***	<0.001
Gender (Male)	0.241***	<0.001
Asian	-0.145***	<0.001
Black	0.046***	<0.001
Hispanic	-0.082***	<0.001
Charlson Index	-0.098***	<0.001
Non-Citizen	-0.010***	<0.001
Observations	2,365,498	
R <sup>2</sup>	0.258	

p<0.05 \*\*p<0.01 \*\*\*p<0.001

Non-citizens incur paid medical claims at a 1.0% higher rate than U.S. citizens.

Thus, H4 is not supported.

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## Results – Utilization

Observations from Data Analysis in RStudio

### Utilization by Citizenship Status – Announcement of Public Charge

**H5: Compared with U.S. citizens, non-citizens are more likely to use healthcare services following the announcement of the revised Public Charge rule.**

Predictors	All Utilization	
	Estimates	p
Intercept	4.417***	<0.001
Age	-0.008***	<0.001
Gender (Male)	0.241***	<0.001
Asian	-0.145***	<0.001
Black	0.047***	<0.001
Hispanic	-0.082***	<0.001
Charlson Index	-0.098***	<0.001
Non-Citizen	0.003	0.296
Non-Citizen - After Announcement	-0.030***	<0.001
Non-Citizen - After Implementation	-0.014 *	0.033
Observations	2,365,498	
R <sup>2</sup>	0.258	

Non-citizens incur paid medical claims at a 2.7% higher rate than U.S. citizens after the Public Charge Announcement.

Thus, H5 is supported.

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## Results – Utilization

Observations from Data Analysis in RStudio

### Utilization by Citizenship Status – Implementation of Public Charge

**H6: Compared with U.S. citizens, non-citizens are less likely to use healthcare services following implementation of the revised Public Charge rule.**

Predictors	All Utilization		PCP Utilization		ED Utilization		Specialist Utilization	
	Estimates	p	Estimates	p	Estimates	p	Estimates	p
Intercept	4.417***	<0.001	5.584***	<0.001	5.650***	<0.001	5.681***	<0.001
Age	-0.008***	<0.001	-0.011***	<0.001	-0.022***	<0.001	-0.016***	<0.001
Gender (Male)	0.241***	<0.001	0.300***	<0.001	0.066***	<0.001	0.146***	<0.001
Asian	-0.145***	<0.001	-0.635***	<0.001	0.862***	<0.001	0.190***	<0.001
Black	0.047***	<0.001	0.079***	<0.001	-0.431***	<0.001	0.125***	<0.001
Hispanic	-0.082***	<0.001	-0.096***	<0.001	-0.243***	<0.001	-0.130***	<0.001
Charlson Index	-0.098***	<0.001	-0.077***	<0.001	-0.057***	<0.001	-0.132***	<0.001
Non-Citizen	0.003	0.296	-0.185***	<0.001	0.200***	<0.001	0.098***	<0.001
Non-Citizen - After Announcement	-0.030***	<0.001	-0.044***	<0.001	-0.023	0.207	-0.025 **	0.004
Non-Citizen - After Implementation	-0.014 *	0.033	-0.002	0.817	-0.016	0.417	-0.041***	<0.001
Observations	2,365,498		2,365,498		2,365,498		2,365,498	
R <sup>2</sup>	0.258		0.173		0.048		0.128	

There is no statistical difference in healthcare utilization between non-citizens and U.S. citizens after the Public Charge announcement.

Thus, H6 is not supported.

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## Results – Utilization

Observations from Data Analysis in RStudio

### Utilization by Citizenship Status – Implementation of Public Charge

*H7: On average, the healthcare costs of non-citizens are lower than the healthcare costs of U.S. citizens.*

Total score: Healthcare Costs			
Predictors	Estimates	Std. Error	p
(Intercept)	2,672	567	<0.0001
U.S. Citizens	-476	281	0.09049
Naturalized Citizens	-1,512	450	<b>0.00079</b>
Permanent Residents (Non-Citizens)	295	279	0.28979
Non-Permanent Residents (Non-Citizens)	2,841	1,144	0.01300
Gender (Male)	8,851	215	<0.0001
Charlson Index	2,750	88	<0.0001
Enrollment Duration	-96	25	<b>0.00014</b>
Age	-501	8	<0.0001
Observations	1,685,570		
R <sup>2</sup> / R <sup>2</sup> adjusted	0.1781 / 0.1781		

There is no statistical difference in per-person healthcare costs between U.S. citizens and non-citizens.

Thus, H7 is not supported.

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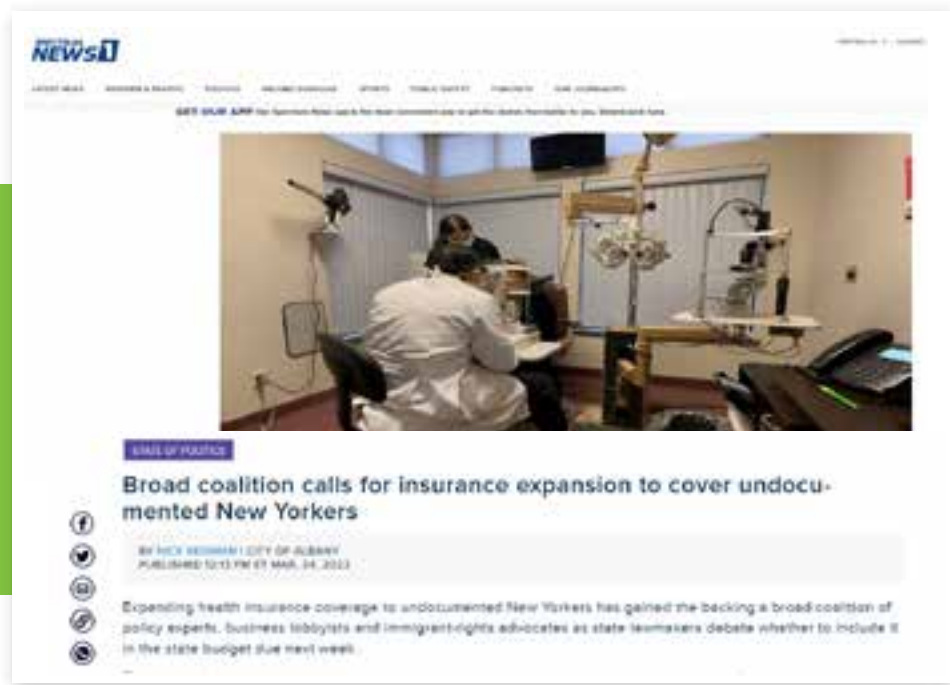


## Research Implications





## Coverage for Undocumented New Yorkers...



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## Coverage for Undocumented New Yorkers...

### New York Statistics

- NY is the 4<sup>th</sup> largest “unauthorized” immigrant population in the country after CA, TX, and FL
- 867,000 unauthorized immigrants among NY’s 19 million residents
  - 74% work, live, reside in New York City
  - 90% are aged 19 years old or older
  - 53% are uninsured

### Community Service Society Study

Table 2: Unauthorized NYS Population by Coverage and Immigrant Status (Baseline)

	Unauthorized Adults (Age 19+)				Unauthorized Children (Age 0-18)				Total Unauthorized	
	Unauthorized Adults		PRUCOL Adults		Total Unauthorized Adults (Unins. + PRUCOL)		Unauthorized Children		Count	Share
	Count	Share	Count	Share	Count	Share	Count	Share		
Insurance Total	264,000	89%	180,000	45%	444,000	57%	12,000	10%	456,000	53%
- Qualified for ESI Medicaid	65,000	21%	0	0%	65,000	8%	0	0%	65,000	8%
- Not qualified for ESI Medicaid	199,000	74%	180,000	45%	379,000	49%	12,000	10%	391,000	45%
Medicaid/CHIP (incl. Special ESI Medicaid)	32,000	10%	23,000	6%	55,000	7%	36,000	30%	91,000	10%
Other Private	24,000	8%	157,000	40%	181,000	23%	11,000	9%	192,000	22%
<b>Total</b>	<b>298,000</b>		<b>408,000</b>		<b>706,000</b>		<b>49,000</b>		<b>755,000</b>	

Source: Benjamin, E., (2016), “How Can New York Provide Health Insurance Coverage to its Uninsured Immigrant Residents?”, Community Service Society.

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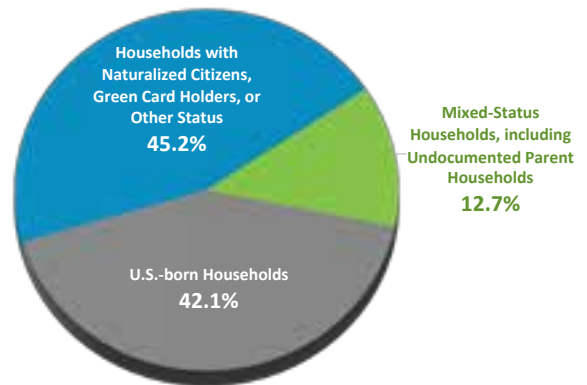


## Nearly 60% of New Yorkers Live in Households with at Least One Immigrant

### Four categories for households:

- 1. U.S.-born-only households:**  
Every household member is U.S.-born
- 2. Naturalized citizens, green card holders, or other status households:** The household has one or more members who is a naturalized citizen, green card holder, or other status or U.S.-born citizens
- 3. Mixed-status household:**  
At least one household member is undocumented
- 4. Undocumented parent household:**  
A subset of mixed-status household, above, in which children are living with at least one undocumented parent

Household Types in NYC (%)



Naturalized citizens and green card holders or other status holders are more likely to live in married couple families (58.7% and 61.4%, respectively) than the city population as a whole (54.4%)

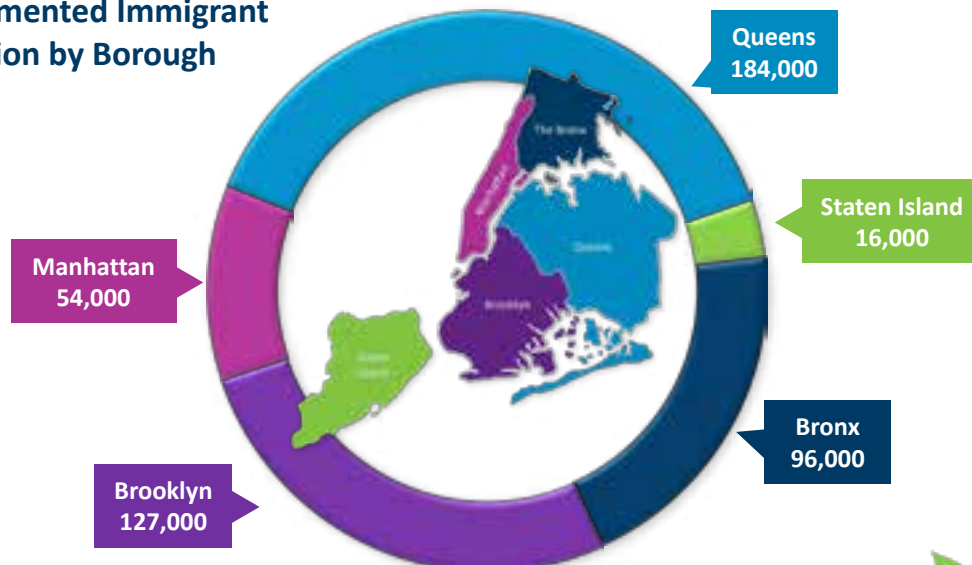
Source: NYC Mayor's Office of Immigration

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## The Largest Portion of Undocumented Immigrants Continue to Reside In Queens, Followed by Brooklyn and the Bronx

### Undocumented Immigrant Population by Borough



Source: NYC Mayor's Office of Immigration

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# Coverage for Undocumented New Yorkers

## Imperatives for Success



### Communication & Education

*Need new & innovative ways to reach eligible populations*



### “No Wrong Door”

*Reduce stigma of citizenship status with systemic review of policies & procedures*



### Simplicity

*Need to simplify the complexity of enrollment, navigation, and recertification*



### Extend Recertification

*Lessons on “continuity of coverage” learned from the Federal Emergency Period in 2020/2021*



### Ethnically Diverse Physician Workforce

*Culturally competent care including language & cultural considerations*

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## Questions?

Citizenship Status as a Social Determinant of Health



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# Post-COVID Conditions (Long COVID): What We Know

Douglas G. Fish, MD  
Chief Medical Officer, NY State Medicaid

October 6, 2022

2

## Disclosure

- No financial conflicts to report



3

## Purpose

- Contextualize and describe the manifestations of post-COVID-19 conditions and their potential impact on public health and health policy.



4

## Objectives

- Understand the prevalence of post-COVID conditions
- Know the common clinical presentations of post-COVID conditions
- Describe the clinical approach to the management of long COVID patients
- Learn the initial steps New York State has taken to address long COVID





## Agenda

- Background
- Prevalence
- Clinical Manifestations
- Diagnosis, Management, and Prevention
- New York State Expert Symposium – February 2022
- Community Partnerships
- Goals and Proposed Next Steps

## Long COVID – Background



7

## Myalgic Encephalomyelitis/Chronic Fatigue (ME/CFS) Syndrome

- A disabling and complex illness characterized by:
  - Post-exertional malaise
  - Problems with sleep, thinking and concentrating, pain, and dizziness
- An estimated 836,000 to 2.5 million Americans suffer from ME/CFS.
  - About 90 percent of people with ME/CFS have not been diagnosed.
- ME/CFS costs the U.S. economy about \$17 to \$24 billion annually in medical bills and lost incomes.
- No definitive cause found and no diagnostic test, so must rely on symptom management

Source: [CDC: What is ME/CFS?](#)  
[Beyond Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: Redefining an Illness](#)



8

## Multisystem Inflammatory Syndrome

- A rare condition that sometimes occurs in children who have had COVID-19 infection.
- Symptoms of multisystem inflammatory syndrome of children (MIS-C) typically develop two or more weeks following infection with COVID-19 and involve inflammation of different parts of the body, such as the heart, lungs, kidneys, brain, skin, eyes, or gastrointestinal system.
- What causes some children to develop MIS-C is not known.
- As of July 25, 2022, the New York State Department of Health has investigated and confirmed 819 cases of MIS-C and 3 deaths attributed to MIS-C in New York children (under 21 years old).
- Of the children confirmed as MIS-C cases, 94 percent tested positive for COVID-19 either by diagnostic tests (PCR or antigen), antibody tests, or both.

Source: [Multisystem Inflammatory Syndrome in Children](#)  
Dufort et al. [Multisystem Inflammatory Syndrome in Children in New York State](#) *N Engl J Med* 2020; 383:347-358.  
DOI: 10.1056/NEJMoa2021756  
Feldstein et al. [Multisystem Inflammatory Syndrome in U.S. Children and Adolescents](#) *N Engl J Med* 2020; 383:334-346. DOI: 10.1056/NEJMoa2021680





## Terminology

- Post-COVID Condition
- Long COVID
- Post-Acute Sequelae of SARS Coronavirus-2 Infection (PASC)
- “Chronic” COVID
- Long hauler – a person with the above

## Long COVID – Background

- Some individuals experience long-term new or continued effects following an initial infection with SARS-CoV-2.
- Long COVID describes a range of ongoing health problems ranging in presentation and severity.
- While found most often in those who experienced severe COVID-19, long COVID can impact even those with an asymptomatic or mild illness after their initial infection.



## CDC Definition

- CDC – at least four weeks after infection is the start of when post-COVID conditions could first be identified.
- Anyone who was infected can experience post-COVID conditions.
  - Some people with post-COVID conditions did not notice when they first had an infection.

Source: [Centers for Disease Control and Prevention: Long COVID or Post-COVID Conditions](#)



## World Health Organization Definition

- Illness that occurs in people who have a history of probable or confirmed SARS-CoV-2 infection
  - Usually within three months from the onset of COVID-19, with symptoms and effects that last for at least two months.
  - The symptoms and effects of post COVID-19 condition cannot be explained by an alternative diagnosis.

Source: [WHO Definition](#)







# Prevalence

## How Common is Long COVID?

- While studies examining long COVID utilize a range of benchmarks to define the condition, the Centers for Disease Control and Prevention published estimates of the portion of individuals who had COVID-19 who go on to experience long-term sequelae:
  - **13.3 percent** experience symptom(s) at least **one month** or longer after infection.
  - **2.5 percent** experience symptom(s) at least **three months** or longer after infection (based on self-reporting).
  - Among individuals who were **hospitalized** for COVID-19, more than **30 percent** experience lingering effects after **six months**.



## Prevalence of Post-COVID Conditions

TABLE. Percentage of adult COVID-19 case-patients and control patients with  $\geq 1$  post-COVID-attributable incident conditions and estimated number of COVID-19 survivors who will experience a post-COVID condition — United States, March 2020–November 2021

Age group, yrs	No. of patients (column %)		No. of patients with $\geq 1$ incident condition (column %) <sup>1</sup>		Absolute risk difference <sup>2</sup>	No. of COVID-19 survivors with a post-COVID condition <sup>3</sup>
	Case-patients	Control patients	Case-patients	Control patients		
18–64	254,345 (72.0)	1,051,588 (64.1)	90,111 (35.4)	154,011 (14.6)	20.8	1/5
$\geq 65$	98,819 (28.0)	589,188 (35.9)	44,840 (45.4)	108,850 (18.5)	26.9	1/4
Total	353,164 (100)	1,640,776 (100)	134,951 (38.2)	262,861 (16.0)	22.2	1/4–5

<sup>1</sup> Percentage of COVID-19 case-patients or control patients with  $\geq 1$  incident condition divided by the total study COVID-19 cohort or control cohort row's age group total.

<sup>2</sup> Percentage point difference between COVID-19 case-patients and control patients (eg., the value 20.8 is calculated as 35.4 minus 14.6).

<sup>3</sup> Number of COVID-19 survivors who experienced a post-COVID condition estimated as the inverse of the absolute risk difference.

Source: [MMWR / May 27, 2022 / Vol. 71 / No. 21](#)



## Biden-Harris Administration Releases August 3, 2022

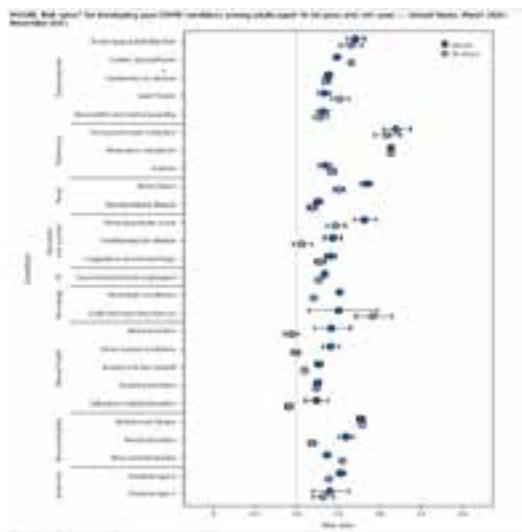
- An [estimated 7.7 to 23 million Americans have developed Long COVID](#), and roughly one million people may be out of the workforce at any given time due to the condition—equivalent to about \$50 billion in lost earnings annually.

Source: [Biden-Harris Administration Releases Two New Reports on Long COVID](#)





## Risk Ratios for Developing Post-COVID Conditions



Source: [MMWR / May 27, 2022 / Vol. 71 / No. 21](#)



## People More Likely to Develop Long COVID

- People who have experienced more severe COVID-19 illness, especially those who were hospitalized or needed intensive care.
- People who had underlying health conditions prior to COVID-19.
- People who did not get a COVID-19 vaccine.
- People who experienced [multisystem inflammatory syndrome \(MIS\)](#) during or after COVID-19 illness.

Source: [Centers for Disease Control and Prevention: Long COVID or Post-COVID Conditions](#)





# Clinical Manifestations

## Symptoms

- Symptoms of long COVID can vary widely.
- Most commonly-reported symptoms include fatigue, difficulty breathing, heart palpitations or chest pain, and neurological symptoms such as headache, difficulty concentrating, or sleep problems.
  - Symptoms may get worse after physical or mental effort (“post-exertional malaise”)
- Symptoms can be ongoing from the initial acute illness, may appear in the weeks following a mild or moderate illness, or may fluctuate over time.



## Clinical Presentation

- Because of the range of long COVID symptoms and the potential lack of a confirmatory positive test, long COVID symptoms may be hard to explain and manage; routine tests, chest x-rays, and ECGs may appear normal.
- Reports of long COVID are similar to reports of myalgic encephalomyelitis, or chronic fatigue symptoms (ME/CFS), and other poorly understood post-viral illnesses (e.g., Epstein-Barr Virus, Influenza).

Source: [Centers for Disease Control and Prevention: Long COVID or Post-COVID Conditions](#)



## COVID-19 Complications

- COVID-19 survivors have twice the risk for developing pulmonary embolism or respiratory conditions.
- One in five COVID-19 survivors aged 18–64 years and one in four survivors aged  $\geq 65$  years experienced at least one incident condition that might be attributable to previous COVID-19.

Source: [MMWR / May 27, 2022 / Vol. 71 / No. 21](#)





## Long COVID Medical Coding

- **Long COVID: Use ICD-10 Code U09.9**
- **For a post COVID-19 condition**, unspecified, like Long COVID, use code DX U09.9. Add other codes for conditions related to the COVID-19 infection, like R50.9 for fever.
- **For a current COVID-19 infection**, use code DX U07.1. Don't use code DX U09.9.
- **For a current COVID-19 infection and conditions from a previous COVID-19 infection**, use code U09.9 with code DX U07.1. Add other codes for conditions related to the COVID-19 infection, like R06.02 for shortness of breath.

Source pp. 30-31: [ICD-10-CM Official Guidelines for Coding and Reporting: Fiscal Year 2022 \(PDF\)](#)



## Diagnosis, Management, & Prevention





## Diagnosis

- Diagnosis is clinical
- No diagnostic test
- [Health inequities](#) may put some people from racial or ethnic minority groups and some people with disabilities at greater risk for developing post-COVID conditions.

Source: [Centers for Disease Control and Prevention: Long COVID or Post-COVID Conditions](#)



## Management

- First, make the diagnosis.
- Clinical evaluations and results of routine blood tests, chest x-rays, and electrocardiograms may be normal.
- Multidisciplinary approach may be necessary, depending on symptomatology.

Source: [Centers for Disease Control and Prevention: Long COVID or Post-COVID Conditions](#)





## Guidance on Long COVID as A Disability

- This guidance explains that long COVID can be a disability:
  - under Titles II (state and local government) and III (public accommodations) of the Americans with Disabilities Act (ADA),
  - Section 504 of the Rehabilitation Act of 1973 (Section 504), and
  - Section 1557 of the Patient Protection and Affordable Care Act (Section 1557).
- Each of these federal laws protects people with disabilities from discrimination.
- A person with long COVID has a disability if the person’s condition or any of its symptoms is a “physical or mental” impairment that “substantially limits” one or more major life activities.

Source: [Guidance on “Long COVID” as a Disability Under the ADA, Section 504, and Section 1557](#)



## Prevention

- The best way to prevent post-COVID conditions is to protect yourself and others from becoming infected.
- Vaccination!

Source: [Centers for Disease Control and Prevention: Long COVID or Post-COVID Conditions](#)







# Expert Symposium Background & Findings

## Expert Symposium Background

- On February 3, 2022, the Department of Health hosted an expert panel on long COVID to discuss actions New York State may consider to respond to long COVID and support New Yorkers experiencing post-COVID conditions.
- The symposium consisted of three panels featuring researchers, clinicians, social scientists, and survivors/activists:
  - **Research panel** – currently available knowledge, potential mechanisms
  - **Clinical panel** – current clinical best practices in long COVID management
  - **Policy/functional** – policies and other next steps NYS should consider, including clinical and non-clinical supports



## Symposium Themes

### Common themes from each panel included the following:

- Clinical guidelines/other clinical supports would be needed for meaningful, universal, consistent long COVID healthcare delivery.
- Universal access to long COVID-related healthcare must be ensured, especially for communities disproportionately impacted by COVID.
- Further actions and conversations facilitated by New York State surrounding long COVID must include input from community partners.
- More research is needed to fully understand long COVID and identify therapeutics that may alleviate symptoms.



## Symposium Themes (continued)

- New York State must take steps to enable and streamline care coordination between multiple specialists and primary care providers, as is often required for complex long COVID cases.
- Research, healthcare, and other supports for long COVID must include mental and psychological health.
- Primary prevention of COVID-19 remains important in addressing the burden of long COVID.
- Non-healthcare supports are also needed by individuals with debilitating long COVID, including occupational supports, employer education, and assurance of availability of reasonable accommodations.





## Commitment to Health Equity

- Throughout the COVID-19 pandemic, Black Americans and other communities of color have endured a disproportionate burden of COVID-19 due to factors related to structural racism.
- While specific data are not yet available, it is widely anticipated that these disparities will hold true for the burden of long COVID.
- Black Americans and other communities of color continue to endure higher likelihood of exposure to COVID-19, increased severity of illness, and limited access to quality healthcare compared to their white counterparts.
  - Further, communities of color have thus far been underrepresented in clinical trials, treatment regimens, and registries related to long COVID.
- Implementation of each of New York State's long COVID goals must therefore take these likely disparities into account and support equitable access to healthcare and social supports.

Source: *The Black Coalition Against COVID: [The State of Black America and COVID-19](#)*;  
*New York Times: [Experts warn of racial disparities in the diagnosis and treatment of long COVID](#)*



## Community Partnerships





## Community Partnerships

- As we craft a long-term plan for supporting New Yorkers with long COVID, partnerships with various stakeholders representing providers, payers, patients, and the general public will be essential.
- Engagement with community stakeholders, including and especially those who are experiencing long COVID firsthand, will be needed across each goal.
- Representation from communities which have been disproportionately impacted by the COVID-19 pandemic, especially communities of color, is crucial in crafting an equitable, long COVID response.

## Goals & Proposed Next Steps



## NYS Long COVID Goals

**Proposed next steps fall within a four-part goal for ongoing work related to long COVID:**

**Goal #1)** Work with healthcare providers, payers, and other organizations with whom New Yorkers interact to provide updated information, disseminate best practices, and support high-quality, evidence-based service delivery for New Yorkers experiencing long COVID

**Goal #2)** Support the advancement of collective knowledge about post-COVID conditions across the age spectrum, which may lead to improved understanding of long COVID and, potentially, other post-viral illnesses affecting New Yorkers

**Goal #3)** Provide resources to the general public to increase awareness of the issue of long COVID

**Goal #4)** Promote access to healthcare, linkage to psycho-social supports, community support groups, enrolling clinical trials, and other relevant supports



## Overview of Medicaid's 1115 Waiver Amendment

New York State is seeking \$13.52 billion over five years to fund a new amendment to its 1115 Waiver that addresses health disparities and systemic health care delivery issues that have been both highlighted and intensified by the COVID-19 pandemic.

***The goals of this waiver amendment are as follows:***

1. Building a more resilient, flexible, and integrated delivery system that reduces health disparities, promotes health equity, and supports the delivery of social care;
2. Developing and strengthening supportive housing services and alternatives for the homeless and long-term institutional populations;
3. Redesigning and strengthening system capabilities to improve quality, advance health equity, and address workforce shortages; and
4. Creating statewide digital health and telehealth infrastructure.





## Resources for People with Long COVID

On August 2, 2022, the U.S. Department of Health and Human Services [delivered two major reports](#) to President Biden, in response his April 5, 2022, [Memorandum on Addressing the Long-Term Effects of COVID-19](#):

- [The Services and Supports for Longer-Term Impacts of COVID-19 Report \(Services Report\)](#) outlines federally funded support and services that can help individuals experiencing the longer-term effects of COVID-19, including Long COVID and its associated conditions, mental health, substance use, and bereavement.
- [The National Research Action Plan on Long COVID \(the Research Plan\)](#) proposes a comprehensive and equitable research strategy to inform a national response to Long COVID.

Source: [Administration for Community Living](#)



Questions?

Thank you!

[douglas.fish@health.ny.gov](mailto:douglas.fish@health.ny.gov)





WITH WORLD-CLASS DOCTORS FROM  
COLUMBIA Well Cornell  
Medicine

# Recovery and Beyond the COVID 19 Pandemic: The Pediatric Population in the United States

Mara Minguez, MD, MSc  
October 6, 2022

## Purpose And Objectives



### OBJECTIVES

- ▶ Highlight data that describes the COVID impact on our pediatric population
- ▶ Describe Post Acute and long –term sequela of the COVID pandemic in the pediatric population
- ▶ List successful efforts achieved by a New York City medical institution
- ▶ Identify challenges and lessons learned

### FINANCIAL DISCLOSURE

I have no relevant financial interest or relationships to disclose



# 01

# New York Presbyterian Hospital



### 10 HOSPITALS

- 2 Academic Partners
- 10,000+ Affiliated Physicians
- 200 Medical Group Practices
- 2M+ Annual Patient Visits



### NYP IN THE COMMUNITY

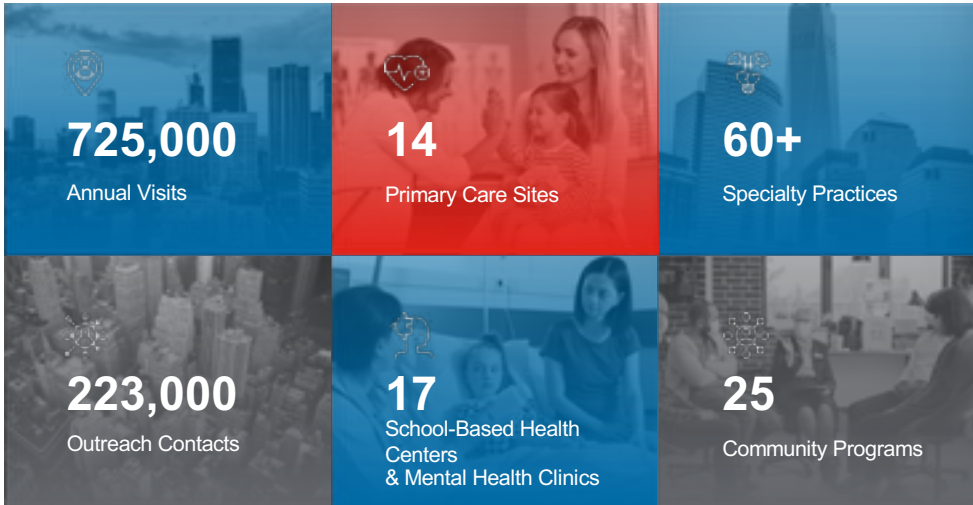
- Community Programming
- Community Advisory Boards
- Dalio Center for Health Justice







## Division Of Community & Population Health



# 02

## COVID Pediatric Statistics





## COVID-19 Current Situation



### New York City

- Over **2.8 M** total cases/pos tests
- Over **42K** reported deaths



### GLOBALLY

- Over **600 million** confirmed cases
- Nearly **6.5 million** reported deaths



### UNITED STATES

- Over **93 million** confirmed cases
- Over **1 million** reported deaths

7



## Cumulative Number: Child COVID-19 Cases

**14.4 million** total child SARS-CoV-2 cases reported



Current **18.4%** of positive cases (children, under age 18, make up 22.2% of the US population)

\_\_\_\_\_ of their total cumulated hospitalizations

\_\_\_\_\_ of all COVID-19 deaths

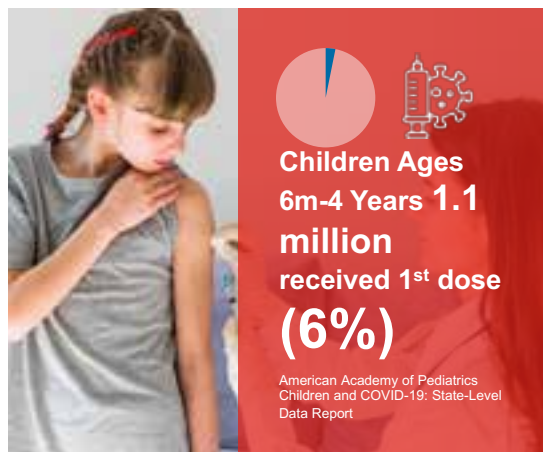
-American Academy of Pediatrics Children and COVID-19: State-Level Data Report

8





## Cumulative Number: Child COVID-19 Vaccination



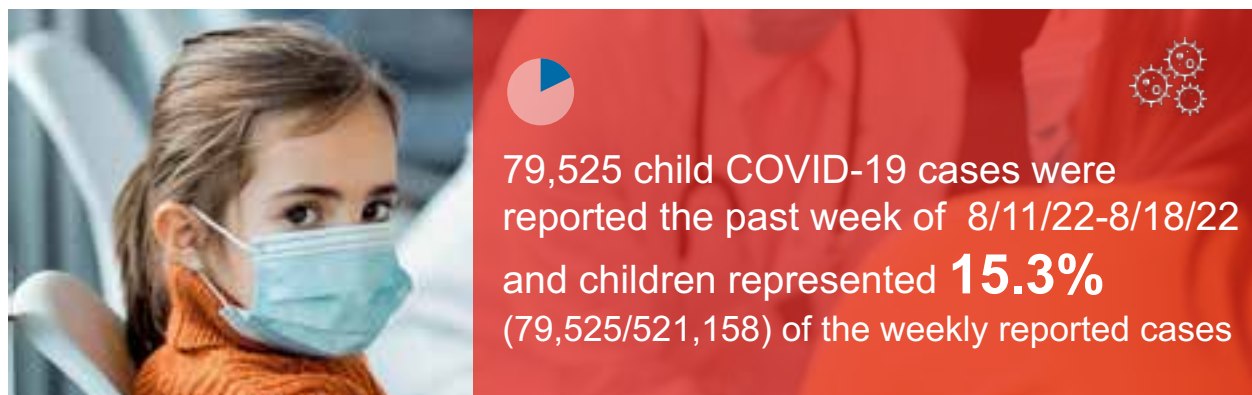
**Children Ages 5-11 Years:** As of August 17th, 2022, the CDC recorded:

- 10.6 million** US children ages 5-11 have received **at least one dose** of COVID-19 vaccine (37%)
- 8.5 million** US children ages 5-11 are **fully vaccinated** (30%)

**Children Ages 12-17 Years:**

- 17.5 million** US children and adolescents ages 12- 17 have received **at least one dose** of COVID-19 vaccine (70%)
- 15 million** of US children and adolescents ages 12- 17 are **fully vaccinated** (59%)

## New Child Cases



-American Academy of Pediatrics Children and COVID-19: State-Level Data Report



# 03

## COVID Sequela in Pediatric Population



### Post Acute



Healthcare

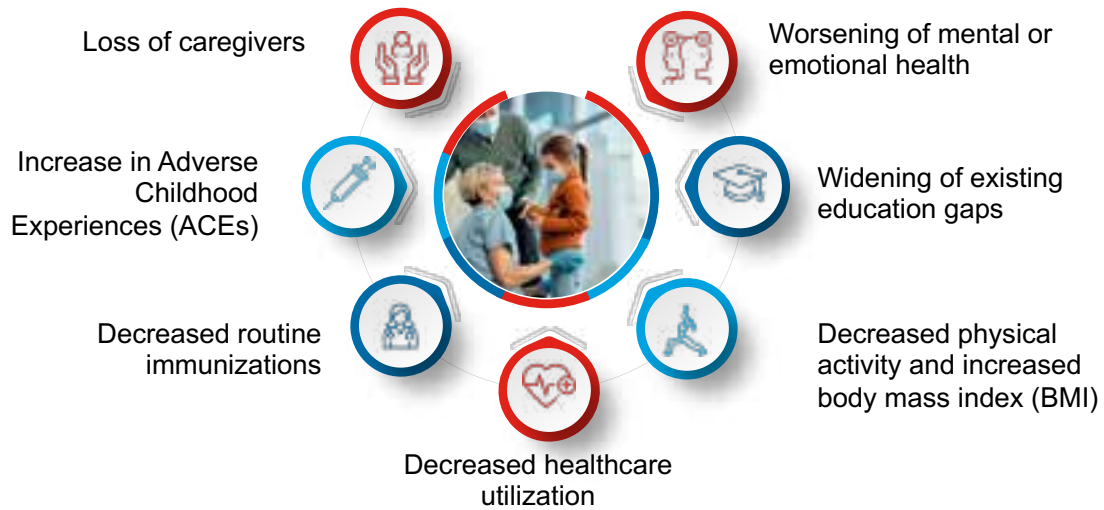
Mental Health

Education

CONSEQUENCES OF THE COVID PANDEMIC



## Indirect impacts of COVID-19 pandemic on Children



13



## HEALTHCARE : Post/Long COVID in Pediatric Population



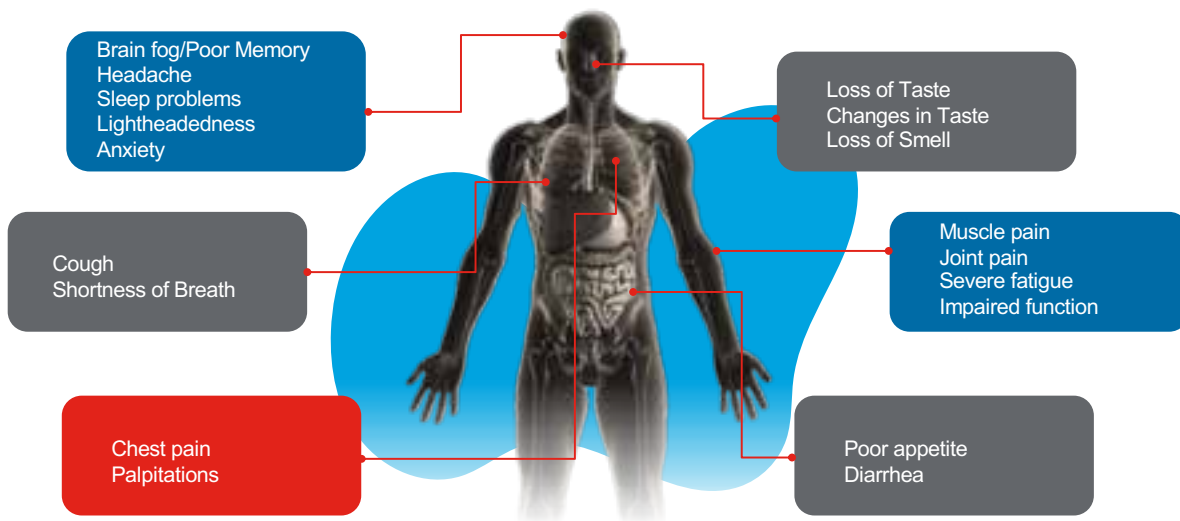
<https://www.cdc.gov/mmwr/volumes/71/wr/mm7131a3.htm>

14





## HEALTHCARE: What are some of the symptoms?



# 04

## Institutional Response in the Community





## Building Healthier Communities



ASSESS COMMUNITY NEEDS



PARTNER WITH THE COMMUNITY



DESIGN OUTREACH + CLINICAL PROGRAMS



## Community Outreach



- ▶ Food Insecurity
- ▶ School-based health center Efforts
- ▶ Partnerships with Community Organizations

- ▶ Pop-Up vaccine sites
- ▶ Health Literacy and Education
- ▶ Increase office screenings
- ▶ Mobile Vaccine Unit





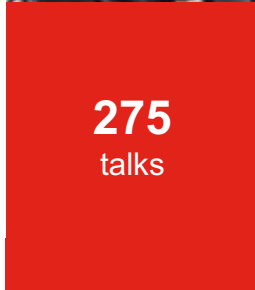
## Our Reach



145  
doctors



Over  
17,500  
community  
members!!



275  
talks



163  
community  
organizations



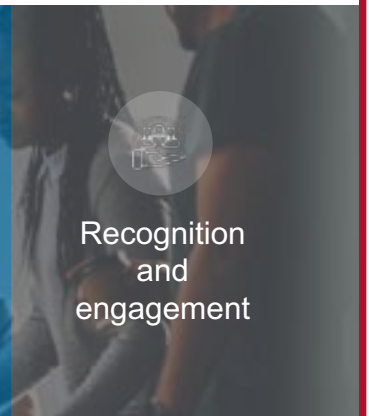
## Lessons Learned



Continuous  
monitoring for  
quality and  
content



Take advantage  
of technology to  
expand reach





Recognition  
and  
engagement









## Challenges



Vaccine Hesitancy

Racial Inequities and Political Divide

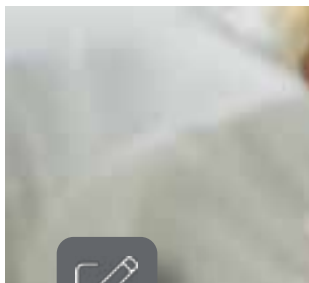



Digital Divide

Medical Provider Burnout

## Summary



The pediatric population was greatly impacted by the COVID 19 Pandemic both acutely and long-term



The main areas of impact include, access to health care and halt of preventive interventions, a dramatic increase in mental health issues, and worsening of our educational gap



▶ Community collaboration and Feedback is crucial for Effective Interventions and implementations

▶ Design of new office practices to screen children and adolescents is key to mitigate potential negative impact of the COVID pandemic in this population



# Thank You



5



## CONTACT INFORMATION



**Mara Minguez, MD, MSc** (she, her, hers)

Assistant Chief Medical Officer for Community Affairs  
Medical & Medical Director, Lang Youth Medical Program  
New York-Presbyterian Hospital

Assitant Professor of Pediatrics and Population & Family  
Health Columbia University Irving Medical Center

[mm2060@cumc.columbia.edu](mailto:mm2060@cumc.columbia.edu)



# **COVID-19 Current Treatment Guidelines and Post COVID-19 Complications**

**Yomaris Pena, MD**  
**Internal Medicine Physician**  
**Chief Medical Officer**  
**SOMOS**

**October 6, 2022**

## Purpose and Objectives

### **PURPOSE**

*Encourage providers to know how to diagnose and treat patients who have developed post COVID long-term complications.*

### **OBJECTIVES**

Objective 1: Provide education on how to manage and follow-up pulmonary, cardiovascular, neurological, renal, and hepatic complications post COVID.

Objective 2: Prevention of chronic diseases post COVID and how to approach a new way of modern healthcare for quality care improvement.

### **FINANCIAL DISCLOSURE**

*Do you have a financial disclosure? None*

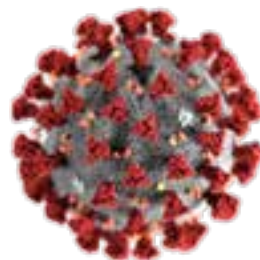


## Agenda

- COVID-19 current clinical outpatient guidelines, a refresher for primary care
- Post COVID-19 Syndrome :
  - What is it?
- Systems affected to review:
  - Pulmonary
  - Cardiac
  - Neurological
- What are we doing?
- How can we help?

“EVERYTHING WE DO BEFORE A PANDEMIC WILL SEEM ALARMIST. EVERYTHING WE DO AFTER WILL SEEM INADEQUATE”

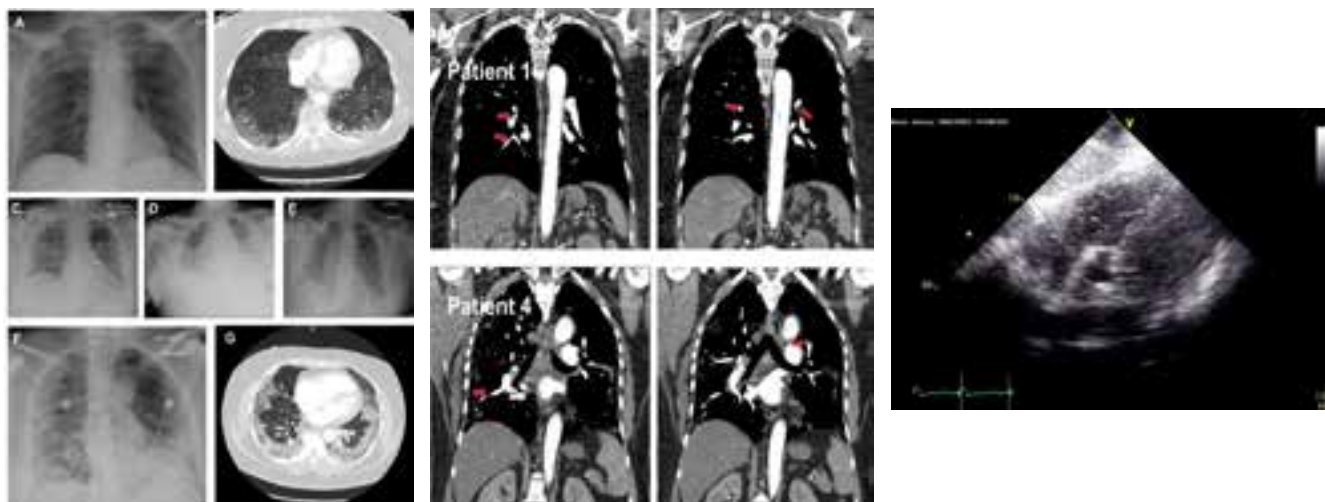
~ Michael Leavitt



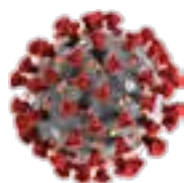


## What kind of Disease?

- Our understanding of this disease has been increasing with time. A disease entity that was initially identified as a primarily respiratory illness has slowly emerged as a systemic syndrome that causes endothelial dysfunction leading to micro-thrombosis and severe inflammatory response leading to a cytokine storm.

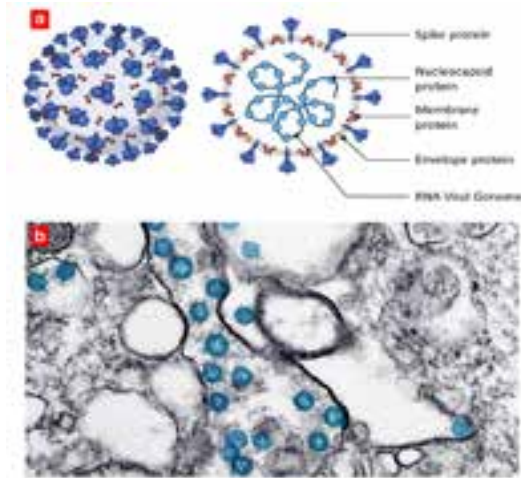


## The Virus





# Coronavirus Structure and Variants



The AAPS Journal (2021) 23: 14 DOI: 10.1208/s12248-020-00532-2



- **Omicron (B.1.1.529):** first reported in South Africa in November 2021

Vaccines 2021, 9(11), 1305; <https://doi.org/10.3390/vaccines9111305>

## Variants

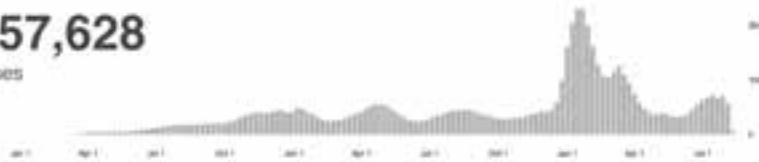
variants of concern (VOCs)	variants of interest (VOIs)
potential to cause enhanced transmissibility or virulence, reduction in neutralization by antibodies obtained through natural infection or vaccination, the ability to evade detection, or a decrease in therapeutics or vaccination effectiveness.	variants with specific genetic markers that have been associated with changes that may cause enhanced transmissibility or virulence, reduction in neutralization by antibodies obtained through natural infection or vaccination, the ability to evade detection, or a decrease in the effectiveness of therapeutics or vaccination.
<b>Alpha (B.1.1.7)</b> <b>Beta (B.1.351)</b> <b>Gamma (P.1):</b> <b>Delta (B.1.617.2)</b> <b>Omicron (B.1.1.529)</b>	<b>Epsilon (B.1.427 and B.1.429)</b> <b>Zeta (P.2)</b> <b>Eta (B.1.525) and Iota (B.1.526)</b> <b>Theta (P.3)</b> <b>Kappa (B.1.617.1)</b> <b>Lambda (C.37)</b> <b>Mu (B.1.621)</b>



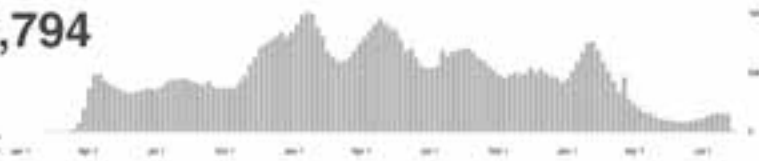
# Current Situation



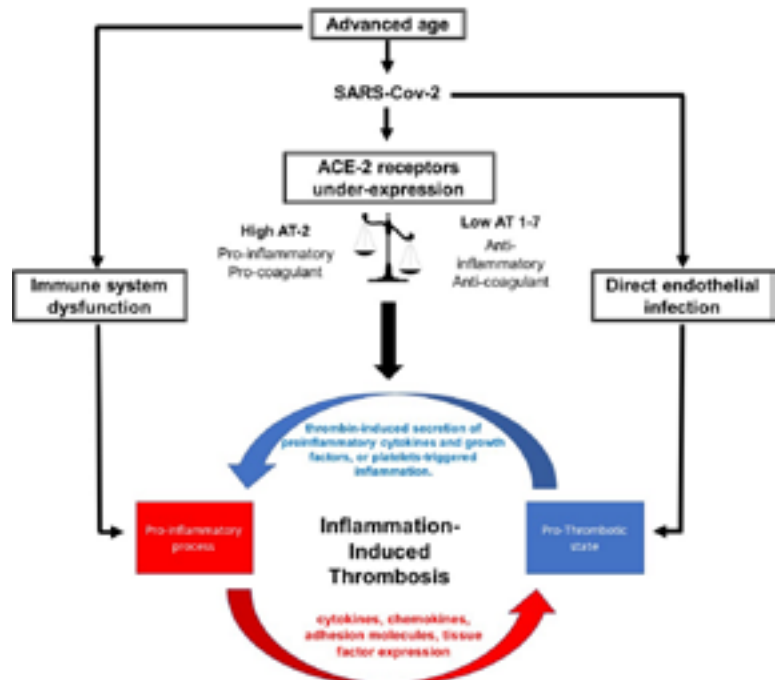
**588,757,628**  
confirmed cases



**6,433,794**  
deaths

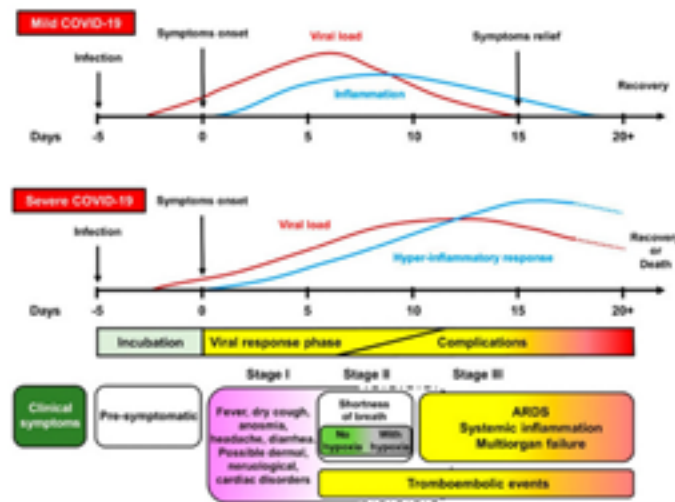


Source: World Health Organization  
Data updated as reported by WHO  
© 2021 WHO. All rights reserved.



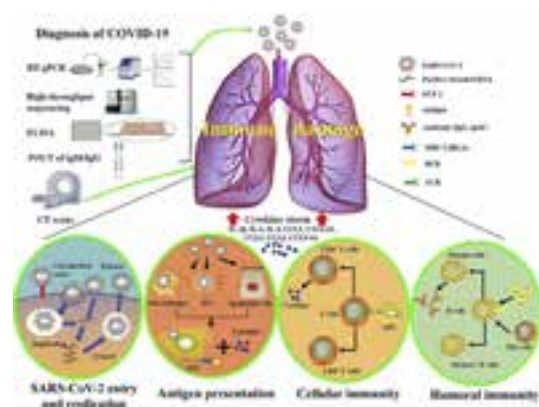
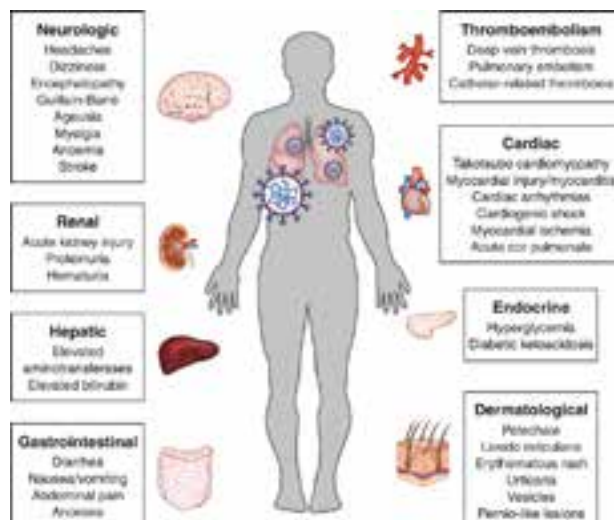


## Timeline of mild and severe COVID-19 and its correlation with viral activity and clinical manifestations.



Journal of Clinical Medicine. 2020; 9(12):4021. <https://doi.org/10.3390/jcm9124021>

## Extrapulmonary Manifestations





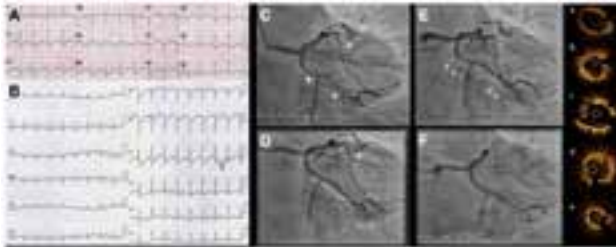


## Embotic and inflammatory manifestations

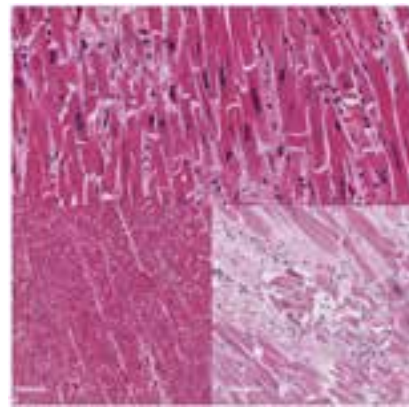
Pulmonary Embolism in a Patient With COVID-19



Acute Stent Thrombosis in Patients With COVID-19



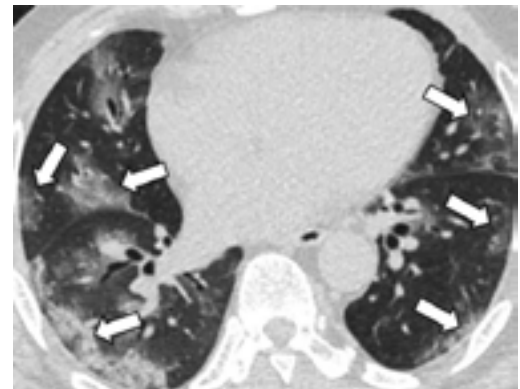
Endomyocardial Biopsy of myocarditis  
Patient With COVID-19



JACC: CASE REPORTS, VOL. 2, NO. 9, 2020

## Chest Computed Tomography (CT)

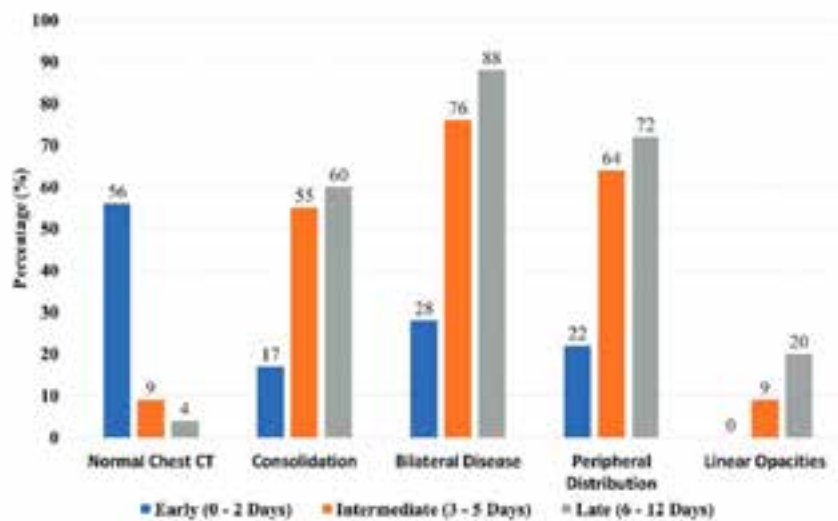
- Given its high sensitivity, chest computed tomography (CT), particularly high-resolution CT (HRCT), is the diagnostic method of choice in evaluating COVID-19 pneumonia
- Several non-specific findings and radiologic patterns can be found on Chest CT. Most of these findings may also be observed in other lung infections.
- The most common CT findings in COVID-19 are multifocal bilateral "ground or ground glass" (GG) areas associated with consolidation areas with patchy distribution.
- Other notable findings include the "reversed halo sign," a focal area of GG delimited by a peripheral ring with consolidation, and the findings of cavitations, calcifications, lymphadenopathies, and pleural effusion.



Radiology 2021; 299:E262–E279 (<https://doi.org/10.1148/radiol.2021204522>)

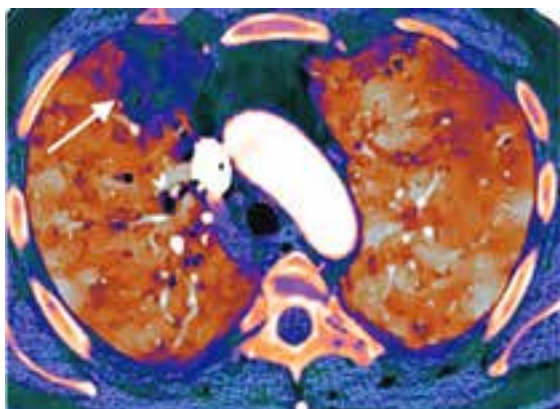


## Frequency of selected chest CT findings as function of time course from symptom onset.



Radiology 2020;295(3):200463

## Other CT modalities



Spectral contrast-enhanced CT pulmonary blood volume map shows subsegmental perfusion defect (arrow) in anterior right upper lobe, in territory of dilated vessel.

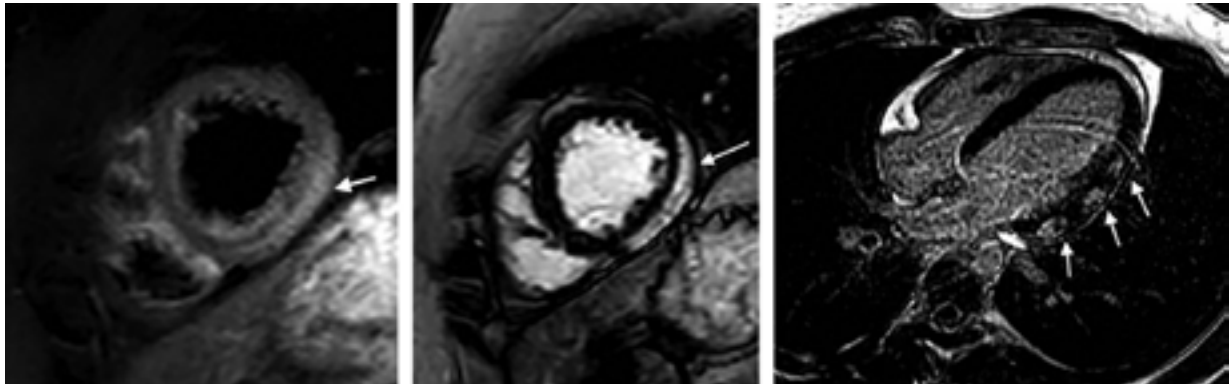


Contrast-enhanced CT angiographic image (vascular window settings) shows isolated subsegmental filling defect (arrow) corresponding to dilated vessel in subsegmental anterior right upper lobe pulmonary artery.

Radiology 2021; 299:E262–E279 (<https://doi.org/10.1148/radiol.2021204522>)



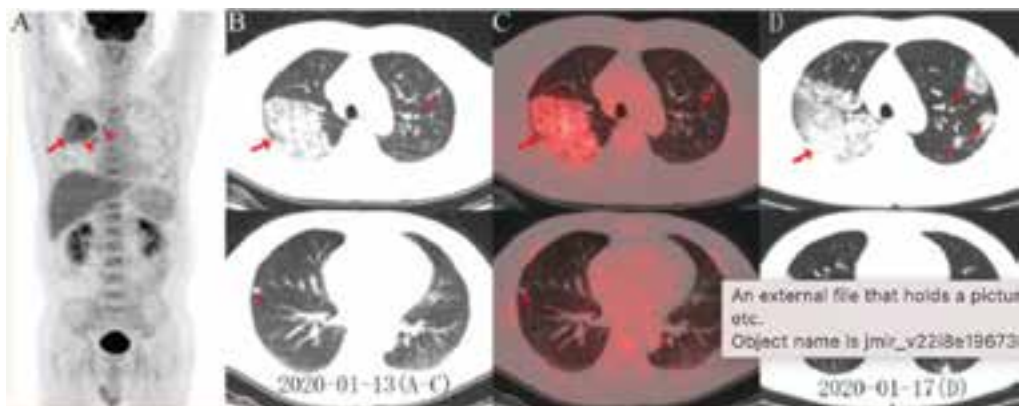
## MRI



Images in a 22-year-old man with COVID-19, shortness of breath, and chest pain. Cardiac MRI demonstrates mildly reduced left ventricular systolic function with ejection fraction of 47%. (a) T2 short-axis image through apical segments demonstrates subepicardial edema (high signal, arrow) along lateral wall. (b, c) There is corresponding subepicardial lateral wall late gadolinium enhancement on short-axis (arrow in b) and four-chamber (arrows in c) images.

Radiology 2021; 299:E262–E279 (<https://doi.org/10.1148/radiol.2021204522>)

## F-FDG PET/CT

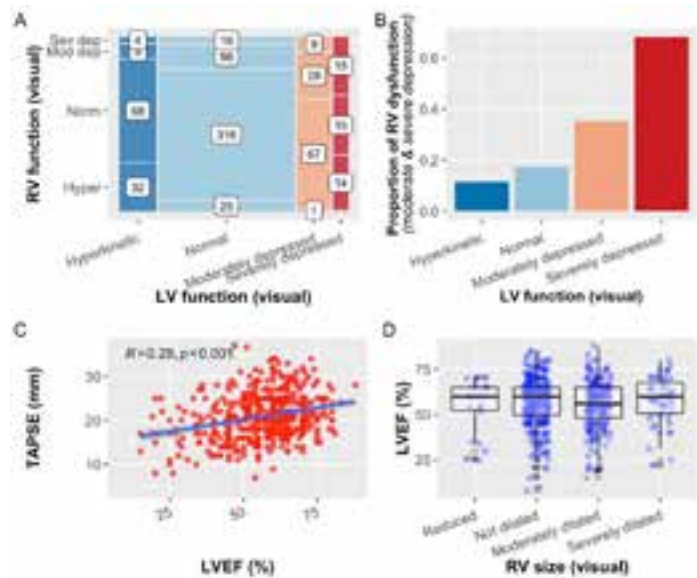


Fluorodeoxyglucose positron emission topography/computed tomography (FDG PET/CT) imaging findings in a patient with coronavirus disease. (A) The PET maximum intensity projection image shows an FDG-avid mass in the right lung with a maximum standardized uptake value of 4.9, as well as increased accumulation of FDG in the right hilar lymph nodes, in the right paratracheal stripe (arrowhead), and in the bone marrow. The axial images of the low-dose CT scan (B) and the PET/CT fusion (C) show ground-glass opacities in the right upper lobe with areas of focal consolidation (arrows) and focal opacities in the right middle and left upper lobes (arrows). Follow-up CT axial images obtained 4 days later (D) show lesion progression in the middle and bilateral upper lobes, with newly developed focal opacities in the left lower and upper lobes (arrows). [J Med Internet Res](#). 2020 Aug; 22(8): e19673.



## Echocardiography

- Useful for critical and severe patients
- Assessment of right and left sided functions
- Parameters to be assessed: LVEF, WMA, RV dimension, TAPSE, PASP
- RV functions initially were the most important predictor of in-hospital mortality



[Intensive Care Med.](#) 2022; 48(6): 667–678.

## Therapies





## How COVID-19 therapies should work



Molnupiravir

Paxlovid

Remdesivir

Hydroxychloroquine and chloroquine

Lopinavir/ritonavir

Ivermectin

Corticosteroids

Interferon- $\beta$ -1a (IFN-  $\beta$ -1a)

Interleukin (IL)-1 Antagonists:

Anti-IL-6 receptor Monoclonal Antibodies

Tocilizumab

Sarilumab and Siltuximab

Janus kinase (JAK) inhibitors (Baricitinib)

Convalescent Plasma

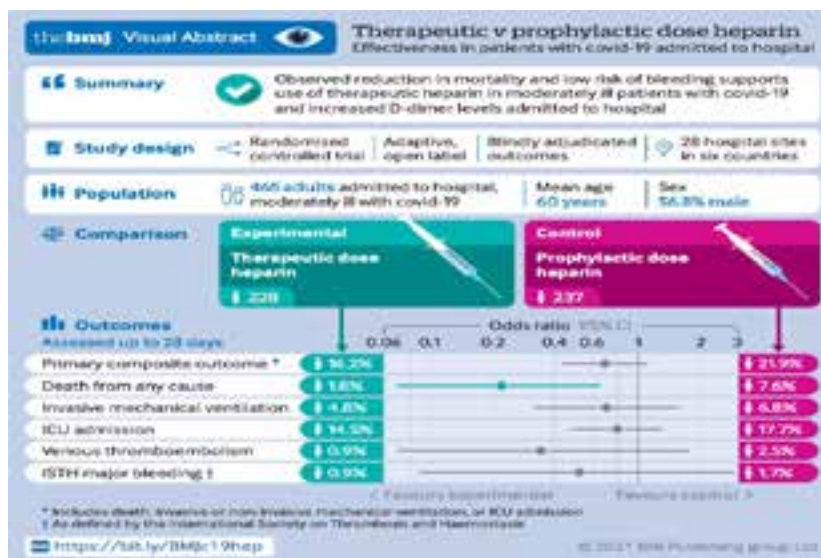
REGN-COV2 (Casirivimab and Imdevimab)

Bamlanivimab and Etesevimab (LY-CoV555 or LY3819253 and LY-CoV016 or LY3832479)

Sotrovimab (VIR-7831)

REGN-COV2 (casirivimab and imdevimab)

## Anticoagulation in Moderately ill (RAPID trial)

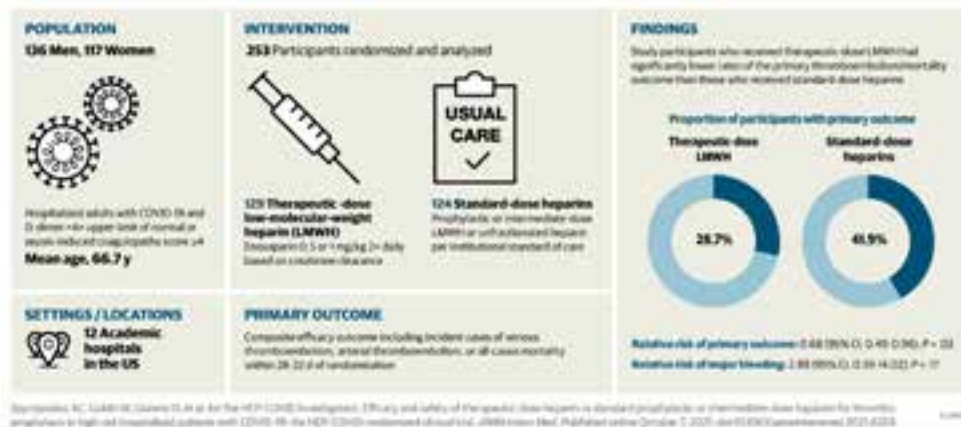


BMJ. 2021 Oct 14;375:n2400. doi: 10.1136/bmj.n2400.



## Anticoagulation in High-risk Hospitalized (HEP-COVID trial)

**RCT: Efficacy of Therapeutic-Dose Heparin for Thromboprophylaxis in Hospitalized Patients With COVID-19**



*JAMA Intern Med.* 2021;181(12):1612-1620. doi:10.1001/jamainternmed.2021.6203

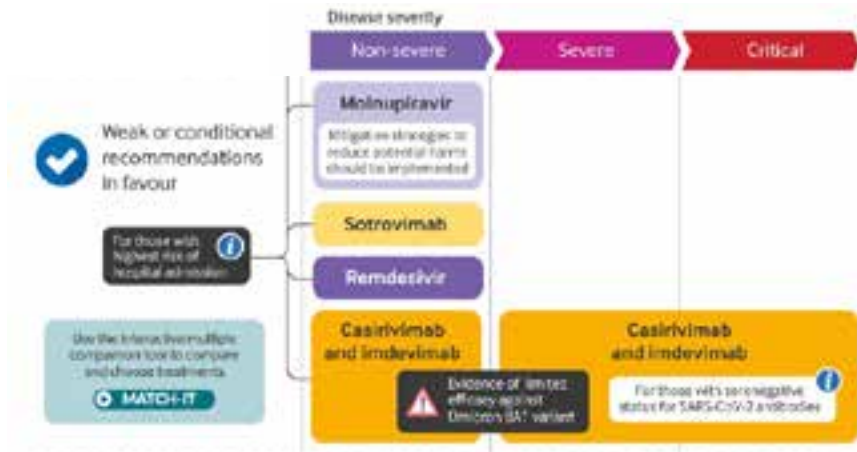
# Guidelines



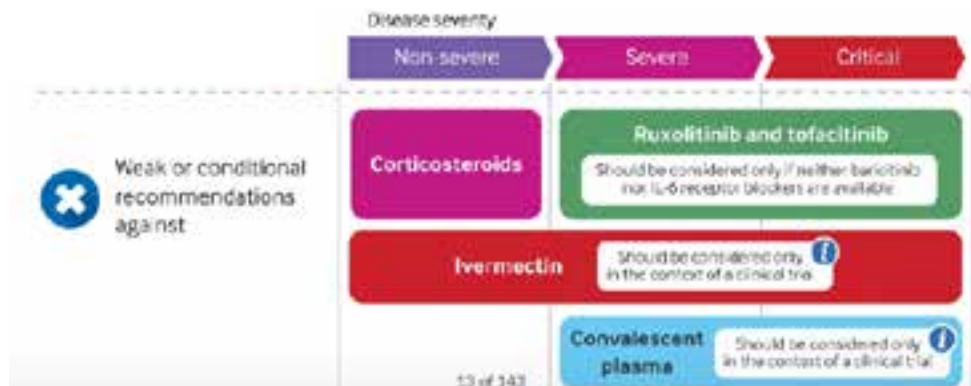




## Can be considered



## Not Recommended







## Current Guidelines Non-Hospitalized Patients

Patient Description	Panel's Recommendations
Does Not Require Hospitalization or Supplemental Oxygen	<p><b>For All Patients:</b></p> <ul style="list-style-type: none"><li>All patients should be offered symptomatic management (AIII)</li><li>The Panel recommends against the use of dexamethasone<sup>1</sup> or other systemic corticosteroids in the absence of another indication (AIII).</li></ul> <p><b>For Patients Who Are at High Risk of Progressing to Severe COVID-19<sup>2</sup></b></p> <p>Preferred therapies. Listed in order of preference:</p> <ul style="list-style-type: none"><li>Ritonavir-based atazanavir (Paxlovid)<sup>3</sup> (AII)</li><li>Remdesivir<sup>4</sup> (BII)</li></ul> <p>Alternative therapies. For use (DREY) when neither of the preferred therapies are available, feasible to use, or clinically appropriate. Listed in alphabetical order:</p> <ul style="list-style-type: none"><li>Bethelovimab<sup>5</sup> (DII)</li><li>Molnupiravir<sup>6</sup> (DII)</li></ul>
Discharged From Hospital Inpatient Setting in Stable Condition and Does Not Require Supplemental Oxygen	The Panel recommends against continuing the use of remdesivir (AII), dexamethasone <sup>1</sup> (AII), or baricitinib (AII) after hospital discharge.
Discharged From Inpatient Setting and Requires Supplemental Oxygen <i>For those who are stable enough for discharge but still require oxygen<sup>7</sup></i>	There is insufficient evidence to recommend either for or against the continued use of remdesivir or dexamethasone.
Discharged From ED Despite New or Increasing Need for Supplemental Oxygen <i>When hospital resources are limited, inpatient admission is not possible, and close follow-up is ensured<sup>8</sup></i>	<p>The Panel recommends using dexamethasone 8 mg PO once daily for the duration of supplemental oxygen (dexamethasone use should not exceed 10 days) with careful monitoring for AEs (BII).</p> <p>Because remdesivir is recommended for patients with similar oxygen needs who are hospitalized, clinicians may consider using it in this setting. As remdesivir requires IV infusions for up to 5 consecutive days, there may be logistical constraints to administering remdesivir in the outpatient setting.</p>

**Rating of Recommendations:** A = Strong; B = Moderate; C = Weak

**Rating of Evidence:** I = One or more randomized trials without major limitations; II = Other randomized trials or subgroup analyses of randomized trials; III = Nonrandomized trials or observational cohort studies; III = Expert opinion.

## Post COVID syndrome





## Objective: Primary Care is Key to Engage patient on the path of recovery

- Based on current information, many post-COVID conditions can be managed by primary care providers, with the incorporation of patient-centered approaches to optimize the quality of life and function in affected patients.
- As of July 2021, “long COVID,” also known as post-COVID conditions, can be considered a disability under the Americans with Disabilities Act (ADA).

## Post-Acute COVID Syndrome (PACS)

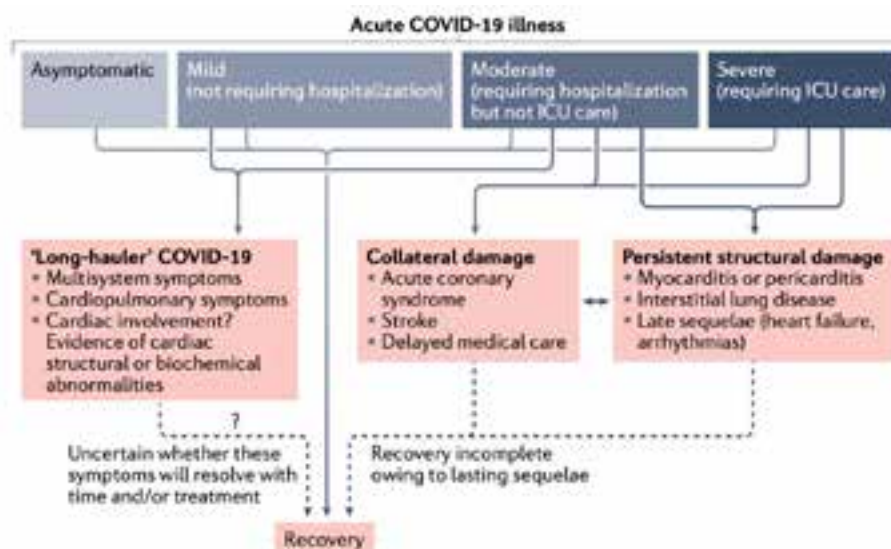
- An umbrella term for the wide range of physical and mental health consequences experienced by some patients that are present four or more weeks after SARSCoV-2 infection, including by patients who had initial mild or asymptomatic acute infection.
- Post-COVID conditions are heterogenous
  - Several patterns have been identified – Persistent symptoms – New-onset late sequelae – Evolution of symptoms/conditions
  - Attributable to different underlying pathophysiologic processes
  - Presentation could be complicated by a number of factors
  - May share similarities with other post-viral conditions



## Post- COVID Syndrome (PCS)

- The National Institute for Health and Care Excellence (NICE) guidelines describe “post-COVID-19 syndrome” as “*Signs or symptoms that develop during or after infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis*”.
- Based on current information, many post-COVID conditions can be managed by primary care providers, with the incorporation of patient-centered approaches to optimize the quality of life and function in affected patients.

## The road to recovery in COVID-19





## Prevalence

- In one study of 4,182 cases, 13.3% reported symptoms lasting  $\geq 28$  days, 4.5% for  $\geq 8$  weeks, and 2.3% for  $\geq 12$  weeks.
- Amongst patients with prior hospitalization these are much higher: Patients were seen a mean of 60 days after onset of symptoms. Only 12.6% of patients reported being asymptomatic, with particularly high rates of ongoing fatigue (53.1%), dyspnea (43.4%), joint pain (27.3%), and chest pain (21.7%).
- PACS is more common in people displaying a wider array of initial symptoms ( $>5$  symptoms at time of diagnosis).
- It also appears to be more common in breakthrough cases (19% experience symptoms  $>6$ wks).

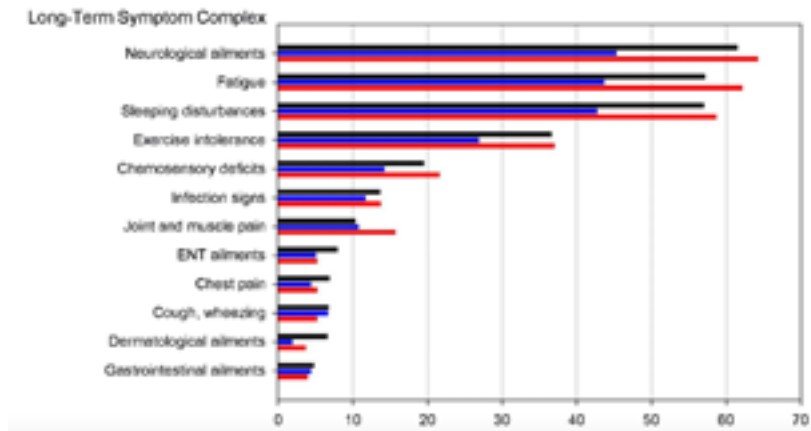
## Commonly affected systems

Cardiovascular	Myocarditis, heart failure, pericarditis, orthostatic intolerance (e.g., postural orthostatic tachycardia syndrome [POTS])
Pulmonary	Interstitial lung disease, reactive airway disease
Renal	Chronic kidney disease
Dermatological	Alopecia
Rheumatological	Reactive arthritis, fibromyalgia, connective tissue disease
Endocrine	Diabetes mellitus, hypothyroidism
Neurologic	Transient ischemic attack/stroke, olfactory and gustatory dysfunction, sleep dysregulation, altered cognition, memory impairment, headache, weakness, neuropathy
Psychiatric	Depression, anxiety, post-traumatic stress disorder (PTSD), psychosis
Hematologic	Pulmonary embolism, arterial thrombosis, venous thromboembolism, other hypercoagulability
Urologic	Incontinence, sexual dysfunction
Others	Weight loss, dysautonomia, allergies and mast cell activation syndrome, reactivation of other viruses, pain syndromes, hearing loss, vertigo, and progression of comorbid conditions





## Commonly reported symptoms



Fatigue 80%

Respiratory 59%

Neurologic 59%

Cognitive impairment 45%

Sleep disturbance 30%

Mental health sx 26%

[www.thelancet.com](http://www.thelancet.com) Vol 51, September, 2022

## RISK Factors for PACS

75% not hospitalized

22% pre-existing respiratory/cardiac dx

34% pre-existing depression/anxiety

4% pre-existing chronic fatigue/fibromyalgia

Average age 45.4

68% female



## PACS score

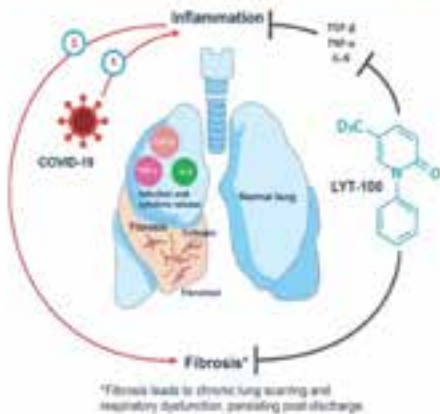
No.	Symptom complex	Self-reported sub-symptoms*
1	Chem sensory deficits	Smelling disturbance, impaired sense of taste
2	Fatigue	Fatigue
3	Exercise intolerance	Shortness of breath, reduced exercise capacity
4	Joint or muscle pain	Muscle pain, joint pain
5	Ear-Nose-Throat (ENT) ailments	Hoarseness, sore throat, runny nose
6	Coughing, wheezing	Coughing, wheezing
7	Chest pain	Chest pain
8	Gastrointestinal ailments	Stomach pain, diarrhoea, vomiting, nausea
9	Neurological ailments	Confusion, vertigo, headache, motor deficits, sensory deficits, numbness, tremor, deficits of concentration, cognition or speech
10	Dermatological ailments	Hair loss, rash, itchiness
11	Infection signs	Chills, fever, general sickness/flu-like symptoms
12	Sleep disturbance	Insomnia, unrefreshed sleep

No.	Symptom complex	Case counts			Regression coefficient	PQ score weight
		I (n = 196)	II (n = 287)	III (n = 95)		
2	Fatigue	107	189	107	1.28	1
4	Joint, wheezing	102	142	134	1.81	1
9	Neurological ailments	111	196	136	1.94	15
4	Joint and muscle pain	102	154	117	1.98	15
1	ENT ailments	102	142	146	1.43	15
8	Gastrointestinal ailments	108	191	139	1.84	5
12	Sleep disturbance	119	191	148	1.88	5
7	Chest pain	102	150	141	1.83	4
11	Infection signs	102	114	147	1.77	10
1	Chem sensory deficits	117	114	131	1.78	10
7	Chest pain	102	142	138	1.78	10
10	Dermatological ailments	102	142	139	1.78	2

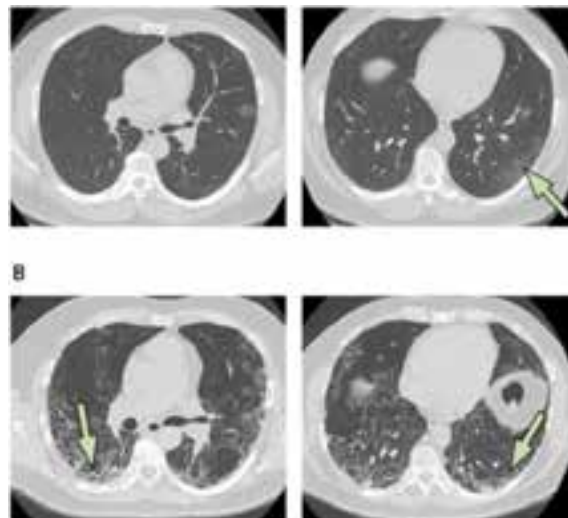
www.thelancet.com Vol 51, September, 2022

## Post COVID lung disease

### LYT-100 in Long COVID respiratory complications & related sequelae



High proportion of mild, moderate & severe COVID-19 patients (up to 53%) show signs of lung fibrosis at three weeks post symptom onset (Li et al. 2020)

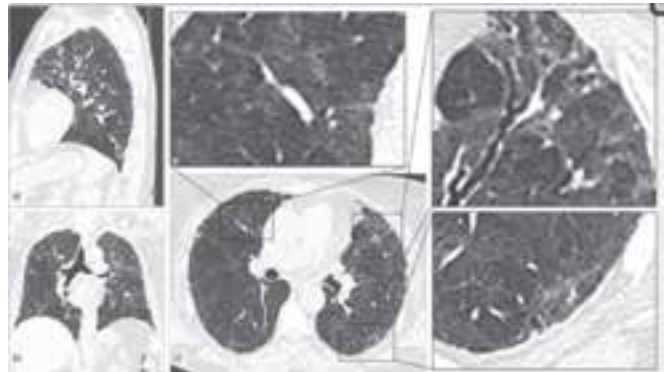


www.thelancet.com/respiratory Vol 8 August 2020



## Post COVID lung disease

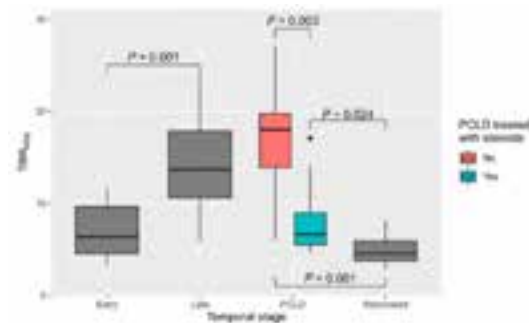
a) Sagittal, b) coronal and c) axial multiplanar reconstructions of a thoracic high-resolution computed tomography scan performed at 4 months after COVID-19 showing the sequelae involvement of the pulmonary parenchyma associated with the presence of fibrosing irreversible lesions with traction bronchiectasis (upper right panel, high magnification image from c), reversible lesion ground-glass opacities (upper left panel, high magnification image from c) and subpleural linear lesions with indeterminate evolution (lower right panel, high magnification image from c).



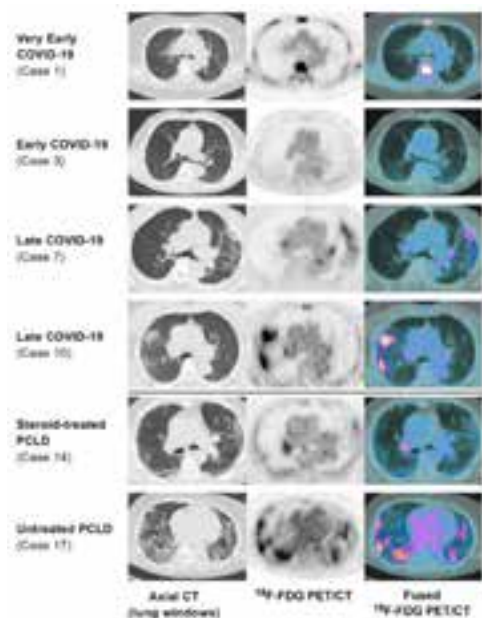
Eur Respir Rev 2022; 31: 210185 [DOI: 10.1183/16000617.0185-2021].

## Post COVID lung disease

Exemplar images demonstrating increasing 18F-FDG uptake with temporal stage and lower 18F-FDG uptake in steroid-treated PCLD (lung-windowed axial CT, 18F-FDG PET [SUV 0–5], and 18F-FDG PET/CT images). Medullary uptake in case 1 was due to leukemia and not COVID-19.

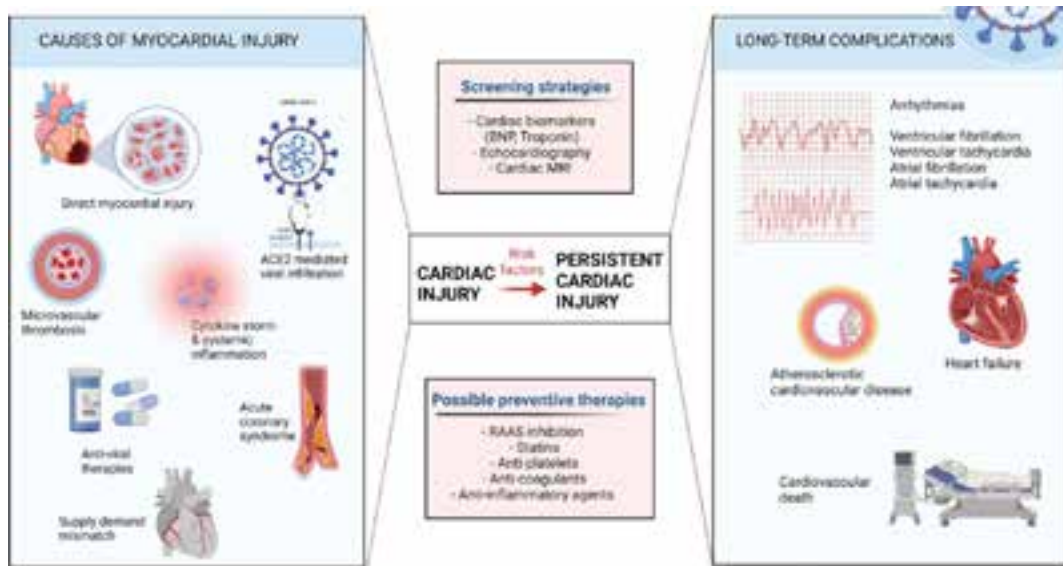


J Nucl Med 2022; 63:270–273



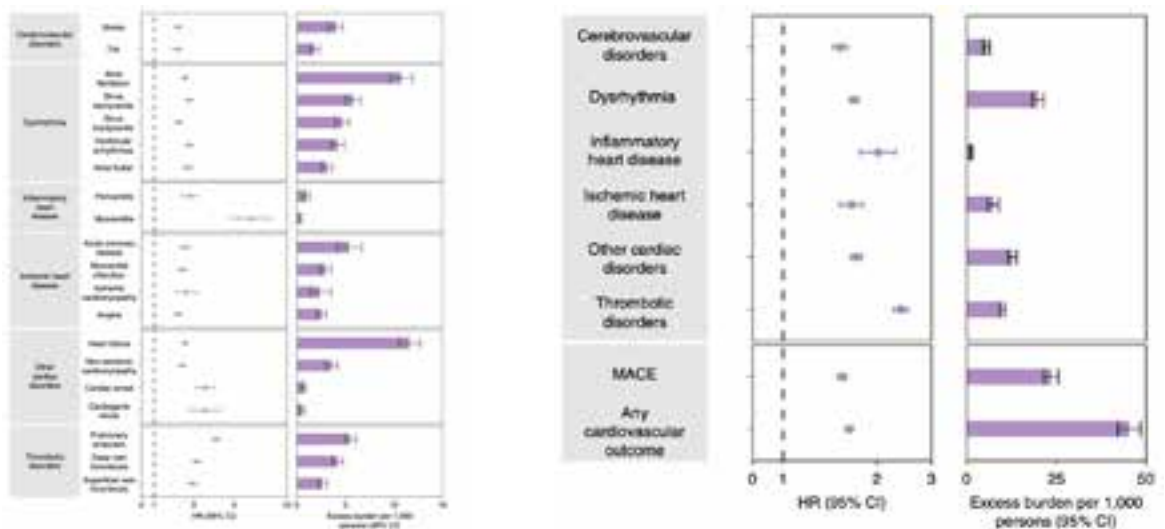


## Persistent cardiac injury



eBioMedicine VOLUME 77, 103892, MARCH 01, 2022

## Risks and 12-month burdens of incident post-acute COVID-19 composite cardiovascular outcomes

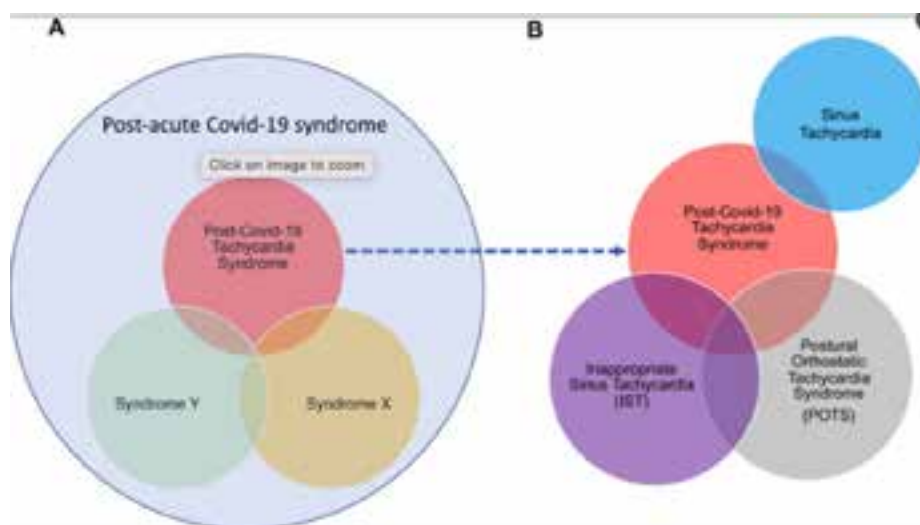


Nature Medicine volume 28, pages583–590 (2022)



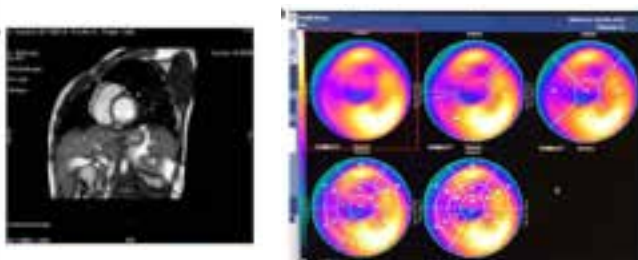
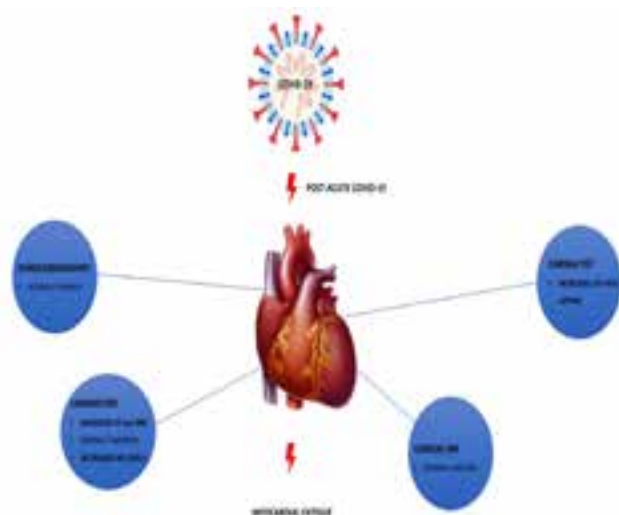


## Post-COVID tachycardia syndrome



Am J Med. 2021 Dec; 134(12): 1451–1456

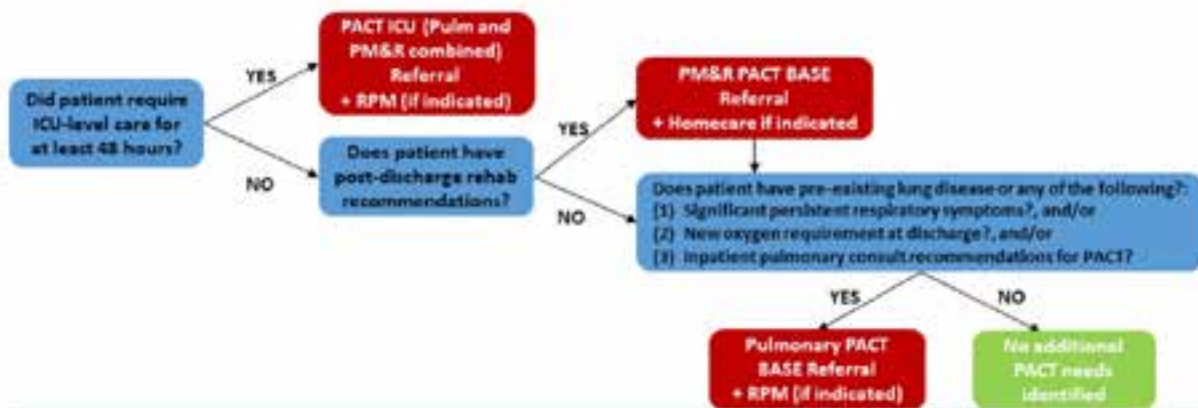
## Laboratory and Imaging Evaluation of Cardiac Involvement in Patients with Post-Acute COVID-19



Cardiac magnetic resonance and cardiac PET imaging (same patient). (A) In short axis view, no cardiac involvement on LGE images. (B) Increased 18F-FDG-PET uptake on lateral and inferolateral walls of left ventricle on bulls eye map and on slices (indicating jeopardized area).

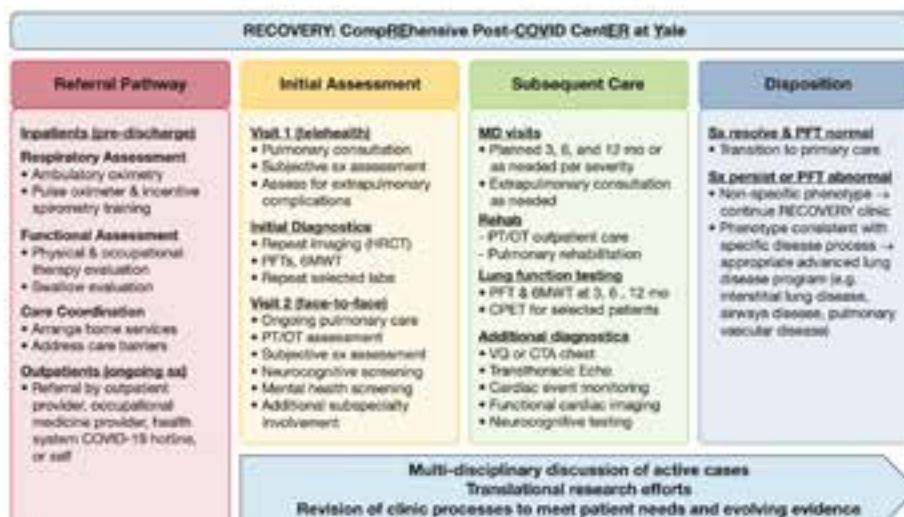


## The Johns Hopkins Post-Acute COVID-19 Team (PACT): A Multidisciplinary, Collaborative, Ambulatory Framework Supporting COVID-19 Survivors



The American Journal of Medicine, Vol 134, No 4, April 2021

## The RECOVERY clinic model



CHEST INFECTIONS: CHEST REVIEWS | [VOLUME 159, ISSUE 3](#), P949-958,



## Neurological complications in LONG COVID

- Cognitive dysfunction is one of the most common symptoms reported in research into Long COVID, occurring in around 70% of patients ([Cirulli et al., 2020](#); [Bliddal et al., 2021](#); [Davis et al., 2021](#); [Ziauddeen et al., 2021](#)), and in many cases appearing second only to fatigue.
- Problems with memory and with speech and language are the most commonly reported cognitive symptoms (after “brain fog”) in Long COVID, affecting around 70 and 40% of patients, respectively ([Davis et al., 2021](#)).

## Neurological symptoms in patients with COVID-19

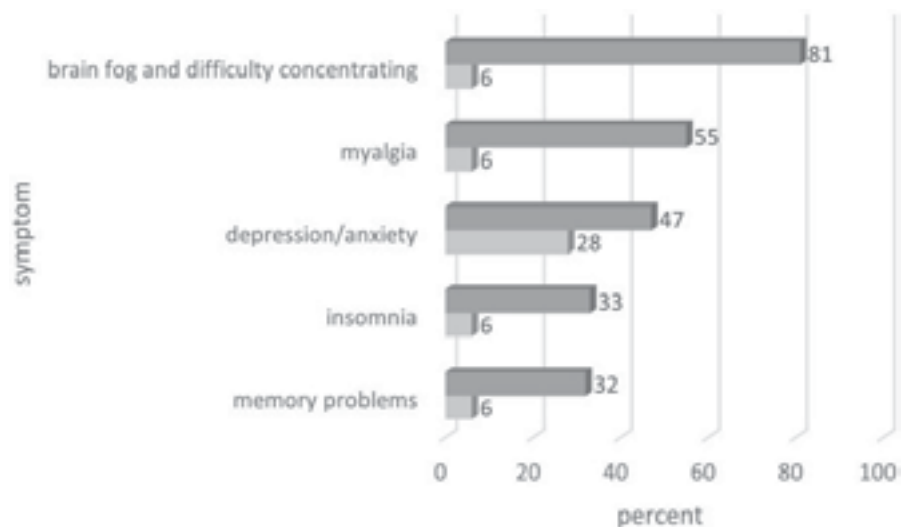
Symptoms	Total (n = 288)	CI95%
<b>NEUROLOGICAL SYMPTOMS</b>		
Any neurological symptom	264 (91.7%)	87.9–94.6
Hypogeusia/ageusia	201 (69.8%)	64.1–75
Headache	199 (69.1%)	63.4–74.4
Hyposmia/anosmia	193 (67.0%)	61.3–72.4
Myalgia	128 (44.4%)	38.6–50.4
Drowsiness	107 (37.2%)	31.6–43
Agitation	60 (20.8%)	16.3–26
Mental confusion	43 (14.9%)	11–19.6
Syncope	14 (4.9%)	2.7–8
Epileptic seizure	8 (2.8%)	1.2–5.4





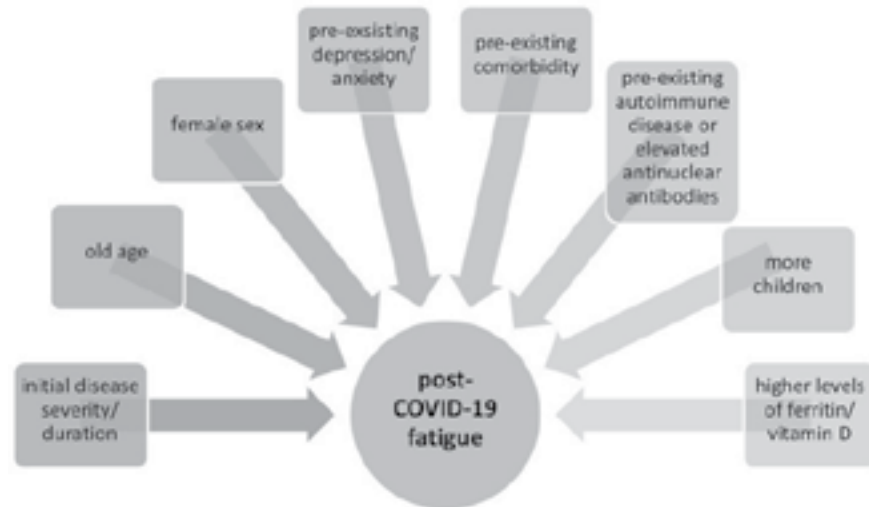
Medication	Mechanism of action	Outcomes (study design)	Class of recommendation/ Level of evidence
Pentoxifylline	PDE inhibitor	Promising results in smell loss (post-marketing surveillance study). No beneficial effects in patients with post-traumatic anosmia (case series)	III/B-NR
Caffeine	PDE inhibitor, Adenosine receptor antagonist	Direct correlation between coffee consumption and smell scores in patients with Parkinson's disease (retrospective cohort). 65 mg of caffeine showed no beneficial effects in patients with hyposmia related with upper respiratory tract infection or sinus node dysfunction (RCT)	III/B-R
Theophylline	PDE inhibitor	Improved the smell and taste dysfunction caused by various diseases (two non-RCT)	III/B-NR
Intranasal isoniazid	Neuroprotective	Beneficial effects in olfactory dysfunction caused by infection (non-RCT), COVID-19 (non-RCT), and other diseases (RCT)	IIa/B-R
Statins	Neuroprotective, anti-inflammatory	Improved anosmia in mice models (two animal studies)	III/C-EU
Minocycline	Neuroprotective	Inhibit apoptosis of OSNs in rat models (Histological analysis)	III/C-EU
Zinc	Trace element, growth factor	Reports of anosmia with intra-nasal zinc gluconate. No beneficial effects of zinc sulfate in chemotherapy-induced taste and smell loss (RCT)	III/B-R
Intranasal vitamin A	Anti-neurodegenerative	Beneficial effects in post-infectious smell dysfunction (retrospective cohort study)	III/C-LD
Omega-3	Neuroprotective	Beneficial effects in olfactory loss caused by tumors (RCT)	III/B-R
Intranasal mometasone	Anti-inflammatory	No beneficial effects in COVID-19 smell loss (RCT)	III/B-R
Intranasal fluticasone	Anti-inflammatory	Beneficial effects in COVID-19 smell loss (non-RCT)	IIa/B-NR
Oral triamcinolone paste	Anti-inflammatory	Beneficial effects in COVID-19 dysgeusia (non-RCT)	IIa/B-NR
Melatonin	Neuroprotective, anti-inflammatory	Inhibit apoptosis of OSNs in rat models (animal study)	III/C-EU

## Post COVID syndrome (symptoms)





## Etiology and risk factors of post-COVID-19 fatigue



Front. Psychiatry, 11 August 2022. <https://doi.org/10.3389/fpsyt.2022.947973>

## Therapeutic Options of Post COVID syndrome

- Rehabilitation programs like pulmonary rehabilitation using hyperbaric oxygen
- Physical therapy including aerobic training,
- Strengthening exercises, diaphragmatic breathing techniques as well
- Mindfulness training
- Molecular hydrogen (H<sub>2</sub>) inhalation → improved physical (6-min walking test) and respiratory function
- Psychotherapeutic approaches such as cognitive behavioral therapy



## RECOVER- Ongoing research by NIH

- The RECOVER Initiative brings together patients, caregivers, clinicians, community leaders, and scientists from across the nation to understand, prevent, and treat PASC, including Long COVID. This group is called the RECOVER Consortium.
- Visit: [About the Initiative | RECOVER COVID](#) for materials for patients and health care providers.