

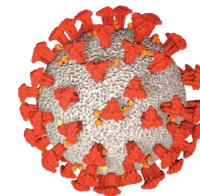
Long COVID patients: They are changing how clinicians think

Bishop O.C. Allen III

Julie Barroso, PhD, RN, ANP, FNAP, FAAN

Sarath Raju, MD, MPH

April 27, 2021



COVID-19
Prevention Network

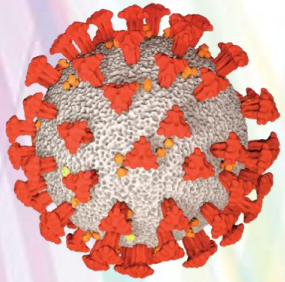
ANAC
Association of
Nurses in AIDS Care

A colorful graphic logo for ANAC, consisting of several overlapping, curved lines in shades of purple, blue, green, and yellow.

Association of Nurses in AIDS Care

Mission: ANAC fosters the professional development of nurses and others involved in the delivery of health care for persons at risk for, living with, and/or affected by the human immunodeficiency virus (HIV) and its comorbidities. ANAC promotes the health, welfare, and rights of people living with HIV around the world.

COVID-19 Prevention Network (CoVPN)



COVID-19
Prevention Network

- CoVPN was formed by the National Institute of Allergy and Infectious Diseases (NIAID)
- Partnership
 - HIV Vaccine Trials Network
 - HIV Prevention Trials Network
 - Infectious Disease Clinical Research Consortium
 - AIDS Clinical Trials Group

Housekeeping

- Participant lines muted during the webinar
- Type questions in the “Question” pane of your Dashboard
- Q & A session at the end of the webinar.



Continuing Nursing Education

Upon full participation in this webinar & completion of an evaluation, participants will be awarded 1.0 contact hours.



The Association of Nurses in AIDS Care (ANAC) is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.



Agenda

- Greetings & Introductions
- Presentation
- Question & Answer
- Closing & Continuing Education (CE) information

Disclosures

The speakers have no relevant conflicts of interest to disclose.

Objectives

- Summarize the post-acute sequelae of SARS-CoV-2 (Long COVID) peer-reviewed and patient-led research
- Examine the nursing perspective in post-acute sequelae of SARS-CoV-2 (Long COVID)
- Describe the lived experience of post-acute sequelae of SARS-CoV-2 (Long COVID)

Presenter Introductions



Bishop O.C. Allen III



Julie Barroso, PhD, RN, ANP, FNAP, FAAN



Sarath Raju, M.D., M.P.H.

Long COVID / Post-Acute COVID-19: A Physician's Perspective

Sarath Raju, MD MPH

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Johns Hopkins School of Medicine

Division of Pulmonary and Critical Care Medicine



JOHNS HOPKINS
M E D I C I N E

Disclosures

- No Relevant Disclosures or Conflicts of Interest



Outline

- Case Presentation
- COVID-19: Where We Are Now
- Overview on Post-Hospital Syndrome
- Post-Acute COVID Syndrome / Long-COVID
- Areas in Need of Research / Models for Care
- Summary

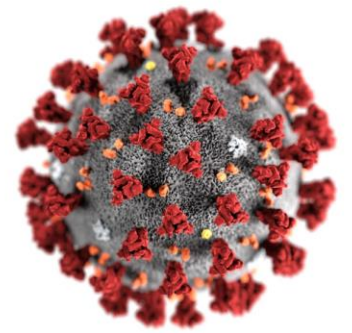
Case Presentation

- **49yo w/ PMHx of HIV** (VL<20, CD4 600), **Mild Asthma**
- 3/27 – Experiences new shortness of breath / abd pain
- 3/29 – Presented to local ED, COVID19+ via nasal swab; hypoxic with rising oxygen requirement
- 3/30 – Transferred to our ICU given progressive disease
 - Requiring Intubation / Mechanical Ventilation
 - Hospital LOS 22 days
 - Complications: Pulmonary Embolism, Bacterial Pneumonia, and Acute Kidney Injury (Cr 2.0 from 1.0)

Case Presentation

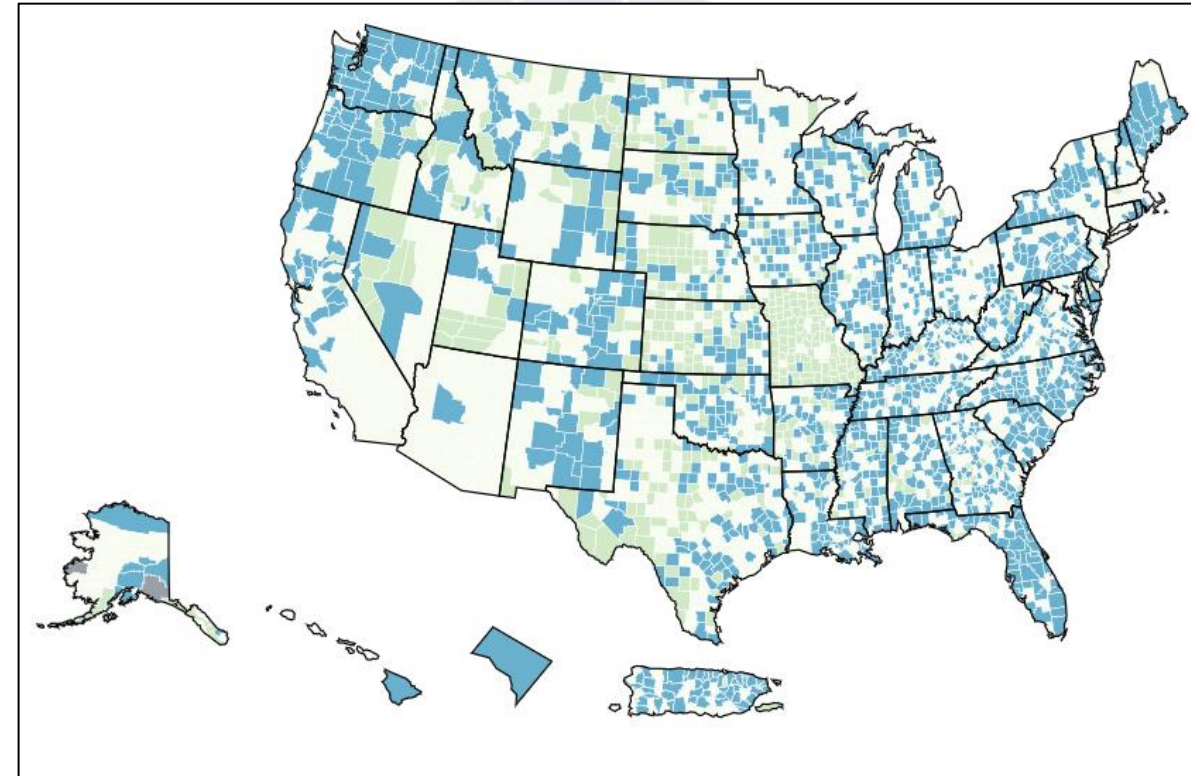
- **Symptoms at Discharge:**
 - Dyspnea, fatigue
- **PACT Physical Therapy PM&R Followup May 2020**
 - Fatigue, Dyspnea and Decreased Physical Function (worse from discharge)
- **PACT Pulmonary Followup Visit June 2020:**
 - Dyspnea
 - Depression
 - Cough
 - Fatigue
 - Complaints of Impaired Memory

COVID-19: Where we are now in the United States



As of April 20, 2021:

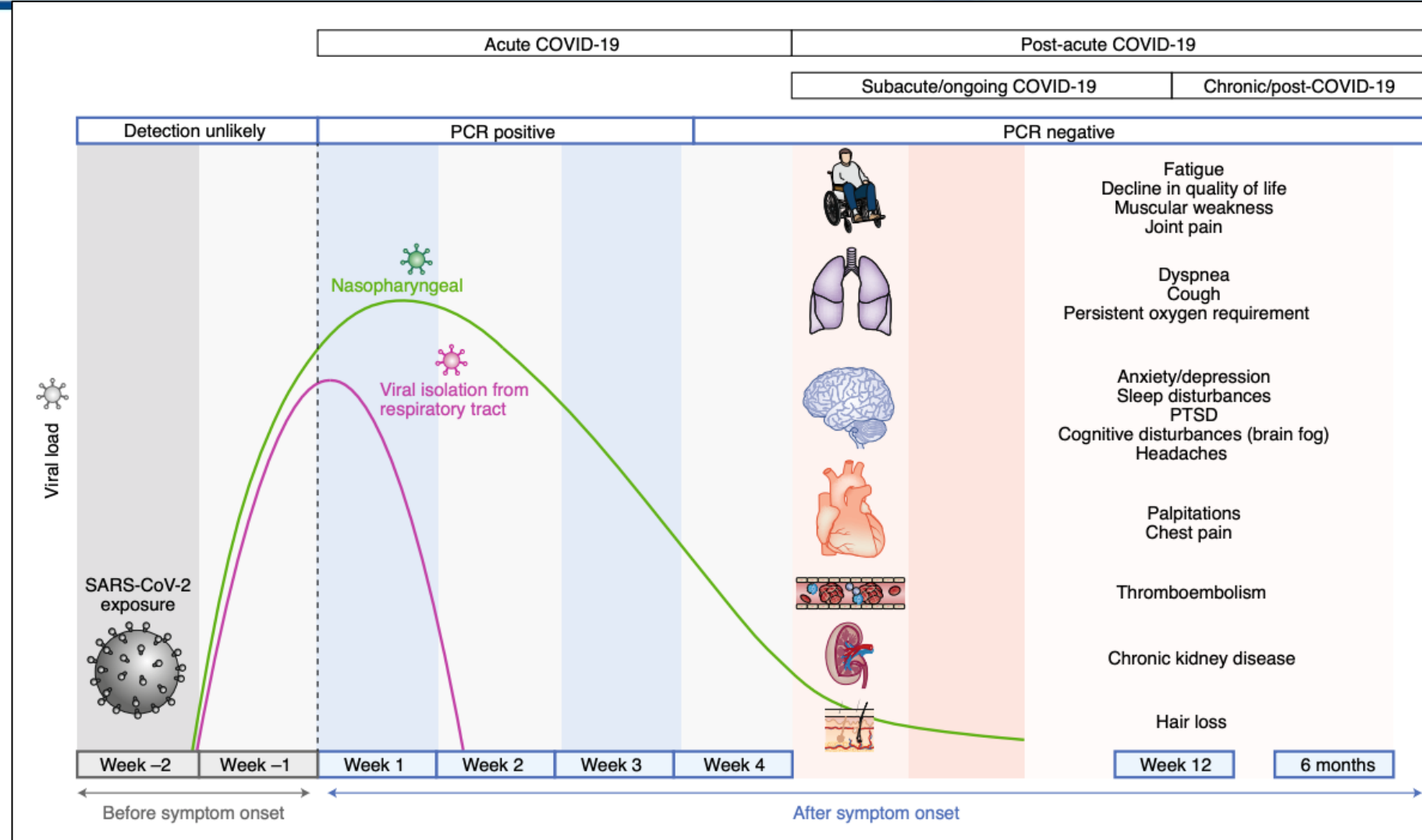
- 31,602,676 Cases
- 2,023,259 Hospitalizations
- 561,356 Deaths



Timeline of Post-Acute COVID-19: AKA Long COVID

Sub-Acute COVID-19:
Symptoms present 4-12 weeks beyond acute COVID-19

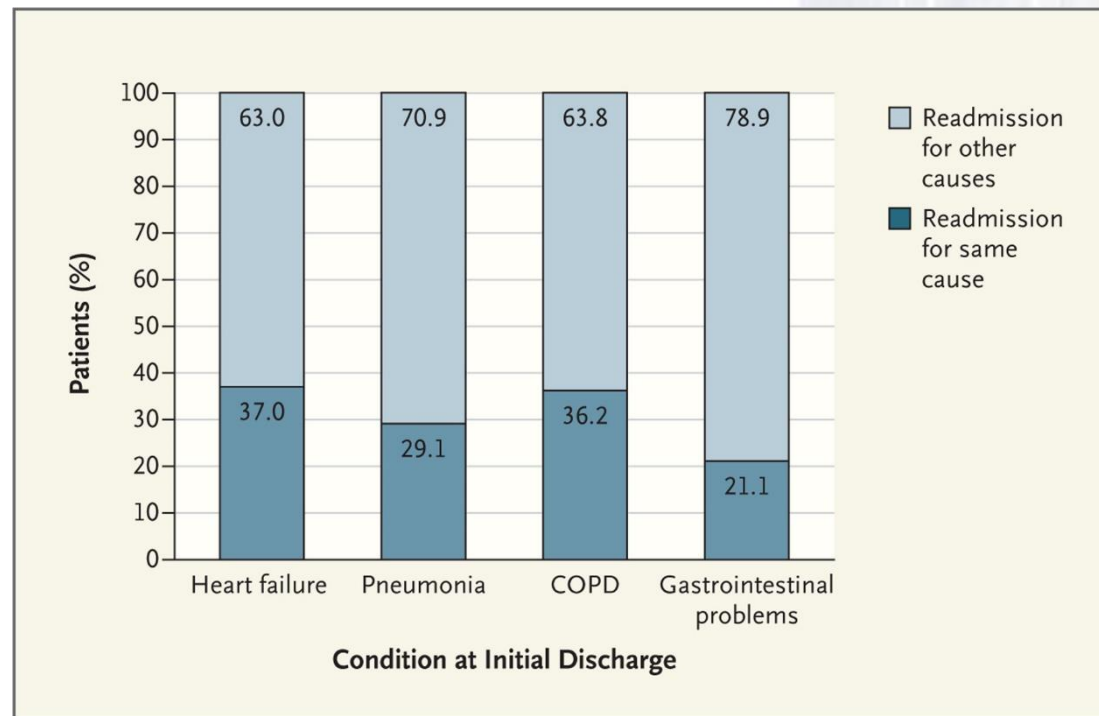
Post-COVID-19 Syndrome:
Symptoms beyond 12 weeks of acute COVID-19 without alternative explanation



Post-Hospital Syndrome in Non-COVID Population

- Acquired, transient period of vulnerability
- Impairments in physical function, cognition and mental health

***1/5 readmitted within 30 days**





The NEW ENGLAND
JOURNAL of MEDICINE

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One-Year Outcomes in Survivors
of the Acute Respiratory Distress Syndrome

Margaret S. Herridge, M.D., M.P.H., Angela M. Cheung, M.D., Ph.D., Catherine M. Tansey, M.Sc.,
Andrea Matte-Martyn, B.Sc., Natalia Diaz-Granados, B.Sc., Fatma Al-Saidi, M.D., Andrew B. Cooper, M.D.,
Cameron B. Guest, M.D., C. David Mazer, M.D., Sangeeta Mehta, M.D., Thomas E. Stewart, M.D., Aiala Barr, Ph.D.,
Deborah Cook, M.D., and Arthur S. Slutsky, M.D., for the Canadian Critical Care Trials Group

Functional Outcomes

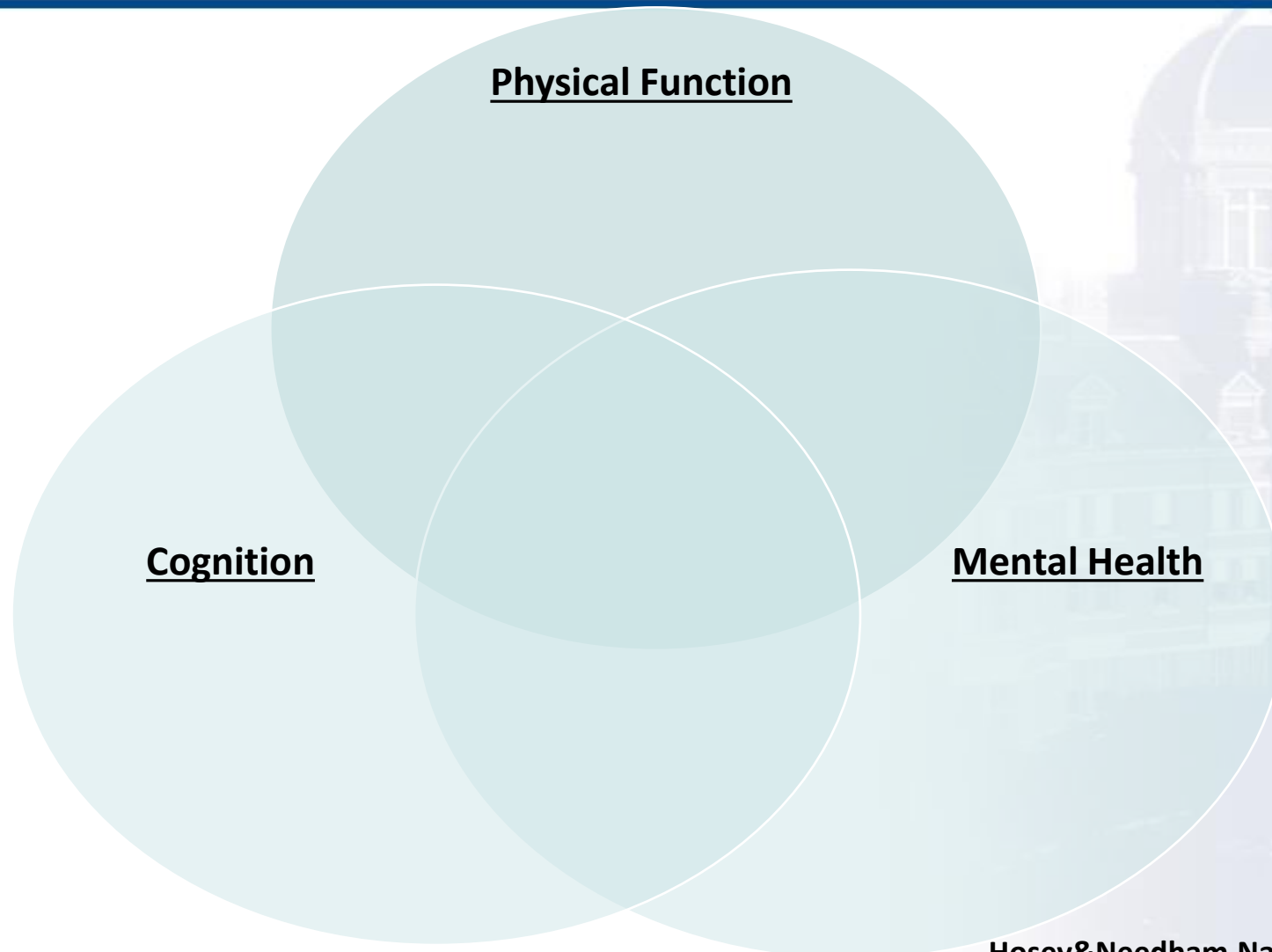
Table 3. Ability to Exercise and Return to Work and Health-Related Quality of Life among Patients with the Acute Respiratory Distress Syndrome during the First 12 Months after Discharge from the ICU.

Outcome	3 Months	6 Months	12 Months
Distance walked in 6 min			
No. evaluated	80*	78†	81‡
Median — m	281	396	422
Interquartile range — m	55–454	244–500	277–510
Percentage of predicted value§	49	64	66
Returned to work — no./total no. (%)¶	13/83 (16)	26/82 (32)	40/82 (49)
Returned to original work — no./total no. (%)	10/13 (77)	23/26 (88)	31/40 (78)

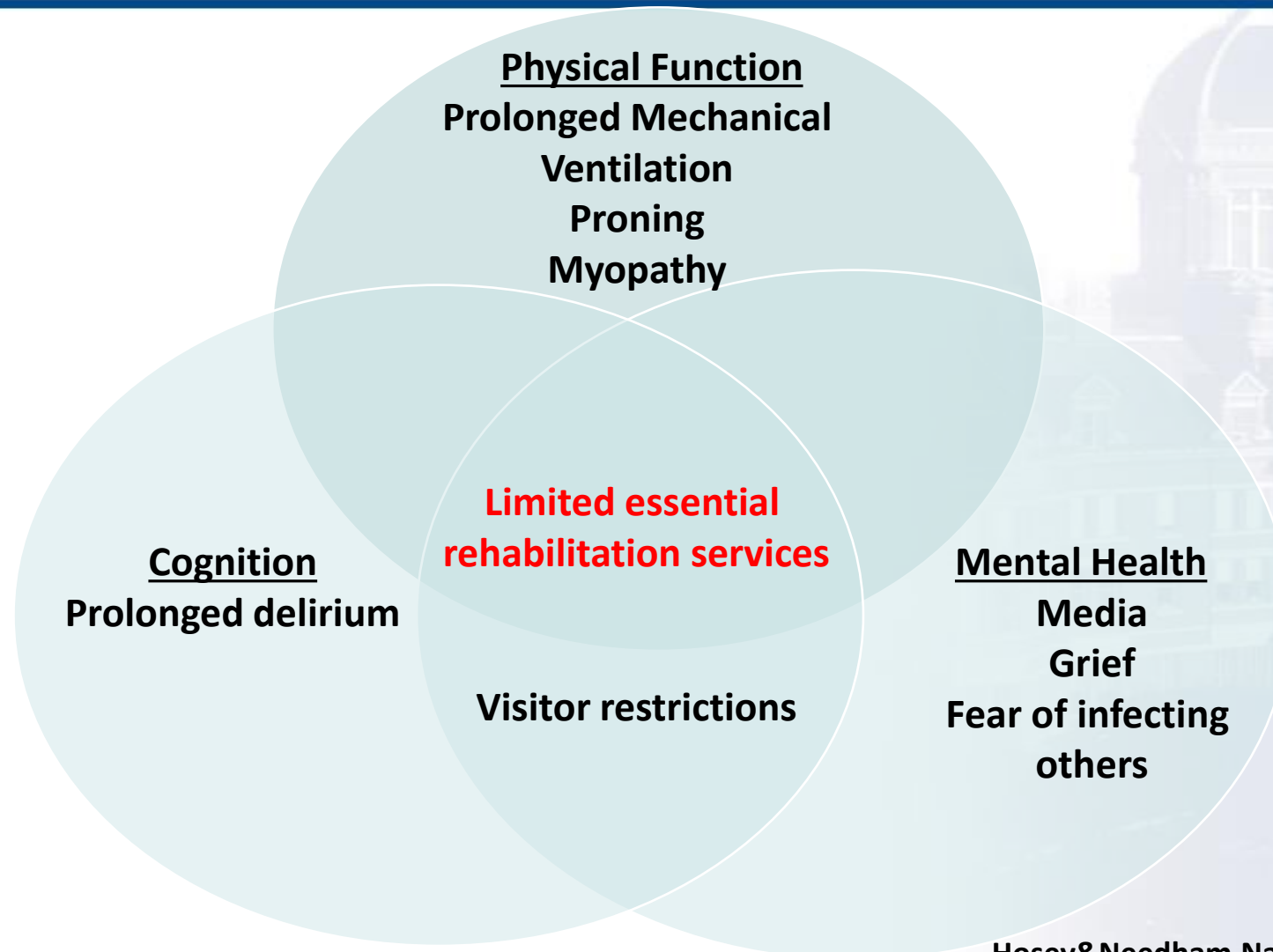
6MWD improved over 1 year, but still abnormal due to:

- **muscle wasting & weakness**, foot drop, joint immobility

COVID-19 Survivorship: Further Complicated by Impaired....



COVID-19 Survivorship: Further Complicated by Impaired.....



Post COVID-19 Symptoms Across the Globe

Persistent Symptoms Seen Across the Globe among both hospitalized and non-hospitalized patients

COUNTRY	STUDY	NUMBER OF CASES INCLUDED	RESULTS
Canada	Wong et al. (2020)	78	<ul style="list-style-type: none"> 51% had persistently reduced quality of life and 50% had shortness of breath at 12 weeks after symptom onset
France	Carvalho-Schneider et al. (2020)	130	<ul style="list-style-type: none"> 40% reported persistent fatigue and 30% breathlessness at 60 days after symptom onset
Italy	Carfi, Bernabei & Landi (2020)	143	<ul style="list-style-type: none"> 87% had symptoms, 55% had three or more symptoms at 60 days after discharge
United Kingdom	Cruz et al. (2020)	119	<ul style="list-style-type: none"> 68% reported persistent fatigue, 57% sleep disturbance and 32% breathlessness at 60 days after discharge
	Arnold et al. (2020)	110	<ul style="list-style-type: none"> 74% had persistent symptoms, typically breathlessness and fatigue and 10% had persistent anomalies on chest X-ray or respiratory function testing at 12 weeks after discharge
USA	Donnelly et al. (2020)	2 179	<ul style="list-style-type: none"> 19.9% were readmitted, 9.1% died and 27% were readmitted or died within 60 days after discharge
China	Huang et al. (2021)	1 733	<ul style="list-style-type: none"> 76% reported persistent symptoms, and 50% had residual anomalies on chest imaging 6 months after discharge

Surviving COVID-19 in Bergamo province: a post-acute outpatient re-evaluation

- **N=767; N=66 (9%) ICU**
 - Median **105d** (IQR 84-127) post-Sx onset
- **51% ≥1 symptom (fatigue, dyspnea)**
- **Pulmonary: Dyspnea: N=228 (31%) (N=52 (7%) > mild)**
PFTs: 19% w/ DLCO <80%
- **Mental Health: 31% PTSD; 11% anxiety; 5% depression**
- **Physical Function: 16% no longer independent**
- **Fatigue: N=334 (44%) (145 (19%) ≥ moderate)**
- **<10% with palpitations, GI symptoms, HA, cough, loss of taste/smell**

6-month consequences of COVID-19 in patients discharged from hospital: a cohort study

Chaolin Huang, MD * • Lixue Huang, MD * • Yeming Wang, MD * • Xia Li, MD * • Lili Ren, PhD * • Xiaoying Gu, PhD *

THE LANCET

- N=1733 – 6 month f/u
- 1265 (76%) ≥ 1 symptom
 - most common fatigue/muscle weakness (N=1038 (63%))
- Pulmonary: Dyspnea - mMRC ≥ 1 (26%)
 PFTs - DLCO < 80% (56% in ICU population)
- Mental Health: Anxiety/depression - 23% (Measured via EQ5D)
- Physical function: Impaired 6MWT 23%

Greater proportion in the post-ICU group w/ dyspnea, decreased mobility, anxiety/depression

Concern for Neurologic / Mental Health Consequences: Data from JHH PACT Clinic



- Approximately 3 months after acute illness:
 - **>50%** with at least mild cognitive impairment
 - Almost all domains impaired
 - Impairments in **BOTH** ICU & non-ICU survivors
 - Impairments greater in ICU vs non-ICU survivors
 - Substantial **mental health impairments**

Domain	Instrument	ICU (N=33)		Non-ICU (N=16)	
		Mean (SD)	N (%) above threshold	Mean (SD)	N (%) above threshold
Anxiety	GAD-7	5.2 (4.3)	4 (12%)	6.5 (4.0)	3 (20%)
Depression	PHQ-9	6.4 (4.6)	6 (18%)	7.9 (5.6)	6 (38%)
PTSD	IES-6	1.3 (1.5)	9 (27%)	---	---

***English-speaking only**

Cardiac Disease Post-COVID: Varying Reports of Post-COVID Cardiac Inflammation

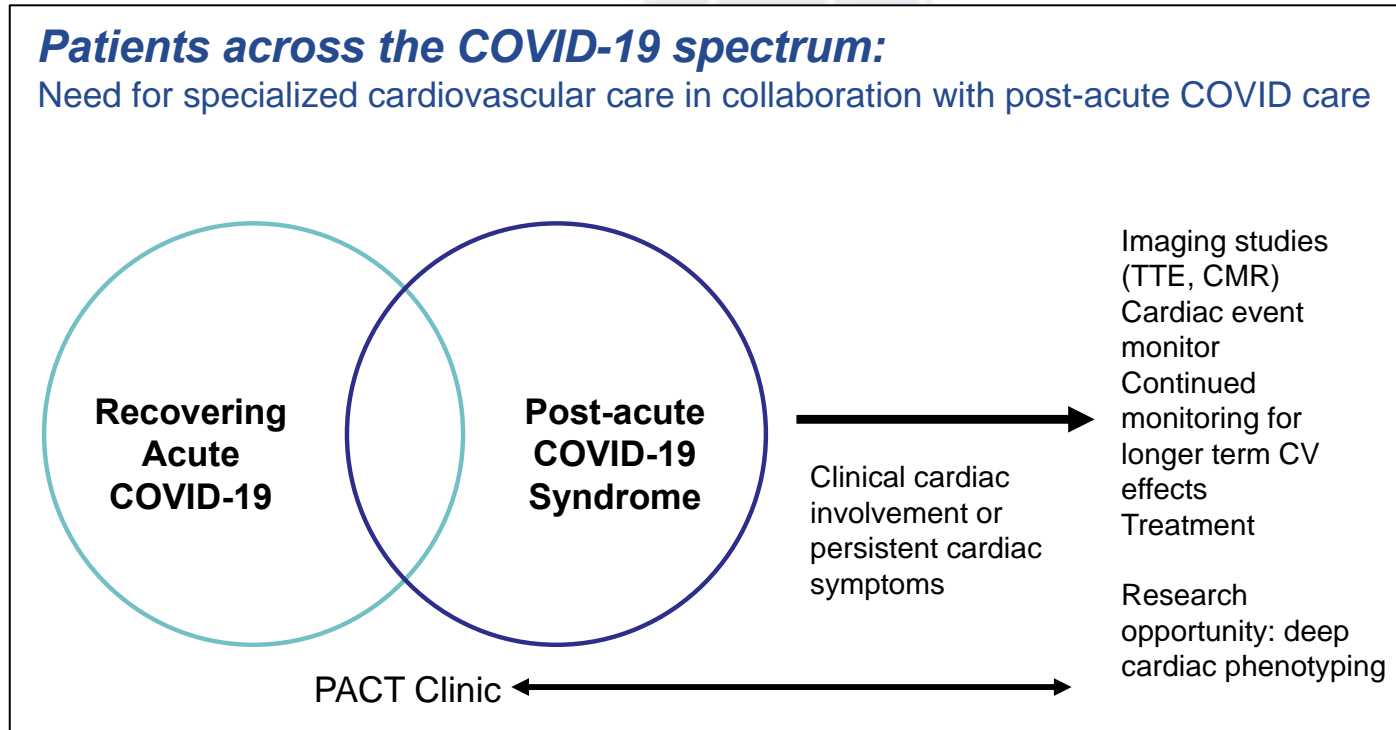
Concern for Cardiac Inflammation (Myocarditis) Post – COVID-19:

Puntman (JAMA Card 7/20): 60/100
(**60%**) with ongoing cardiac inflammation
seen via MRI

- Numbers much higher than seen in other practices

Rajpal (JAMA Card 9/20): Myocarditis in
young athletes recovering – M 4 / 26 (**15%**)

Starekova (JAMA Card 1/2021): Found
lower prevalence of myocarditis in athletes
recovering = N 2/145 (**1.4%**)



Characterising long-term covid-19: a rapid living systematic review

- “Living” Systematic Review: January 1 2020 – September 28 2020 →
 - Inclusion criteria: > 21d after symptom onset or post-hospital discharge
- 28 studies, 9442 people, 13 countries
 - Limited by variable symptom reporting and definition of “long-COVID”
- Most frequently reported symptoms:
 - Increased dependency in ADLs (48%)
 - Breathlessness – 13 studies (46%)
 - Smell/taste disturbance – 12 studies (43%)
 - Fatigue – 11 studies (39%)
 - Also reported: psychological symptoms anxiety > depression > PTSD symptoms)

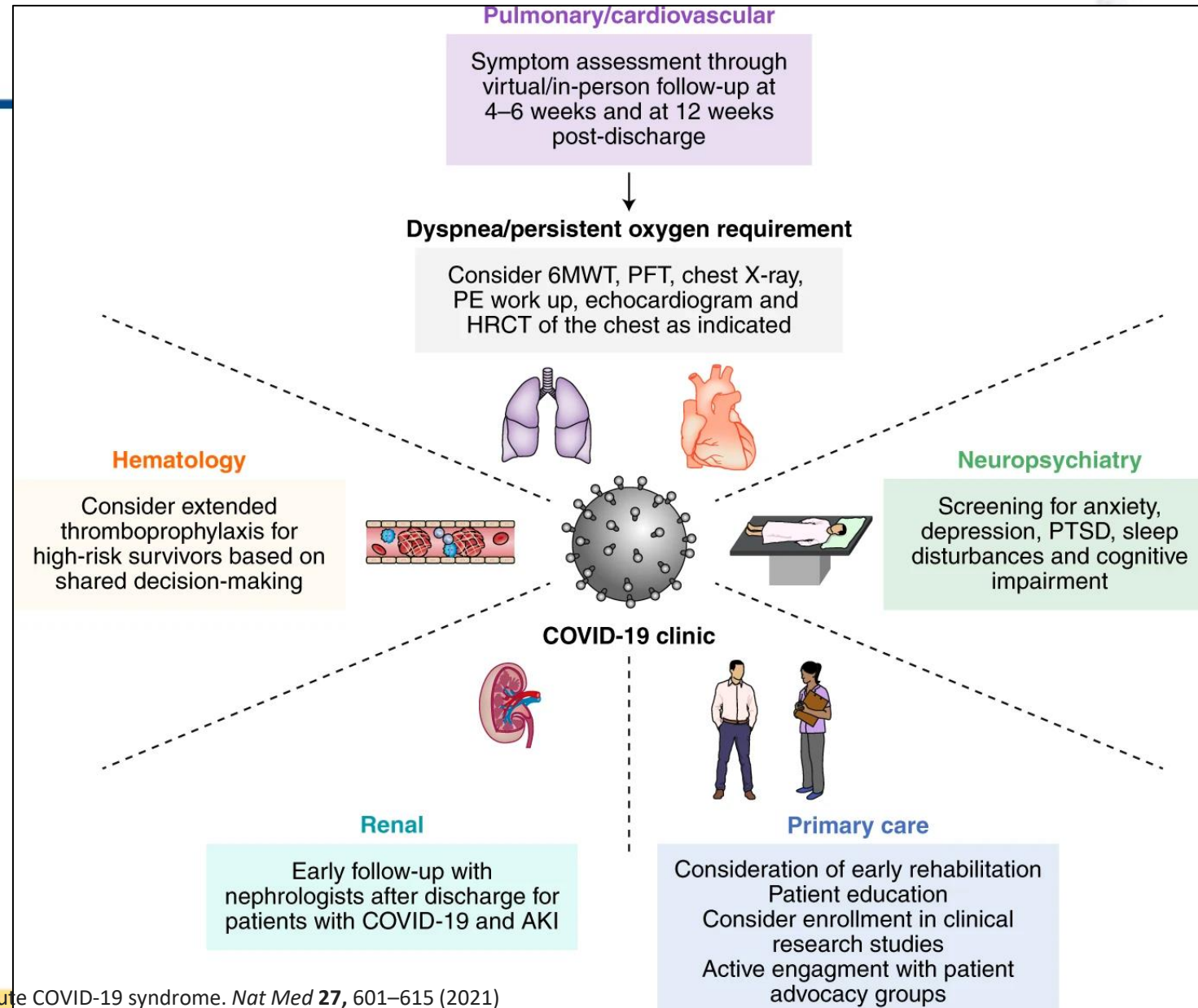
Robust research needed to describe Post-COVID Syndrome

Unknowns:

Areas in Need of Investigation

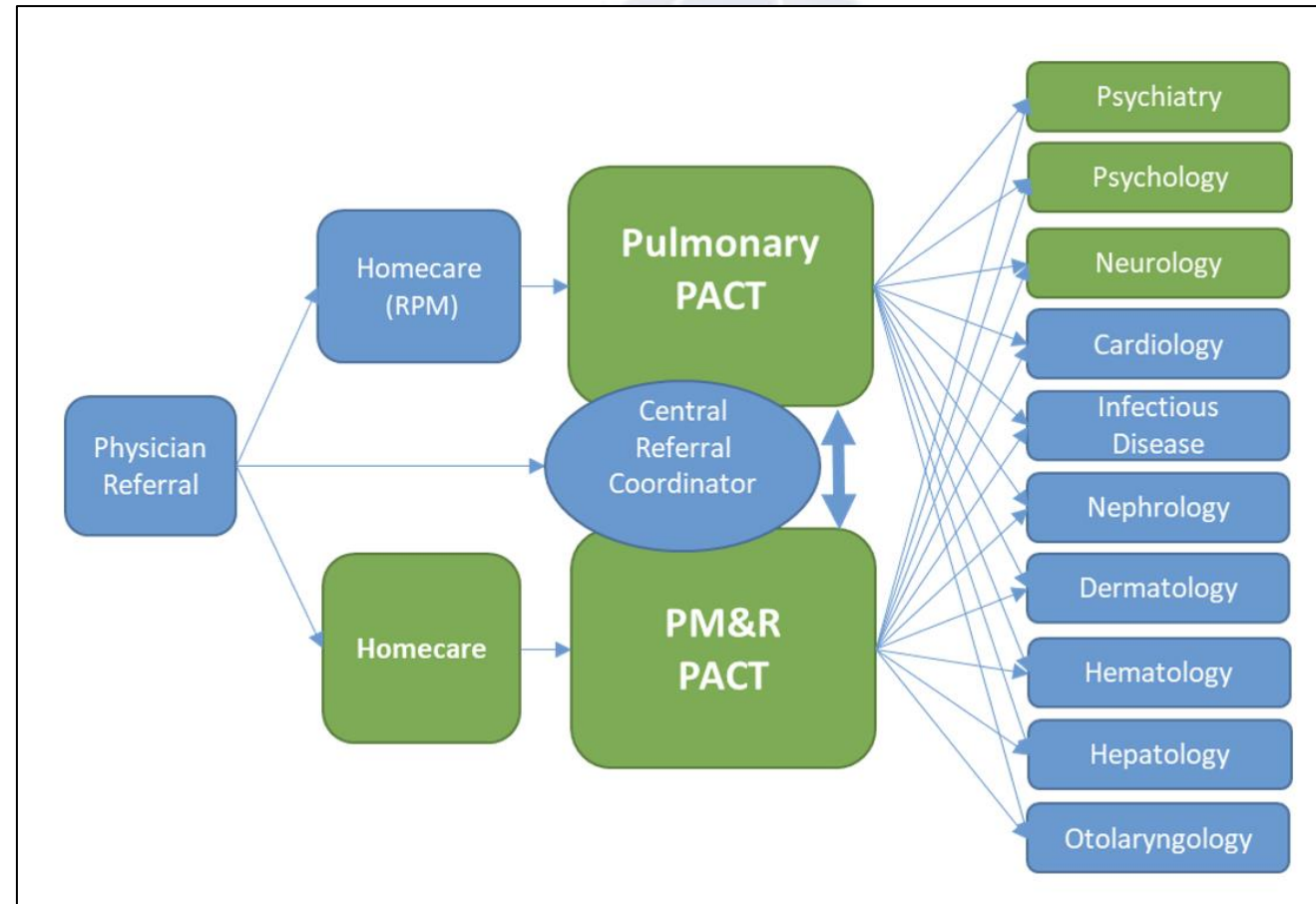
1. Risk Factors/ True Etiology of post-COVID-19 Syndrome
2. Interventions for post-COVID-19 Syndrome
3. True Prevalence of post-COVID-19 Syndrome
4. Natural History of post-COVID-19 Syndrome
5. The Impact of post-COVID-19 Syndrome in Low-Income / Disadvantaged Communities

Multidisciplinary Care Will Be Key



Multidisciplinary Post-COVID Clinics: Johns Hopkins PACT Clinic

- **Conception: March 2020**
 - First patient: **April 7, 2020**
- **Multi-Disciplinary Clinic**
 - Pulmonary and Critical Care Medicine
 - Physical Medicine and Rehabilitation
- **Weekly multi-D meetings**



JH PACT – Need for Standardized Assessments Post-COVID

Domain	Instrument
Health-related Quality of Life	EQ5D PROMIS Global 10
Mental Health Depression Anxiety PTSD	PHQ9 GAD7 IES-6
Cognition	Telephone cognitive battery MoCA-Blind
Pain	EQ5D pain question
Physical Function	AM-PAC Surgical Short Form
Respiratory Symptoms	BCSS, mMRC
Employment	Qualitative
Readmissions	Qualitative

COMS acute respiratory failure survivors: Needham et al. AJRCCM. 2017. 196(9); Turnbull et al. CCM. 2017. 45(6).
 Spruit et al. Interim Guidance on Rehabilitation. ERS/ATS Task Force. ERS. 2020. in press.
 Mikkelsen et al. SCCM Int'l Consensus LT Impairments Critical Illness. CCM. 2020; 48(11):1670-79
 Semler et al. NHLBI Working Group. 2020; 202:511-523

Johns Hopkins Post-Acute COVID-19 Team (JH PACT): Care Will Be a Group Effort

- **PCCM**

- Emily Brigham, MD, MHS
- Ashraf Fawzy, MD, MHS
- Ed Chen, MD
- Karthik Suresh, MD
- Panagis Galiatsatos, MD
- Nadia Hansel, MD, MPH
- Christian Merlo, MD, MPH
- Dale M. Needham, MD, PhD
- Sarath Raju, MD, MPH
- Sarah Collins
- Cate Weaver
- Norma Wright, RN
- Sally Snader, RN
- Carmen Salvaterra, MD
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- Laurie Fitz, PT
- Megan Hosey, PhD
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- Allison Hays, MD

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- Anne Yacoub, MD

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- Ally Gorgone

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- Lisa Richey

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- **Otolaryngology**

- Simon Best, MD

- **Hepatology**

- Tinsay Woreta, MD

- **Nephrology**

- John Sperati, MD
- Derek Fine, MD

- **Dermatology**

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- Jun Kang, MD

- **Infectious Disease**

- Sara Keller, MD MPH MSPH
- Chris Lippincott, MD MPH

- **Hematology**

- Rakhi Naik, MD MHS
- Evan Braunstein, MD PhD

Summary

- COVID-19 Survivors may face health issues beyond their acute illness
- More work is needed to understand the prevalence and cause of Long COVID/ Post-Acute COVID-19
- Survivors are at risk for pulmonary, neurologic, and mental health consequences
- Investment in multi-disciplinary care/resources is required to help COVID-19 survivors
- Research into effective treatments is required

VANDERBILT



School of Nursing

Long COVID: Crowd-Sourced Studies and Patient Perspectives

Julie Barroso, PhD, RN, ANP, FNAP, FAAN

Sadie Sommer, MPH, Research Assistant

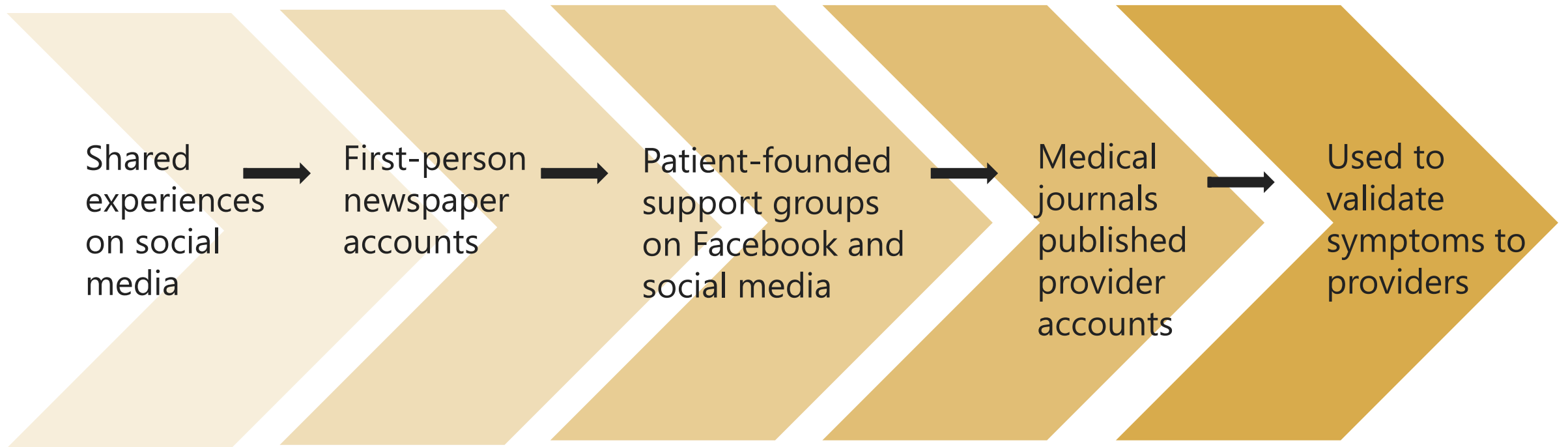
Patient-driven definition:

┌ A collection of symptoms that develop during or following a confirmed or suspected case of COVID-19 infection, and which continue for more than 28 days

Long COVID has a strong claim to be the first illness created through patients finding one another on Twitter and other social media.



Timeline to recognition



Publication timeline

- ▶ May 2020: an all-patient team published first survey of prolonged symptoms
- ▶ Followed by more patient-lead initiatives
- ▶ Most recent included >3,400 respondents
- ▶ Director of NIH called them “citizen scientists”

medRxiv

THE PREPRINT SERVER FOR HEALTH SCIENCES



Cold
Spring
Harbor
Laboratory

BMJ Yale

Many studies include people who have not had a positive diagnostic test for COVID-19

- ▶ Lack of testing services/supplies
- ▶ False negative tests
- ▶ Did not seek testing
 - Stigma, income, caretaker status, self-isolating
- ▶ Tested too early or late to indicate positive infection

If we don't truly know the number, we don't know how to provide support and care, nor do we know the true effect of the pandemic

- Acknowledge the limitations
- Similar data regardless of positive diagnostic test with exception of taste and/or smell
- Johns Hopkin's study w/ 25,000 recruitment goal will include symptomatic people without positive test



The advertisement features a light blue background. At the top, the title "Johns Hopkins COVID Long Study" is written in a large, bold, blue font. Below the title, a smaller line of text states "Participation includes a one-time, 10-15 minute survey." In the center, there is a prominent red button with the text "BEGIN SURVEY" in white, uppercase letters. At the bottom of the advertisement, there is a horizontal row of six portrait photographs of diverse individuals, all wearing white surgical face masks. The individuals include an older man with glasses, a young woman, a man with glasses, a Black woman, a woman with blonde hair and glasses, and a young woman.

Crowd-sourced Long COVID studies

- ▶ Body Politic COVID-19 support group survey
- ▶ Symptoms for more than 2 weeks
- ▶ Patient-centric, participatory research methods
- ▶ Respondents (n=640) to survey April-May 2020
- ▶ Survey questions and symptoms were aggregated and curated by patients
- ▶ Analyzed by patients with appropriate expertise

Top 10 symptoms

mild shortness of breath

mild tightness of chest

moderate fatigue

mild fatigue

chills or sweats

mild body aches

dry cough

elevated temperature (98.8-100 F)

mild headache

brain fog/concentration challenges



Respondents reported:



Volatile recovery



Relapse lasting 6 weeks or more



Major decline in physical activity for most



Returning symptoms for many who did re-engage in physical activity

Study highlighted the critical need for early and accurate testing

47% of respondents were denied testing or not tested

- ▶ Positive respondents reported loss of smell and taste more often
- ▶ Stigma and a lack of understanding by healthcare professionals compromised access to healthcare and quality of support

Other crowd-sourced Long COVID studies

- ▶ 1567 respondents
- ▶ Many from Facebook groups, Survivor Corps
- ▶ Reported similar findings, 98 symptoms
- ▶ Painful symptoms reported by 26% of respondents



SCHOOL OF MEDICINE
DEPARTMENT OF MEDICINE



Expanded Body Politic Survey

- ▶ Illness lasting over 28 days
- ▶ Onset prior to June 2020
- ▶ Distributed online
- ▶ Objective: to characterize 1) symptom profile and time course
2) impact on daily life, work and return to baseline health
- ▶ 3,762 respondents from 57 countries
- ▶ Respondents reported 205 symptoms in 10 organ systems, with 66 symptoms traced over 7 months.

Most people suffering from Long COVID had more than one symptom, often had multiple symptoms, and **no body system was spared.**

These symptoms led to **profound functional limitations** with people being unable to return to work full-time or at all.

The **most common** symptoms were consistent across studies.

Most common symptoms:



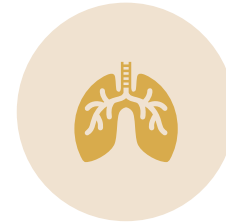
FATIGUE



MUSCLE AND
BODY ACHES



COGNITIVE
DYSFUNCTION



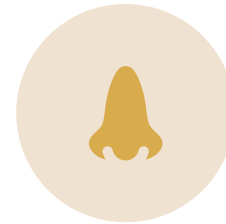
SHORTNESS OF
BREATH



HEADACHES
AND DIZZINESS



COUGH

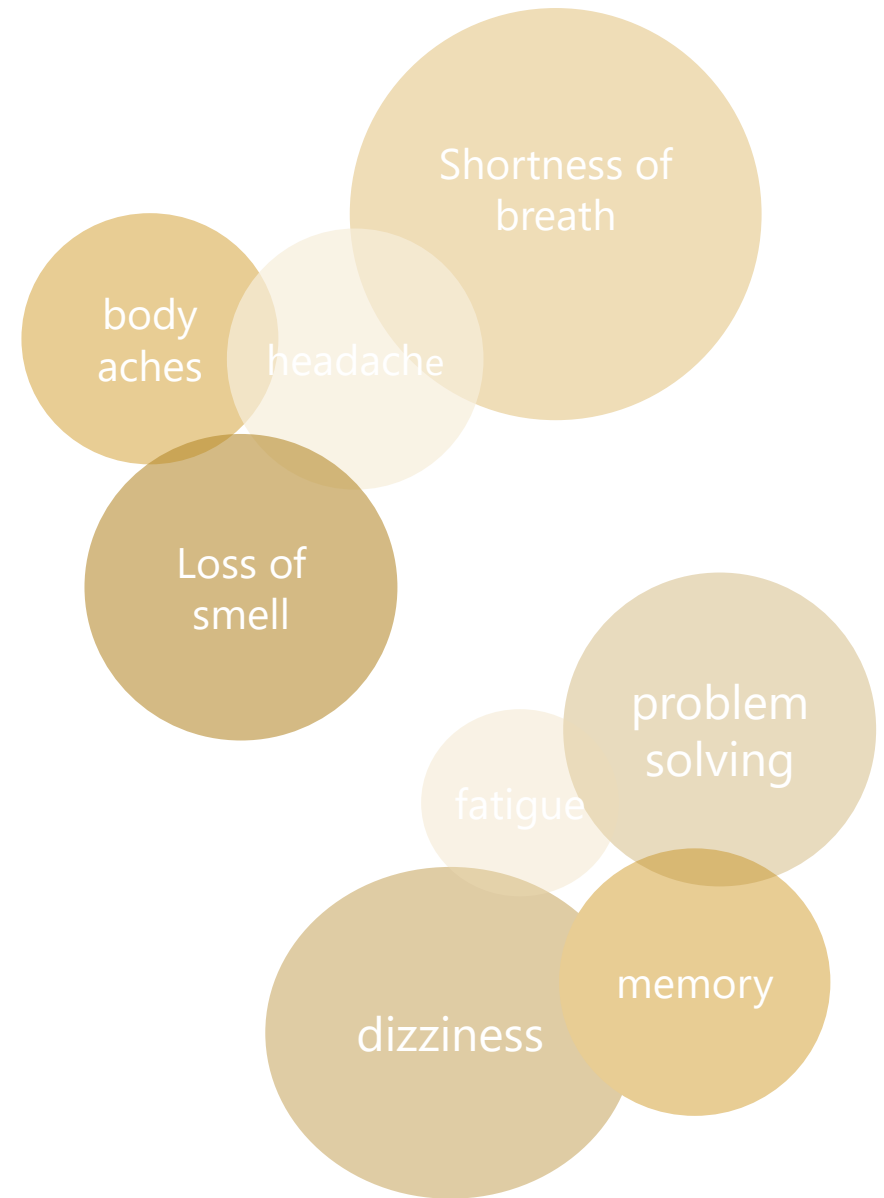


LOSS OF TASTE
OR SMELL

It is urgent that we start to answer some of the many questions surrounding Long COVID.

- ▶ We have consistent research on the symptoms that are suffered by Long COVID patients
- ▶ Next step should be to determine which symptoms cluster together – my proposed work

The occurrence of symptom clusters appears to worsen patient outcomes.



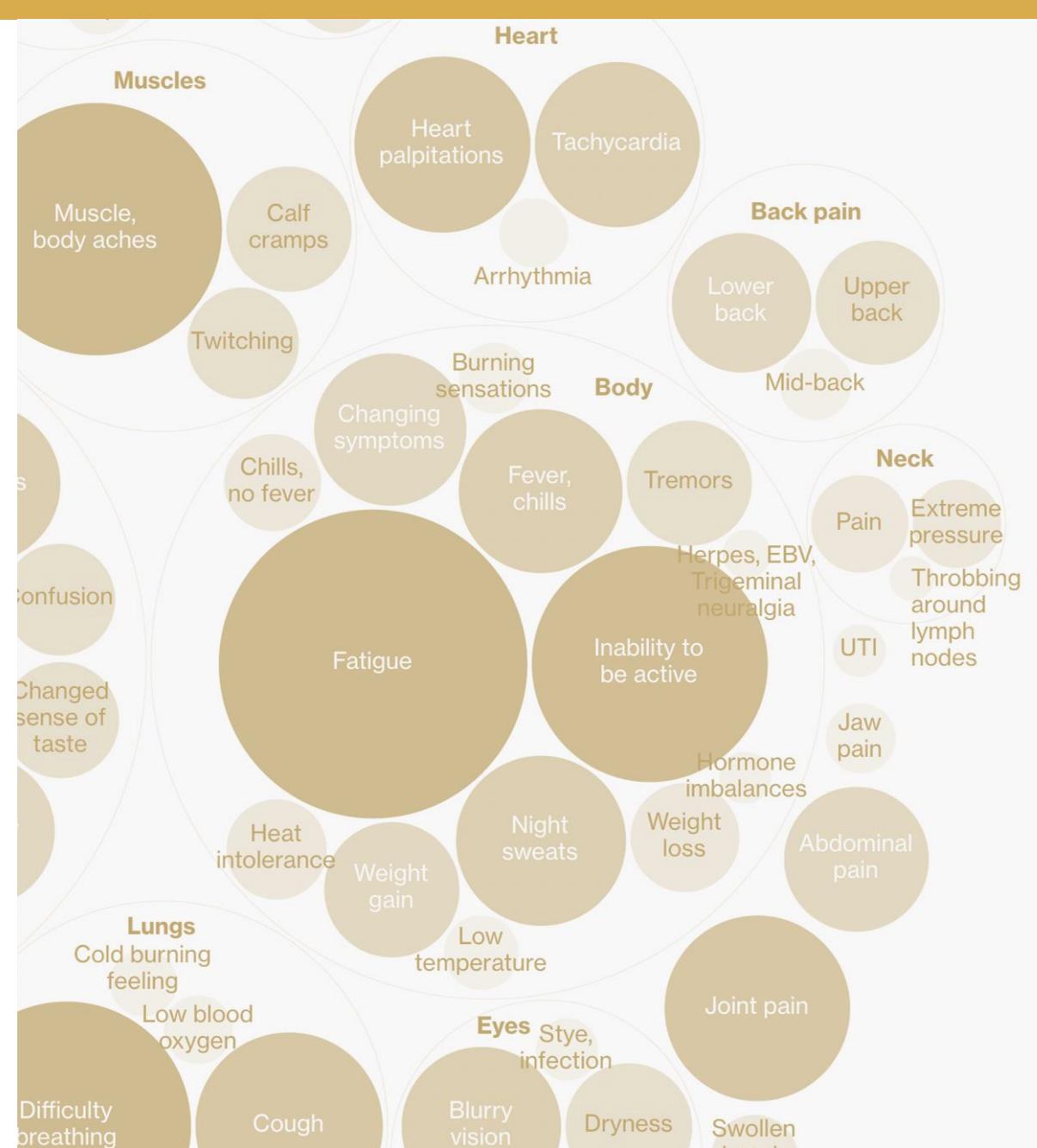
Identifying and examining clusters may allow us to identify risk for a higher symptom burden.

- ▶ Understanding a “driving” symptom that triggers other symptoms is needed
- ▶ Identifying the mechanisms that underlie symptom clusters
 - co-occurrence and severity
- ▶ One-time survey (n=500)
- ▶ Administer to participants recruited from online support groups
- ▶ Examine symptom clusters’ impact on functioning via interview (n=100 of the original 500)

Our long-term goal is to further our scientific knowledge about the symptoms of Long COVID in order to develop interventions to ameliorate their impact.

- ▶ Aim #1: examine the symptom clusters found in sample
- ▶ Aim #2: build on the results of the cluster analysis to determine the impact of clusters on functional activities through in-depth interviews with randomly selected participants from each cluster.

<https://www.bloomberg.com/graphics/2020-opinion-covid-long-haulers-chronic-illness/>



Nursing care:

- ▶ For all patients with COVID; there are no specific nursing interventions for those with Long COVID
- ▶ Unusual symptoms:
 - _ GI disorders – N/V, diarrhea
 - _ Loss of smell, taste
 - _ CVA, blood clots
 - _ COVID toes – purple toes
 - _ Children have different symptoms
- ▶ Not everyone will need to be hospitalized
- ▶ Rapid deterioration days 8-10

Monitoring and diagnostics:

- ▶ Chest xray/CT scan
- ▶ CBC w diff, metabolic profile (hepatic, renal function)
- ▶ Inflammatory markers (d-dimer, lactate, ferritin, C reactive protein)
- ▶ ECG
- ▶ Scoring tools help us determine level of care

Nursing assessment:

- ▶ Comorbidities
- ▶ Vital signs
- ▶ Pulse oximetry
- ▶ Lung sounds
- ▶ Mental status
- ▶ Capillary refill
- ▶ Urinary output

Nursing interventions:

- ▶ Goals of care – assessed on admission, reevaluated
- ▶ Prognosis
- ▶ Improving or declining
- ▶ What are the patient's wishes?
 - _ Advanced directives
 - _ Discussion with family or healthcare representative

- ▶ Delirium prevention and treatment – assess each shift; cognitive activities; sleep/wake cycle; hearing aids/eyeglasses; mobility; hydration; pain management
- ▶ Early progressive mobility – helps with delirium and deconditioning
- ▶ Oxygenation – close monitoring for deterioration; prone positioning - proning ventilated patients improves outcomes; for non-ventilated patients, improves secretion clearance, recruits posterior lung regions, improves ventilation/perfusion matching
- ▶ Nutrition – early initiation of parenteral feeding (small bore feeding tube in the small intestine)

- ▶ Social isolation – increases risk of delirium; video conferencing, engaging the individual – be reassuring, smile behind the mask
- ▶ IV pumps outside of the room – decreases the exposure of the nurse inside the room; saves PPE; can respond more quickly to patient needs
- ▶ Standards of care – you have to decide what can be changed...bed changes and baths every 24 hours?

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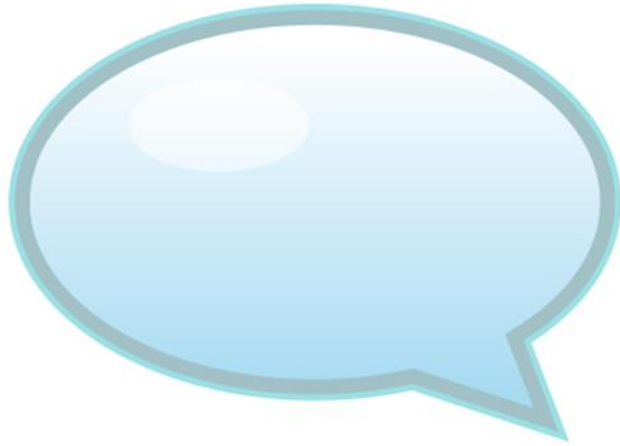
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Bishop O.C. Allen III

Q & A Discussion



**Additional questions?
Email Kara: kara@anacnet.org**



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