NORTHEAST
BUSINESS GROUP ON HEALTH

COVID-19 Update

SPECIAL EDITION: LONG COVID

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Medical Director NEBGH

Monday May 9th, 2022

Speaker

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Mount Sinai Health System, NY

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Post-Acute Sequelae of SARS CoV-2 (Long Covid)

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May 9, 2022

Mount Sinai

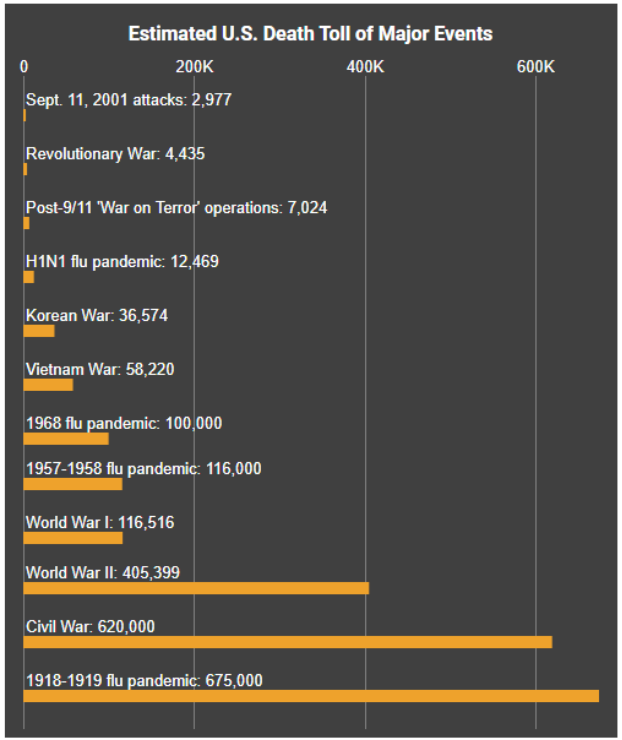
Disclosures

I have NO financial disclosure of conflicts of interest with the material in this presentation.

Objectives

- Introduction to the origins of Long-COVID
- Define Long-COVID
- Brief update on current literature and clinical significance
- Overview of Mount Sinai Post-COVID clinic
- Patient and physician attitudes towards Long-COVID

COVID-19: Impacting statistics



*2,154,614

- **COVID-19 – Globally**
- ~500 Million total cases
- ~6.2 Million total deaths

- **COVID-19 – United States**
- ~81 million total cases
- ~1 million deaths

- **COVID-19 – New York City**
- ~2.4 Million total cases
- ~40,000 total deaths

- **Total hospital beds: NYC**
- 15,366

https://covid.cdc.gov/covid-data-tracker/#datatracker-home

A New Paradigm in COVID Care

- Emergence of patients that were:
- Too sick to go home
- Not sick enough for the hospital

What is ……????

- Long-Covid
- Long Haulers
- Post-acute sequelae SARS-CoV-2 Infection (PASC)
- Post-COVID-19 syndrome
- Long-Covid 19

What is ……????

Post-COVID conditions are a wide range of new, returning, or ongoing health problems patients can experience ***four or more weeks*** after first being infected with the virus that causes COVID-19.

https://www.cdc.gov/coronavirus/2019-ncov/long-term-effects/index.html

What is ……????

Prevalence and Persistence of symptoms vary substantially	Group of individual conditions lumped together
• Heterogenous study design • Difference in syndrome definition	• Prolonged post-viral syndrome • Long-term tissue / organ damage • Ongoing inflammation

PACS Impact – Populations

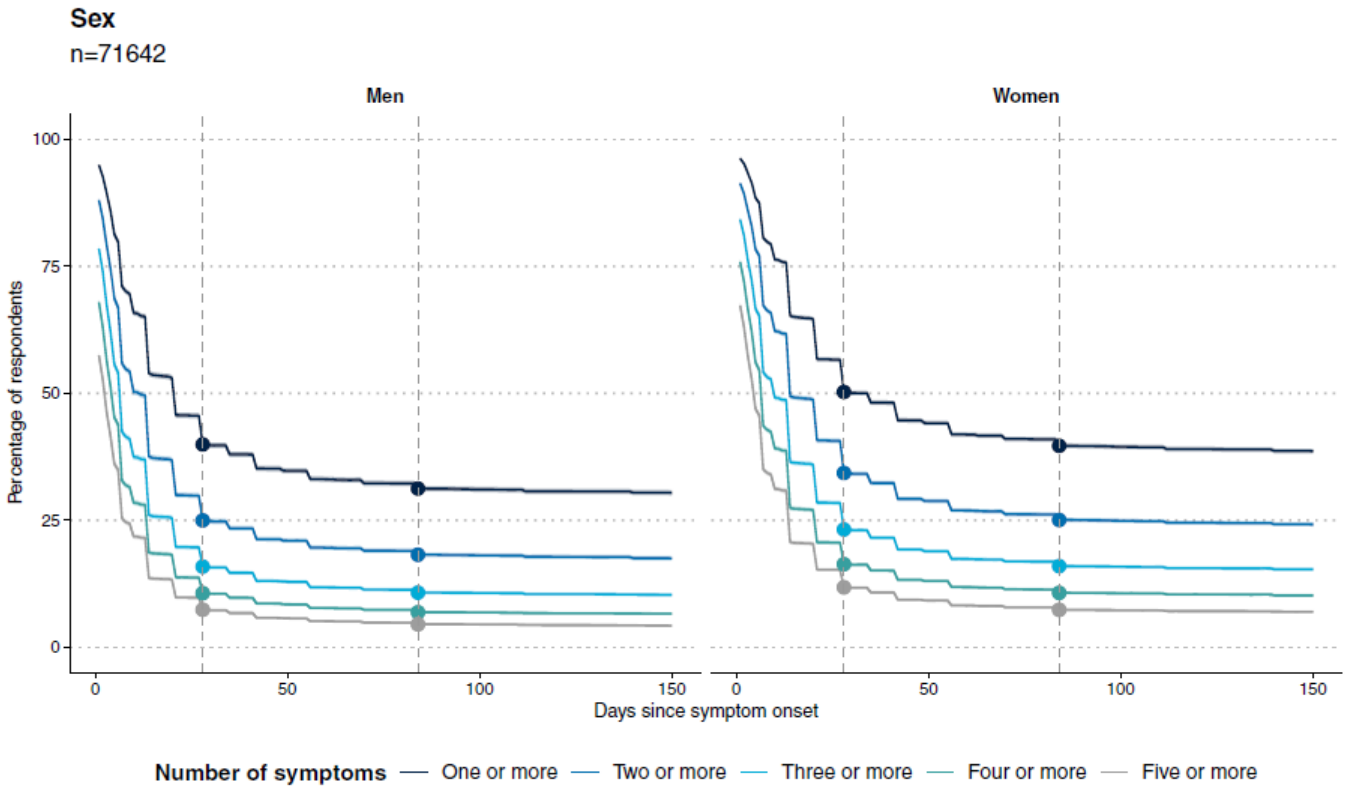
~1.7 Million people living in private households in the UK (2.7% of population) experiencing self-reported “long-COVID” symptoms (persistent > 4 weeks after suspected coronavirus infection otherwise unexplained)

More than 1.1 million respondents report symptoms that ***adversely affected day-to-day activities***, with severe limitations reported by 322,000 (67% and 19% of total people reporting symptoms)

Greatest in ages 35-69, females, people living in more deprived areas, health/social care workers, those with pre-existing health conditions/disability (notable increases in 17 to 24 year olds)

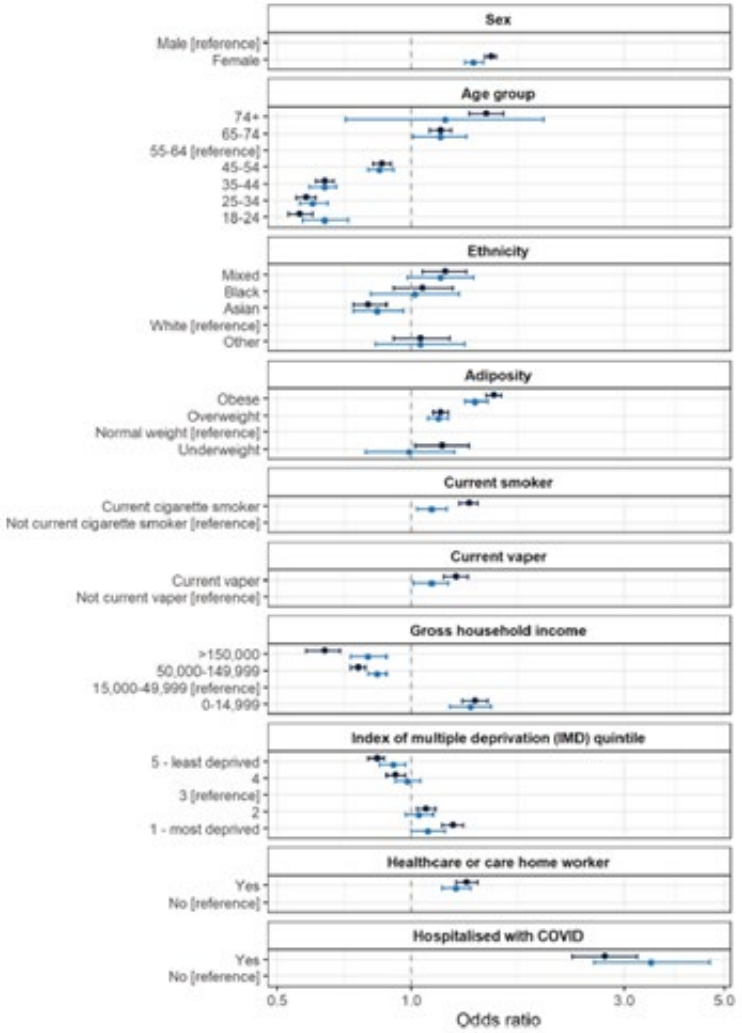
https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/7april2022

PACS Impact – Populations



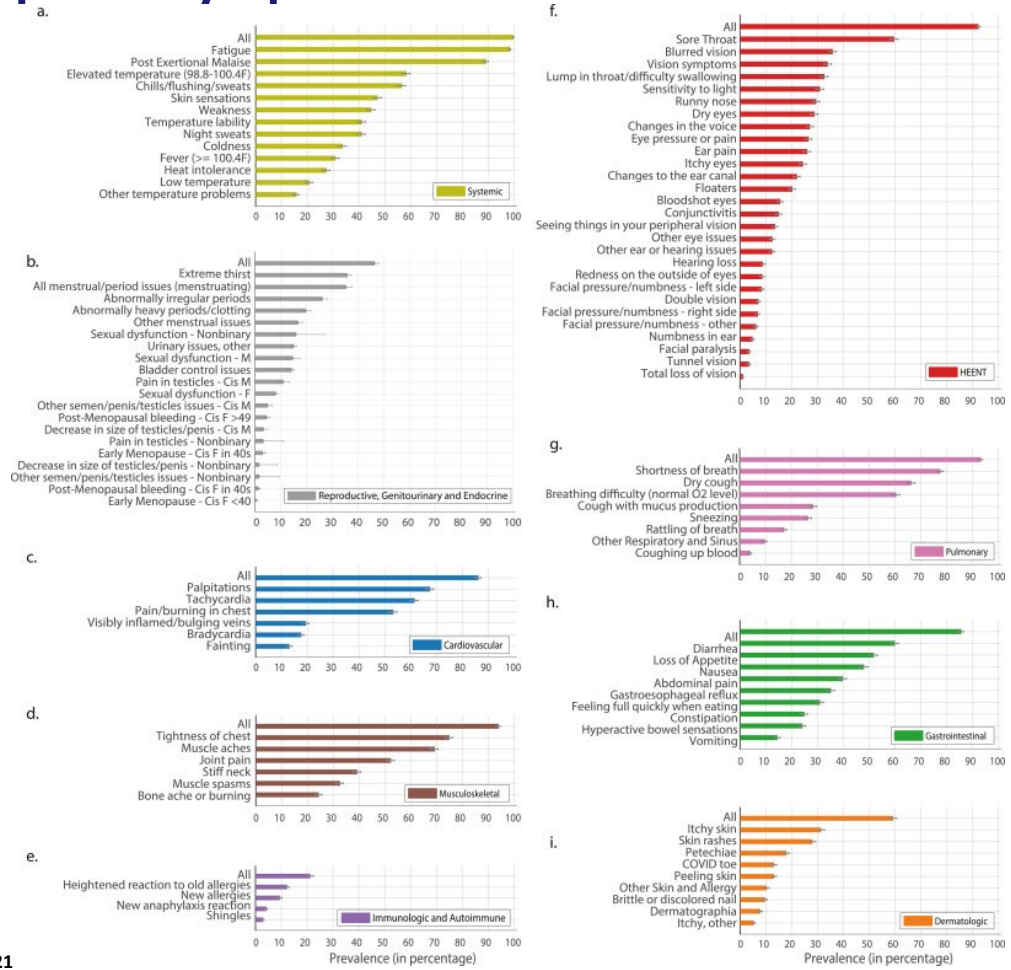
https://doi.org/10.1038/s41467-022-29521-z
Whitaker et al. UK

PACS Impact – Populations



https://doi.org/10.1038/s41467-022-29521-z
Whitaker et al. UK

PACS Impact – Symptom Persistence



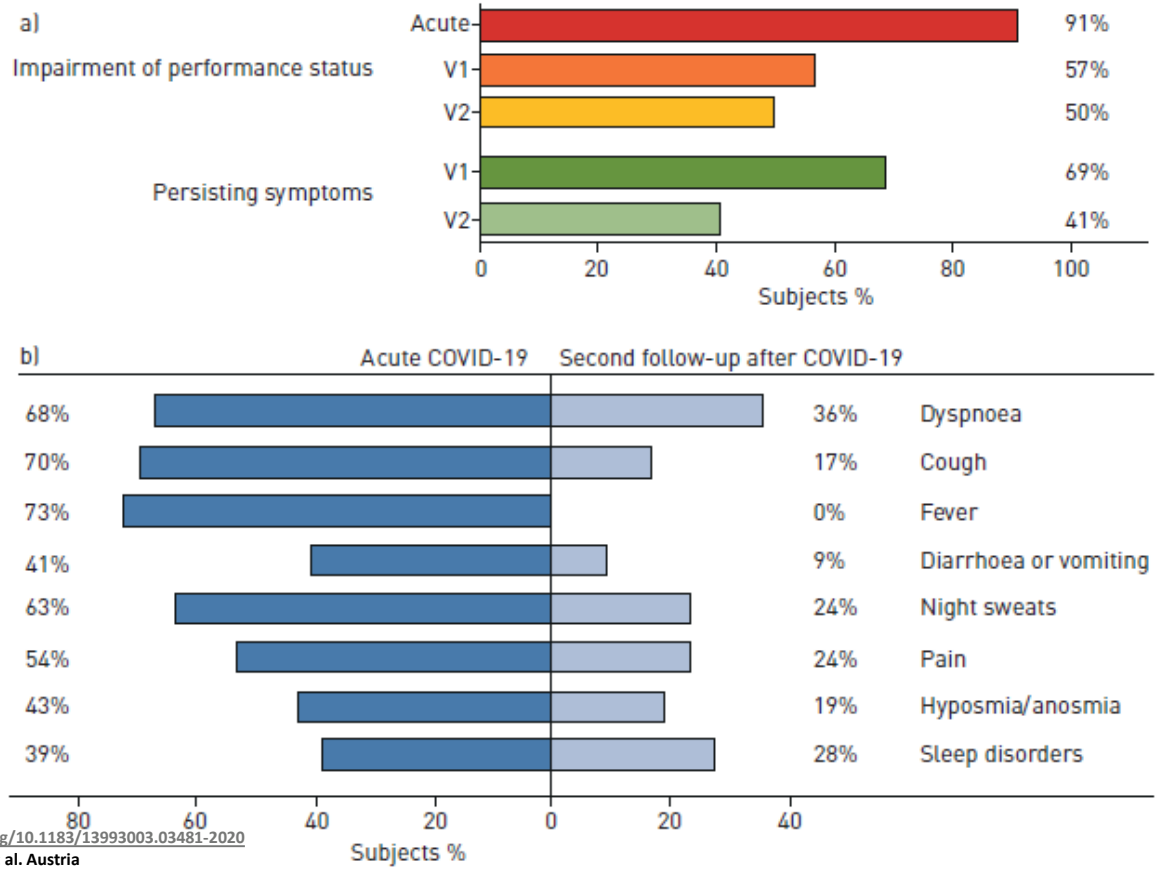
Davis, Lancet Aug 1, 2021

PASC – Cardiopulmonary Disease

- Evaluation of patients at 60 days and 100 days after onset of COVID-19 infection
- Inclusive of patient hospitalized, or those with outpatient care but with persistent symptoms
- Patients evaluated via:
  - Clinical examination
  - Medical record review
  - COVID-19 symptom questionnaire
  - Spirometry
  - CT scan
  - Labs

https://doi.org/10.1183/13993003.03481-2020

PASC – Cardiopulmonary Disease



https://doi.org/10.1183/13993003.03481-2020
Soonweber et al. Austria

PASC – Cardiopulmonary Disease

TABLE 2 Pulmonary function of coronavirus disease 2019 (COVID-19) patients at follow-up

	First follow-up[#]	Second follow-up[¶]	p-value time change
Subjects	126	133	
Lung function impaired[+]	53 (42)	48 (36)	0.388
FVC L	3.6±1.0	3.7±0.9	**<0.001**
FVC <80% predicted	34 (27)	29 (22)	**0.049**
FEV_1 L	2.9±0.8	3.0±0.8	**0.001**
FEV_1 <80% predicted	28 (22)	30 (22)	1.000
FEV_1/FVC %	84±11	80±11	**<0.001**
FEV_1/FVC <70%	5 (4)	11 (8)	0.063
TLC L	6.2±1.3	6.2±1.3	0.881
TLC <80% predicted	14 (11)	15 (11)	0.791
D_{LCO} mmol·min^{-1}·kPa^{-1}	7.7±2.4	7.9±2.3	**<0.001**
D_{LCO} <80% predicted	39 (31)	28 (21)	**0.022**
P_{O_2} mmHg	79±10	78±9	0.864
P_{O_2} <75 mmHg	40 (32)	45 (37)	0.871

https://doi.org/10.1183/13993003.03481-2020
Soonweber et al. Austria

PASC – Cardiopulmonary Disease

Table 2

Pulmonary function tests results at three-month follow-up.

N = 122	
FEV1/FVC ratio (%, median, IQR)	96 (83–106)
FVC (% predicted values, median, IQR)	88 (78–98)
N patients with impaired FVC (Z-score ≤ -2) (N, %)	24 (19)
FEV1 (% predicted values, median, IQR)	91 (81–102)
N patients with impaired FEV1 (Z-score ≤ -2) (N, %)	19 (15)
N patients with impaired FEF25-75 (Z score ≤ -2) (N, %)	5 (3.73)
DLCO (% predicted values, median, IQR)	74 (61–89)
N patients with impaired DLCO (Z-score ≤ -2) (N, %)	58 (46)

FEV1: forced expired volume in 1 s; FVC: forced vital capacity; DLCO: lung diffusion capacity; FEF25-75: forced expiratory flow at 25–75% of forced vital capacity.

https://doi.org/10.1016/j.rmed.2021.106383

Froidure et al. Belgium

PASC – Cardiopulmonary Disease

- Pre-print study Mount Sinai Respiratory Institute
  - 24 patients with Acute PE many weeks post acute COVID-19
  - 75% of these patients did not require hospitalization
  - Recommendation that consideration be made for PE evaluation if symptoms of persistent shortness of breath or chest pain present in setting of:
    - D-dimer elevation
    - Factor VIII elevation
    - Other clinical risk of VTE
  - Unknown if prophylaxis can reduce development of VTE

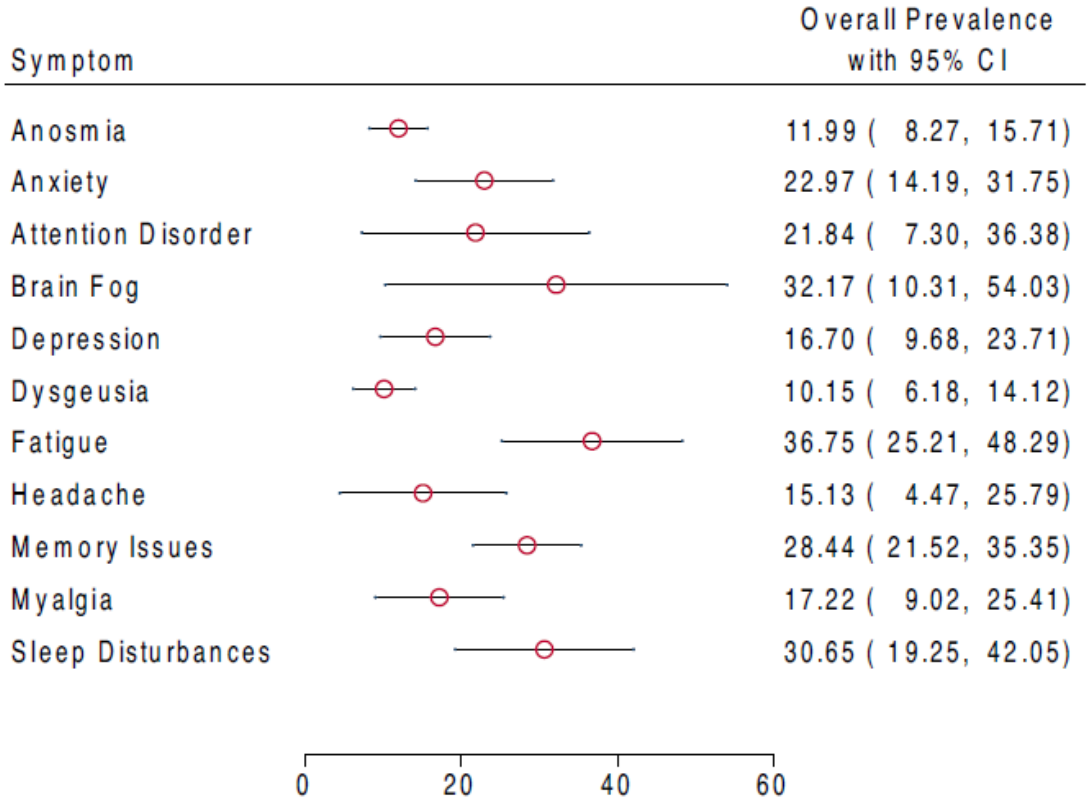
Steiger et al

PASC – Neurologic and Neurocognitive Dysfunction

	All Patients (N=10,530)	Non-hospitalised (N= 4,747)	Hospitalised (N=5,783)
Demographic Characteristics			
Male[a]	4115/10140 (41)	924/4245 (22)	2975/5464 (54)
Age[b], mean, (SD)	52 (10)	46 (4)	57 (7)
Acute COVID-19 Information			
Hospital admission	6107/10530 (58)	324/4747 (7)	5783/5783 (100)
Duration of hospital admission[c], days (SD)	12 (4)	-	12 (4)
ICU admission	522/4045 (13)	-	522/4045 (13)
Duration of ICU admission[d], days (SD)	13 (4)	-	13 (4)
Comorbidities			
CAD	117/4682 (3)	30/3762 (1)	87/920 (9)
CKD	232/4088 (6)	-	232/4088 (6)
COPD	187/8032 (2)	15/3762 (0)	172/4270 (4)
Diabetes	998/8217 (12)	68/3762 (2)	930/4455 (21)
Hypertension	1885/8217 (23)	342/3762 (9)	1543/4455 (35)
Acute COVID-19 Symptoms			
Anosmia	416/818 (51)	202/353 (57)	214/465 (46)
Confusion	7/120 (6)	-	7/120 (6)
Dysgeusia	346/776 (45)	183/353 (52)	163/423 (39)
Headache	198/413 (48)	183/353 (52)	15/60 (25)
Myalgia	100/538 (19)	-	100/538 (19)
Neurological symptoms of post-COVID-19 syndrome			
Anosmia	357/3164 (11)	93/505 (18)	264/2659 (10)
Attention Disorder	271/1207 (22)	73/130 (56)	198/1077 (18)
Brain Fog[e]	1557/4329 (36)	1515/3914 (39)	42/415 (10)
Confusion[e]	95/949 (10)	74/152 (49)	21/797 (3)
Dysgeusia	246/2703 (9)	86/505 (17)	160/2198 (7)
Fatigue	3197/7173 (45)	2430/4747 (51)	767/2426 (32)
Headache	1502/7437 (20)	1398/4267 (33)	104/3170 (3)
Memory Issues[e]	1584/5033 (29)	1311/3892 (34)	273/1141 (24)
Movement Disorder	28/857 (3)	-	28/857 (3)
Myalgia	1373/7555 (18)	1159/4267 (27)	214/3288 (7)
Pain	582/2086 (28)	107/350 (31)	475/1736 (27)
Paraesthesia	78/1218 (6)	-	78/1218 (6)
Neuropsychiatric symptoms of post-COVID-19 syndrome			
Anxiety	598/3104 (20)	198/632 (31)	400/2472 (16)
Depression	480/3104 (15)	173/632 (27)	307/2472 (12)
PTSD	135/964 (14)	35/130	100/834 (12)
Sleep disturbance	2411/7993 (30)	1411/3892 (36)	1000/4101 (24)

https://doi.org/10.1016/j.jns.2022.120162
Premraj, et al. Australia

PASC – Neurologic and Neurocognitive Dysfunction



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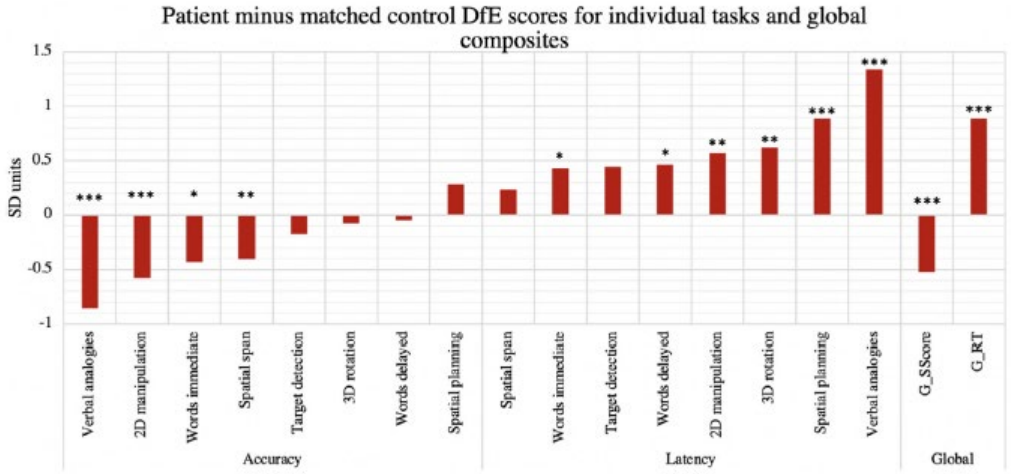
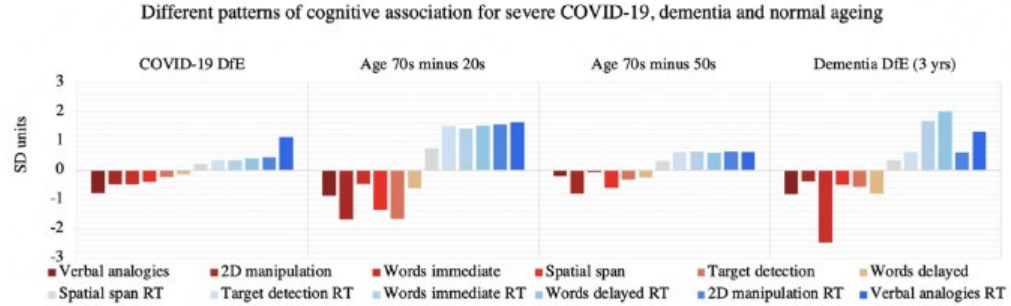
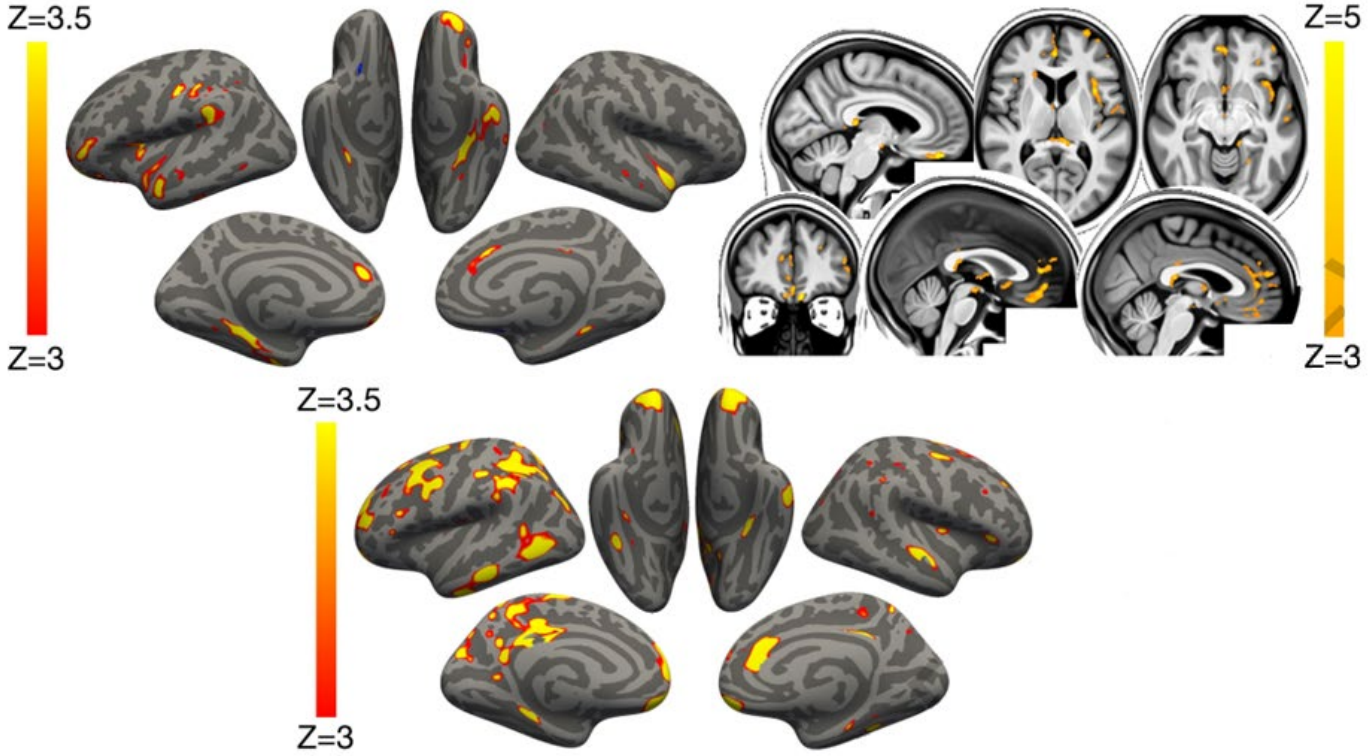
Premraj, et al. Australia

PASC – Neurologic and Neurocognitive Dysfunction





https://doi.org/10.1016/j.eclinm.2022.101417
Hampshire, et al. UK



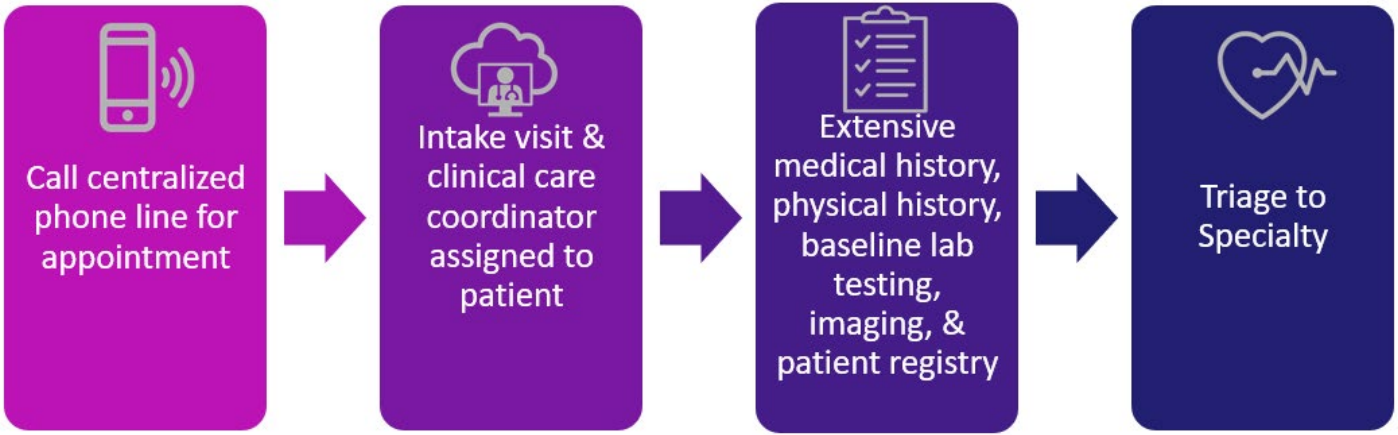
https://doi.org/10.1038/s41586-022-04569-5
Douaud, et al. UK.

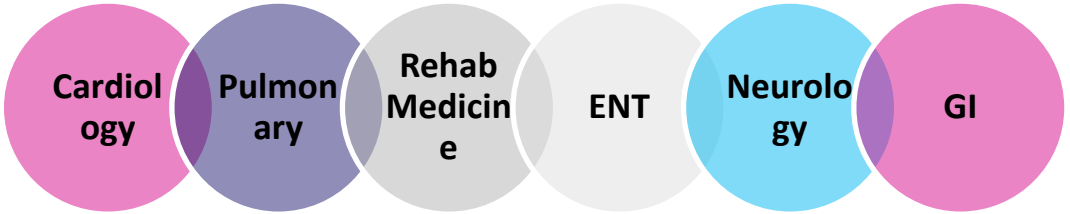
SARS-CoV-2 is associated with changes in brain structure in UK Biobank

Area of Interest	Function
Parahippocampal gyrus	Memory encoding and retrieval
Anterior cingulate cortex	Complex cognitive function: empathy, emotions, impulse control, decision making
Temporal pole	High order cognitive function
Orbitofrontal cortex	Sensory integration, decision making, expectations
Insula	Detection of novel stimuli/emotions
Supramarginal gyrus	Interpretation of tactile sensory data
Amygdala	Encoding memories and regulating emotions
Fronto-parietal lobe	Executive function, cognitive function, goal-orientation
Temporal lobe	Memory encoding and auditory information processing

https://doi.org/10.1038/s41586-022-04569-5
Douaud, et al. UK.

Center for Post COVID Care – Mount Sinai





Registry and Biobank – Data Collection

EMR Data

- Pre-COVID health status and labs
- Acute COVID episode
- Post COVID complications

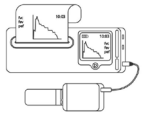
Biorepositories

- COVID-19 Biobank
- Other acute COVID-19 cohorts

In-person Interviews

- Socio Demographics
- Pre- COVID Health
- Acute COVID episode
- Comorbidities
- Complications
- Chronic symptoms
- Mental health
- Cognitive status
- Quality of life

Biometrics: BMI, O2 sat

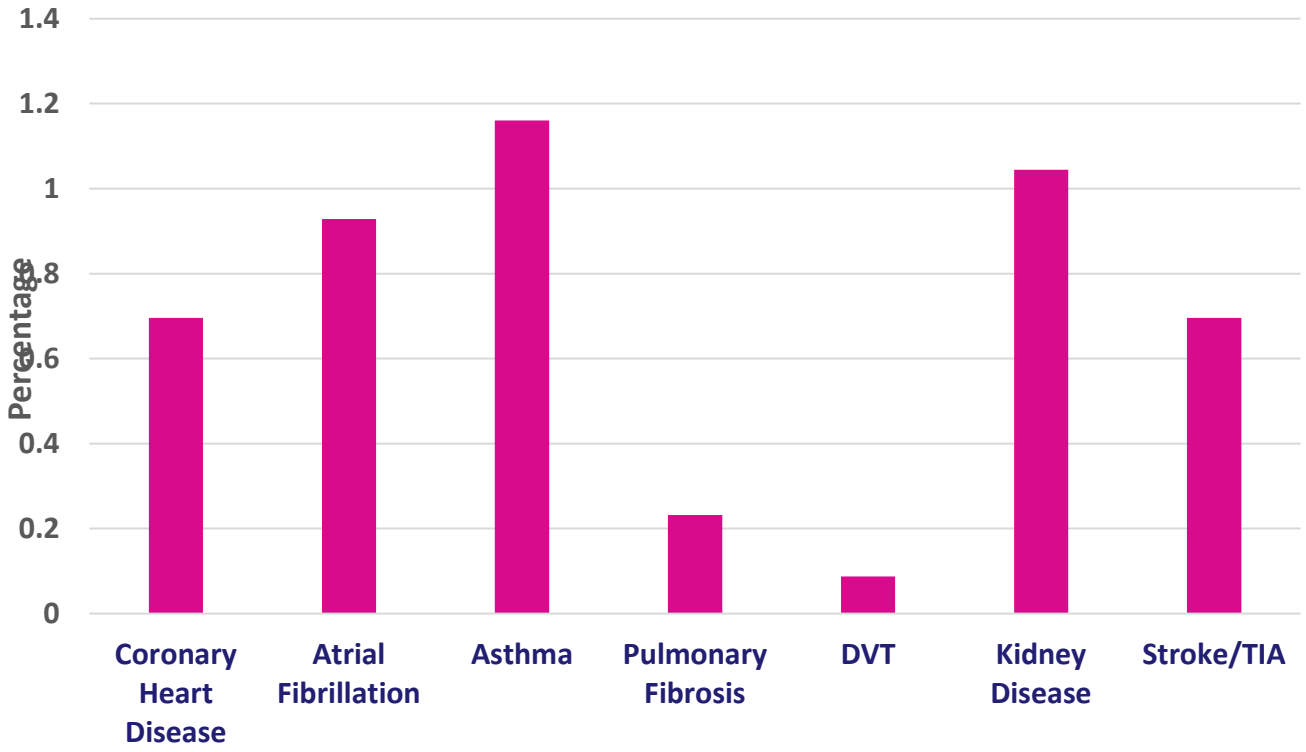


Spirometry

CBC, Chemistry and COVID-19 Antibodies

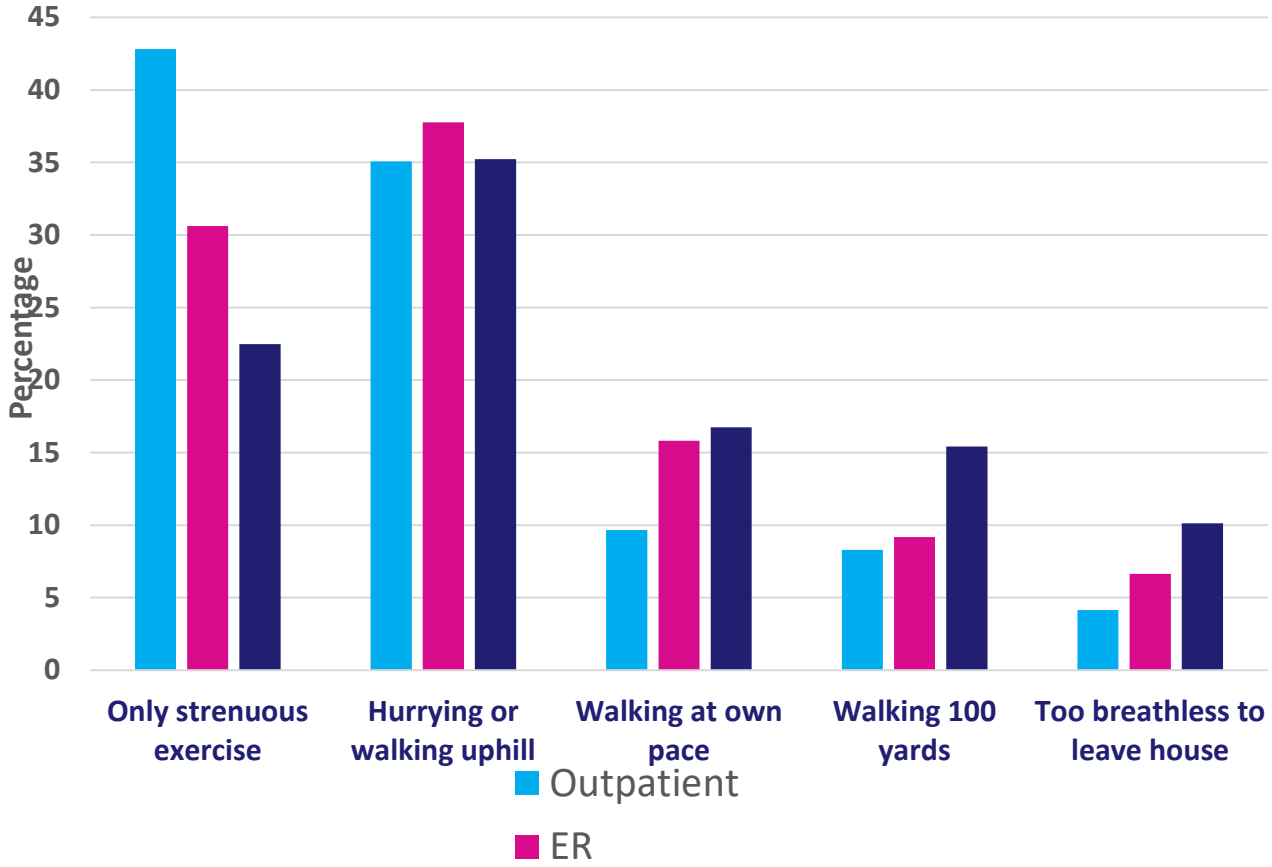
Banking blood/urine

New Comorbidity Diagnoses Post-COVID-19

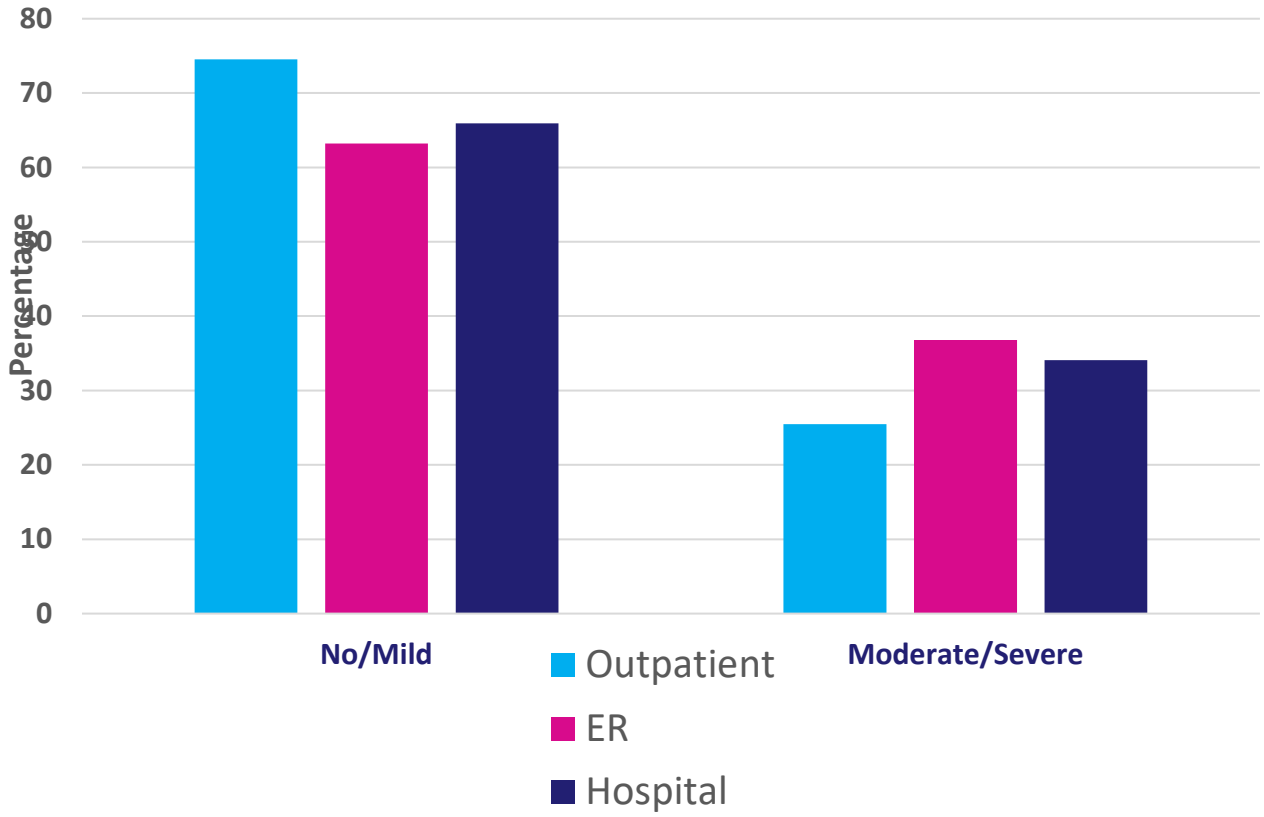


Self-reported General Health Pre- vs. Post-COVID-19

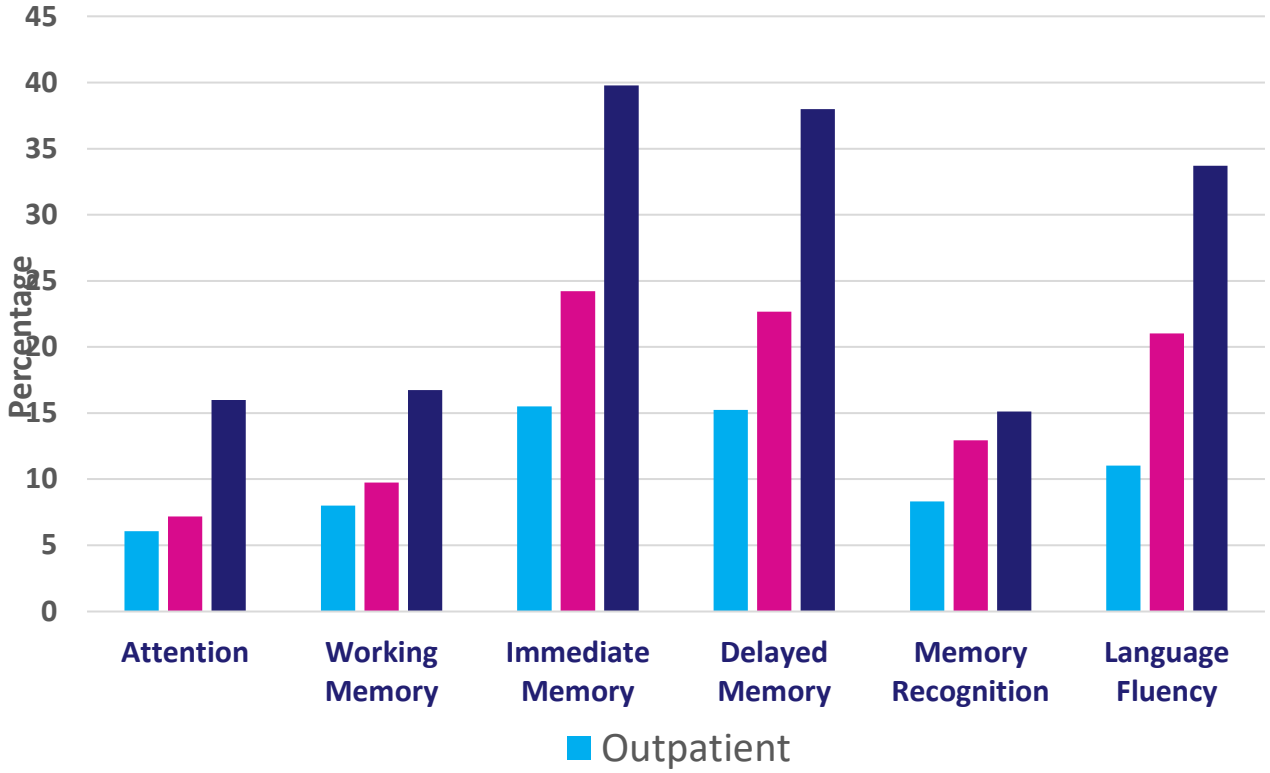
Prevalence of Shortness of Breath among Registry Participants



Self-reported Symptoms of Depression among Registry Participants



Prevalence of Cognitive Dysfunction Post-COVID-19

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Empathize • Organize • Mobilize
About
COVID Positive?
Long COVID
Resources
News / Media
Support SCorps
En Español
Survivor Corps is one of the larg
providing education and resour
connecting them with medical an
and helping with the
COVID Positive?
Long COVID
ES
En Español
Medical Research
Research & Reports

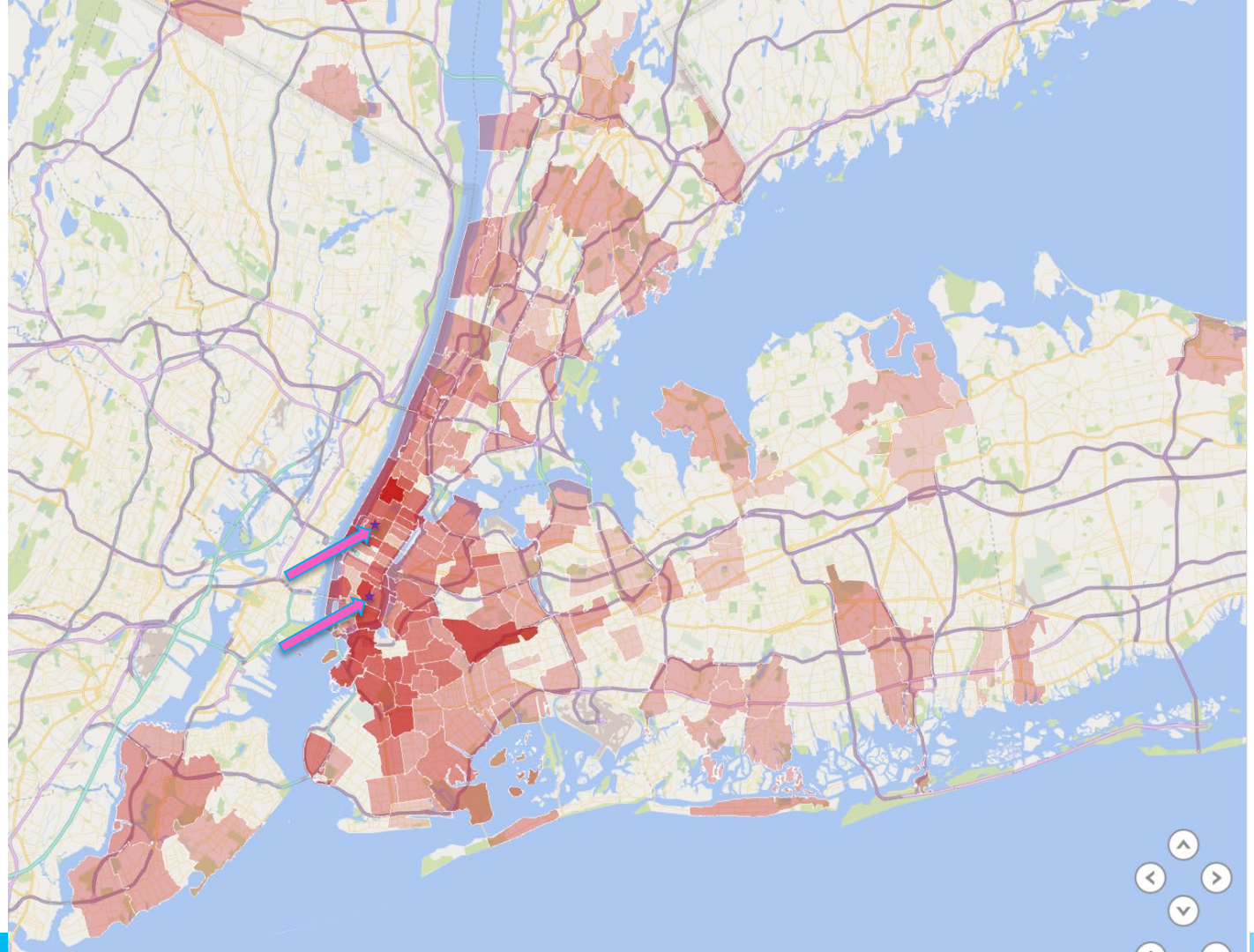
Conclusions

Considerable prevalence of pulmonary symptoms

Large proportion of COVID-19 patients reporting symptoms of depression and PTSD

Symptoms correlate with disease severity

Longer follow-up is needed to evaluate whether these patients are at increased risk of chronic complications



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Questions

Upcoming NEBGH virtual events:

- **May 10 –** Racial Health Equity: Make Sure ALL Employees Have Access to Best Practice Obesity and Diabetes Treatment
- **May 16 –**Monday COVID-19 Update
- **May 18 -** CAA Transparency in Coverage Rules: What We Know
- **June 16 -** Benefits Leadership for a Changing World: Accept the Challenge!