

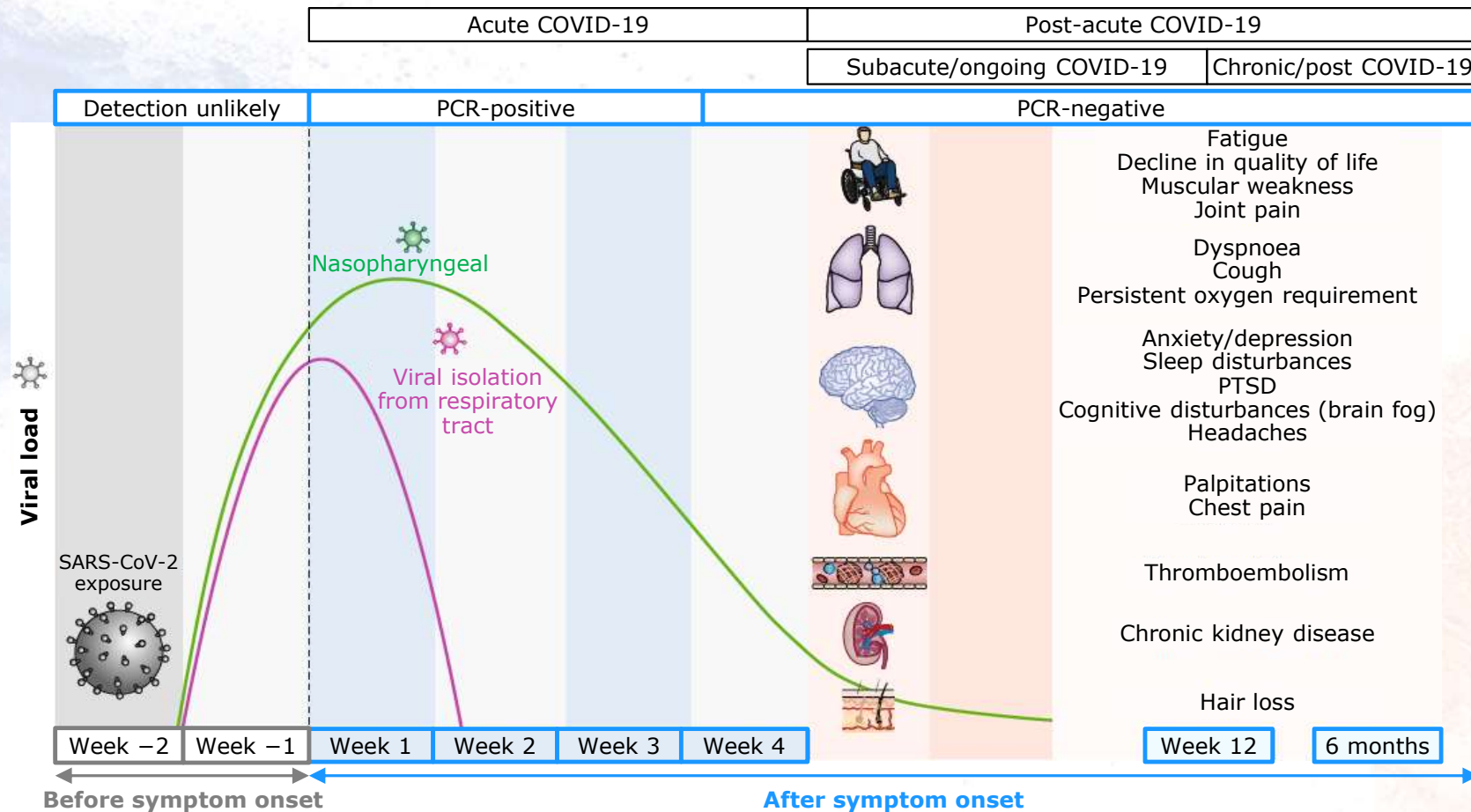
POST COVID

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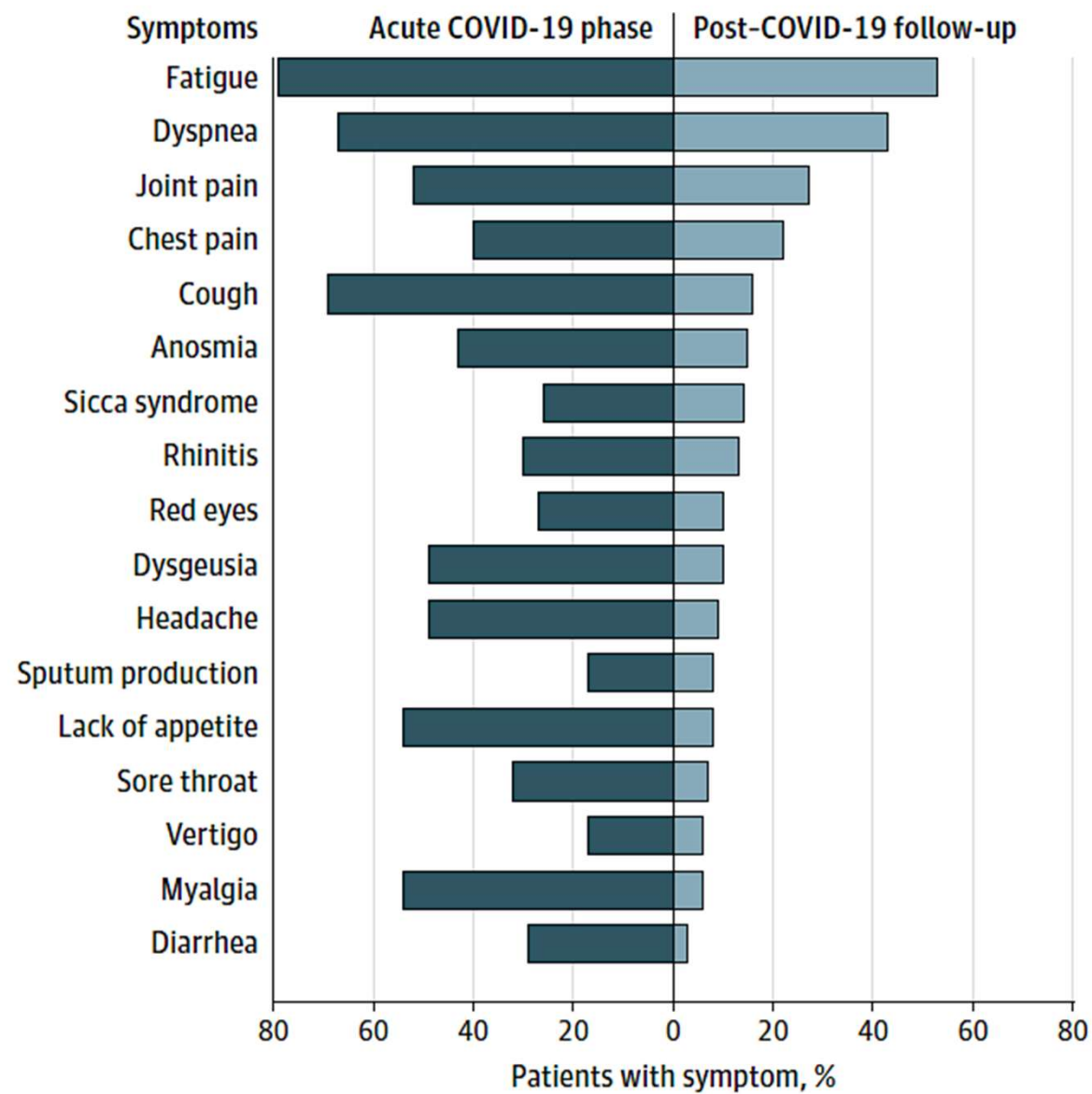
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Timeline for acute and post-acute COVID-19



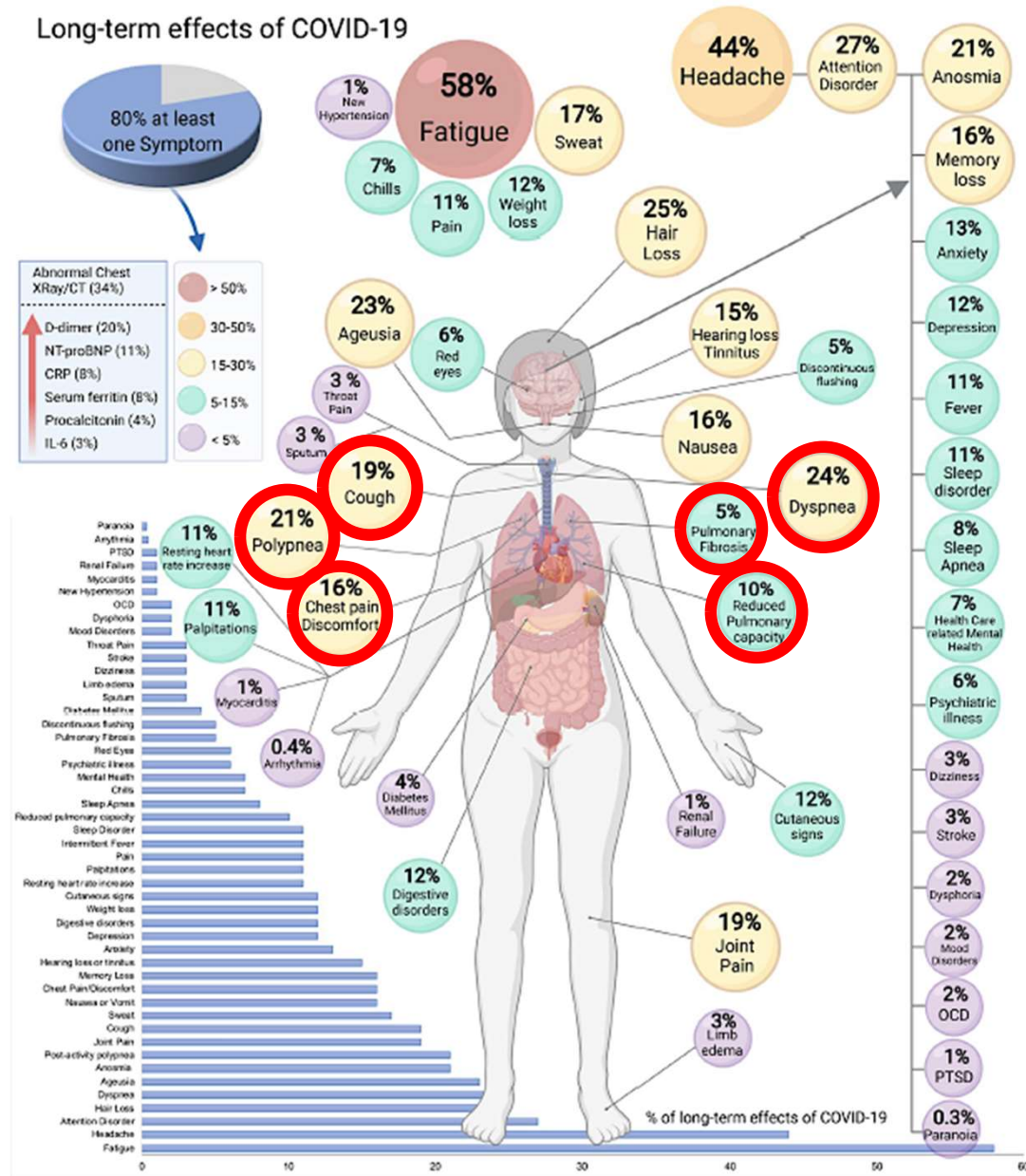
PCR, polymerase chain reaction; PTSD, post-traumatic stress disorder;
SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

Nalbandian A, et al. Nat Med.
2021 Mar 22. Online ahead of print.



Carfi A et al, *JAMA* 2020; 324: 603-605

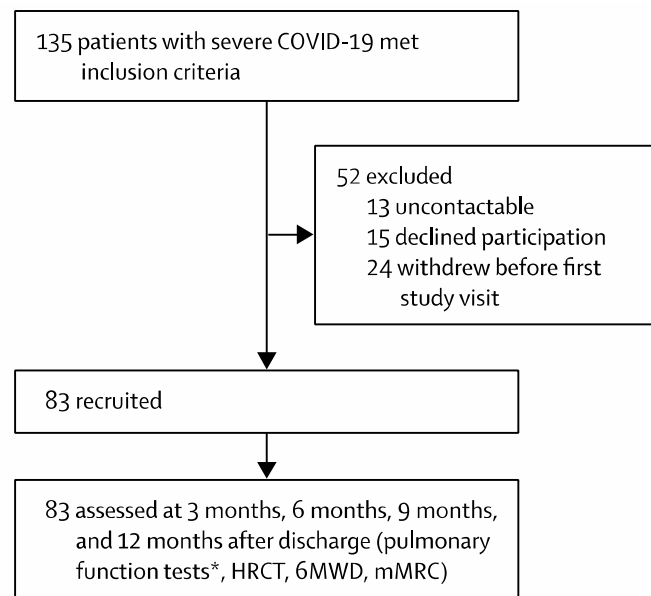
Long-term effects of COVID-19



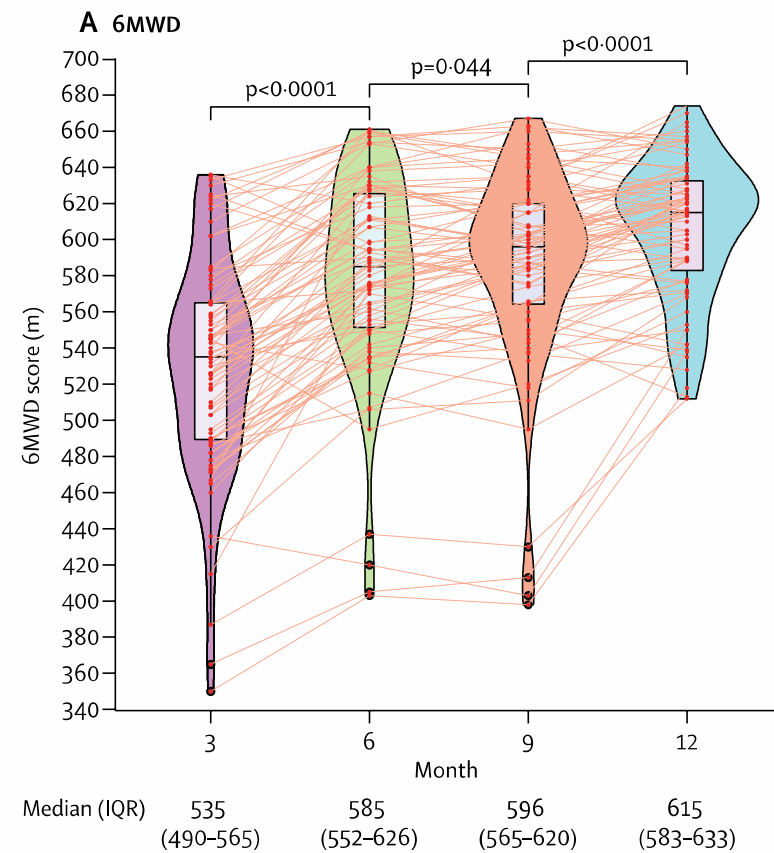
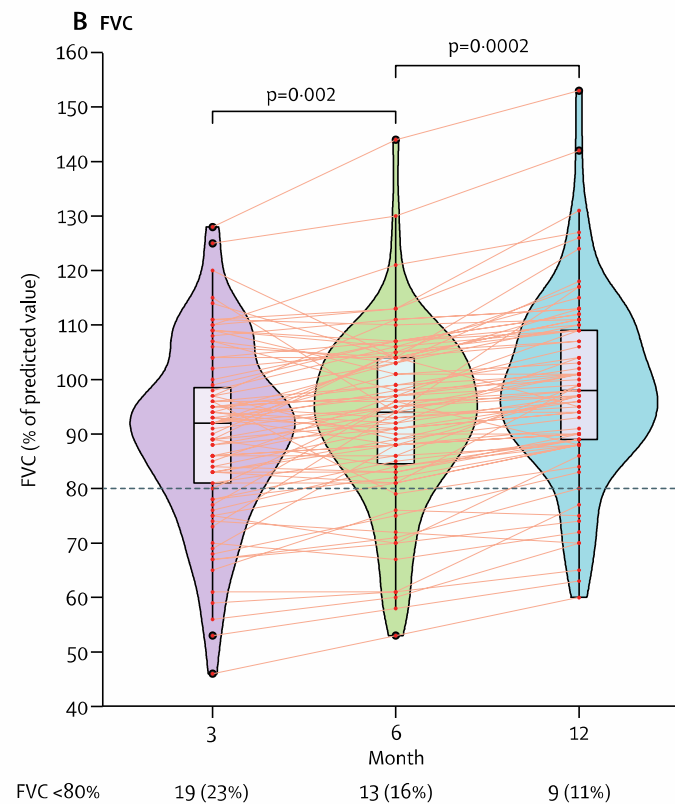
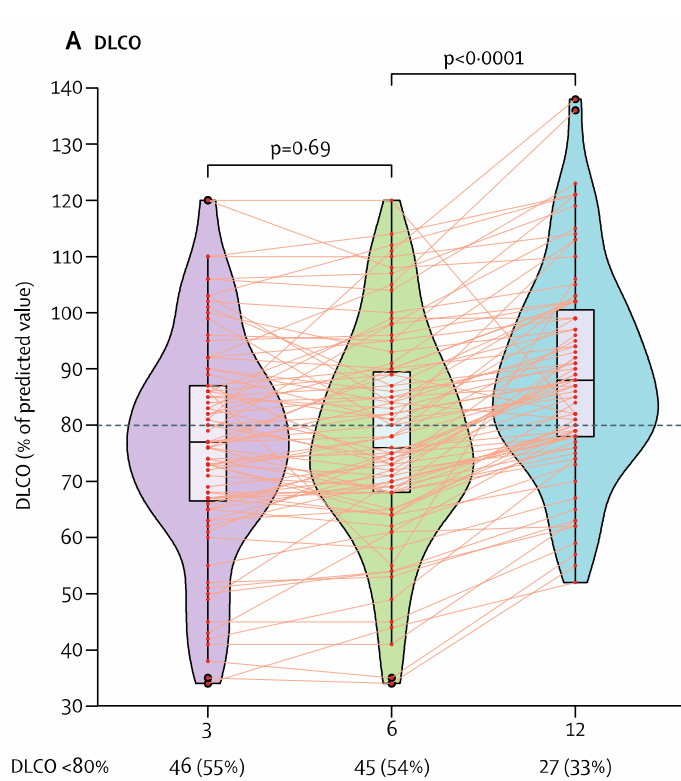
3-month, 6-month, 9-month, and 12-month respiratory outcomes in patients following COVID-19-related hospitalisation: a prospective study



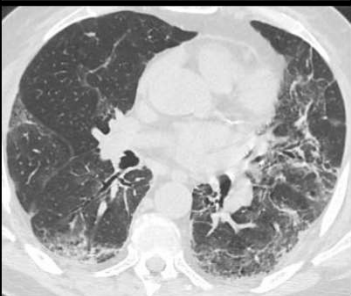
Xiaojun Wu*, Xiaofan Liu*, Yilu Zhou*, Hongying Yu*, Ruiyun Li*, Qingyuan Zhan*, Fang Ni, Si Fang, Yang Lu, Xuhong Ding, Hailing Liu, Rob M Ewing, Mark G Jones†, Yi Hu†, Hanxiang Nie†, Yihua Wang†



	All patients (n=83)
Age, years	60 (52–66)
Sex	
Male	47 (57%)
Female	36 (43%)
BMI, kg/m ²	25.0 (23.5–27.1)
Cigarette smoking	
Never smoked	83 (100%)
Comorbidities*	0
Hospitalisation	
Length of hospital stay, days	29 (25–35)
Peak CT pneumonia score during hospitalisation	30 (24–36)
Oxygen supply	
Nasal cannula or mask	37 (45%)
HFNC or NIV	46 (55%)
Antivirals	
Oseltamivir	53 (64%)
Ribavirin	83 (100%)
Ganciclovir	42 (51%)
Corticosteroids	0



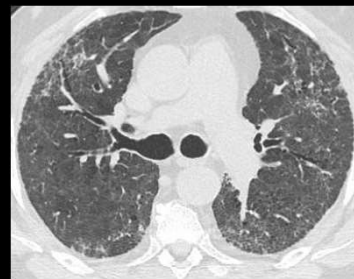
T0



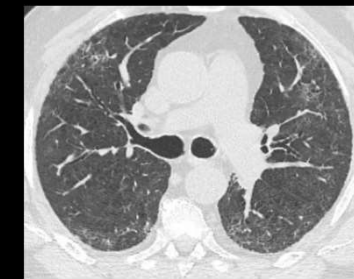
1 MONTH



4 MONTHS



9 MONTHS



RESEARCH

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Residual respiratory impairment after COVID-19 pneumonia

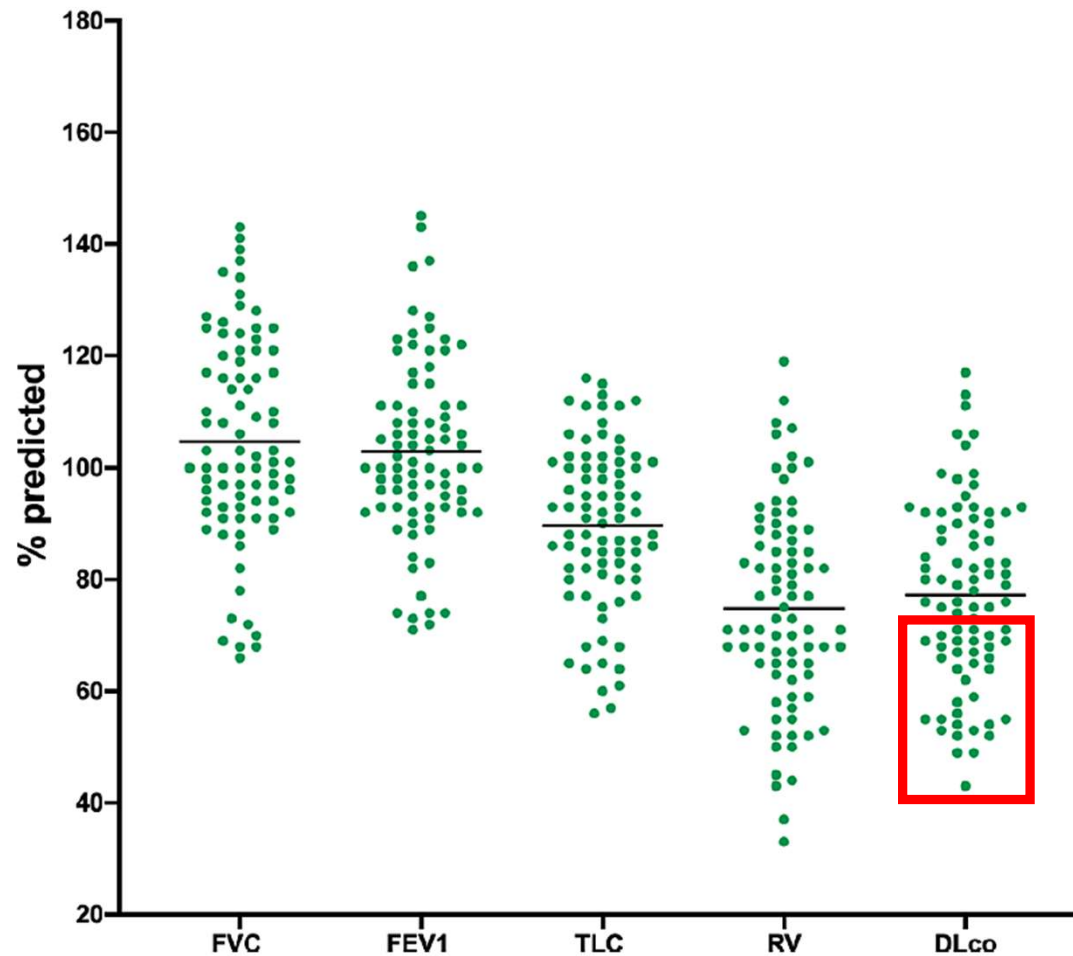


Francesco Lombardi^{1,2}, Angelo Calabrese^{1,2}, Bruno Iovene¹, Chiara Pierandrei², Marialessia Lerede², Francesco Varone¹, Luca Richeldi^{1,2} and Giacomo Sgalla^{1*} on behalf of the Gemelli Against COVID-19 Post-Acute Care Study Group

FOLLOW-UP OF A COVID-19 HOSPITALIZED COHORT

	Available observations	N = 87
Age, years		58 (13)
Male, n (%)		58 (67)
BMI (kg/m ²)		26.7 (4.4)
p/F worst	76	281 (150)*
Hospitalization time (days)	86	13 (10)*
Day from discharge (days)	85	35 (21)*
Smoking history, n (%)	85	
Never smoker		33 (39)
Smoker		4 (5)
Former smoker		48 (56)

LUNG FUNCTION TESTS ONE MONTH AFTER DISCHARGE

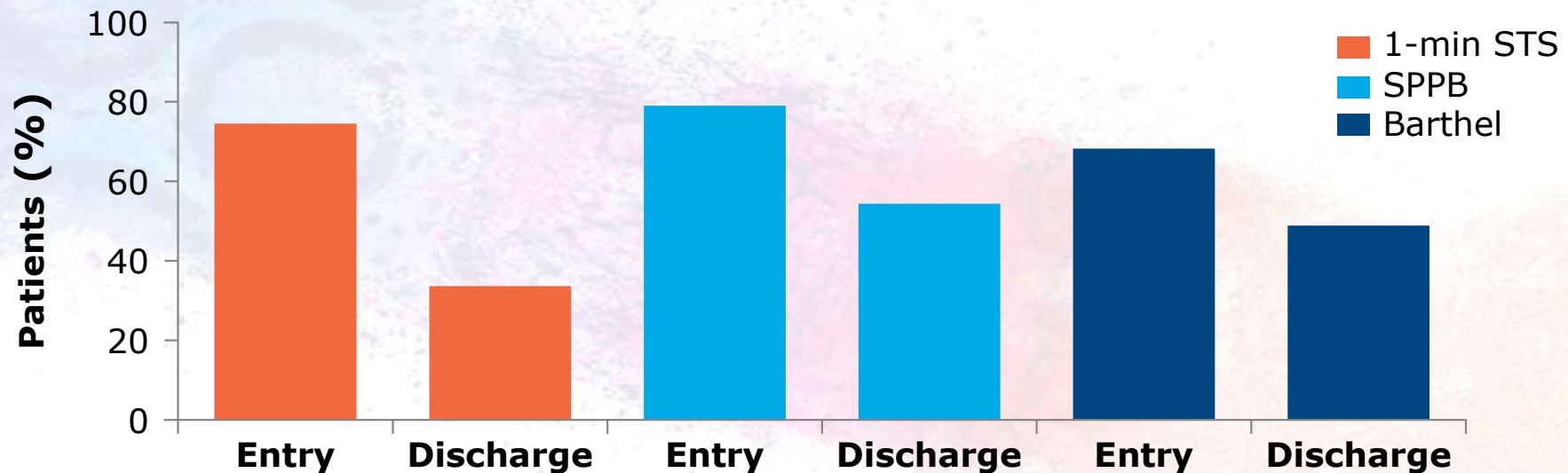


P/F RATIO DURING THE ACUTE PHASE PREDICTS RESIDUAL RESPIRATORY IMPAIRMENT

	N available observations	p/F ≥ 300 (N = 28)	p/F $< 300 \geq 200$ (n = 27)	p/F < 200 (n = 21)	p value
Age (years)	76	52.3 (14.0)	59.2 (12.2)	63.1 (11.9)	0.014
Sex	76				0.618
Male		19 (68)	17 (63)	16 (76)	
Female		9 (32)	10 (37)	5 (24)	
BMI (Kg/m ²)	75	25.7 (5.1)	27.3 (3.9)	28.0 (4.3)	0.181
p/F worst	76	349.0 (55.8)*	276.0 (54.0)*	135.0 (92.5)*	<0.001
Hospitalization time (days)	76	9.5 (6.0)*	13.0 (9.0)*	23.0 (14.0)*	<0.001
ICU admission	76	0 (0)	1 (4)	13 (62)	<0.001
FVC [§]	73				
Litres		4.23 (0.18)	3.77 (0.18)	3.68 (0.21)	0.099
% predicted		119.6 (3.3)	104.5 (3.4)	92.0 (3.9) [°]	0.005
DL _{CO} [§]	73				
Litres		23.23 (0.97)	21.05 (1.00)	18.69 (1.15) [°]	0.017
% predicted		82.7 (2.7)	80.6 (2.8)	64.9 (3.2) ^{° #}	<0.001

Impaired physical functioning for recovering patients hospitalized with COVID-19

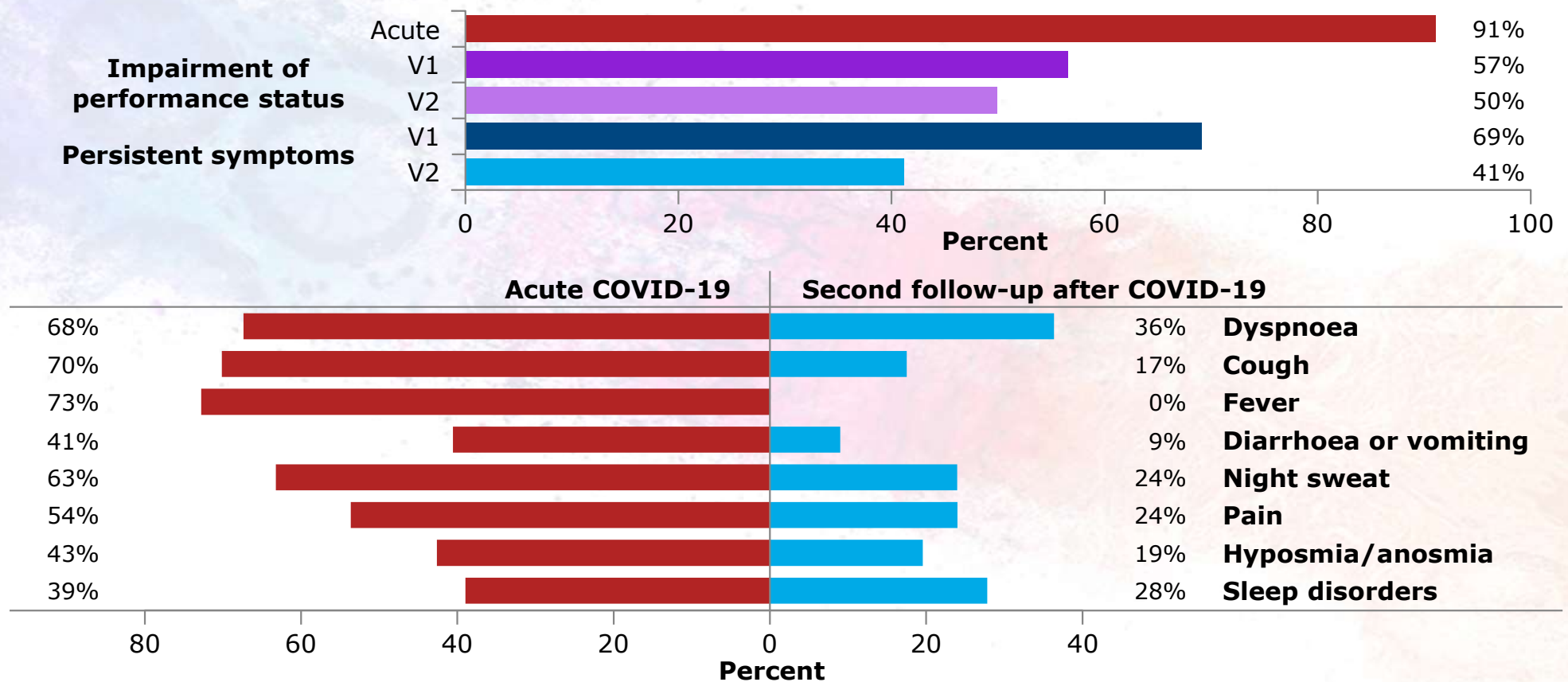
Proportions of patients with abnormal physical functioning and/or abnormal performance of activities of daily living



- Most patients had low (53.3%) or moderate (17.5%) SPPB summary scores
- 47.5% of patients still scored poorly on the Barthel index

Cardiopulmonary recovery after COVID-19: an observational prospective multicentre trial (1)

Symptom burden in the CovILD study cohort during acute COVID-19 and at follow-up

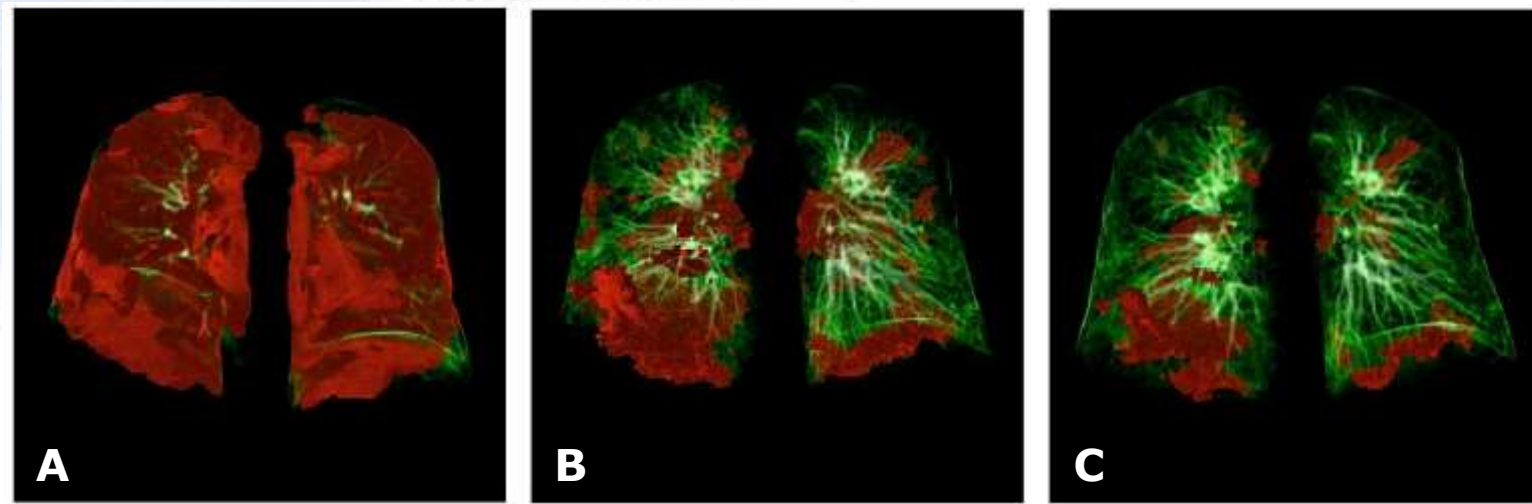


V1, first follow-up 60 days after diagnosis;
V2, second follow-up 100 days after diagnosis.

Sonnweber T, et al. Eur Respir J. 2020 Dec 10. Online ahead of print.

Cardiopulmonary effects in recovering patients after COVID-19 infection

Representative sequential CT scans of a 56-year-old male COVID-19 patient during acute disease and follow-up



- Pulmonary 3D modelling assessed with CT (A) during acute COVID-19, (B) at 60 days follow-up, and (C) at 100 days follow-up
- Areas with increased opacity are marked with red; normal lung areas are indicated in green

Early outcomes after lung transplantation for severe COVID-19: a series of the first consecutive cases from 4 countries

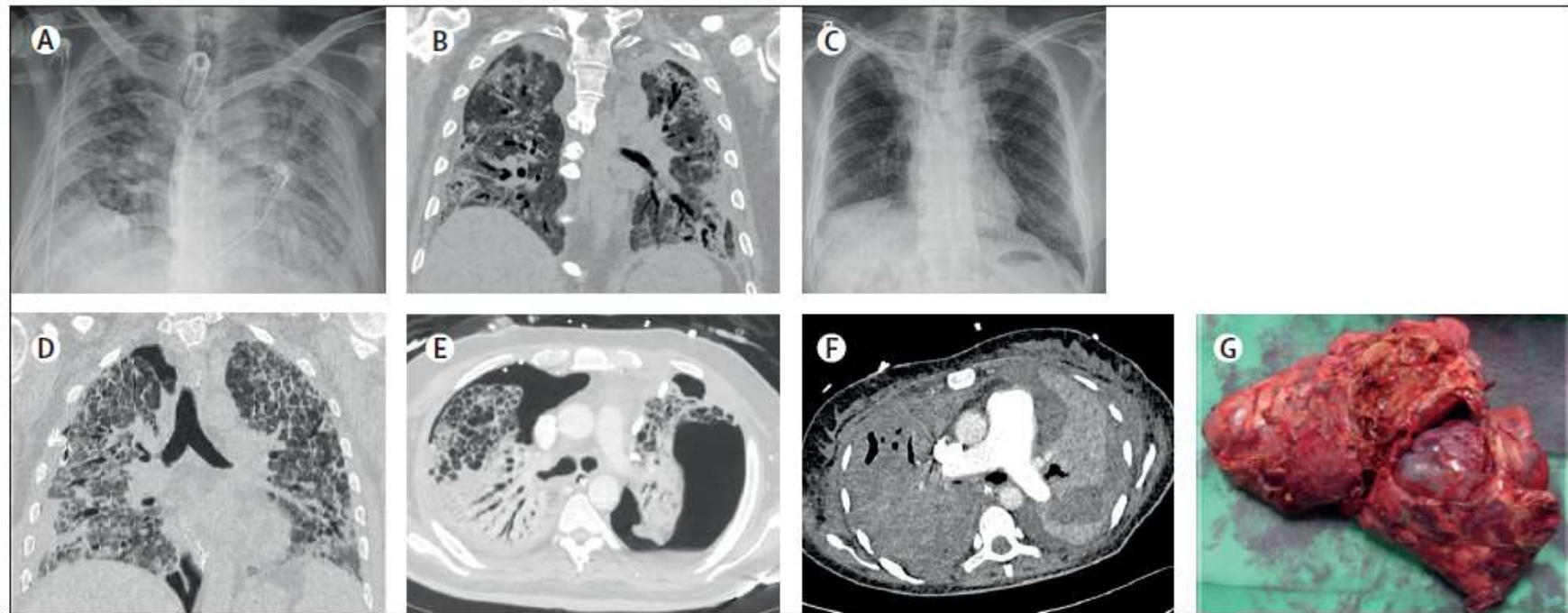


Figure 1: Imaging and gross pathology of transplant recipients

Typical chest radiograph (A) and CT (B) of a recipient undergoing lung transplantation for COVID-19-associated acute respiratory distress syndrome at the time of listing, showing honeycombing, consolidation, and bronchiectasis. (C) A chest radiograph of a representative recipient at the time of hospital discharge is given for comparison. (D–G) Typical radiological and gross pathological features seen in our patients at the time of listing: diffuse fibrosis in all lobes (D), pneumothoraces and shrinking lungs (E), parenchymal necrosis (F), and cavernous changes (G).

Implications of all available evidence

- **Lung transplantation** is feasible in patients with **irreversible lung injury** associated with COVID-19 who cannot be weaned off mechanical ventilation or extracorporeal membrane oxygenation
- Further studies are needed
 - To identify patients who are likely to progress to irreversible lung damage
 - To establish long-term outcomes in patients with severe COVID-19 who undergo lung transplantation

Summary of post-acute COVID-19 by organ system

Pulmonary



- **Dyspnoea, decreased exercise capacity, hypoxia** are common persistent symptoms
- **Reduced diffusion capacity**, restrictive pulmonary physiology, ground-glass opacities, and fibrotic changes are observed at follow-up of COVID-19 survivors

Haematological



- **Thromboembolic events** were identified to be < 5% in retrospective studies

Cardiovascular



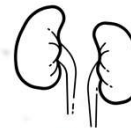
- **Palpitations, dyspnoea, and chest pain** may continue as persistent symptoms
- Long-term sequelae may include increased cardiometabolic demand, myocardial fibrosis or scarring, arrhythmias, tachycardia, and autonomic dysfunction

Neuropsychiatric



- Persistent symptoms may include fatigue, myalgia, headache, dysautonomia, and cognitive impairment
- **30–40%** of COVID-19 survivors reported **anxiety, depression, sleep disturbances, and PTSD**

Renal



- **Reduced eGFR** has been reported at 6 months follow-up
- Resolution of AKI during acute COVID-19 occurs in majority of patients

Endocrine



- Endocrine sequelae may include **new or worsening** control of existing **diabetes mellitus**, subacute thyroiditis, and bone demineralization

Gastrointestinal and hepatobiliary



- Potential of **gut microbiome alteration**, which can result in enrichment of opportunistic organisms and depletion of beneficial commensals

Dermatological



- **Hair loss** has been reported in approximately **20%** of COVID-19 survivors
- Papulosquamous eruptions, in particular pernio, were reported as long-lasting skin manifestations¹

Multisystem inflammatory syndrome in children



- Affects children **> 7 years** and disproportionately those of African, Afro-Caribbean, or Hispanic origin
- Cardiovascular and neurological complications can occur

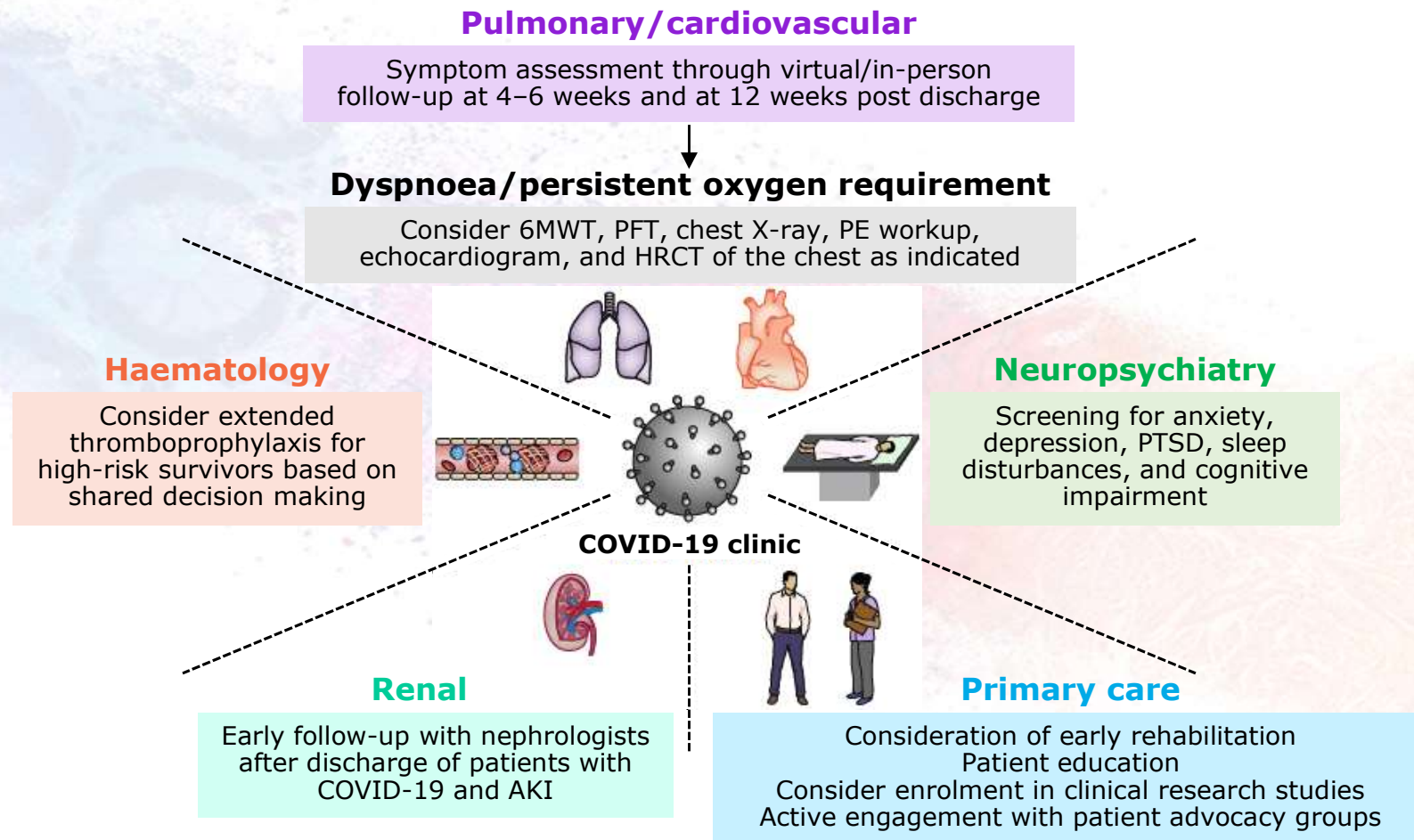
Patients at highest risk of COVID-19 pneumonia complications

- All patients managed on ICU or high-dependency unit
- All patients discharged with a new oxygen prescription
- All patients with protracted dependence on high inspired fractions of oxygen, continued positive pressure ventilation, and bi-level non-invasive ventilation
- Any other patient the discharging team has significant concerns about

Post-COVID-19 holistic assessment

- Assessment and management of breathlessness, oxygen requirement, dysfunctional breathing, post-viral cough, anxiety, fatigue
- Symptom or palliative care management where required
- Psychosocial assessment and onward referral where required
- Consideration of
 - Rehabilitation needs and onward referral where required
 - A new diagnosis of venous thromboembolic disease
 - Specific post-ICU complications such as sarcopenia, cognitive impairment, and PTSD

Interdisciplinary management in COVID-19 clinics



6MWT, 6-min walk tests; PE, pulmonary embolism.

Nalbandian A, et al. Nat Med. 2021 Mar 22. Online ahead of print.

THANK YOU FOR YOUR ATTENTION

