

So, you've had COVID-19...

Now what?

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Disclosures

- No relevant disclosures

Objectives

- Discuss pulmonary complications of COVID after discharge from the hospital
 - Evaluate a case from Colorado as an example
- Review lessons from other respiratory infections as it pertains to lung function
- Outline the sparse literature to date as it pertains COVID and lung function

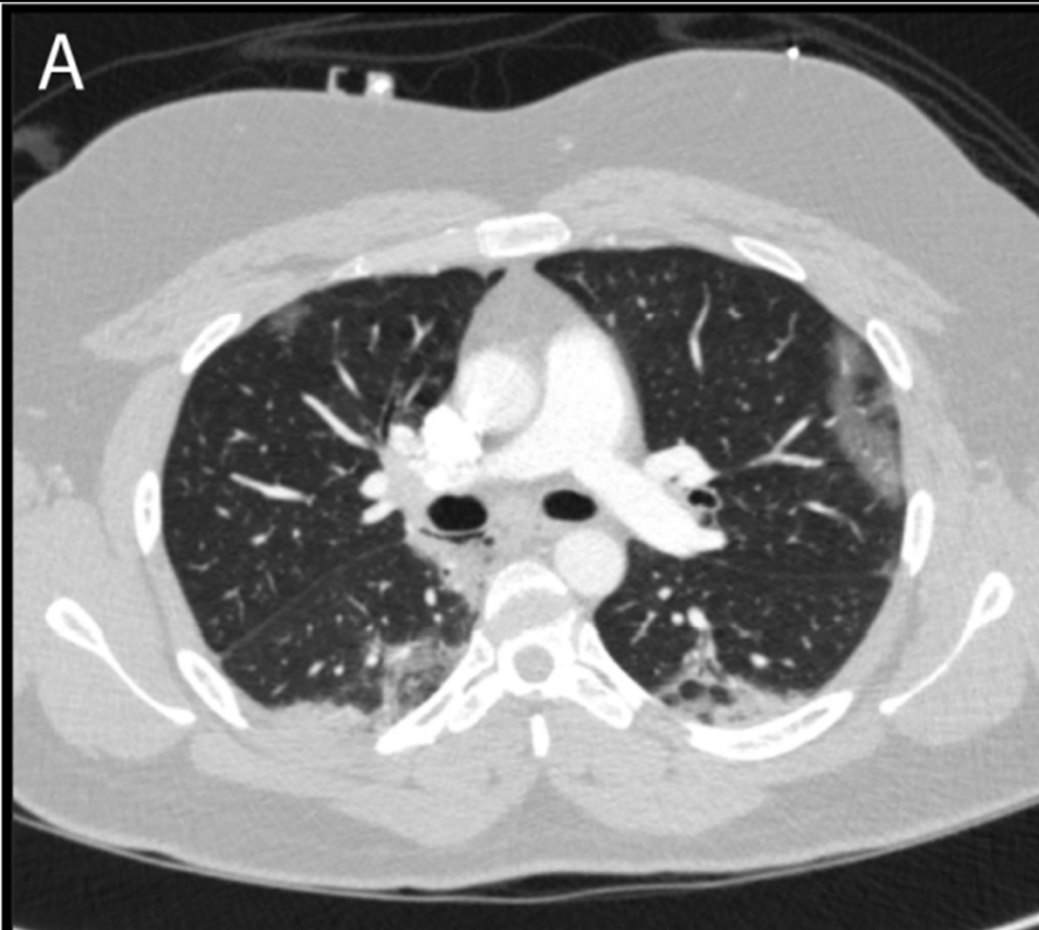
Case

- 28 year old obese male, previous short term smoker, admitted to the ICU at the beginning of April with COVID+
 - Required high flow nasal cannula 15L and greater
 - Required self-proning
 - No exposure to invasive or non-invasive mechanical ventilation
 - Treated with hydroxychloroquine and supportive care
- Clinically improved and sent home on 2 liters per minute of oxygen

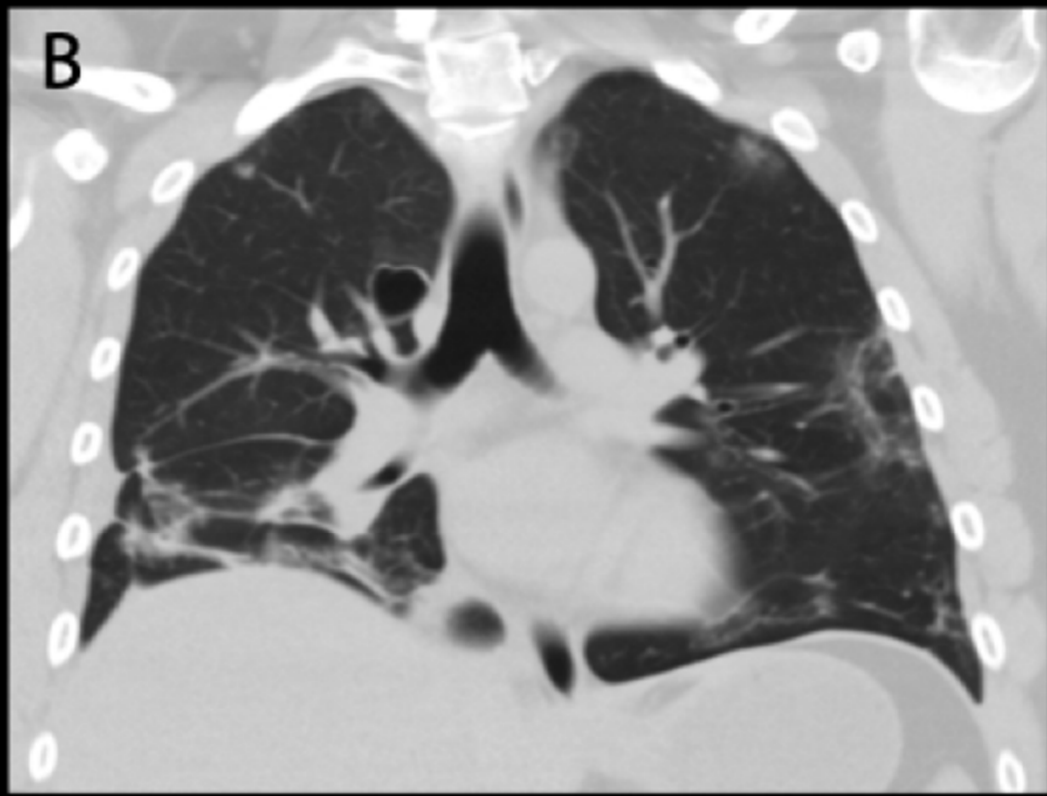
Case Continued

- Two weeks later, presents to the emergency department with acute onset chest pain, shortness of breath, and scant hemoptysis
- Chest X-Ray with right sided pneumothorax, treated with tube thoracostomy. This rapidly resolved, and the next day discharged home.
- 2 days later he returns to the ED with the same symptoms and computed tomography (CT) is performed

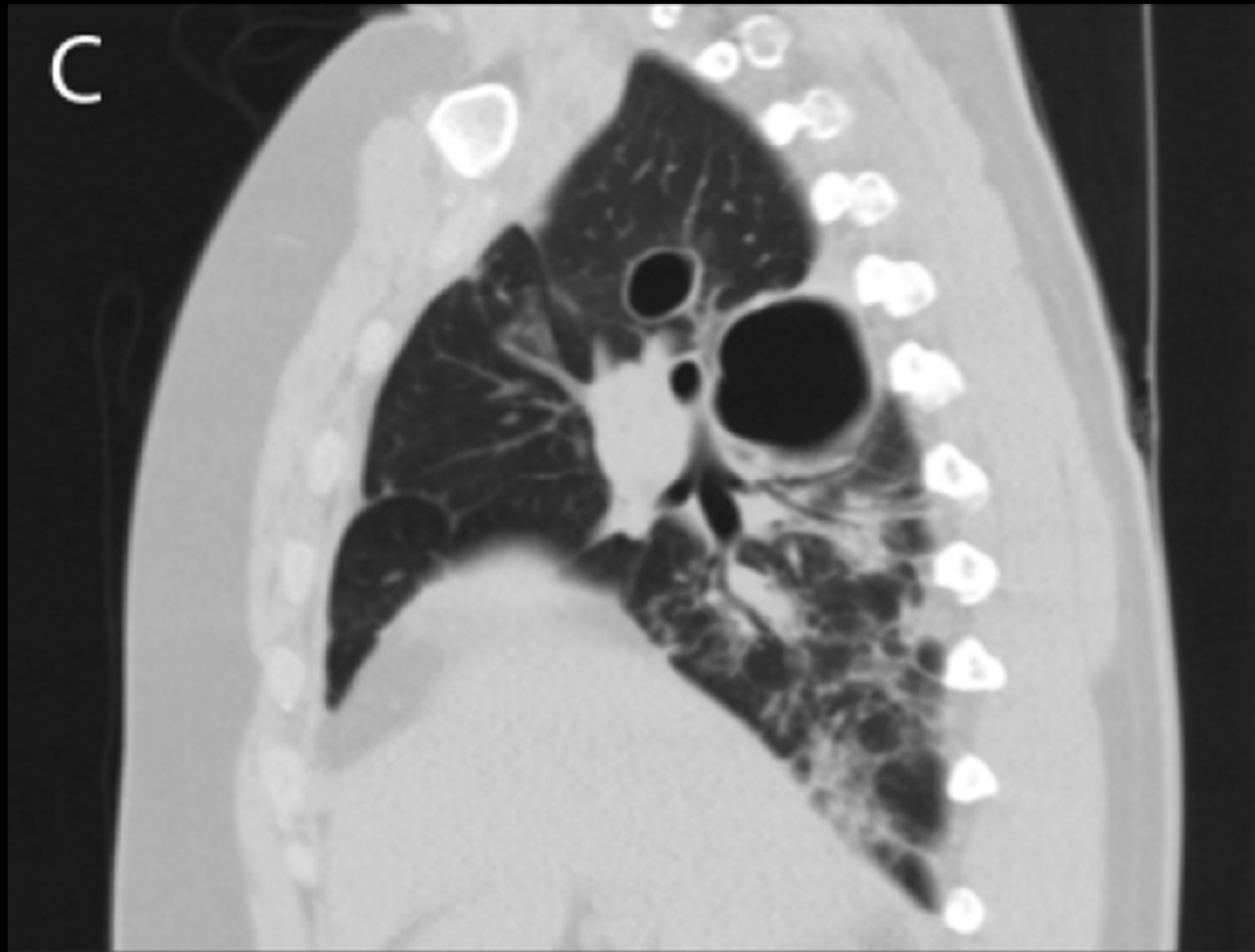
Initial Scan



Follow-up Scan



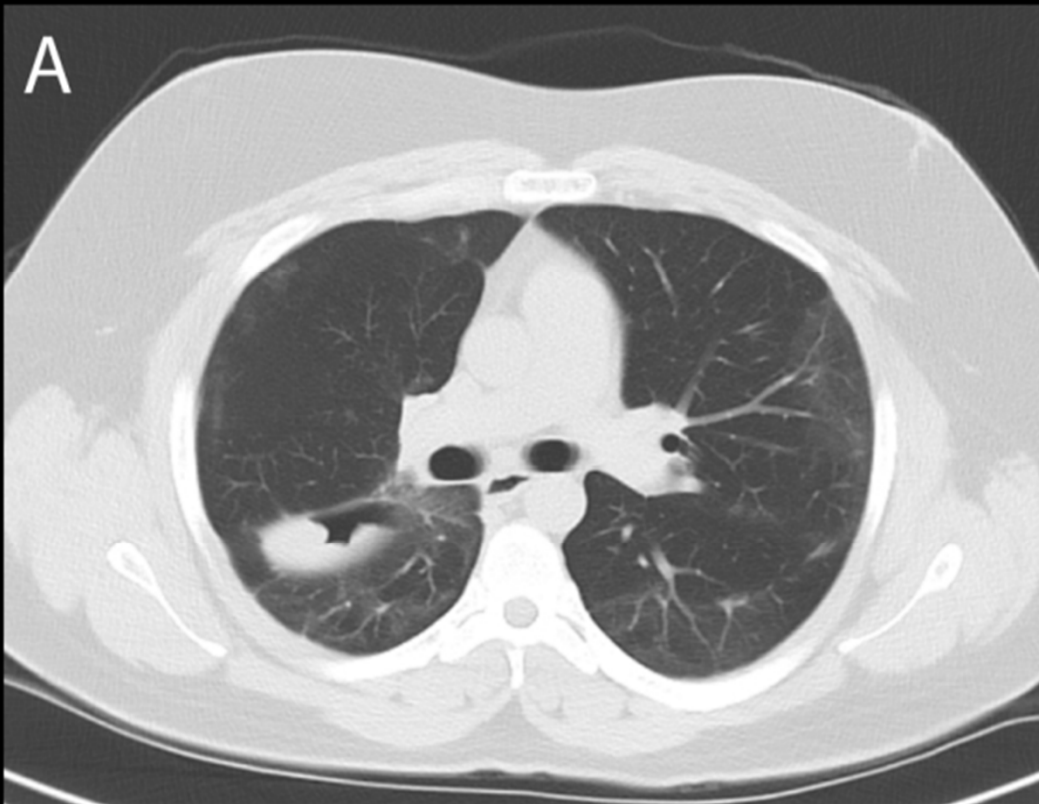
Follow-Up Scan



Clinical Course

- All infectious data, including HIV and fungal studies were negative
- Pneumothorax resolved at 5 days, chest tube removed
- Pneumatocoeles appeared smaller
- Had one month follow up CT scan:

One Month Later



Pneumatoceles (PTC) and Pneumothoraces (PTX)

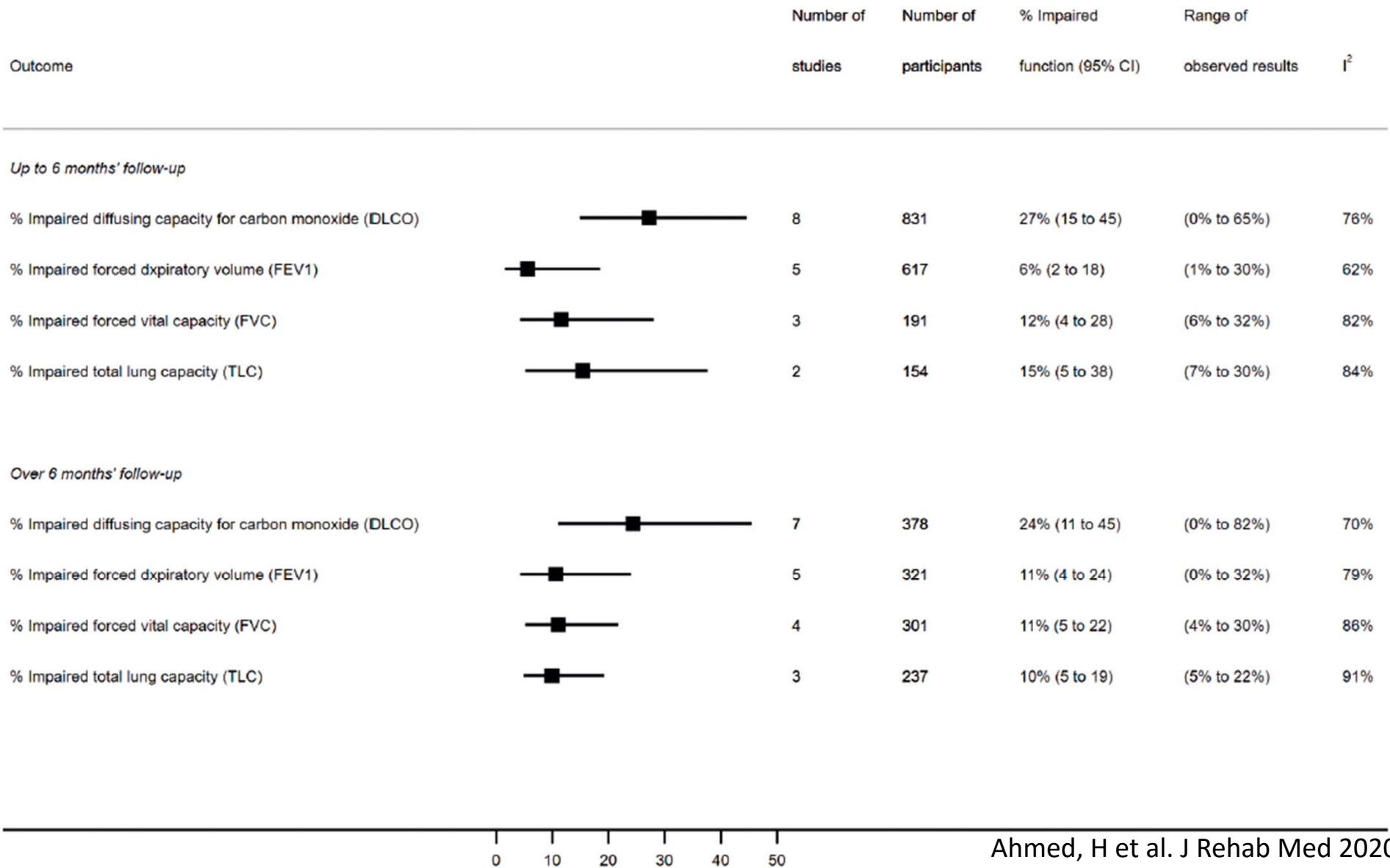
- Seen in a number of conditions, including during previous viral epidemics
 - Subpleural pneumatoceles and PTX seen during H1N1, and previous SARS (1)
 - In these case, often during hospitalization
 - Most often associated with mechanical ventilation
- With COVID-19 Pandemic
 - Reports of PTC and PTX during hospitalizations, in addition to peripheral ground glass (2,3)
 - Increasing reports of PTC and PTX after hospitalization as demonstrated here
 - Highlight in this case was without mechanical ventilation

1- Sihoe et al. Severe Acute Respiratory Syndrome Complicated by Spontaneous Pneumothorax. Chest. 125(6) 2345-2351. 2004

2- Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497–506

3- Salehi S, Abedi A, Balakrishnan S, et al. Coronavirus disease 2019 (COVID-19): a systematic review of imaging findings in 919 patients. AJR Am J Roentgenol 2020 Mar. 14

Lung Function- SARS and MERS of Old



Lung Function in COVID

Table 1. Demography and pulmonary function characteristics of discharged patients with COVID-19

	Total (n=110)	Mild illness (n=24)	Pneumonia (n=67)	Severe Pneumonia (n=19)	<i>p</i> value
Age, years	49.1 ± 14.0	46.8 ± 15.6	47.9 ± 13.7	56.5 ± 11.0 ^{a,b}	0.04
Spirometry					
FVC%pred	93.59 ± 12.25	94.06 ± 10.48	94.12 ± 12.31	91.12 ± 14.30	0.632
<80% pred, No.(%)	10 (9.09)	3 (12.50)	5 (7.46)	2 (10.53)	0.644
FEV ₁ %pred	92.70 ± 11.57	94.26 ± 11.00	92.59 ± 11.87	91.12 ± 11.58	0.676
<80% pred, No.(%)	15 (13.64)	4 (16.67)	9 (13.43)	2 (10.53)	0.857
Diffusion capacity					
DLCO%pred	78.18 ± 14.29	84.70 ± 13.88	79.76 ± 11.99	64.79 ± 14.35 ^{a,b}	<0.001
<80%pred, No.(%)	51 (47.22)	7 (30.43)	28 (42.42)	16(84.21) ^{a,b}	0.001
DLCO/VA%pred	92.09 ± 16.68	99.35 ± 18.25	92.30 ± 15.70	82.58 ± 13.91 ^{a,b}	0.004
<80%pred, No.(%)	29 (26.85)	3 (13.04)	18 (27.27)	8 (42.11)	0.09
Lung volume					
TLC%pred	86.32 ± 11.32	87.13 ± 10.43	88.11 ± 10.72	79.16 ± 12.13 ^{a,b}	0.008
<80%pred, No.(%)	27 (25.00)	4 (17.39)	14 (21.21)	9 (47.37) ^{a,b}	0.049
RV%pred	86.83 ± 19.37	87.17 ± 16.88	89.79 ± 19.21	76.16 ± 19.96 ^b	0.024
<65%pred, No.(%)	10 (9.26)	2 (8.70)	3 (4.55)	5 (26.32) ^b	0.021

Summary

- Pulmonary Consequences of COVID-19
 - Seeing pneumatoceles and pneumothoraces
 - In and Out patient
 - Patients exposed and not exposed to mechanical ventilation
 - Reduction in pulmonary function
 - Decrease appears worse in more severe disease
 - Most “quality” literature at this stage is just at/post discharge, need follow up data
 - Previous SARS/MERS epidemics demonstrated reduced lung function (DLCO, volumes, flow) with most notable impact on diffusion capacity
 - Discharge data for COVID-19 in line with that

References

- Sihoe et al. Severe Acute Respiratory Syndrome Complicated by Spontaneous Pneumothorax. *Chest*. 125(6) 2345-2351. 2004
- Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395:497–506
- Salehi S, Abedi A, Balakrishnan S, et al. Coronavirus disease 2019 (COVID-19): a systematic review of imaging findings in 919 patients. *AJR Am J Roentgenol* 2020 Mar. 14
- Ahmed H, et al. Long-Term Clinical Outcomes in Survivors of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) Coronavirus Outbreaks after hospitalization or ICU Admission: A Systematic Review and Meta-Analysis. *J Rehab Med* 2020; 52 Epub ahead of print
- Mo X, Jian W, Su Z, *et al.* Abnormal pulmonary function in COVID-19 patients at time of hospital discharge. *Eur Respir J* 2020; in press

Questions?