UNIVERSITEIT STELLENBOSCH UNIVERSITY

Morning Brief : Scientific Review

18 May 2020

The purpose of the Morning Brief is to **summarize** and present key information, research articles and other relevant publications pertaining to critical care and COVID-19. We aim to prioritise information, articles and publications released in the preceding 24-48hours.

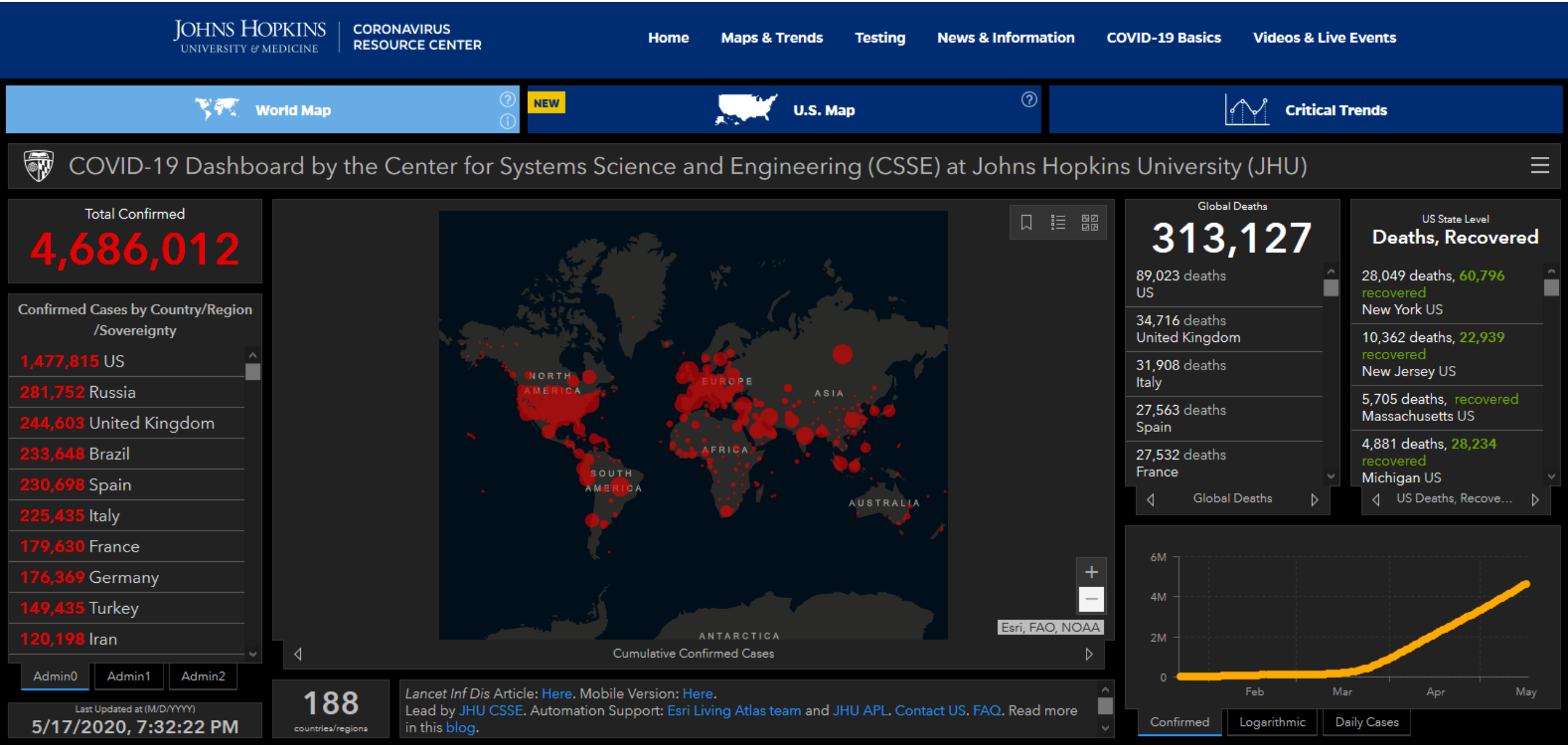
Stellenbosch University Research Response Team

STELLENBOSCH UNIVERSITY PULMONOLOGY

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

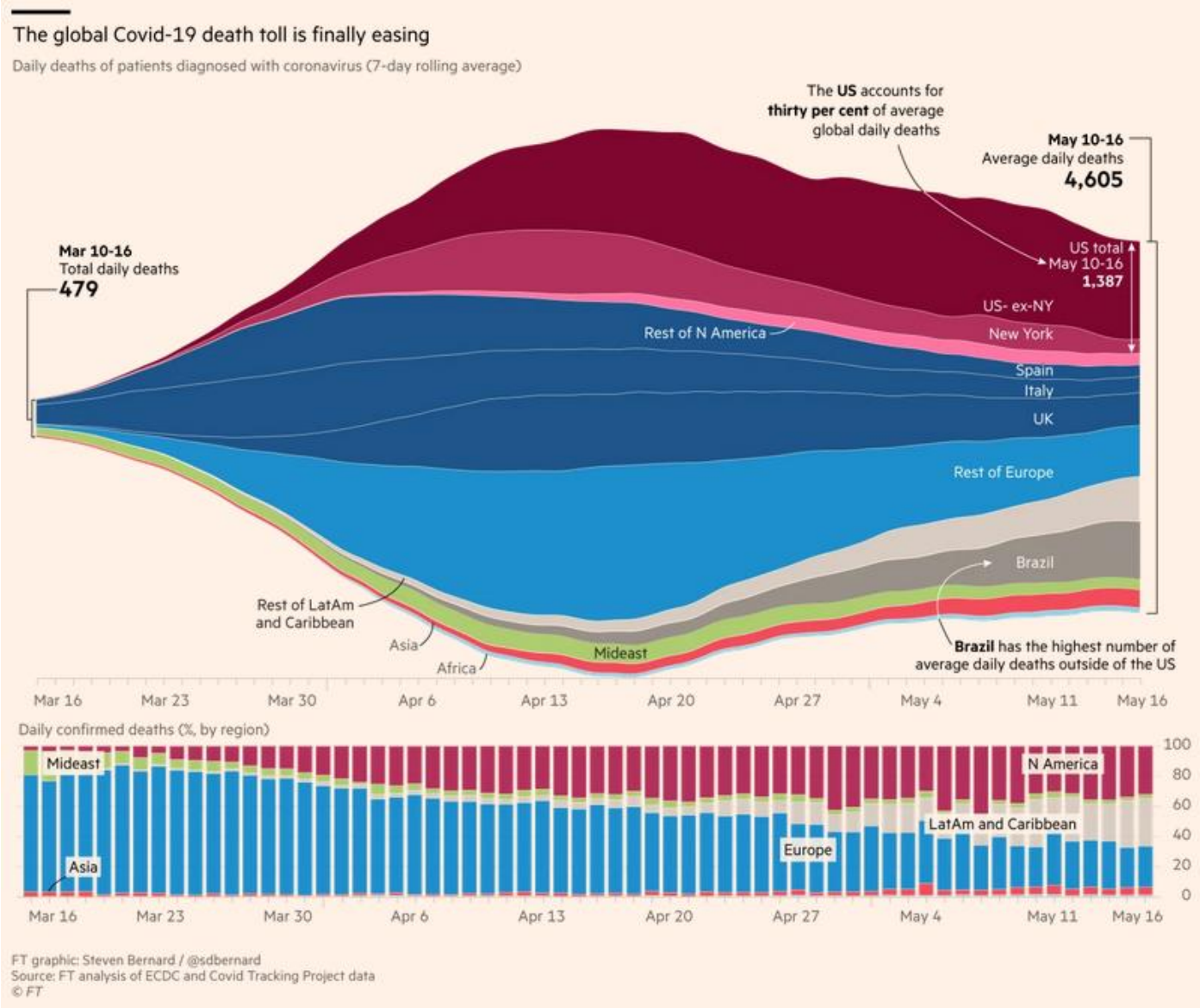
Content of the brief

- Global Statistics
- South African Statistics
- Topics:
  - Multi-system inflammatory syndrome in children
  - Lung CT and Lung function



Source: https://coronavirus.jhu.edu/map.html

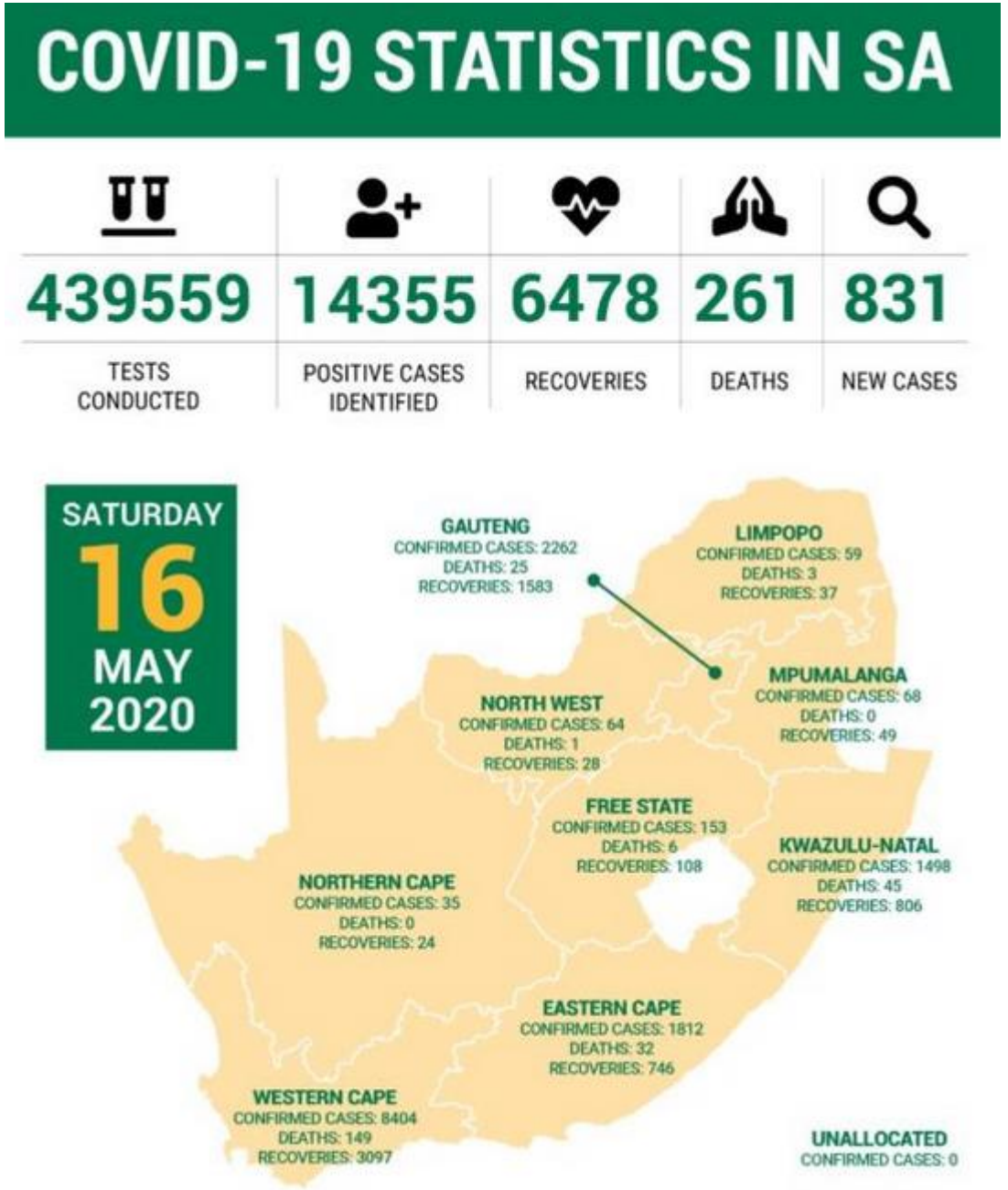
Global Statistics



Accessed at 19:20 on 17 May 2020
Source: https://www.ft.com/content/a26fbf7e-48f8-11ea-aeb3-955839e06441

UNIVERSITEIT STELLENBOSCH UNIVERSITY

South African Statistics



Accessed at 21:00 on 17 May 2020
Source: https://sacoronavirus.co.za

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Multisystem Inflammatory Syndrome in Children (MIS-C) Associated with Coronavirus Disease 2019 (COVID-19)

HAN HEALTH ALERT NETWORK

This is an official CDC HEALTH ADVISORY

Distributed via the CDC Health Alert Network
May 14, 2020, 4:45 PM ET
CDCHAN-00432

From April 16 through May 4, 2020, 15 patients aged 2-15 years were hospitalized, many requiring admission to the intensive care unit. As of May 12, 2020, the New York State Department of Health identified 102 patients (including patients from New York City) with similar presentations, many of whom tested positive for SARS-CoV-2 infection by RT-PCR or serologic assay. New York State and New York City continue to receive additional reports of suspected cases.

THE LANCET

In the past month we found a 30-fold increased incidence of Kawasaki-like disease. Children diagnosed after the SARS-CoV-2 epidemic began showed evidence of immune response to the virus, were older, had a higher rate of cardiac involvement, and features of macrophage activation syndrome.

CDC Health Alert Network, May 14, 2020, 4:45 PM ET CDCHAN-00432
Verdoni, L et al., An outbreak of severe Kawasaki-like disease at the Italian epicentre of the SARS-CoV-2 epidemic: an observational cohort study, The Lancet, May 13, 2020DOI:https://doi.org/10.1016/S0140-6736(20)31103-X

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

Articles of Interest

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Wang YH, Dong CJ, Hu Y, et al. Temporal Changes of CT Findings in 90 Patients with COVID-19 Pneumonia: A Longitudinal Study

[published online March 19, 2020]. Radiology.

doi: 10.1148/radiol.2020200843

Background and Purpose:

- **Background:** CT may play a central role in the diagnosis and management of COVID-19 pneumonia.
- **Purpose:** To perform a longitudinal study to analyze the serial CT findings over time in patients withCOVID-19 pneumonia.

Materials and Methods:

- During January 16 to February 17, 2020, 90 patients (male : female, 33:57; mean age, 45 years) with COVID-19 pneumonia were prospectively enrolled and followed up until they were discharged or died, or until the end of the study.
- A total of 366 CT scans were acquired and reviewed by 2 groups of radiologists for the patterns and distribution of lung abnormalities, total CT scores and number of zones involved. Those features were analyzed for temporal change.

Results:

- CT scores and number of zones involved progressed rapidly, peaked during illness days 6-11 (median: 5), and was followed by persistence of high levels.
- The predominant pattern of abnormalities after symptom onset was ground-glass opacity (35/78 [45%] to 49/79 [62%] in different periods).
- The percentage of mixed pattern peaked (30/78 [38%]) on illness days 12-17, and became the second most predominant pattern thereafter.
- Pure ground-glass opacity was the most prevalent sub-type of ground-glass opacity after symptom onset.
- The percentage of ground-glass opacity with irregular linear opacity peaked on illness days 6-11 (14/50 [28%)]) and became the second most prevalent subtype thereafter.
- The distribution of lesions was predominantly bilateral and sub-pleural.
- 66/70 (94%) patients discharged had residual disease on final CT scans

Conclusion:

- The extent of lung abnormalities on CT peaked during illness days 6-11.
- The temporal changes of the diverse CT manifestations followed a specific pattern, which might indicate the progression and recovery of the illness.

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 (https://doi.org/10.1183/13993003.01217-2020).

Background and Purpose:

- In light of the widely documented lung injuries related with COVID-19, concerns are raised regarding the assessment of the lung injury for discharged patients.
- A recent report portrayed that discharged patients with COVID-19 pneumonia are still having residual abnormalities in chest CT scans on discharge, with ground-glass opacity as the most common pattern.
- Persistent impairment of pulmonary function and exercise capacity have been known to last for months or even years in the recovered survivors with other coronavirus pneumonia (severe acute respiratory syndrome/SARS and middle east respiratory syndrome/MERS)
- This manuscript aims to describe the characteristics of pulmonary function in discharged Covid 19 survivors.

Methods:

- Recruited 110 laboratory confirmed non-critical COVID-19 cases, from February 5th to March 17th from admitted patients.
- Disease severity were categorized as mild illness(mild symptoms without radiographic appearance of pneumonia), pneumonia(having symptoms and the radiographic evidence of pneumonia, with no requirement for supplemental oxygen), severe pneumonia(having pneumonia, including one of the following: respiratory rate > 30 breaths/minute; severe respiratory distress; or SpO2 ≤ 93% on room air at rest), and critical cases (e.g. respiratory failure requiring mechanical ventilation, Septic shock, other organ failure occurrence or admission into the ICU).
- Spirometry and pulmonary diffusion capacity test (Cosmed PFT Quark, Rome, Italy) were performed following the ATS-ERS guidelines on the day of or one day before discharge.
- To minimize cross infections, carbon monoxide diffusion capacity (DLCO) was measured by the single-breath method.

Results:

- Severity : 24 mild illness /67 cases of pneumonia /19 cases of severe pneumonia
- The mean age of these cases was 49.1 years.
- Fifty-five were females.
- Forty-four (40%) patients had at least one underlying comorbidity, of which 23.6% had hypertension and 8.2% had diabetes. Only 3 patients (2.7%) were reported having chronic respiratory diseases (one patient with asthma, one with chronic bronchitis and one with bronchiectasis).
- No significant differences were found among the three groups of cases, in the relation to gender, smoking status, underlying disease and the BMI value.
- The duration from onset of disease to pulmonary function test was 20±6 days in cases with mild illness, 29±8 days in cases with pneumonia and 34±7 days in cases that presented severe pneumonia. On the day of discharge, the SpO2% on room air at rest was normal in all subjects and no significant difference was found among the different groups (all $p>0.05$).

Results:

- Spirometry was uneventfully completed in all patients, except for two failed diffusion capacity tests.
- Anomalies were noted in DLCO% in 51 cases (47.2%), total lung capacity (TLC)% in 27 (25.0%), forced expiratory volume in the first second (FEV1)% in 15 (13.6%), forced vital capacity (FVC) % in 10 (9.1%), FEV1/FVC in 5 (4.5%), and small airway function in 8 (7.3%).
- Significant difference in impaired diffusing-capacity among the different groups of severity, which accounted for 30.4% in mild illness, 42.4% in pneumonia and 84.2% in severe pneumonia, respectively($p<0.05$). This trend of the gradual decrease in level of DLCO among patients was identical with the varying degree of severity.
- For about half (25/51) of the DLCO-impaired patients, the DLCO corrected for alveolar volume (DLCO/VA) was still within the normal range, which might indicate that DLCO decrease was more than the DLCO/VA in recovered subjects. The value of TLC % predicted in severe pneumonia cases was much less than that of pneumonia or mild illness, suggesting higher impairment of lung volume in severe cases.
- There was no significant difference among the discharged survivors with different severity in regard to other ventilatory defects (e.g. FEV1, FVC, FEV1/FVC).

Conclusions:

- In the follow-up studies for patients who had SARS lasting from half a year to two years in the rehabilitating SARS patients, impaired DLCO was the most common abnormality, ranging from 15.5% to 43.6%, followed by defected TLC, ranging from 5.2% to 10.9%.
- Wan et.al showed that 37% of MERS survivors still presented with an impairment of DLCO, but normal TLC at 12 months.
- This study seems to be more consistent with the findings in SARS.
- In this study, the greater decline in DLCO vs DLCO/VA suggests that diffusion membrane may be more causative of the pulmonary dysfunction compared to lowered lung volume. The low proportion and severity of small airway dysfunction in this cohort also suggests that COVID-19 is more likely associated with diffuse lung epithelial damage and small airway congestion.
- When evaluating lung fibrotic changes in SARS, the Dynamic DLCO scores were found more sensitive than HRCT.
- Whether survivors of COVID-19 with impairment of DLCO or residual abnormalities of chest CT will develop pulmonary fibrosis requires further investigation.

Limitations:

- The lack of the baseline PFT results prior to the illness make it difficult to make a comparison with the results after the illness. As there are only a minority of patients having chronic respiratory disease, it should be acceptable to speculate that the basic lung function in majority of patients would be normal.
- The association between CT image and the lung function parameter wasn’t analyzed in this study.
- The cross-sectional analysis only provides a short follow-up, the long-term dynamic variation of the lung function after hospital discharge still require further investigation.

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

This summary was prepared by Dr A Hiemstra and Dr E Maasdorp as part of the daily brief to the TBH ICU team.