# Lung Ultrasound as a tool for monitoring the interstitial changes in recently hospitalised patients with COVID-19 pneumonia - the COVIDLUS study

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## INTRODUCTION

Lung Ultrasound (LUS) can track the interstitial changes of COVID-19 pneumonia (CP) in the acute phase. CT is highly sensitive at detecting lung fibrosis post CP, but its use is associated with increased ionising radiation.

The COVID Lung Ultrasound Study (COVIDLUS) is a prospective single-centre pilot to assess the utility and feasibility of using serial LUS in adult patients recovering from CP.

## METHODS

21 subjects provided consent on the day of hospital discharge (D0) and were followed up for 83 days. High-resolution CT was performed on Day 83 and correlated with LUS scores (LUSS) on Days 0/41/83. 3 clinicians reviewed and scored the LUS images independently; CT scoring was performed by 2 thoracic radiologists blinded to the LUS findings.

Lymphocyte count, C-reactive protein, D-dimer, ferritin, lactate dehydrogenase and troponin (Days 0/41/83), spirometry (Days 41/83) and EQ-5D-3L (Days 41/83) were obtained as secondary outcomes. A 6MWT was performed at the end of the study.

## CONCLUSIONS

- LUS may be used to track the recovery of lung interstitial changes following CP.
- The utility of LUS to accurately predict development of lung fibrosis in post-COVID patients requires further study.

## REFERENCES

1. Lichter Y et al. Lung ultrasound predicts clinical course and outcomes in COVID-19 patients. Intensive Care Med. 2020 Oct;46(10):1873-1883

2. Soldati G et al. J Ultrasound Med. 2020 Jul;39(7):1413-1419

**Figure 1**
HRCT of study subject at day 83, depicting widespread but mild peribronchial and subpleural ground glass consolidation

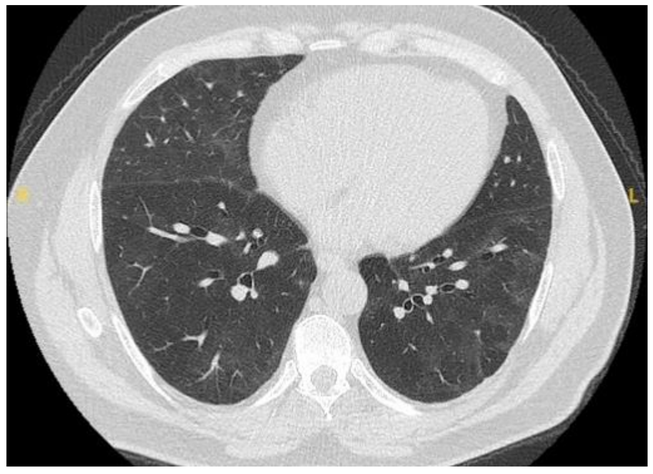
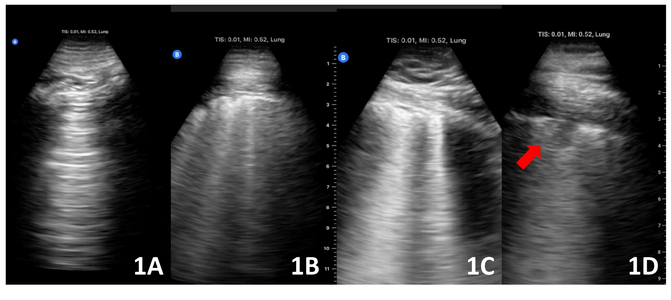
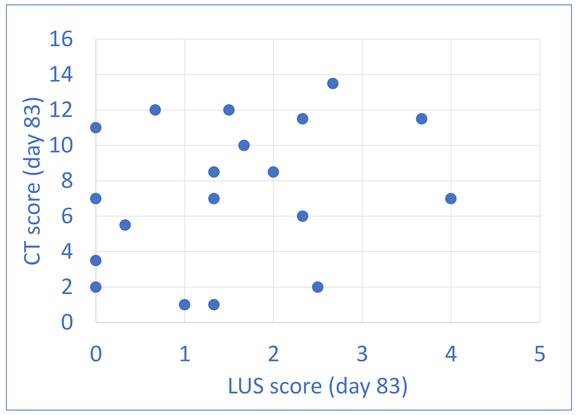
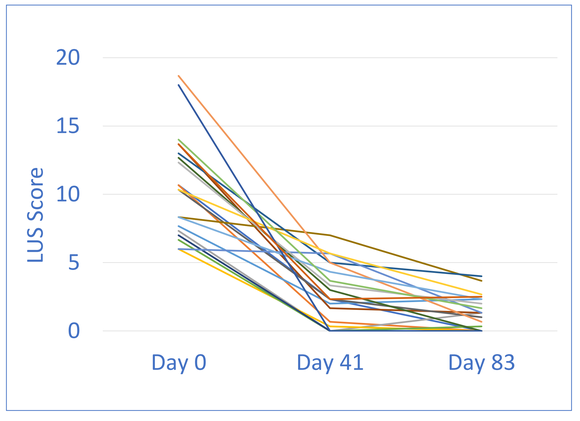


**Figure 2**
Representative LUS images showing (1A) normal Kerley A lines with normal lung sliding, (1B) Discrete Kerley B lines, (1C) Kerley B lines which coalesce, and (1D) areas of subpleural consolidation (indicated by arrow). Adapted from Lichter Y[1] and Soldati G[2] et al.

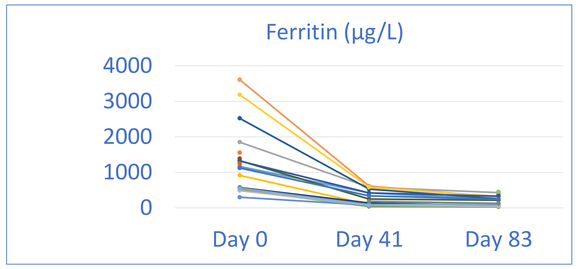



**LUSS correlated poorly with HRCT at Day 83** ($r^2$=0.28)




**Mean LUS scores decreased significantly by Days 41 & 83, as compared to Day 0 of the study**
(Mean LUS scores: 10.9 [D0] / 2.8 [D41] / 1.5 [D83]; p<0.0001)




**Ferritin was significantly lower at Days 41 and 83 compared to Day 0**

| Day | Lung function measure | n | Correlation coefficient | P-value |
|---|---|---|---|---|
| Day 41 | FEV1 | 19 | -0.29 | 0.22 |
| | FVC | 19 | -0.21 | 0.39 |
| | TLCO | 19 | -0.43 | 0.07 |
| Day 83 | FEV1 | 18 | -0.31 | 0.21 |
| | FVC | 18 | -0.18 | 0.47 |
| | TLCO | 18 | -0.33 | 0.19 |

Lung function did not show any significant association with LUS scores at Day 41 or 83. A small negative association between $TL_{CO}$ and LUS scores was noted at day 41, but this did not reach statistical significance

## OUTCOMES

- A total of 21 subjects consented to participating in COVIDLUS, whilst 19 (10 males [52%]; average age 52 years) completed the study. 1 patient died following complications of COVID-19 and 1 patient declined attending on Day 83 of the study
- Feedback from subjects showed LUS was well received without any reported adverse effects
- Despite the majority of patients showing resolution of LUS changes from COVID-19, a significant proportion (30%) continued to report poor health and limited exercise tolerance at Day 83