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Correspondence

Validation of the COVILUS score to diagnose COVID-19 in an emergency room cohort

In 2020, our team published a study on the association of lung ultrasound images with COVID-19 infection in an emergency room cohort [1]. We used the points described by the bedside lung ultrasound in emergency (BLUE) protocol (upper and lower BLUE points and posterolateral alveolar and/or pleural syndrome point) to develop a model for diagnosis of COVID-19 in patients presenting to the Emergency Department with suspected infection [2]. We found that a combination of clinical features and lung ultrasound signs were independently associated with positive SARS-CoV-2 infection. Subsequent development of adult respiratory distress syndrome (ARDS) was also associated with lung ultrasound signs (≥ 3 upper lung B-lines and ≥ 3 lower lung B-lines).

From our previously published data, we propose a score (COVILUS score between 1 and 6 points) taking into account the coefficient of each variable of lung ultrasound in a multivariable logistic model (Table 1). We then conducted a prospective observational study to validate this score on an independent cohort. Participants gave informed consent. We studied 100 patients admitted to the emergency room who underwent lung ultrasound for suspected COVID-19 infection as part of the BLUE protocol and who had a SARS-CoV-2 test. An independent, blinded clinician calculated the scores. Mean (SD) age was 67 (17) years and mean (SD) BMI was 28 (6) $kg.m^{-2}$. Twenty-nine patients had a positive SARS-CoV-2 test and 12 of these (41%) developed ARDS, six (21%) were admitted to ICU, four (14%) suffered a pulmonary embolism, three (10%) developed a secondary bacterial infection and six (21%) died. The area (95%CI) under the receiver operating characteristic curve of the COVILUS score was 0.92 (0.85–0.99). A score ≥ 4 could predict a positive SARS-CoV-2 test; sensitivity, 94% (86–98%); specificity, 66% (46–82%); positive predictive value, 53% (40–91%); and negative predictive value, 96% (86–97%). The odds ratio (95%CI) for subsequent ARDS in patients with COVID-19 was also independently associated with: ≥ 3 upper site B-lines, 1.55 (1.08–2.24), p = 0.03 and ≥ 3 lower site B-lines, 1.69 (1.23–2.31), p = 0.003.

Table 1 COVILUS score

Lung ultrasound signs	Points
Upper BLUE point: B lines ≥ 3	1
Lower BLUE point: Thickened pleura	1
Lower BLUE point: Subpleural consolidation	2
PLAPS point: Thickened pleura	2

BLUE, bedside lung ultrasound in emergency; PLAPS, posterolateral alveolar and/or pleural syndrome.

Some will argue that a rapid antigen test can be used to diagnose COVID-19 infection, as most produce a result in 15–30 min, but none of the antigenic tests so far evaluated are a robust accurate alternative to PCR for the diagnosis of COVID-19 in symptomatic subjects or contacts of infected patients (sensitivity of 66%–74% for significant viral load, specificity between 93% and 100% depending on the tests evaluated) [3].

In conclusion, use of the COVILUS score could diagnose COVID-19 infection with particularly good sensitivity and could facilitate more effective triage of patients presenting to emergency departments. Moreover, use of lung ultrasound could identify the signs associated with development of a severe form of COVID-19.

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Resternotomy revisited

Since the publication of our UK national audit of resternotomy after cardiac surgery [1], we have performed additional analysis examining the variation in resternotomy across centres. Figure 1 shows a Forest plot of each centre and the number of resternotomies performed as a proportion of the total number of cases performed in the year. It can be seen that there are outliers in both directions; centres with higher than expected rates (centres 15 and 17) and centres with lower rates (centres 14, 22 and 24).

There are numerous caveats to this analysis. Primarily these are uncontrolled data; we did not examine when resternotomy occurred, the pathways involved in each centre or when it occurred. However, the analysis does point to differences in practice that are affecting patient outcome. We intend to expand this work to examine why some centres have lower rates of resternotomy by collecting further data and liaising with the centres.

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Reference

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Study	Events	Total	Propotion	Weight (%)	95% CIs
1	2	14	0.14	1.8	-0.07 - 0.35
2	1	14	0.07	1.8	-0.08 - 0.23
3	1	38	0.03	4.89	-0.03 - 0.08
4	0	16	0	2.06	0 - 0
6	12	60	0.2	7.72	0 - 0.3
7	3	25	0.12	3.22	-0.02 - 0.26
8	3	20	0.15	2.57	-0.02 - 0.32
11	12	51	0.24	6.56	0.11 - 0.36
13	12	38	0.32	4.89	0.16 - 0.47
14	1	9	0.11	1.16	-0.15 - 0.37
15	22	122	0.18	15.7	0.11 - 0.25
16	4	27	0.15	3.47	0 - 0.29
17	7	49	0.14	6.31	0.04 - 0.24
18	7	62	0.11	7.98	0.03 - 0.19
19	6	52	0.12	6.69	0.03 - 0.21
20	12	38	0.32	4.89	0.16 - 0.47
21	5	31	0.16	3.99	0.02 - 0.3
22	4	6	0.67	0.77	0.12 - 1.21
23	0	18	0	2.32	0 - 0
24	3	33	0.09	4.25	-0.01 - 0.19
25	9	34	0.26	4.38	0.11 - 0.42
27	1	20	0.05	2.57	-0.05 - 0.15
total	**127**	**777**	**0.16**	**100**	**0.14 - 0.19**

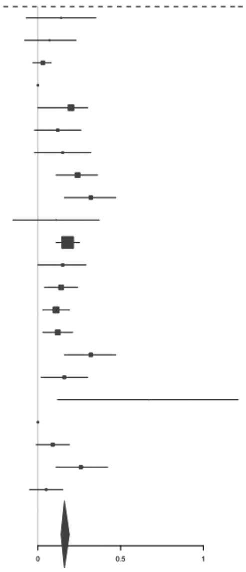

Figure 1 Forest plot of each centre and the number of resternotomies performed as a proportion of the total number of cases performed in the year.

