A Modified Ultrasound Lung Score in Patients with Pulmonary Symptoms of COVID-19 in the Emergency Department

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Objective: To evaluate whether a modified lung score (MLS) on bedside ultrasound for COVID-19 patients with pulmonary symptoms was associated hospital admission, length of stay, and survival to hospital discharge. Association with older age was also assessed.

Methods: This cross-sectional study was conducted from August 1, 2021 to September 30, 2021 at a tertiary care teaching hospital with an emergency medicine ultrasound fellowship. The study included patients with confirmed COVID-19 who presented to the emergency department with pulmonary symptoms. Ultrasound was performed by Emergency Medicine faculty and residents with basic training in bedside ultrasound, including point-of-care pulmonary ultrasound. The COVID-19 lung score was developed to risk stratify severity of pulmonary complications including interstitial edema and consolidation; it ranges from 0-36 with A lines = 0, isolated B-lines = 1, confluent B-lines = 2, and subpleural consolidation = 3. This includes 12 lung zones: anterior superior, anterior inferior, lateral superior, lateral inferior, posterior superior, and posterior inferior on both right and left lungs. We modified the score to include only 8 zones, excluding the four posterior lung zones, to avoid moving critically ill patients into the upright or decubitus positions. Our modified lung score had a total score that ranged from 0-24. Outcome measures included survival to hospital discharge, hospital admission, and length of stay. Age was categorized into 50 years and older vs younger than 50 years. Data were analyzed using means with 95% confidence intervals and independent sample t-tests as well as area under the ROC Curve (AUROC).

Results: There were 31 patients with confirmed COVID-19 who had a modified lung score (MLS) measured. Outcome measures were available on 17 patients. Mean age of patients was 64 (SD 24) years, 56% were female, and mean weight in Kg was 85 (SD 46). Race distribution was 44% black, 11% Hispanic, 39% white, and 6% unknown. There were 83% admitted to the hospital, 11% were admitted to the ICU, and 22% did not survive to hospital discharge. Mean hospital length of stay was 6.7 (SD 7.8) days. The MLS was 10.4 (95%CI 6.7-14) in admitted patients and 5.7 (95%CI 0-24) in discharged patients. There was no significant correlation with hospital length of stay rho=0.27 (95%CI -0.26-0.67). The MLS was 12 (95%CI 0-24) in patients who did not survive to hospital discharge and 9 (95%CI 5.2-12.8) in patients who survived to hospital discharge. The MLS predicted mortality with an AUROC 0.66 (95%CI 0.32-0.99). The MLS was higher in patients 50 years and older compared to those younger than 50 years 10.8 (95%CI 6.6-15.1) versus 6.4 (95%CI 0-13.7), but it was not statistically significant.

Conclusion: This study describes how ultrasound lung scores can be used in the emergency department to evaluate COVID-19 patients with pulmonary symptoms. Although the study is limited by the small sample size, there was a tendency for the modified lung score to be higher in admitted patients and in those who did not survive to hospital discharge with a fair predictive ability of survival. Further studies with a larger sample of patients are needed to further evaluate this non-invasive method of predicting survival in COVID-19 patients in the emergency department.