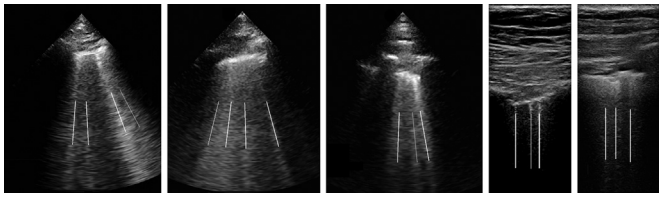
collection were performed on days 3, 5, 7 or 12+/- 1 day for admitted patients. All clips with 2 or more B-lines were included (N=80), as well as a random selection of 70 clips with 1 or fewer B-lines. B-line count for inclusion was based on visual rating by two researchers with POCUS training. A POCUS fellowship trained emergency physician visually assessed each clip frame and counted the maximum number of B-lines per clip. This was compared to automatic counts by the commercially available Lumify TM Lung B-lines Quantification software by intraclass correlation coefficient (ICC) and Cohen's weighted kappa.

Results: Of the 899 total clips,150 clips from 30 unique subjects and 44 overall exams were used for analysis, with 100 clips from patients with confirmed COVID by PCR. The average maximum B-line count by algorithm was 1.52 +/- 1.24, and that by expert was 1.60 +/- 1.35 (ns). The ICC between algorithm and expert was 0.87 (95% CI 0.83-0.91), with a weighted kappa of 0.64 (95% CI 0.48-0.81), indicating substantial agreement. Average of maximum B-line counts, ICC and weighted kappa between algorithm and expert were comparable for COVID+ and COVID- subgroups as well as between transducer types. For COVID + subgroup, the average of maximum B-line counts was 1.73 +/- 1.28 for algorithm and 1.78 +/- 1.37 for expert, with weighted kappa 0.67 (95% CI 0.50-0.84), and ICC 0.87 (95% CI 0.83 to 0.91).

Conclusion: An automated algorithm developed on non-COVID patients can accurately distinguish and quantify B-lines in clips from patients with COVID-19, with substantial agreement to expert visual rating.



20 Safer Delivery of Aerosolized Medications When Dealing With COVID-19 and Other Contagious Airborne Viruses

Pepe PE, Rios S, Leal L, Cardona JC, McNally MA, Roach JP, Antevy PM/University of Texas Health Sciences Center, Houston, TX (USA), Houston, Texas, City of Coral Springs / Parkland Fire Department, Coral Springs, Florida, Memorial Healthcare System and Joe DiMaggio Children's Hospital, Hollywood, Florida, Coral Springs / Parkland Fire Department, Coral Springs / Parkland Fire Department, Coral Springs, Florida, Cleveland Clinic of Florida, Broward Sheriff's Office, Fort Lauderdale Fire Rescue, Weston, Florida, Coral Springs / Parkland Fire Department, Davie Fire Rescue and Palm Beach County Fire Rescue, Coral Springs, Florida

Study Objective: Nebulizer treatments for ill patients with chronic lung disease, reactive airways and other respiratory emergencies have been implicated in aerosolized spread of highly contagious airborne viruses, including COVID-19. Considering the increased risk of aerosolized spread of viruses within confined ambulance compartments, this study specifically evaluated a specially designed nebulizer mask modified with expiratory-port filters and sealing faceplates to minimize bio-aerosol spread.

Methods: Recognizing that fugitive aerosol emissions (such as those that would possibly carry COVID-19) typically range from 0.5 to1.5 micron (μ), a six-port (0.3–10μ) Kanomax 3889 R particle measurement (PM) counter was placed 78 cm from each of 15 rotating adult volunteers (non-patient, beardless) including 7 women and 8 men, ages 18-59 with a mean age of 39 years. The subjects were each sitting upright on a stretcher within a closed standard ambulance compartment. Assigned to one of three rotating fleet ambulances, subjects used the EMS agency's usual jet-nebulizers with a conventional mask (CM) and then returned on another day to receive jet-nebulization with the aerosol-controlling mask (ACM) or vice versa (ACM first day, CM next day). After documenting baseline ambient PMs (PM amb) within the compartment, the Kanomax operator quickly brought in a subject, closed the door, and waited 5 minutes before making a pre-nebulization PM (preNeb-PM). Jet-nebulizers (using H 2 0 solutions) were then applied (either by CM or ACM as described) for 5 min with immediate post-nebulization measurements (Post1) and two successive measurements (Post2/Post 3), all five minutes apart.

Results: Following the 5-min nebulization, mean CM PMs (Post1 cm) were 152.2-fold larger than mean ACM PMs (Post1 ACM) measurements (p=0.001) and respectively remained 49.6-fold (p=0.005) and 7.2-fold (p=0.006) larger at Post2 and Post3 readings. PM amb and preNeb-PM were all similar (NSD) for both ACM and CM approaches when examining all studied particle sizes (0.5, 1.0, and 3.0 μ) including 1μ preNeb-PMs, measuring 6,977 for ACM approaches and 5,683 for CM use, respectively (NSD). While mean Post1 ACM 1μ PMs decreased (-31.7%) from pre-Neb-PM readings (6,977 to 4,662; p=0.002), counterpart Post1 CM 1μ measurements rose 14,500.09% (from 5,683 to 709,549.93; p=0.002) with corresponding significant elevations for 0.5μ (p=0.001) and 3μ (p=0.002) particle sizes using conventional masks. Of additional note, though applied for just five minutes, ACMs were uniformly well tolerated.

Conclusion: Compared to conventional methods, a modified mask system designed specifically to limit aerosolization of inhaled solutions did provide profound control of fugitive aerosolized particle emissions during nebulizer applications. The findings indicate a much safer approach to treating COVID-19 patients and all others requiring nebulization.

21 Lung Ultrasound Versus Chest X-Ray for the Radiographic Diagnosis of COVID-19 Pneumonia in a High Prevalence Population

Gibbons RC, Mendez K, Magee M, Goett H, Murrett J, Genninger J, Tyner N, Tripod M, Costantino TG/Lewis Katz School of Medicine at Temple University, Philadelphia, Pennsylvania

Study Objectives: The viral illness severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), more commonly known as coronavirus 2019 (COVID-19), has become a global pandemic infecting over 160 million individuals worldwide. Symptoms are often vague, and physical exam findings have proven unreliable as indicators of infection. Therefore, diagnosis typically relies on imaging or nasopharyngeal swabs. The objective of this study was to compare point-of-care lung ultrasound (LUS) with chest x-ray (CXR) to determine which is the more accurate diagnostic imaging modality for diagnosing COVID-19 pneumonia.

Methods: This was a single-center, prospective, observational study at an urban university hospital with >105,000 patient visits annually. Patients >18 years old, who presented to the emergency department with signs and symptoms of COVID-19, were eligible for enrollment. Each patient received a LUS, performed by an emergency medicine resident or attending physician, using a portable, handheld ultrasound and a portable AP CXR after the LUS was completed. High-risk patients or those with an abnormal imaging finding underwent a non-contrast-enhanced computed tomography (NCCT) as the diagnostic standard. The primary outcome was the sensitivity and specificity of LUS and of CXR at identifying COVID-19 pneumonia against NCCT as the reference standard. Using a power analysis of 80%, our sample size calculation of 98 patients was based on previous data demonstrating a 20% difference in sensitivities between LUS and CXR at diagnosing pneumonia. Data are presented as proportions with 95% confidence intervals (CIs). Data analysis included the chi-square and t tests.

Results: 143 consecutive patients with signs and symptoms of COVID-19 were approached and enrolled. 27 patients were considered low-risk by the attending per emergency department guidelines, and 6 patients were admitted for alternate diagnoses without advanced imaging. 110 patients underwent LUS, CXR, and NCCT. 99 LUS and 73 CXRs were interpreted as positive. 81 NCCT were interpreted as positive providing a prevalence of COVID-19 pneumonia of 75% (95% CI 66.0-83.2) in our study population. Sensitivity of LUS was 97.6% (95% CI 91.6-99.7) vs 69.9% (95% CI 58.8-79.5) for CXR. Specificity was 33.3% (95% CI 16.5-54.0) for LUS and 44.4% (95% CI 25.5-64.7) for CXR. LUS positive and negative likelihood ratios were 1.46 (95% CI 1.12-1.92) and 0.0723 (95% CI 0.01-0.31), respectively vs 1.26 (95% CI 0.87-1.81) and 0.67 (95% CI 0.39-1.16) for CXR. PPV and NPV for LUS were 81.8% (95% CI 72.8-88.9) and 81.8% (95% CI 48.2-97.7) compared to 79.5% (95% CI 68.4-88.0) and 32.4% (95% CI 18.0-49.8) for CXR.