

RATIONALE

- Lung auscultation is used in the diagnosis and management of respiratory diseases in both outpatient and acute care settings.
- As clinician assessment is labor intensive, the current standard of care consists of intermittent auscultation.
- While telemedicine tools have been developed to enable intermittent assessments in patients' homes, there is no existing practical method for continuous auscultation.
- We developed the Strados Remote Electronic Stethoscope Platform (RESP) for continuous monitoring and analysis of respiratory sounds.
- We hypothesize that continuous auscultation as a modality of monitoring is more sensitive than intermittent auscultation in determining the presence of wheezes in patients presenting with asthma or COPD exacerbation.

METHODS

- Adult patients with a diagnosis of COPD and/or asthma presenting to New York Metropolitan Hospital emergency department (ED) with respiratory distress were included.
- Lung sound recordings up to 40 seconds were made using an electronic stethoscope (3M Littmann 3200) while the patient inhaled deeply.
- Continuous auscultation using RESP (Figure 1) continued until the patient was discharged home or admitted to the hospital.
- Patients were instructed to breathe normally during continuous auscultation.



Figure 1: Remote Electronic Stethoscope Platform (RESP)

	Intermittent auscultation	Continuous auscultation
Number of patients enrolled	43	43
Number of patients analyzed	40	40
Total duration of recording (minute)	28	2492
Average duration of recording per patient (minute)	0.7	62.3
Number of wheezes captured	550	2896
# of patients with wheezes	31/40 (77.5%)	34/40 (85%)

Table 1: Intermittent vs continuous auscultation in wheeze detection

- Two board-certified physicians listened to the Littmann and RESP recordings to determine the presence or absence of wheezes.
- Descriptive statistics were used to analyze the results.

RESULTS

- 43 patients were included in the study, of which 40 patients were included in the analysis due to incomplete data in 3 patients.
- The average length of continuous auscultation recording was 62.3 minutes.
- 77.5% (31/40) of intermittent auscultation recordings contained wheezes.
- In contrast to 85% (34/40) of continuous auscultation recordings.

CONCLUSION

- Although limited by a small sample size, our study suggests that continuous auscultation may be superior to intermittent auscultation in determining the presence of wheezes in patients presenting with asthma or COPD exacerbation.
- Additionally, our study demonstrates the feasibility of this monitoring modality in a noisy and hectic emergency room.
- Although not detailed in this abstract, the accuracy of our machine learning algorithm in wheeze detection stands at 94% and the methodology will be reported separately in a data science forum.
- Remote continuous auscultation may be a useful application in a range of cardiopulmonary disorders, and further studies are warranted.