# INCREASING ABNORMAL LUNG SOUNDS AFTER DISCHARGE FROM COPD EXACERBATION PREDICTS READMISSION

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## Purpose

- The post-acute care patient loses the daily physician monitoring available during hospitalization. Strados Labs' *RESP*™ Biosensor is an FDA-cleared wearable device that enables archiving of a patient's lung sounds for longitudinal analysis, which reduces the impact of inter-operator variability and provides a valuable clinical decision tool for post-acute care, telemedicine, and long-term care.

- We conducted an observational device feasibility study to evaluate the relationship between respiratory sounds and pulmonary status.

## Methods

- A *RESP* Biosensor was placed on the left upper chest of a 49-year-old male with morbid obesity admitted for acute exacerbation of chronic obstructive pulmonary disease (AECOPD). Periodic recordings were collected for 30 seconds every fifteen minutes during hospitalization and continued after discharge to home. Data from the *RESP* Biosensor was not available to the treatment team for clinical decision making. Separately, we collected the attending physician's pulmonary exam findings daily.

- During hospitalization, the *RESP* Biosensor collected increasingly abnormal lung sounds per day leading up to discharge. However, clinician assessment via daily bedside auscultation indicated resolving wheezes and improved air movement. On hospital day 4 (day of discharge), the patient was no longer tachypneic and reported normal oxygen saturation on room air. He was discharged home. However, the *RESP* biosensor collected 44.44% increase in cough and 119% increase in wheeze between hospital day 3 and the day of discharge.

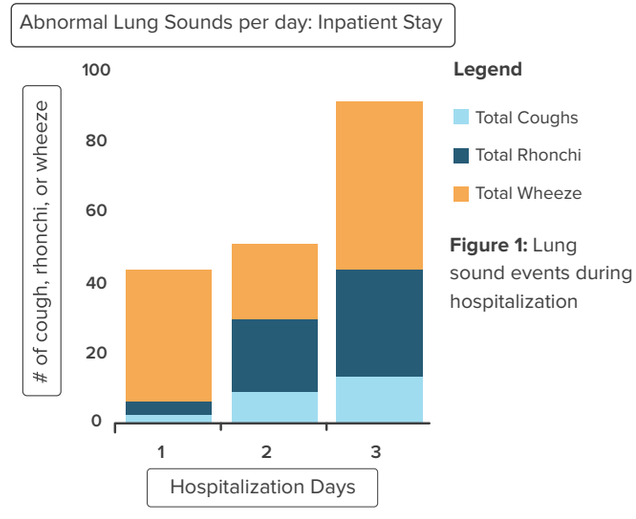


**Figure 1:** Lung sound events during hospitalization

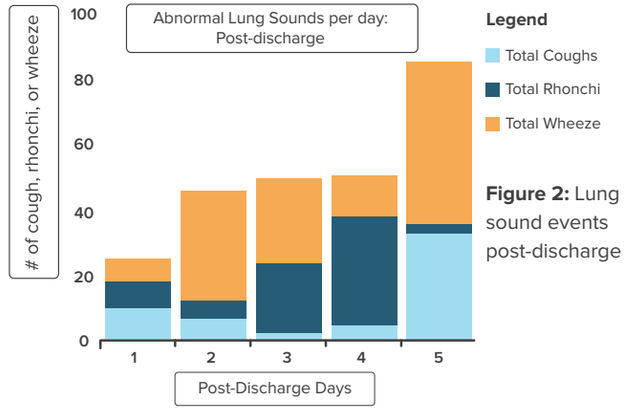


**Figure 2:** Lung sound events post-discharge

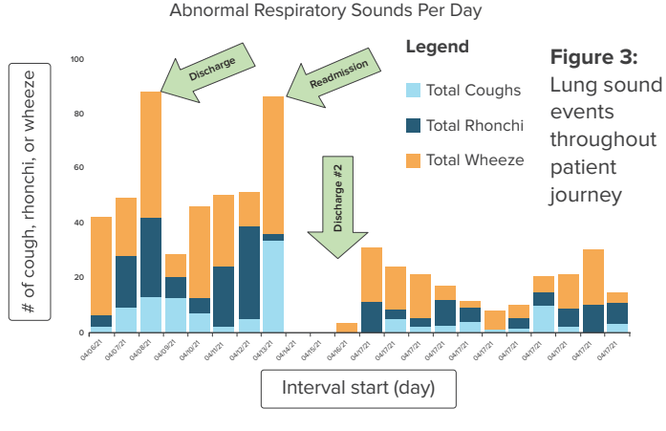


**Figure 3:** Lung sound events throughout patient journey

## Results

- After discharge, the patient continued to wear the *RESP* Biosensor, which collected increasing coughs, rhonchi, and wheezes over 5 days. On post-discharge day 5, the patient sought medical intervention and was subsequently readmitted. The biosensor captured a 316% increase in wheezes and a 580% increase in coughs on the day of readmission as compared to the previous day.

- He resumed wearing the *RESP* Biosensor for 11 days when he returned home after the second readmission. The biosensor continued to collect coughs, rhonchi, and wheezes from the patient, which remained consistent and lower as compared to previous days before medical intervention.

## Conclusions

- Increasing frequency of abnormal lung sounds captured by the *RESP* Biosensor during the immediate post-acute period predicts clinical worsening and could be a biomarker to guide earlier interventions. Outpatient data provide a useful baseline against which to assess early worsening.

- The relatively stable amount of abnormal respiratory sounds collected over 11 days after the patient's second admission may reflect his baseline symptomatology.

## Clinical Implications

- Longitudinal analysis of abnormal lung sounds could offer a biomarker independent of the patient's vital signs and oxygen requirement to predict clinical worsening and guide clinical decision-making.