The Strados Remote Electronic Stethoscope Platform - a novel wearable remote auscultation system designed to collect longitudinal lung sounds with equivalent fidelity as FDA-cleared stethoscopes

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RATIONALE

- Lung auscultation is used in the diagnosis and management of respiratory diseases in both outpatient and acute care setting. The current standard of care consists of ad-hoc episodic checks of a patient's respiratory status in which the true character and quality of the patient's worsening respiratory condition may be missed because of insufficient longitudinal data.

- A novel wearable device was developed, the Strados Remote Electronic Stethoscope Platform (RESP), as a diagnostic aid to clinicians to extend the temporal and geographic reach of traditional stethoscopy. RESP is comprised of a wearable device, a mobile application, and a clinician portal through which clinicians can review lung sounds..

METHODS

- We developed RESP as a diagnostic aid that can adapt to existing clinician workflows and EMRs. The Strados Wearable Device (SWD), a component of the RESP, is a lightweight wearable that adheres to the chest wall using a medical grade adhesive similar to Tegaderm. (Figure 1)

- The Strados Mobile App (SMA) installed on a smartphone provides the user interface to configure and operate the wearable SWD. The mobile app can also be used to playback recorded lung sounds. (Figure 2)

Figure 1. The SWD passively detects, amplifies, collects, and stores lung sounds. The SWD is rechargeable and has 10-24hr of battery life depending on configuration. It was designed to be cleaned with commonly used antiseptic wipes.

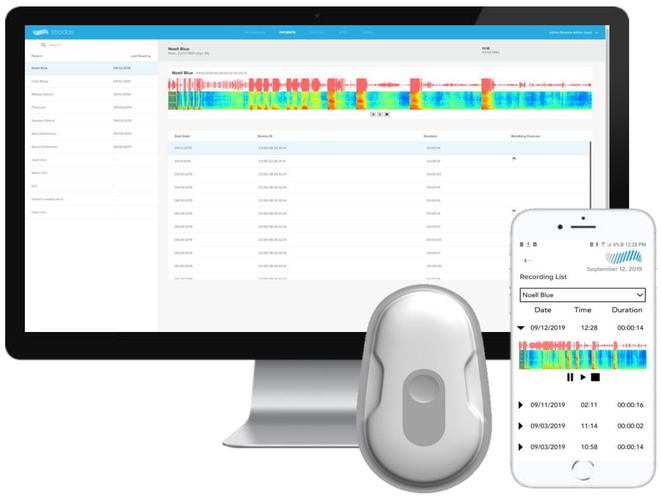

Figure 2. The Strados Mobile App (SMA) and the Strados Clinician Portal (SCP)

- The Strados Clinician Portal (SCP) lists recorded lung sounds and displays the corresponding audio spectrograms of patient recordings, for clinician review. The system was designed to record the lung sounds to equivalent fidelity as current FDA cleared devices. (Figure 2)

RESULTS

- The RESP has a sample rate of 4kHz and an audio frequency range of 50Hz – 2000Hz, which is equivalent to FDA-cleared electronic stethoscopes.

- The system transfers the lung sound data to a mobile phone using low-energy Bluetooth, and subsequently stores the data on the cloud accessible by the Strados clinician portal.

- RESP system is HIPAA compliant and secured with industry-standard encryption.

- The system architecture is engineered to allow flexible integration with existing EMRs and tele-health platforms.

CONCLUSION

- The Strados RESP can be used in acute care and home settings to provide data that has largely been difficult to collect, allowing clinicians to glean new insights and intervene early before disease decompensations cause significant morbidity and mortality.

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