

Results of Clinical Performance Testing of a Novel Wearable e-stethoscope in Patients with Chronic Lung Diseases

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RATIONALE

- Auscultation of lung sounds has remained a major challenge to remote patient monitoring, telemedicine including tele-ICU management and post discharge care whether hospitalization resulted from exacerbation or surgery.
- The Strados Labs Remote Electronic Stethoscope Platform (RESP®) is the first and only device that offers the clinical staff access to the patient remotely with a wearable device, adhered to the chest wall and designed to capture all lung sounds and transmit them through AWS or SD card retrieval for annotation, interpretation recording and uploading to a clinician accessible portal.
- We hypothesize that that one device, placed initially by a clinician, is adequate to assess changes in sounds transmitted through the airways associated with asthma, rhonchi, bronchitis, and cough.

METHODS

- Five (5) Adult patients with a diagnosis of a cardiopulmonary disease presenting to Bay Area Hospital in Coos Bay, Oregon were included.
- Four devices were placed on the patients as indicated in Figure 1 by an expert (physician skilled in auscultation).
- One (1) minute audio recordings were captured.
- Additional one (1) minute recordings were captured with two devices with locations selected as optimal “listening” sites.
- Additional one (1) minute recordings were captured with one device with the location selected as the optimal “listening” site.

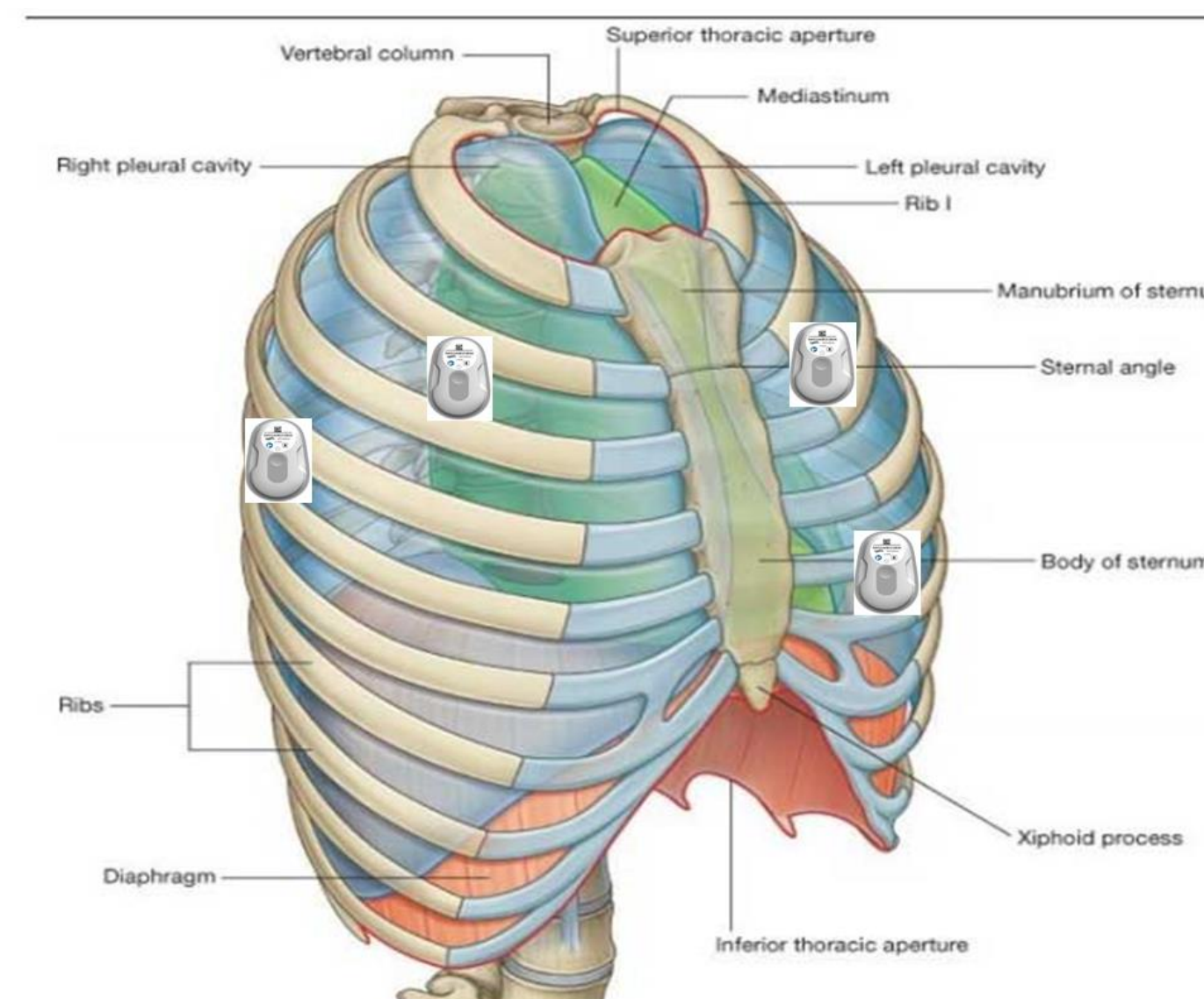


Figure 1: Placement of the 4 RESP™ devices

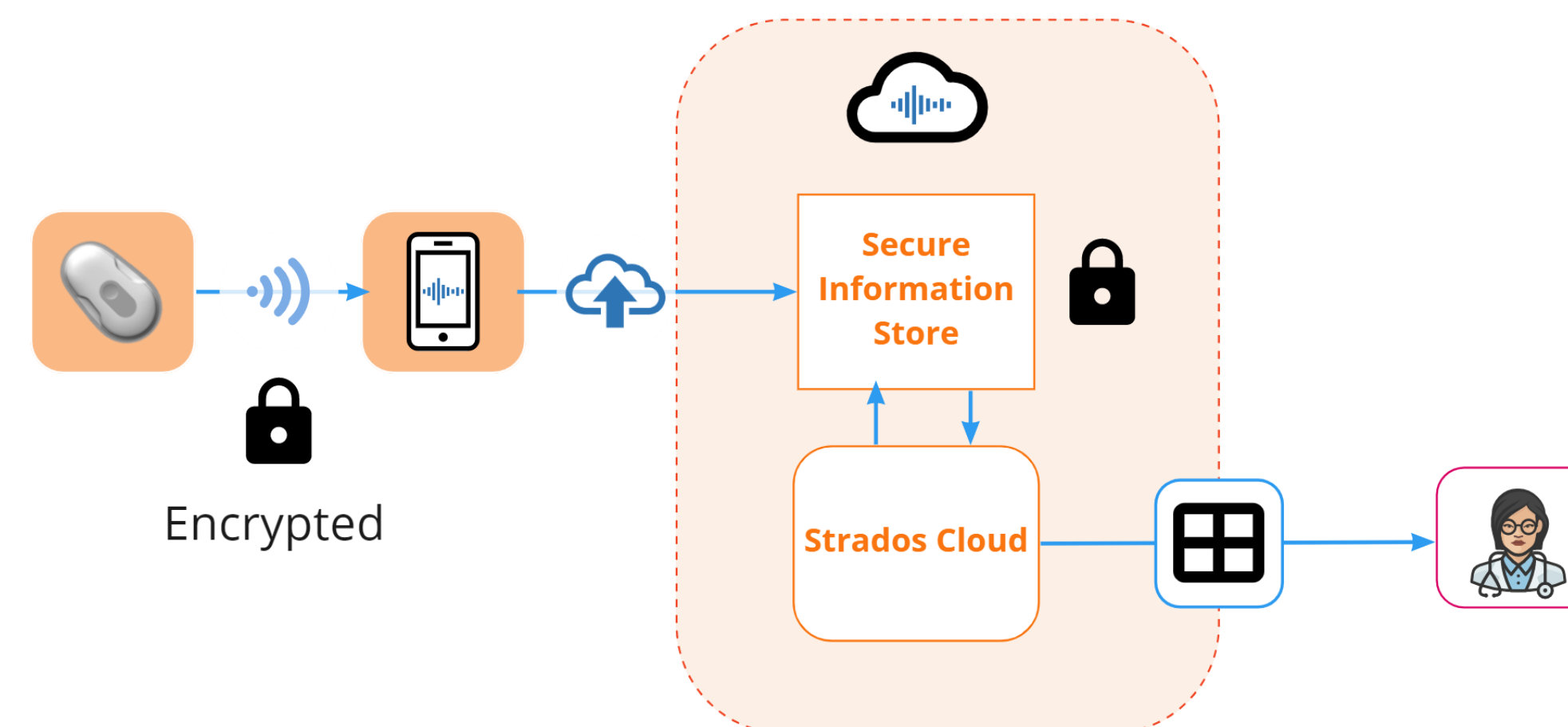


Figure 2: RESP™ Data collection process

- Additional one (1) minute recordings were captured with controlled background noise (music, talking, and white noise at approximately 60 decibels)
- During segments within each of the recordings a Littmann 3200® recorded lung sounds for comparison.
- At least two board-certified physicians listened to the Littmann 3200® and RESP® recordings.

RESULTS

- The physicians summarized the sounds heard as the same between the RESP® and the Littmann 3200 for forty-seven (47) of the fifty (50) paired recordings which included rales, wheezes, rhonchi, coarse breathing, coughs, diminished breath sounds, and no breath sounds.
- For three (3) of the paired recordings that were not identical, the difference was discriminating among normal, diminished, and no lung sounds.
- In some cases, the reviewers noted that inspiratory wheeze and expiratory wheeze could be determined with the RESP®, but not the Littmann 3200®.

CONCLUSION

- Novel methodologies must be compared with reference devices that provide a “ground truth” for comparison.
- In the case of lung sounds, including cough, wheeze, rhonchi, crackles, or rales the RESP® provides substantially equivalent performance to a gold standard.
- For patients with diffuse lung sounds associated with airway diseases, a single RESP® is sufficient to capture diffuse lung sounds and changes.
- See also ABS 5749