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Novel low-cost remote respiratory auscultation device vs. traditional stethoscope

Telemedicine, Monitoring, Diagnosis

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Background: There are no inexpensive remote auscultation devices that could be accessible for use by the general population, therefore a universal solution was designed that transforms a mobile phone into an auscultation instrument.

Aims: Compare the spectral characteristics of the Clarity® vs. traditional electronic stethoscope. Evaluate the quality of the audio samples of the Clarity® vs. traditional electronic stethoscope by expert doctors.

Methodology: A non-randomized observational study was carried out. Recordings were made in the right lateral of a Sim Man Laerdal® Advanced Medical Simulation Mannequin with the Clarity® coupled to a Huawei P smart 2019 mobile and with the Electronic Stethoscope Littmann© 3200, collecting samples of normal respiratory sounds, crackles, rhonchi, and wheezing. The technical characteristics were unified using Adobe Audition©. The spectral characteristics were compared in pairs according to the type of noise acquired using MATLAB©. A blind interactive online form was made, where medical experts listened recordings of both devices and evaluated them.

Results: Grouped in pairs according to clinical situation, using MATLAB©. The squared magnitude coherence was calculated between the frequency spectra, obtaining a high coherence in the spectrum characteristic of each type. The interactive online form was completed by 84 physicians. In the evaluation of the quality of the recordings, Clarity® obtained an average of 8.35 out of 10, while the electronic stethoscope obtained 6.58 with a p-value <0.001.

In conclusion, the recordings of the Clarity® device are of comparable quality to those of a traditional electronic stethoscope.