Helena Binetskaya, J Pulm Respir Med 2018, Volume 8
DOI: 10.4172/2161-105X-C2-030

7th International Chronic Obstructive Pulmonary Disease Conference

October 22-23, 2018 | Rome, Italy

Possibilities of early detection of COPD exacerbations

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Statement of the Problem: COPD exacerbations contribute significantly to the total COPD burden on the healthcare systems due to considerable morbidity and mortality associated with COPD. At the same time, it is now recognized that many exacerbations are delayed to be reported or are not reported at all to healthcare professionals. This results in significant impact on exacerbation outcomes, hospitalization, and health status. Early detection and prompt treatment of COPD exacerbation can reduce their impact on health status and health care utilization.

Methodology & Theoretical Orientation: LungPass—an innovative device that can be used for early detection and monitoring of lung conditions, including COPD exacerbations. It works on the basis of lung sound detection using a digital stethoscope with a subsequent evaluation of auscultation data and questionnaires (including symptoms, peak expiratory flow rate (PEFR), adherence to therapy, etc.) through a developed mobile application. The first step of our study after the algorithm development was evaluation of its accuracy in lung sounds detection compared with "gold standard" and individual practitioners. The second step will be assessment of the possibility of using the device for early detection COPD exacerbations and managing them in cooperation with healthcare providers.

Findings: 300 audio records from patients with bronchitis, pneumonia, asthma and COPD were classified by the developed diagnostic algorithm and the overall classification accuracy was 90.8% (for normal breathing sensitivity (Sn): 82%, specificity (Sp): 99%, for wheezes+rhonchi Sn: 93%, Sp: 99%, for coarse crackles+fine crackles Sn: 98%, Sp: 90%). To date, a study protocol for second step of our research has been developed.

Conclusion & Significance: The developed device and app demonstrated high lung sound classification accuracy and together with analyzing change of symptoms, daily activity, using of short-acting bronchodilators, PEFR, etc. may be used for monitoring and early detection of COPD exacerbations.

Biography

Helena Binetskaya is CEO and co-founder of a medical device startup Healthy Networks. LSE alumni and Quality assurance engineer in the past, she ventured into respiratory world after her baby daughter started coughing badly. Worried about pneumonia, she took her to a hospital - only to find out it was a nasal drip. Upon returning home, she discovered dozens of PubMed articles on Computer Lung Sound Analysis outperforming humans. Together with PhDs in Respiratory from Belarus LungPass, a very affordable device for early detection and monitoring of lung conditions was created.

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