

OREO

Advancing personalized prevention strategies for chronic obstructive pulmonary disease and associated comorbidities that utilize existing IT technologies and novel AI based tools

ABSTRACT

COPD is a major global public health concern affecting around 12% of the population, as evidenced by GOLD in 2023. Being the third leading cause of death, following cardiovascular diseases, COPD imposes a considerable economic strain, with an estimated direct cost of approximately 38.6 billion Euros per year in the EU alone. Exacerbation occurs during the natural course of the disease and increases with disease progression despite pharmacotherapies and interventional approaches. It often requires hospitalization, degrades the quality of life, and increases the socio-economic burden. It is thus essential to shift the current paradigm of managing exacerbation events to early prediction and timely intervention that can prevent occurrences and hospitalization. By employing novel approaches to build a holistic data-driven prediction model, we address current limitations in this field which generally take into account a specific or limited class of information. At the same time, involving patients in three countries provides a much-needed support for generalization across diverse stakeholders and geographic regions.

In this context, we aim to reach beyond SOTA in the preventive care of COPD patients and pioneer the development of a holistic prediction model, supported by an underlying AI framework and a digital platform. It combines analysis of speech and text narratives with health parameters related to comorbidities and with a plethora of triggering factors such as sleep data, diet, stress, and environmental variables. We complement our prediction model with personalized profiles of the platform users which reflect indicators and triggers (early predictors) of a patient's exacerbation, concurrently serving as an access point for educational content for all involved stakeholders. We will start from the consortium partners' existing solutions and leverage the involvement of a wide range of stakeholders from Poland, Romania and Italy. We will use novel AI approaches to develop prediction models for exacerbation by integrating information regarding the risk of exacerbation. Then, we will validate the model to identify its predictive power and adequacy. We will also build personalized profiles of early predictors for the pilot users. By involving more than 300 users we will promote the adoption into medical care and transferability at a larger geographical scale while accounting for differences between different legal, economic, and educational contexts. The ultimate goal is to improve healthcare systems' quality, efficiency, equity, and sustainability. This in turn, will improve the quality of life of COPD patients and caregivers, will reduce the burden and costs for healthcare services. Tertiary prevention is OREO's main focus. However, by including in our models a plethora of triggers and indicators linked to COPD, we will also provide novel tools for secondary prevention by identifying risk factors that can be addressed to reduce, delay, and avoid COPD development.

Backed up by scientific evidence, we can indubitably claim that the implementation of a COPD exacerbation prediction model that can be used non-intrusively and reliably by patients at home, will have a profound impact on both individual health outcomes and the broader landscape of healthcare

services. At individual level, OREO has the capability to contribute to improve health, disease control, and life quality, reduce absenteeism due to illness, and improve economic stability. We expect the health economics to reveal a 25% reduction in costs for the patients. Personalized profiles will help patients better understand their risk factors and become more responsible in managing them by acting timely and effectively. It will also support clinicians in making informed decisions, ultimately benefiting both patients and healthcare providers. Adoption into healthcare services will enhance their efficiency, optimize resources, save costs and support long-term sustainability.

KEYWORDS

- COPD
- AI
- Multi-variable exacerbation prediction model
- Exacerbation
- Language processing
- Speech processing

DURATION

36 months

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