

Next-generation asthma inhalers

December 7 2018



Credit: Konstantinos Votis

In Europe alone, there are almost 30 million people who suffer from asthma. The myAirCoach project provides an innovative smart inhaler device along with integrated mobile Health (mHealth) personalised asthma monitoring services for empowering and guiding patients with asthma to manage their own health on a daily basis.

Asthma, a chronic inflammatory disease of the airways, is the most common disease of childhood, posing a significant socioeconomic burden. Although [asthma](#) cannot be cured, its symptoms can be satisfyingly controlled to ensure the best quality of life for [asthma patients](#).

To address this issue, the EU-funded [myAirCoach](#) project proposed a novel mobile health tool so patients can manage their own health. "Our

aim was to generate a personalised guidance system that empowers patients to optimise their treatment and manage asthma,” explains Dr. Konstantinos Votis, a key researcher and technical coordinator in the project. The idea is for patients to gain control over this disease but also to adhere to personalised goals and guidelines such as a healthy lifestyle, exercise and specific dietary habits.

Innovative design

The myAirCoach comprises of a sensor-based inhaler capable of monitoring several clinical, behavioural and environmental factors, and communicating them to a mobile device. It incorporates user friendly tools and provides direct feedback to an appointed healthcare setting to ensure timely optimal treatment.

myAirCoach scientists developed a pipeline of advanced algorithms, and machine learning techniques. This involved the processing of raw physiological measurements such as exhaled nitric oxide, and [environmental conditions](#) such as humidity provided through wireless sensors. Using a computational modelling approach, behavioural variables such as physical activity are dynamically evaluated alongside personal profile data. This provides patients with personalised prediction to manage and reduce the risk of exacerbations in outdoor and indoor environments. It also recognises the treatment scheme and reminds patients to take medication while supporting them through each step of inhalation therapy. Collectively, the physiological information and the patient adherence to therapy are communicated to healthcare professionals.

A major challenge was the miniaturisation of sensors for their successful integration into the self-management framework. In addition, the smart inhaler had to become an integral part of the existing clinical procedures and asthma treatment protocols. When tested in patients, the system

exhibited clinically relevant and statistically significant improvement in asthma control and reduction in severe asthma exacerbations.

Impact of the myAirCoach solution

myAirCoach is an improvement of existing self-management systems, which are complex in nature, and are based on the assumption that patients will commit to the self-management methodology.

Dr. Votis says, "myAirCoach has been designed to fill this commitment gap by introducing an intelligent sensing environment, thereby minimising patient intervention to the monitoring procedure." The most significant achievement is undoubtedly the personalised response to treatment and progress, which empowers patients to be active participants in their disease management.

Overall, the myAirCoach system is expected to optimise strategies for the treatment of asthma on a patient basis after taking into consideration disease progression and evolution. At the same time, healthcare professionals will be able to supervise the condition of patients outside the clinic and use analytical tools to support their treatment decision. The system will also be beneficial for families of asthma sufferers as they will be better informed about the clinical state of their loved ones and the proper use of medication.

Dr. Votis says, "The patented myAirCoach system to extend its application beyond asthma for the self-management of other respiratory diseases." Long term, this will translate into a better understanding of the mechanisms underpinning the onset and progression of these diseases.

Provided by CORDIS

Citation: Next-generation asthma inhalers (2018, December 7) retrieved 6 May 2024 from <https://medicalxpress.com/news/2018-12-next-generation-asthma-inhalers.html>

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