An ecosystem for integrated care of multimorbid patients

Chronic disease management costs the EU healthcare system EUR 700 billion annually. ProACT is a European initiative that aims to advance home-based patient chronic disease and multimorbidity self-management via a digital integrated care system.

Approximately 50 million people in Europe live with multimorbidity (the presence of 2 or more chronic health conditions). Most models of care focus on a single disease approach to treatment, which is not always suitable for multimorbid patients, given the complexity of managing multiple disease symptoms, medications and health professional appointments. This can be confusing and potentially unsafe for patients, if not handled appropriately.

ProACT: A digital solution to self-managing chronic diseases and multimorbidity
To empower patients and their caregivers to play an active role in self-management and care, the EU-funded project ProACT developed a digital integrated care system capable of supporting multiple disease management. "Our goal was to advance integrated care by providing patients, their caregivers and health and social care services with a single digital platform to manage multiple chronic conditions. ProACT provides a suite of digital applications and technologies to effectively support multiple disease management and people-centred care. The project also aims to offer the best delivery of care through 24/7 real-time feedback to individuals," explains project coordinator John Dinsmore.

The platform allows multimorbid patients to monitor both health symptoms (e.g. blood glucose and blood pressure) as well as well-being (e.g. mobility and sleep) on a single-user mobile application. ProACT collects and analyses this data through a mobile app and a tailored toolkit of wearable and medical devices, specific to each individual user's disease profile. The data becomes available to patients and their relevant care network of supporting actors via a suite of CareApps, offering both personalised feedback as well as education and training specific to the needs of the user (e.g. education on heart failure or diabetes and training on using the application and devices).

The ProACT system has been designed to target diabetes, heart disease, chronic heart failure and chronic obstructive pulmonary disease, with the potential to be further developed to address other chronic diseases. Over 160 key stakeholders, including general practitioners, pharmacists, caregivers and hospital consultants across the participating countries, were also involved in the platform co-design and development process. Data from 8 504 adults via The Irish Longitudinal Study on Ageing (TILDA) was employed to train the AI system on the key ProACT diseases.

**Acceptance and future prospects**

ProACT has been tested with 144 individuals in a proof-of-concept trial across 3 EU Member States (Belgium, Ireland and Italy) with promising outcomes. The intervention design was successful with participants effectively changing their behaviour towards using a digital self-management solution.

In addition, patients demonstrated improved health self-awareness, better diet and increased physical activity, and learned how to better manage their symptoms. Equally, caregivers and healthcare professionals positively endorsed the flexible ProACT approach for monitoring patients via the tailored CareApps. "Undoubtedly, developing a single digital system that can support multiple disease management while advancing integrated care for patients and their care network was the most significant achievement of the project. To our knowledge ProACT is the first system to successfully deliver this goal," emphasises Dinsmore.

The project’s behavioural science-based co-design and patient-centric approach has significantly advanced
EU understanding of digital care for people living with multiple chronic diseases, an area previously underexplored within EU health systems. At the same time, the project has provided clear guidelines to optimise the transferability potential of such digital platforms for their successful integration into European healthcare systems.

ProACT has received a commendation from the Irish Healthcare Awards 2018 and was a finalist in the 2019 European Data Science Awards. A number of grants have been secured to advance the ProACT platform and associated research, with further trials due to commence in February 2020. A spin-off company scheduled to launch in 2020 will exploit the collective outputs of the ProACT project in parallel with any ongoing research activity.

Keywords
ProACT, healthcare, integrated care, multimorbid patients, self-management, disease management, mobile application, digital health, eHealth, mHealth

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