



## **POWER2DM: predictive model-based decision support for diabetes patient empowerment**

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**Introduction** The prevalence of diabetes has increased markedly over the last 50 years in parallel with increasing rates of physical inactivity and obesity. As of 2010, there are approximately 285 million people in the world who are diagnosed with T2DM compared to around 30 million in 1985. There is an urgent need to develop cost-effective intervention strategies for diabetes. Given the enormous scale of the problem, and the fact that such a large percentage of cases arise due to an unhealthy lifestyle, personalized care systems that include innovative self-management support strategies, well-linked to the medical care of patients, are of prime importance.

**Method** The main aim of POWER2DM is to develop and validate a personalized self-management support system (SMSS) for T1DM and T2DM patients that combines and integrates: (i) a decision support system (DSS) based on interlinked predictive computer models (ii) automated e-coaching and advice functionalities based on Behavioural Change Theories and (iii) realtime personal data processing and interpretation.

The DSS will be based on existing predictive models that were originally developed primarily for decision support to healthcare professionals, specifically the KADIS short-term-plasma glucose prediction model, the T2D-Marvel medium/long-term prediction model for diabetes progression, and established long term diabetes-related risk scoring models for diabetes and its co-morbidities.

The SMSS will provide automated personalized care plans in terms of lifestyle changes and therapy adjustments for short term optimal metabolic control as well as for medium/long-term prevention of deterioration and diabetes complications. The SMSS will fully integrate subject-specific health behaviour change interventions to increase adherence of the patients to their personalized care management program. The predictions will be based on real-time personal data monitoring and tracking. The POWER2DM will be evaluated in 3 pilot studies in 3 different European countries Germany, Netherlands, Spain with 280 patients in total where half of them will receive POWER2DM support and other half as control group.

**Results** In the first 8 months of the project, to-be scenarios have been produced by the end-users, which, following user-centred design principles, led to the identification of technical use cases and formal requirements, and then the conceptual design of the POWER2DM architecture. Work is now focused on the calibration of the predictive models, research on interventions for behaviour change and implementation of the first prototype.

**Discussion** Yet despite multiple policy reports and international declarations, action on and funding for diabetes still lags behind other chronic conditions like cancer or cardiovascular disease. Existing diabetes care and prevention services and approaches do not sufficiently target patients or have a limited focus mainly on Blood Glucose Control, there is a gap between evidence-based findings and diabetes care, self-management interventions are not able to maintain efficacy over longer periods of time, and there is too much time delays in finding optimal therapy.



**Conclusion** By the 12 months of piloting in diverse settings, POWER2DM aims to strengthen the evidence base in self management support for patients with diabetes with the usage of prediction models and Just-in-time Adaptive Interventions designed based on behavioural change theories.