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CONFERENCE ABSTRACT

Health Data Integration Architecture for Continuous Behavioral Health Monitoring and Delivering Personalised, Just-in Time Adaptive Interventions in the ADLIFE Project

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Introduction: In the ADLIFE project (H2020, SC1-DTH-11-2019, 875209), an integrated care planning approach is used where patients are assigned various care plan activities by multidisciplinary care teams. To increase patients' adherence to the care plan, a continuous behavioral monitoring architecture is developed for delivering digital personalised, just-in time adaptive interventions. Continuous behavioral monitoring necessitates real-time tracking of a patient's care plan activity achievements, through various sources of data, such as medical devices, electronic health records and the mobile ADLIFE app, used by the patient.

Theory/Methods: The integration architecture consists of personal medical devices, a FHIR repository, a mobile application, a health data ingestion stack and a rule-based intervention engine. Medical devices and electronic health records are used as patient health data sources. The mobile application is used as an intermediary device for integrating personal medical device data with standard based interfaces. The mobile application gathers personal health data from devices and forwards them to the health data ingestion stack, using predefined inbound adapters. In addition, the mobile application has appropriate graphical interfaces for end-users to check their care plan activities, their adherence performance and to receive and configure motivational interventions/reminders about their activities.

The ingestion stack streaming layer starts with inbound adapters, which can consume incoming data and forward them to the plan intervention engine, using Apache Kafka. The real-time analytics engine uses Apache Spark Streaming modules to gather data from Kafka and transform them to the desired format to process and plan interventions to be delivered to the patient. Furthermore, the ingestion stack queries the FHIR repository periodically to make all the data available for the plan intervention engine.

The rule-based plan intervention engine uses all integrated data to calculate a patient's adherence performance and to confirm if an intervention should be sent to a patient; it then delivers such intervention(s) to the patient, through a mobile phone notification.

Results and Discussion: We will present the implementation of ingestion stack and rule-based plan intervention engine. In the ADLIFE project, we have decided to deliver behavioural change interventions to increase adherence and motivate patients to realize the following activities: self-measurement of selected clinical parameters and vital signs; symptom recording; completing PROM questionnaires; and physical exercise. At the time of writing of this abstract, twenty-two different intervention delivery rules have been defined to provide motivational messages and reminders based on the patient's most recent achievement status.

Conclusions: This work is being carried out within the scope of the ADLIFE project and will be validated in part by the ADLIFE pilot studies, including seven clinical pilot sites with a total of 882 patients, 1243 caregivers and 577 healthcare professionals.

Implications for applicability/transferability, sustainability, and limitations: The technical architecture and intervention delivery rules are ready to be piloted. The usability and acceptance of the technology, by patients, and the effectiveness of the behavioral interventions on patient's adherence will be assessed during pilot studies.