

## CONFERENCE ABSTRACT

### Management of personalised guideline-driven care plans addressing the needs of multi-morbidity via clinical decision support services

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**Introduction:** The clinical management of patients suffering from multiple chronic conditions is very complex, disconnected and time-consuming with the traditional care settings. C3-Cloud project aims to build an integrated care platform for addressing the growing demand for improved health outcomes of multimorbid and long-term care patients.

**Theory/Methods:** C3-Cloud has established an ICT infrastructure enabling continuous coordination of patient-centred care activities by a multidisciplinary care team MDT and patients/informal care givers. The Coordinated Care and Cure Delivery Platform C3DP allows, collaborative creation and execution of personalised care plans for multi-morbid patients through systematic and semi-automatic reconciliation of clinical guidelines. Clinical decision support CDS systems implementing flowcharts from evidence based clinical guidelines are integrated to present suggestions for treatment goal and activities e.g. medications, follow-up appointments, diet, exercise, lab tests. Pilot site local care systems are integrated with the C3DP via the technical and semantic interoperability platform to facilitate informed decision making. Active patient involvement is realized through a Patient Empowerment Platform presenting personalized care plan to the patient and establishing a continuous bi-way communication with the patient to collect patient observations, questionnaire responses, symptoms and feedback about care plan goals and activities.

**Results:** The following research results have been achieved to enable guideline enabled personalised care plan management for addressing the needs of multi-morbidity:

43 logical flowcharts were designed out of 4 disease guidelines Type 2 Diabetes, Heart Failure, Renal Failure and Depression.

181 CDS rules assessing 166 patient criteria and recommending 154 goal/activity suggestions were implemented as CDS services in GDL covering T2D and RF.

52 reconciliation rules were designed for eliminating contradicting guideline recommendations due to multi-morbidity.

23 HL7 FHIR profiles were defined for representing care plan and patient data.

C3DP has been integrated with these CDS services via CDS-Hooks specification to recommend personalised care plan goals and activities.

**Discussions:** In this research, we have successfully implemented an ICT infrastructure enabling guideline-driven integrated care for multi-morbid patients. Although our ICT solution covers all the technical requirements identified by clinical partners, effective implementation of integrated care in real-life care setting requires major changes in organisational responsibilities and care pathways.

**Conclusions:** User-centred design and usability testing have successfully been completed. C3-Cloud pilot application will now be operated in 3 European pilot sites with the participation of 62 MDT members and 1200 multi-morbid patients for 15 months.

**Lessons learned:** There are two main research lines for reconciliation of contradicting guideline recommendations: 1 fully-automated reconciliation via ontology reasoning, 2 manually-crafted reconciliation rules by clinical expert groups. Although first approach is more dynamic, research results are still for very primitive cases and not clinically validated. As we are targeting an industry-ready solution after piloting in real-life settings, we have opted for the second option.

**Limitations:** When a new chronic disease is to be addressed within our platform, reconciliation rules covering all disease combinations have to be re-assessed by the clinical expert group.

**Suggestions for future research:** Fully-automated reconciliation approaches need to be further studied and validated in real-life settings.

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**Keywords:** personalised care plan; clinical guidelines; multi-morbidity; clinical decision support; patient empowerment

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