

An Ontology based Scheme for Formal Care Plan Meta-Description

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*This work was supported by eCP: Electronic Clinical Protocols project (MIS 375876),
funded under the Greek National Programme Thales, co-funded by the European Commission.*

*Partially, this work was supported by the FP7-ICT project CARRE (No. 611140),
co-funded by the European Commission.*



Summary

- Propose a conceptual model and an ontology for a meta-description of formal care plans
 - ↪ *Focusing on care plans as a whole and not addressing internal algorithmic steps*
- Our care plans' modeling allows
 - ↪ *Semantic tagging*
 - ↪ *Semantic enrichment*
- Advantages of our modeling
 - ↪ *Use and re-use care plans across platforms*
 - ↪ *Link to other scientific information (e.g. papers in PubMed, PHR, etc)*
 - ↪ *Modeling of the provenance*
 - ↪ *Justifications for modifications or alterations to care plans*

e-ClinPro: Clinical protocol management system

- A heterogeneous semantic social network to **describe** and **organize** clinical protocols
- The protocols' organization is based on their **provenance**, **evolution** and **modifications**

The screenshot displays the e-ClinPro web interface. At the top, there is a blue header with the 'e-ClinPro' logo, a menu icon, and a 'Guest' user profile. Below the header, a section titled 'Protocols' with the subtitle 'Manage your protocols here!' and an 'Add New Protocol' button is visible. The main content area shows a protocol for 'Acute coronary syndrome'. It includes a 'Management pathway' section with 'Related Conditions' (Acute coronary syndrome, Stable angina, Myocardial infarction, Chest pain, Hyperglycaemia, unspecified) and 'Downloads & links' (a URL to the NICE pathways overview). The 'Entry points' section is highlighted with an orange box and contains the text: 'Chest pain ☒ yes AND (Assessment of chest pain ☒ stable OR Assessment of chest pain ☒ unstable)'. An orange arrow points from this box to a detailed view of the entry point logic. This detailed view shows a logical expression: 'not Chest pain value is yes' (with a red 'X' icon) OR 'not Assessment of chest pain value is stable' (with a red 'X' icon) OR 'not Assessment of chest pain value is unstable' (with a red 'X' icon). The 'Evidence list' section at the bottom provides references for the protocol, including NICE guidance and a study by Skinner JS et al. (2010).

Formal care plans

- **Clinical guidelines**
 - ↳ *Systematically developed recommendations to address various clinical problems*
- **Clinical protocols**
 - ↳ *Detailed algorithms on how to address a particular clinical problem (based on guidelines)*
- **Care pathways**
 - ↳ *Care algorithms integrating multidisciplinary tasks for patient care in and outside the hospital (based on guidelines)*
- ...

Examples of formal care plans

Diabetes Diagnosis

Criteria for Diabetes Diagnosis: 4 options

A1C $\geq 6.5\%$* Performed in lab using NGSP-certified method and standardized to DCCT assay
FPG ≥ 126 mg/dL (7.0 mmol/L)* Fasting defined as no caloric intake for ≥ 8 hrs
2-hr PG ≥ 200 mg/dL (11.1 mmol/L) during OGTT (75-g)* Performed as described by the WHO, using glucose load containing the equivalent of 75g anhydrous glucose dissolved in water
Random PG ≥ 200 mg/dL (11.1 mmol/L) In persons with symptoms of hyperglycemia or hyperglycemic crisis

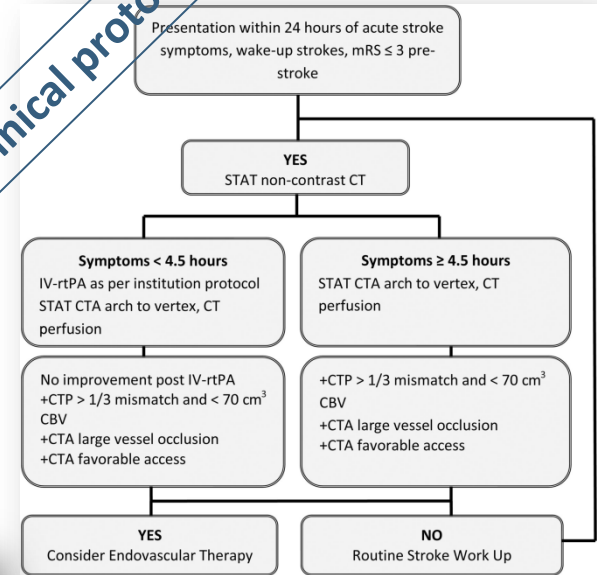
*In the absence of unequivocal hyperglycemia results should be confirmed using repeat testing

* Unless clinical diagnosis is clear, same test to be repeated using a new blood sample for confirmation

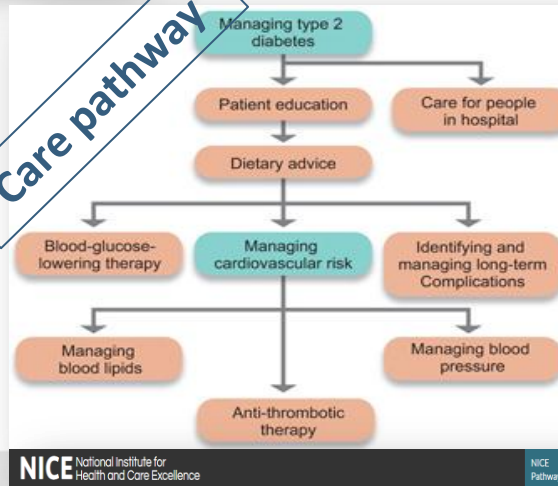
* 2 discordant results? Result above cutpoint should be repeated

American Diabetes Association

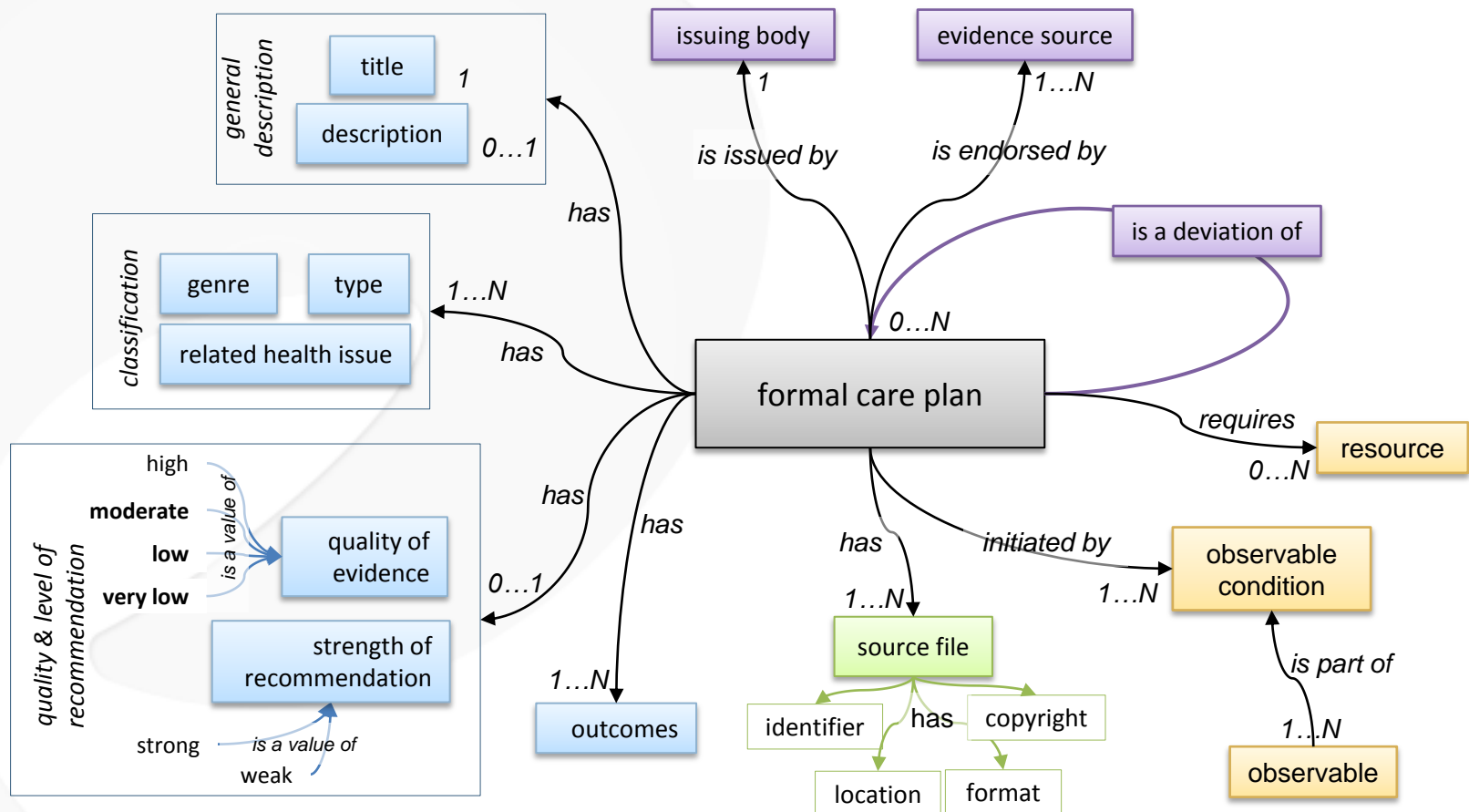
Clinical protocol



Care pathway



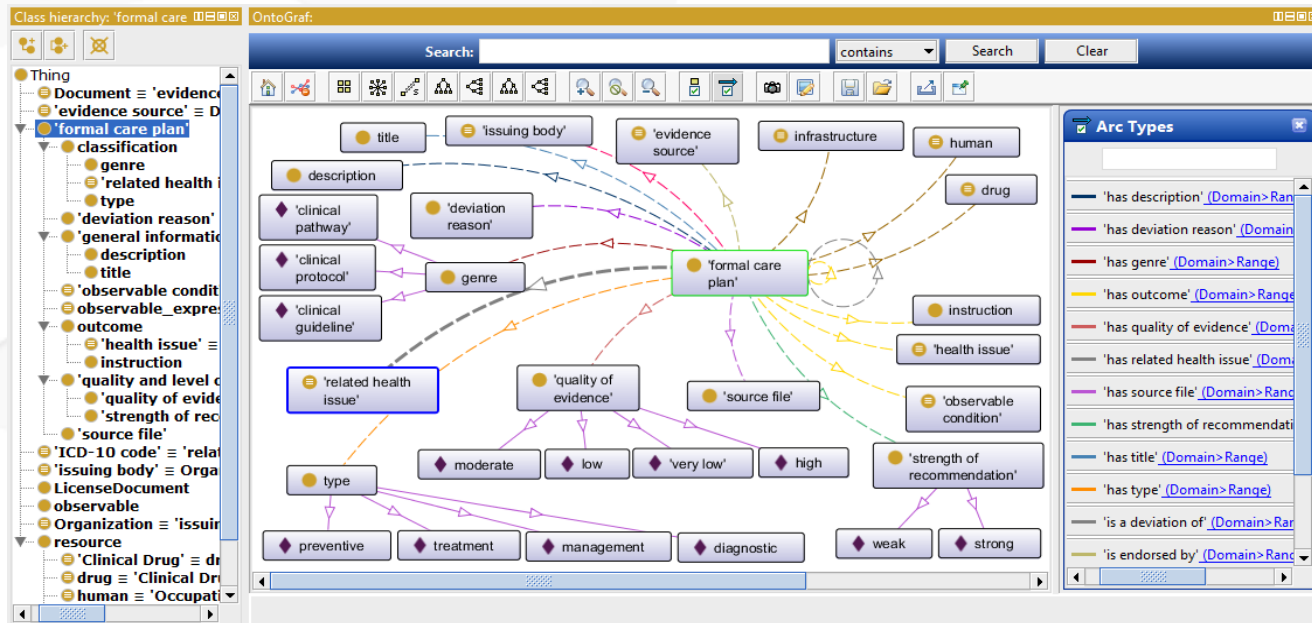
Conceptual model of care plan meta-description



Ontology implementation

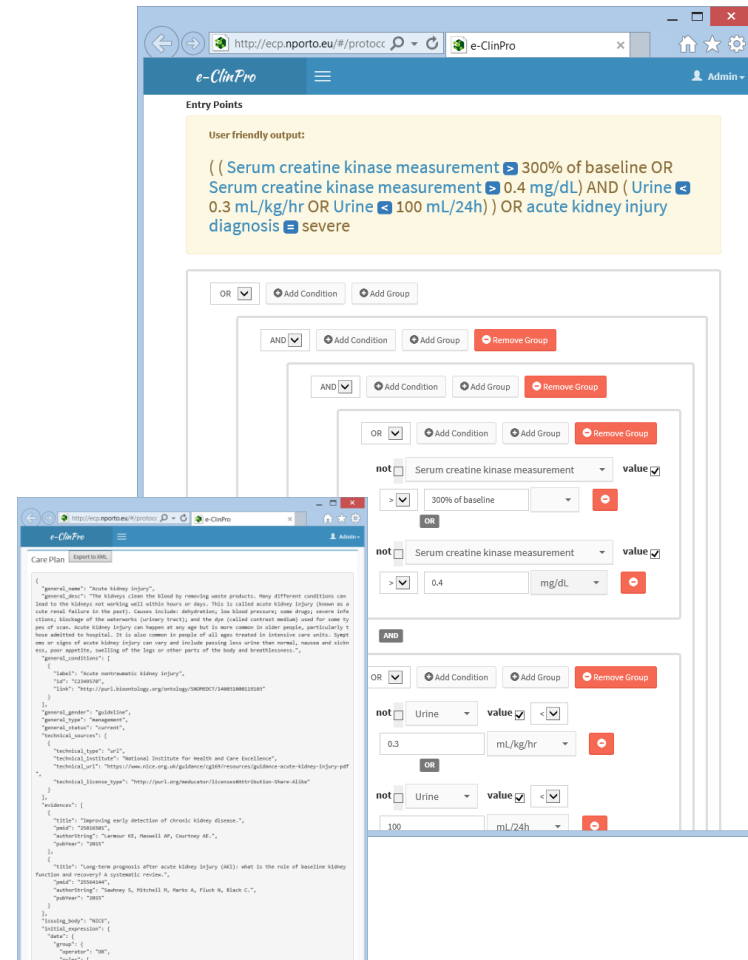
- Implemented with OWL2 using Protégé
- Available online in: <http://purl.bioontology.org/ontology/ECP>
- Integrated with commonly used standards and controlled vocabularies:

↪ *ICD-10, SNOMED-CT, QUDT, UO, GRADE and UMLS*



Development process and evaluation

- Development by health care professionals (4 medical & 4 technology experts)
- Testing with 20 clinical protocols and guidelines (by **NICE**, **NKF KDOQI**, **ADA**, **Hellenic Society of Nephrology** and **2 Greek National University Hospitals**)
- Medical experts found:
 - *The model was straightforward to use*
 - *The terminology was familiar and easy to understand and apply*
 - *The only difficulty identified in the expression of initial logical condition*



Conclusions

- Introduce a metadata scheme and ontology for the description of formal care plans
- Goal of the proposed scheme was to support:
 - ↪ *Care plan management in electronic repositories*
 - ↪ *Organization and classification*
 - ↪ *Universal tracking queries of care plans used by search engines or medical portals*
 - ↪ *Literature of evidence provenance*
 - ↪ *Institutional provenance*
- Our aim was to define in a formal, ontology-based, platform-independent metadata set to describe formal care plans and their relationships



Any questions?

THANK YOU

Acknowledgement



This work was supported by eCP: Electronic Clinical Protocols project (**MIS 375876**), funded under the Greek National Programme Thales and the FP7-ICT project CARRE (No. **611140**), both co-funded by the **European Commission**.



eCP: Development of electronic clinical protocols



CARRE Project: Personalized patient empowerment and shared decision support for cardiorenal disease and comorbidities