International developments in *open*EHR archetypes and templates

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Abstract

Electronic Health Records (EHRs) are a complex knowledge domain. The ability to design EHRs to cope with the changing nature of health knowledge, and to be shareable, has been elusive. A recent pilot study[1] tested the applicability of the CEN 13606 as an electronic health record standard. Using *open*EHR archetypes and tools[2], 650 clinical content specifications (archetypes) were created (e.g. for blood pressure) and re-used across all clinical specialties and contexts. Groups of archetypes were aggregated in templates to support clinical information gathering or viewing (e.g. 80 separate archetypes make up the routine antenatal visit record). Over 60 templates were created for use in the emergency department, antenatal care and delivery of an infant, and paediatric hearing loss assessment. The primary goal is to define a logical clinical record architecture for the NHS but potentially, with archetypes as the keystone, shareable EHRs will also be attainable. Archetype and template development work is ongoing, with associated evaluation occurring in parallel.

Key Words (MeSH):

Medical Informatics; Decision Making, Computer-Assisted

Background

The *open*EHR Foundation is an international, not-for-profit company; it is an online community whose mission is 'to promote and facilitate progress towards electronic health records of high quality, to support the needs of patients and clinicians everywhere' (Ingram 2002). 'The *open*EHR endeavour is about creating specifications, open source software and tools in the technical space for [a health computing] platform. In the clinical space, it is about creating high-quality, re-usable clinical models of content and process - known as archetypes - along with formal interfaces to terminology'[3]. The design purpose is 'to enable semantic interoperability of health information between, and within, EHR systems' (Leslie 2007). The founding shareholders are University College London, United Kingdom (UK) and Ocean Informatics Pty Ltd, Australia. Membership of the *open*EHR community is free to interested individuals via the website.[4]

The European Committee for Standardisation (CEN) develops multidisciplinary standards for member countries of the European Union (EU) and some affiliated non-EU countries. The standards in health informatics are developed by CEN's Technical Committee 251 (CEN/TC 251), which has produced *CEN 13606,* an electronic health record (EHR) extract standard using the *open*EHR archetype methodology (Begoyan 2007). CEN 13606 is a five-part standard comprising a Reference Model, an Archetype Interchange Specification, Reference Archetypes and Term Lists, Security Features, and Exchange Models; to date, it has been adopted by 48 countries (Begoyan 2007).

Trial of an EHR standard (CEN 13606)

In January, 2007 the UK's National Health Service (NHS) commissioned a pilot study to test the applicability of the CEN 13606 as an electronic health record standard, using *open*EHR[5] archetypes and Ocean Informatics'[6] tools.

1 Commissioned by the UK's National Health Service (NHS) in 2007.
2 Supplied by Ocean Informatics
3 www.openEHR.org
4 www.openEHR.org
5 www.openEHR.org

The project scope was defined by content requirements for iSoft's Lorenzo clinical application development. 'The models produced from this project are intended to set the foundation for a logical clinical record architecture for the NHS.' (NHS, at Centre for Health Informatics and Multiprofessional Education 2007: 4). The output from the initial two-month pilot project included nearly 250 archetypes and 40 templates.

Archetypes are data specifications for unique clinical concepts ranging from the simple, such as blood pressure, temperature or pulse, through to the complex, such as recording the risk of a condition from a positive family history. *Templates* are aggregations of the archetypes that enable all clinical information for a specific clinical purpose to be captured, stored and shared. They are designed for use across the complete range of clinical contexts, including medical specialties, specific institutions, or for use across a whole health domain, such as nursing. Templates can comprise as few as one archetype (e.g. to record a simple Blood Pressure reading from a home monitoring machine) to nearly 80 archetypes (i.e. 80 discrete clinical concepts) in an antenatal consultation record.

Further NHS development[7] work to December, 2007, has resulted in the development of a total of approximately 650 archetypes and 60 NHS templates. These templates have been modelled to support three discrete approaches to clinical care:

- recording a visit to the Emergency Department for any of the 'top 10' presentations (e.g. chest pain, collapse, and joint injury)
- a woman's 'journey' from pre-pregnancy consultation, through antenatal booking, routine antenatal visits, recording labour and delivery of an infant, and postnatal checks
- assessment of a child with hearing loss – following the initial outpatient assessment, admission to a short stay ward for insertion of ventilation tubes and discharge communications back to their general practitioner.

This new approach has enabled the NHS to define clinical concepts once as an archetype, publish the archetype after rigorous clinical review, and then re-use these archetypes in various templates. To date, the NHS has provided templates to just one of its clinical application developers, with the potential to provide these same archetypes and templates to all NHS software suppliers.

Once clinical applications use archetyped clinical data then they will be able to share health information in a way that will be both human-readable and also directly computable (for example, for clinical decision support and care pathways). This is known as *semantic interoperability* – something that has been a goal for many years, but not been wholly achievable until now. *open*EHR archetypes and templates are the keystone to achieving the reality of shareable electronic health record data.

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