Lessons learned when modeling discharge summaries using Fast Healthcare Interoperability Resources

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Abstract

We ported CDA-based discharge summaries to a Fast Healthcare Interoperability Resources (FHIR) system that both supports gradual progression from narrative text to structured data entry and enhances secondary usability.

Introduction

Japan lacks a national Electronic Health Records system; healthcare institutions exchange discharge summaries within regional health networks. We sought to support clinical decision-making using artificial intelligence to structure discharge summary data; we ported legacy CDA (Clinical Document Architecture) documents to a FHIR system.

Methods

We reviewed the discharge summary specification ver. 1.41 of the HL7 Japan and mapped elements in CDA documents to FHIR STU3-based documents by defining FHIR profiles using Forge (an officially recognized profiling tool). If elements of the summary specification were not included in the standard FHIR Resource, we sought to identify useful elements in the extension registry of the HL7 International database; if this failed, we created our own extensions. We focused specifically on chief complaints, past and current medical histories, and problems and allergies that have not yet been well-structured or recognized as important in terms of clinical decision-making.

Results

We found that resources pertaining to religion, race, language skills, reading of a Chinese characters, and medical institution identifiers required expansion. Each element corresponding to a CDA document was covered by 21 unique FHIR resources. Current and past medical histories, chief complaints, and reasons for visiting hospital were integrated into a Condition resource by combining discriminators, clinical status, and asserters (Table 1). Compared to the Nakayama allergy model [1], we found differences in the extent of critical granularity. Also, there was no element for an alert level on the FHIR side.

Table 1 Consolidated medical information incorporated into an FHIR condition resource

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<tr>
<th>CDA Section</th>
<th>LOINC Code</th>
<th>FHIR Condition</th>
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| Current medical history | LOINC:10164-2 History of Present illness Narrative | Active/Recurrence
|                   |                   | Practitioner                                                                   |
| Past medical history | LOINC:11348-0 History of Past illness Narrative | Inactive/Resolved/Remission
|                   |                   | Practitioner                                                                   |
| Chief Complaint    | LOINC:10154-3 Chief complaint Narrative - Reported | Active/Recurrence
|                   |                   | Patient / Related Person                                                      |
| Reason of visit    | LOINC:29289-5 Reason for visit Narrative | Active/Recurrence
|                   |                   | Practitioner with reference to Encounter                                       |

Conclusion

FHIR emphasizes pragmatism in daily usage and seeks to attain convergence using minimal resources; an effort is made not to scatter identical data among multiple locations. Homogeneous information that changes its name over the time, and by the reporter, context, and target is collected in the Condition resource and separated CDA elements are mapped to that resource. This careful information model organizes data contained in electronic medical records, minimizes information scattering, and promotes the collection of structured data. Porting of CDA data to the FHIR environment will minimize information rearrangement and enhance secondary usability.

References