Data Model for Health Information Exchange

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Objective
Leverage ANSI/ASTM Specification 1039 standard to develop a data model that captures health information data as it is collected during any patient’s health examination. Build on this data model and incorporate XML, XSLT and Schema methodology in such a way as to facilitate data exchange between and among different health domains.

Background
American Society for Testing and Materials (ASTM) was working to develop a Common Oral Health Record (COHR). They found similarities in operational tasks among health care clinicians and created the ASTM/ American National Standards Institute (ANSI) Standards Specification 1039.

Method
Developed a domain specific (e.g. dental) task list that is used as standardized daily operational tasks for a practicing oral health physician. Categorized dental tasks of "Provide Direct Patient Service" in accordance with ANSI/ASTM 1039’s standard category descriptors: Receive Patient, Obtain Patient Health Data, Determine Health Status, Determine Treatment Plan, Deliver Patient Care Services and Release Patient. Used these descriptors to develop sub-tasks that generate low-level data information models (i.e. collected dental data filtered through Specification 1039 standard Dental Information Model (DIM)). This work facilitates ad-hoc searches by consulting physicians: enables physicians to dynamically build search queries by exploring a patient’s latest dental examination. For example, when a physician uses this model an Internet capability known as “type-ahead” is imposed. This capability suggests further search parameters. Today when typing “Obtain Patient Health Data-patient dental examination” in a Google search bar you get further suggestions. You can continue to type or click on a suggestion. Utilizes the HL7 Clinical Document Architecture (CDA) and XML-based HTML to develop a user interface for Health Information Exchange. Can feed this HTML output via Internet, mobile phone or email to concerned parties (i.e. patient, dentist, physician, etc.).

Results
Created a common approach, across health care domains, that leverage standardized tasks and best practices to report structured health care data to consulting health care providers. These standardized tasks can include doctor order sets, lab test procedures, genomic mapping procedures or virtually anything that follows basic scientific methodology and tasks.

Conclusions
Health Information Exchange (HIE) is facilitated because any health care provider can query standardized tasks and effectively collect, report or utilize health data during routine patient examinations.

To illustrate:
1. A health care provider consultant would initiate a patient’s dental information search by typing “Receiving a Patient”. This query would generate a drop down menu suggesting dental practices, physician practices, clinics, hospitals or even an HIE hub.
2. Selecting any one of these suggestions would narrow the search down to a particular dental practice or clinic.
3. Clicking on a particular dental practice would generate a firewall challenge at the patient’s dental office and the consulting physician, would enter a pre-authorization ID that had been previously obtained.
4. Further drop down suggestions are now based on this dentist’s standardized tasks. Once all patient information is collected the consulting physician’s data collection is complete and the physician is locked out of the current dental practice.

Capturing relevant data using this technique is very simple because when the consultant reaches the lowest-level data store a reviewable data model is displayed. If the data is deemed relevant a check box can is selected. When all relevant data is determined each data information element is collected and all the elements are used to generate a working document called an XSL stylesheet.

Finally, this stylesheet is used with other semi-static working documents and applied against the HL7 CDA architecture. This process transforms the XSL stylesheet into a pre-defined formatted document for reporting. In this particular case a Dental Examination Report (DER, shown to the left) is created. This document is similar to a Continuity of Care Document (CCD) but contains data elements specifically tailored to the consulting physician by the consulting physician.

References

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