Service-Oriented Architecture for Pediatric Immunization Decision Support

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We integrate a personally-controlled health record (PCHR) with a Department of Public Health (DPH) immunization registry and clinical decision support (CDS) tool, creating an immunization information system using a service-oriented architecture (SOA). This SOA enables the DPH, a trusted authority, to provide CDS to both clinicians and patients/parents.

Background

The growing number of vaccines and complexity of guidelines make pediatric immunization an area ripe for well-developed CDS. Provision of CDS using a SOA, in which core capabilities are contained within independent software services,[1] offers access to multiple users and efficient updating to reflect evolving guidelines. Integration with a PCHR allows for adaptation of CDS according to user role and clinical setting.

Methods and Results

We describe the modular components of the system. *PCHR.* Indivo is a suite of architectures, standards, and technologies providing patients/parents with strict control over their encrypted record. That record is accessible over the web and emphasizes security and portability. Patients/parents can share all or selected portions of the record with others by granting role-based access. A key feature of Indivo is its subscription framework that allows for deployment of institution-specific agents that periodically update the record with new electronic data from the provider institution. *MA Immunization Information System (MIIS)*. The MIIS consists of an **immunization registry** and an **immunization decision support module**. The registry contains patients' complete immunization history and is populated by data supplied by health care providers. The decision support module, created by the MA DPH, provides CDS in the form of recommendations, tailored to a patient's immunization history and clinical characteristics, about vaccines that are due or contraindicated.

Data Flow. Indivo serves as the patient/parent-controlled source of data for the CDS module and as the access point to CDS for patients/parents and clinicians.

1. Patients/parents initiate an Indivo subscription to the immunization registry, as well as to electronic health records maintained by clinicians. Immunization and other clinical data from these sources are integrated into the Indivo data store, providing a copy under patient/parent control.

2. The Indivo user interface enables patients/parents, or other users to whom they have given access, to query the immunization decision support service. The user is prompted to complete or update a questionnaire regarding aspects of the patient's current health status and medical history that are relevant to vaccine contraindications. A version of the questionnaire employing language appropriate for either laypersons or health professionals is displayed based upon the user's role.

3. The patient's birth date, immunization history, and other relevant health data are sent to the module to obtain tailored recommendations.

4. Once recommendations are returned to Indivo, local rules are applied such that only recommendations pertinent to the patient's clinical setting (e.g. routine immunization versus preparation for international travel) are displayed. By accessing Indivo, patients/parents or clinicians view recommendations that are expressed using a format and language appropriate for their user role.
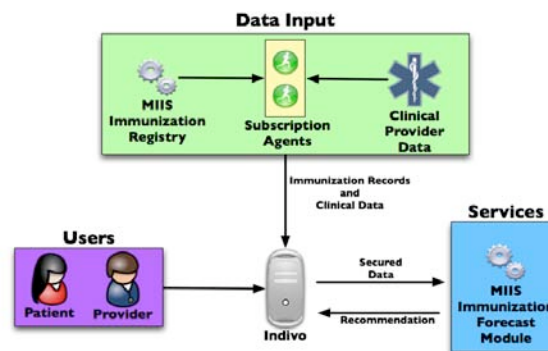
Conclusions

Use of a SOA for CDS enables public health experts to promote health on a wide scale but in an individualized manner. Inclusion of a PCHR allows for creation of privacy safeguards.

References

1. Kawamoto, K. and D.F. Lobach. J Am Med Inform Assoc, 2006. 14(2): p.146-55.