Query Health and i2b2: Enabling Standards-based, Multiplatform Population Health Queries

Jeffrey G. Klann, PhD1,2, Shawn N. Murphy, MD, PhD1,2
1Partners Healthcare, Boston, MA; 2Harvard Medical School, Boston, MA

Abstract
Undertanding population-level health trends is essential to effective public health. Therefore, the ONC has launched the Query Health Initiative, a large collaboration seeking to build a national network for distributed, population-level health queries across multiple platforms. The reference implementation will include i2b2, a widely-used data repository and analysis platform. Here we describe enabling i2b2 to use Query Health’s data transport layer, the first step in intertwining i2b2 with Query Health.

Introduction
In September 2011, the Office of the National Coordinator for Health Information Technology (ONC) launched an initiative that will cross the boundaries of individual healthcare institutions in order to understand population-level trends [1]. ONC believes this Query Health Initiative, a public-private collaboration to develop standards and services for population-level queries, is essential to public health. To encourage participation, a distributed query model is being used, which “brings questions to the data,” so that individual patient information is never disclosed and institutional data is only disclosed as part of a larger aggregate.

In 2004, the NIH-funded i2b2 Center was established and charged with developing a national computational infrastructure for biomedical computing [2]. The i2b2 software is now actively used as a research data repository at over 60 hospitals nationwide. The Shared Health Research Information Network (SHRINE), an i2b2 extension, already enables population-level distributed health queries across networks of i2b2 instances [3]. Several other i2b2-based distributed query systems also exist around the county.

i2b2 has been selected as one of three platforms for the Query Health Reference Implementation. This will “open up” i2b2 distributed queries to be part of a larger multiplatform network, in which disparate data repositories and query engines will interoperate across a common data security and transport layer (PopMedNet) using an HL7 standardized querying format (HQMF).

Here we describe PopMedNet-enablement for i2b2 (i2b2/PMN), the first step in intertwining i2b2 and Query Health. Two Query Health pilots are slated to use this integration by the end of 2012, one through the New York State Department of Health and the other related to the FDA mini-Sentinel project.

Methods
i2b2/PMN builds on the experience of SHRINE, has several architectural similarities, and will allow SHRINEs to easily adapt to participate in Query Health. Each SHRINE site has a standalone Query Aggregator which provides a user interface and distributed query engine. i2b2/PMN uses a similar standalone Query Aggregator which relies on PMN as the message transport medium. Each SHRINE health data provider’s i2b2 instance is outfitted with an Adapter which responds to queries from the Aggregator, translating the standard SHRINE ontology to the local i2b2 ontology. Using a similar approach, i2b2/PMN provides its own Adapter. The i2b2 instance sees this as a SHRINE Adapter, thus making it appear that Query Health queries are coming from a SHRINE.

Discussion and Conclusion
Integration of i2b2 into the Query Health Initiative is an important step in crossing the “last mile” of population health queries through interoperability. As Query Health evolves, on-the-fly translation between HQMF and local formats may allow interoperability among systems, creating an infrastructure for comprehensive population health queries. This integration and the upcoming pilots already demonstrate collaboration across several research groups, government entities, and clinical practices.

References