Bridging the gap: Improving Secondary Use of EHRs with i2b2

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Introduction

In order to reuse EHRs for research (Secondary Use), researchers may have to apply for the permission of using EHR data for their research. This process is e.g. necessary in a German research project, called Greifswald Approach to Individualized Medicine (GANI_MED). It is unknown to researchers at the time of a query, how many patients fit necessary inclusion and exclusion criteria for a certain study. There is often an informational gap between a researcher and the research platform. It is not possible to take a look at available data, before issuing a formal application for that data. Also, results come with a significant delay.

Methods

A Java based data import tool has been developed that imports generic metadata and observation data into i2b2. An i2b2 web client plugin has been developed, allowing to define and export queries needed for the data application at the data transfer unit at Greifswald. A new tab was introduced next to the i2b2 Query Tool tab to access the plugin. The solution was evaluated by four researchers. A questionnaire was used to measure the usability and usefulness of the solution. Among other topics, the questionnaire also covers the general impression, usability and comprehensibility of the i2b2 web client in general and the i2b2 web client’s Query Tool in particular.

Results

Metadata and medical data can be imported into i2b2. Both follow a generic structure, allowing to add or remove datasets dynamically. In the i2b2 web client, a query can now be defined analogous to the data application process at Greifswald. The query defined in i2b2 can be exported as an XML file and is going to be uploaded to the transfer unit’s web application at Greifswald. This process allows to exchange the query between i2b2 and the transfer unit. Granting a two weeks period of testing the solution, three of four key users completed and returned the questionnaire. The i2b2 web client’s Query Tool is considered by the key users to be an intuitively usable, clearly arranged tool. Key users think, that i2b2 represents the process of their research planning visually, by allowing to define inclusion and exclusion criteria, measuring the absolute patient count and allowing diverse breakdowns. Currently, the i2b2 Query Tool allows to query for one group of patients at a time. Yet, key users would like to define inclusion and exclusion criteria for several different patient groups at the same time, which would allow them to visually compare those groups directly. Adding a new tab next to the Query Tool to directly access the plugin is considered a good solution by key users, making the new functionality more directly visible and accessible.

Discussion

The data imported into the i2b2 database is coming from multiple sources, such as information systems and medical devices. More source systems can be added to i2b2 in the future, not requiring changes in the structure of the metadata or medical data. Also, the developed importing tool does not need to be reprogrammed, once metadata or medical data are added or removed. Researchers are able to get a preview of existing patient data, allowing them to query for large parts of EHR data, before actually issuing a formal application. Inquiries for clarifications by phone or e-Mail are replaced by i2b2, which reduces workload of the data transfer unit at Greifswald. Key users consider the solution as a significant improvement to their research planning, compared to their clinical, empirical experience with patients.

Outlook

As a future step, the integration of the query defined in i2b2 into the application process at Greifswald needs to be developed. It is also planned to include more source systems and projects in the future, such as “SHiP” and the “Nationale Kohorte”.

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