The University of Kansas' HERON Nests: FY2013 sees HERON become more integrated in Medical Center and Hospital through increases in system use and data.

Tamara M. McMahon, Matthew C. Hoag, Nathan J. Graham, Bhargav Adagarla, Daniel W. Connolly, Sravani Chandaka, Rebecca T. Horvat, Lemuel R. Waitman

Division of Medical Informatics, Department of Biostatistics, University of Kansas Medical Center, Kansas City, KS

Introduction

HERON, The University of Kansas Medical Center's (KUMC) i2b2 instance, was originally released in the fall of 2010. Over the past few years, HERON has continued to grow in terms of functionality and size, surpassing one billion facts. FY2013 sees HERON becoming more integrated within The University of Kansas Hospital (KUH), University of Kansas Physicians, Inc. (UKP), and KUMC with improved training, governance, and data fulfillment processes. System and data usage have increased as well as the need for additional types of data in HERON, such as REDCap project data, procedure orders, visit details, structured note concepts, and social, family, surgical, and medical histories. With these changes, HERON has become increasingly relevant to research and organizational improvement at KUMC.

Microbiology

Microbiology results with susceptibility is the latest enrichment to the HERON data pool. The Microbiology ontology combines culture site, organism, and antibiotic (in that order) to form the concept hierarchy, with a susceptibility modifier available at each level.
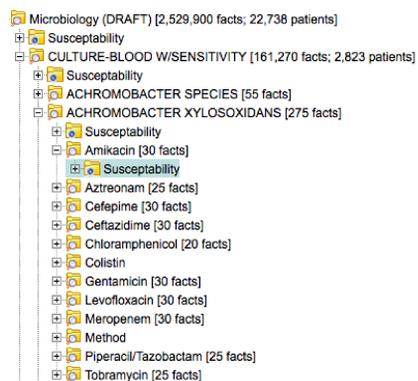

The Microbiology concept hierarchy is currently a limited prototype with several possible enhancements.

Proposed enhancements include:
• Incorporating negative culture results
• Identifying contaminated specimens in the concept hierarchy
• Mapping the internally identified organisms to a national ontology
• Utilizing Growth/Colony Forming Units (CFU) as an additional modifier

Timeline Hover Text Enhancements

• In addition to the concept code, the standard i2b2 timeline has been enhanced to show the full concept name, nval/tval, modifier string, and fact start_time.
• Time resolution is now displayed to the minute rather than to the day
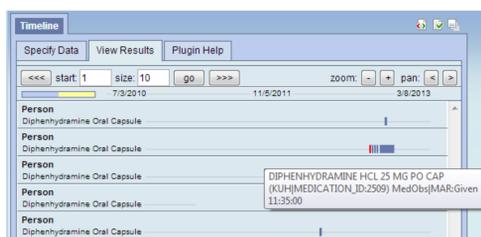
Medication Modifiers

Last year we presented our medication hierarchy which we created based on VA Classes and RxNorm to map local drug terminologies to a national standard.
• Medications are organized based on VA Classes at the top-level
• Ontology further sub-divided based on RxNorm Semantic Clinical Dose Form (SCDF)

This year, we enhanced the hierarchy to include modifiers that provide more specific classification of medication-related facts.
• Types of dose modifiers:
  1. Cumulative daily dose of a medication order
  2. Dose classified as "given" according to the Medication Administration Record (MAR)
• Queries for either type of dose modifier prompts for a numeric dose value
• Other modifiers include dispensed, historical (home medication), inpatient order, outpatient order, PRN order, and MAR result type ("Given", "Wasted", "Refused", etc)
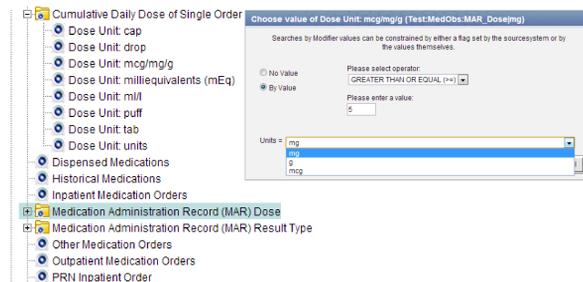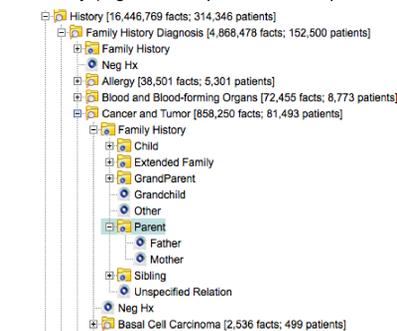

History

A variety of new types of data related to patient history have been added to HERON. It is now possible to query against a patient's Medical, Family, Social, and Surgical History.
• Medical History (4.8M facts, 150K patients) – Implemented as a modifier to the overall Diagnosis concept hierarchy
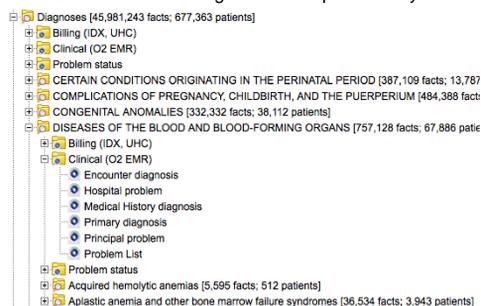
• Surgical History (3.3M facts, 160K patients) – A standalone member of the History ontology containing a patient's past surgical procedures
• Social History (8.2M facts, 314K patients) – A standalone member of the History ontology supporting queries concerning a patient's sexual activity and tobacco usage with some numerically sensitive concepts (such as "pack per day")
• Family History (4.8M facts, 150K patients) – A standalone member of the History ontology supporting queries about a patient's family history (e.g. "Cancer patients with a parent who had cancer?")


Future Work for History includes mapping the surgical procedures in Surgical History and the diagnoses in Family History to a standard ontology.

Death Date Discrepancies

HERON includes death information from several sources:
• Epic EMR
• Social Security Death Master File (SSDMF)
• North American Association of Central Cancer Registries (NAACCR)
• University HealthSystem Consortium (UHC)

It was discovered that death dates from various sources in HERON didn't agree in many case. The medical informatics team has an ongoing collaboration with the KU hospital team to reconcile these discrepancies.
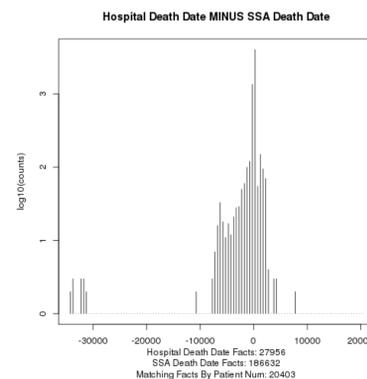
Quality Improvement

More physicians and researchers turned to HERON for quality improvement projects, which is a change from the traditional research uses of HERON. This prompted the Data Request Oversight Committee (DROC) to expand request guidelines to include quality improvement requests. University of Kansas Hospital, KUMC, and University of Kansas Physicians Group agreed to this expansion.

In order to receive identified data in lieu of an IRB, researcher must identify the project as quality improvement, attach a QI Letter of Determination, and answer the following four questions:

1. What is the problem you are addressing?
2. What data are needed?
3. Who will receive the results of the analysis?
4. Who will decide whether or not to implement changes based on your results?

Usage

• 149 students and staff sponsored (102 sponsorship requests reviewed)
• June 1, 2012-May 31, 2013 108 Non-Medical Informatics users ran 3110 queries
• Increased interest to use HERON for Quality Assurance measures.

Year-Month	Queries	Users
2013-06	12	3
2013-05	372	29
2013-04	695	32
2013-03	957	31
2013-02	846	25
2013-01	901	26
2012-12	285	14
2012-11	416	19
2012-10	426	25
2012-09	372	22
2012-08	564	27
2012-07	283	28
2012-06	337	20

January 2013-March 2013 had highest search numbers with 957 searches by 31 (includes Medical Informatics users) users in March 2013.

Fishing Tournament

HERON grew in data and functionality over the past few years. With this growth comes complexity. As a result, users are in need of more training than the standard bi-weekly Informatics Clinic. In response, we are holding our first **Fishing Tournament: a HERON training workshop**.
Agenda
August 1st: 1:00-5:00 PM Classroom style training
  Convene for social gathering
August 2nd: 8:00-0:00 AM Hands-on training on attendee topics
  10:15-11:30 Discussion

Invited: KUMC/Frontiers researchers and regional informaticians

Data Requests

Data requests during the 2012-2013 academic year doubled over the previous two years. Requests submitted span 36 research topics and many included multiple searches per request. Upon the receipt of data, some users were surprised at the amount of data and expressed concern with analyzing the raw data.

In an effort to help users understand the data request process:
• Training sessions now have a portion devoted to data set discussions; e.g., what to expect and intended data uses
• Increased contact with users prior to providing data to review any search questions
• Data fulfillment in REDCap (in development)

REDCap DUA fulfillment
• User defines concepts
• Three forms:
  • Patient
  • Encounter
  • Diagnosis
• One record per patient
• Raw data downloadable in a CSV file

Next steps include providing data request fulfillments through an R tool for those comfortable with using R.

One patient per record in REDCap projects

Diagnosis from example
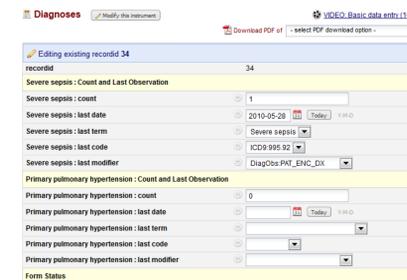
Honest Broker approach to cross-institutional data requests

As collaborations grow within the Kansas City metropolitan area hospitals and within academic medical centers, so does the desire for federated searching across organizations. In conjunction with the CTSA IKFC IDR, we are developing a low-tech, human Honest Broker approach to federated searching.

Acknowledgements