Strategic Health IT Advanced Research Projects (SHARP) and Beacon Communities for HIT standards and interoperable data exchange

Christopher G. Chute, MD DrPH
Mayo Clinic

Successfully Leveraging HITECH Resources
MN eHealth Summit
17 June 2010

SHARP: Area 4: Secondary Use of EHR Data
A $15M National Consortium

- 14 academic and industry partners
- Develop tools and resources that influence and extend secondary uses of clinical data
- Cross-integrated suite of project and products
  - Clinical Data Normalization
  - Natural Language Processing (NLP)
  - Phenotyping (cohorts and eligibility)
  - Common pipeline tooling (UIMA) and scaling
  - Data Quality (metrics, missing value management)
  - Evaluation Framework (population networks)

Collaborations

- Agilax Technologies
- CDISC (Clinical Data Interchange Standards Consortium)
- Centerphase Solutions
- Deloitte
- Group Health, Seattle
- IBM Watson Research Labs
- University of Utah
- Harvard Univ. & i2b2
- Intermountain Healthcare
- Mayo Clinic
- Minnesota HIE (MNHIE)
- MIT and i2b2
- SUNY and i2b2
- University of Pittsburgh
- University of Colorado

© Mayo Clinic 2010
**Project Advisory Committee**

Suzanne Bakken, RN DNSc, Columbia University  
C. David Hardison, PhD, VP SAIC  
Barbara A. Koenig, PhD, Bioethics, Mayo Clinic  
Issac Kohane, MD PhD, i2b2 Director, Harvard  
Marty LaVenture, PhD MPH, Minnesota Department of Health  
Dan Masys, MD, Chair, Biomedical Informatics, Vanderbilt University  
Mark A. Musen, MD PhD, Division Head BMIR, Stanford University  
Robert A. Rizza, MD, Executive Dean for Research, Mayo Clinic  
Nina Schwenk, MD, Vice Chair Board of Governors, Mayo Clinic  
Kent A. Spackman, MD PhD, Chief Terminologist, IHTSDO  
Tevfik Bedirhan Üstün, MD, Coordinator Classifications, WHO

**Vision**

- To assemble a federated informatics research community committed to open-source resources that can industrially scale to address barriers to the broad-based, facile, and ethical use of EHR data for secondary purposes
- To create, evaluate, and refine informatics artifacts that advance the capacity to efficiently leverage EHR data to improve care, generate new knowledge, and address population needs
- To make these artifacts available to the community of secondary EHR data users, manifest as open-source tools, services, and scalable software
- To partner with industry developers who can make these resources available with commercial deployment and support.

**Themes & Projects**

<table>
<thead>
<tr>
<th>Themes</th>
<th>Projects</th>
<th>Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Normalization</td>
<td>Clinical Data Normalization</td>
<td>IBM, Mayo, Utah, Agilex</td>
</tr>
<tr>
<td>Phenotype Recognition</td>
<td>Natural Language Processing (NLP)</td>
<td>Harvard, Group Health, IBM, Utah, Mayo, MIT, SUNY, i2b2, Pittsburgh, Colorado</td>
</tr>
<tr>
<td>High-Throughput Phenotyping</td>
<td>UIMA and Scaling Capacity</td>
<td>CDISC, Centerphase, Mayo, Utah</td>
</tr>
<tr>
<td>Data Quality</td>
<td>IBM, Mayo</td>
<td></td>
</tr>
<tr>
<td>Evaluation Framework</td>
<td>Mayo, Utah</td>
<td></td>
</tr>
<tr>
<td>Agilex, MN HIE, Mayo, Utah</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Project 1 - Clinical Data Normalization**

CG Chute, MD DrPH

- Build generalizable data normalization pipeline
- Semantic normalization annotators involving LexEVS
- Establish a globally available resource for health terminologies and value sets
- Establish and expand modular library of normalization algorithms
### Project 2: Clinical Natural Language Processing (cNLP); GK Savova, PhD

- **Overarching goal**
  - High-throughput phenotype extraction from clinical free text based on standards and the principle of interoperability
- **Focus**
  - Information extraction (IE): transformation of unstructured text into structured representations
  - Merging clinical data extracted from free text with structured data

### Project 3: High-Throughput Phenotyping; Jyoti Pathak, PhD

- Develop portable phenotype algorithms
  - Administrative Data; Labs; Medications
  - Build on NHGRI eMERGE experience
- Phenotyping logic specification
- Applications of phenotype characterization
- Expansion of Cohort Amplification methods

### Project 4 - UIMA exploitation; Marshall Schor – IBM Research

- Use UIMA as a unifying framework, leveraging ecosystem
  - Work with team leads to identify “fit” (or not) of UIMA into subprojects
    - Phenotyping and Data Quality, especially
  - Support UIMA and UIMA-AS use
    - Consult on pipeline design / architectures / configuration
  - Support scaling, capacity flexibility
    - Develop and deploy virtual machine images that can dynamically scale in cloud computing environments
    - Develop integration / deployment tooling with goal of simplicity
      - Enabling widespread adoption of POC

### Project 5 - Data Quality; Kent Bailey, PhD

- Refine metrics for data consistency
- Deploy methods for missing or conflicting data resolution
- Integrate methods into UIMA pipelines
- Refine and enhance methods
Project 6 - Real-world evaluation framework
Dr. Huff

• Iteratively test normalization pipelines, including NLP where appropriate, against normalized forms, and tabulate discordance.
  * Normalize retrospective data from the EMRs and compare it to normalized data that already exists in our data warehouses (Mayo Enterprise Data Trust, Intermountain).
• Use cohort identification algorithms in both EMR data and EDW data.
  * Normalize the data against CEMs.

Beacon: $12.3M Healthcare improvement through standards-based health information exchange

• 11 SE MN counties; all public health depts, Mayo, Winona Health System, Olmsted Medical Center, MN Health Information Exchange, Indian Health Service, VA, Federal Med Center
• Demonstrate efficacy in childhood asthma & DM
  * Implement standards-based data exchange
  * National data exchange methods and monitoring
  * Comparative effectiveness research
  * Invoke 6-sigma and LEAN quality improvement
  * Disease metrics, utilization of ER and hospital
**Beacon Grant for SE MN**

**Vision**

SE MN community will embrace standards based HIE to improve access, quality and efficiency of health care delivery

- County Public Health Departments
- Mayo Clinic Rochester
- Mayo Health System
- Olmsted Medical Center
- Public school systems
- Winona Health System
- MN HIE
- Stratis – REACH (HIT Ext.)
  - Key Health Alliance
- Agilex
- Veterans Administration
- Indian Health Service
- US DOJ – Bur. Prisons

**Goals**

**Childhood Asthma and Diabetes**

- Reduce Emergency room visits
- Reduce unscheduled MD visits
- Reduce hospitalization
- Improve self-reported functioning
- Improve compliance with the treatment of asthma
- Improve school attendance
- Reduce days out of work – self-reported for Diabetes
- Improve compliance with Diabetes

**SE MN Beacon**

**Care Provision**

- Public health
- Nursing homes
- Hospitals
- Emergency rooms
- Home health
- Schools
- Out-patient clinics

**Counties**

- Dodge county
- Fillmore county
- Freeborn county
- Goodhue county
- Houston county
- Mower county
- Olmsted county
- Rice county
- Steele county
- Wabasha county
- Winona county

**Population Health Improvement Goals and Needs for Beacon**

- Identify affected individuals currently without effective treatment
- Engage public health services for underserved populations
- Improve telemedicine connections in rural communities through Winona’s eSuite
- Report score card every month to practices on performance
- Provide platform for analysis of data for comparative effectiveness research
Conceptual IT infrastructure for Beacon

**Public health** (NH’s, schools, home health)

**Analysis (and reporting to practice)**

**Population management**

**Beacon Infrastructure Needs**

- EMR’s (outpatient & inpatient)
- Clinical systems
- Public health
- Home health
- Pharmacies
- Cost & utilization (outpatient, ED, inpatient, pharmacies, Lab, claims data)

**Beacon Population Management & Practice Reporting System**

- Reports for practices for quality & utilization (MCR, OMC, MHS, WHS)
- Reports for practices & physicians for managing care for patients in need (clinical data)
- Practice management system for practices & public health
- Real time alerts for patients in need of care and being seen
- Identification of high risk patients (home & public health)
- Schools
- Patient education & activation (PHR-MCHM)

**SE MN Beacon: More information…**

- **Main Page**
- **Health IT Pilot Communities through Recovery Act Beacon Community Program**
- **Beacon Community Awarded: Mayo Clinic Rochester, Mayo Clinic College of Medicine, Rochester, MN**
- **http://informatics.mayo.edu/beacon**

**SE MN Beacon Community Goal for Population Health in Service**

- Enhance patient management and reduce costs associated with hospitalization and emergency services for patients with diabetes and childhood asthma and address vaccine health disparities for subgroup populations and communities.