Health Sciences South Carolina: A Statewide Collaborative Learning Health System

- **Focus**: University—Health System collaborations to advance health
- **Approach**: Technology Empowered Communities of Practice
- **Collaborative Programs**:
  - Integrated research data repository
  - Surgical quality collaborative
  - Emergency department health information exchange
  - e-IRB and multi-site IRB reliance

Current data contributors include MUSC, Palmetto Health System and Spartanburg Health systems. Greenville Health System data is available but the health system is no longer an active member of HSSC.
The Problem: Research Data at the Hospital Level

- Clinical systems are typically integrated in point-to-point connections
- Research data is stored in islands
- Limited connectivity between these domains
The Problem:
Research Data at the State Level

- This architecture scales badly across multiple organizations
Current state: Single Integrated Database

Collection

Healthcare Institutions
- Medical University South Carolina
- Palmetto Health
- Spartanburg Regional Health System

Data Scope:
- Demographics
- Diagnoses
- Procedures
- Medication orders
- Medication admin
- Labs

Data Feed Types:
- HL7, 837A, CSV

Storage

MPI

Operational Data Store (HTB)

Clinical Data Warehouse (CDW)

Access

Anonymized i2b2

Cohort Analysis

Data Marts & Registries
# Information-at-Rest to Information-in-Motion

<table>
<thead>
<tr>
<th>Current</th>
<th>Future</th>
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<tbody>
<tr>
<td>Information <strong>resource</strong> for research</td>
<td>Information <strong>platform</strong> for collaboration</td>
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<tr>
<td>• Single central database</td>
<td>• Federated provider databases</td>
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<tr>
<td>• Proprietary data model (HL7 v3RIM derived)</td>
<td>• Multiple linked data models</td>
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<td>• Periodic database releases</td>
<td>• API for access by EHRs and other apps</td>
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<td>• Governance based access data by honest brokers</td>
<td>• Research master ID integrated with institutional data</td>
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<tr>
<td>• Limited access for clinical applications (no &quot;API&quot;)</td>
<td>• Information enrichment <em>subscriptions</em> (deaths, claims, environmental data, ADT events)</td>
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<td>• Export for analytics to separate platform</td>
<td>• Integrated open source analytics (OMOP/OHDSI)</td>
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Smile CDR for Sympatico

- Complete FHIR-based Clinical Data Repository Solution
- Powered by HAPI FHIR
- Launched as a commercial offering in 2016
Collaboration Architecture for the Future
Goal: Platform for Cross-enterprise Data Integration for Collaboration, and Research

**Condition List** app provides longitudinal view of conditions across participating organizations.
Maintain Clients’ Data in Different CDMs for Collaboration

Research collaboration requires the ability to maintain data in multiple clinical data models without excessive maintenance costs. Smile CDR support the use of FHIR subscriptions between data stores to maintain data multiple formats.
Example CDM for Collaboration: OHDSI

- OMOP CDM is a Common Data Model + Standardized Vocabulary

OHDSI is a multi-stakeholder, interdisciplinary collaborative with thousands of members.

OHDSI supports the OMOP CDM and set of open source analytics tools.

OHDSI runs an ongoing set of observational studies evaluating pharmacotherapies and predictive analytics models.
Open Source Analytics Using OHDSI/OMOP
Collaboration Architecture for the Future
Goal: Enrich data with Information Subscriptions

**ED Notification App** provides cross-enterprise notification when some patients present at any participating Emergency Room (todo: add screenshot)
Automatically Enrich Member Databases with New Linked Information from External Sources

Social determinants of health data subscriptions from geolinked sources
Information Subscriptions: Environmental Data from Networked Regional Sensors

Air pollution data (geolinked) vs. asthma admissions to EDs
Future Plans: Expanded Scope

● Current Scope:
  ○ Patients, Encounters, Conditions, Vital Signs, Insurance
  ○ 2 Hospital Systems
  ○ OHDSI linked CDM
  ○ ADT notifications
  ○ Research MPI and mortality data subscriptions

● Under Development:
  ○ Laboratory Results
  ○ Medication Orders and Administration
  ○ Additional Hospital Systems
  ○ Geolinked data
Thank You

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