Eliminating Barriers to Genuine Health Information Exchange
The Vision: A Closed Looped Healthcare Platform

Data Aggregation

Normalization

Collaborative Care Planning

Patient Engagement

Realtime Monitoring

Interventions / Population Management

Outcome Analytics

Care Plan

Care Outcomes
The Reality: Heterogeneous Environments

- Consumer Engagement
- Clinical Data
  - eClinicalWorks
  - GE Centricity
  - AC, AHS, NextGen, PF
- Community Environment
- Care Planning
- Care Coordination
- Consumer Engagement
- Acute & Ambulatory Environment
- Discharge Planning, Clinical Data
- Orders\Results, ADT, C-CDA ToC, etc.
- EMRs & Ancillary
- Financial Analytics
- Clinical Analytics
- Client Custom Data Warehouse
- ETLs Scheduled
- Care Navigation
- Clinical Data
- Population Financial Analytics
- Population Clinical Analytics
- Patient Portal
- Consumer Engagement

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The Reason: Varying Levels of Interoperability

- **Technical interoperability**
  Neutralizes effects of distance - e.g., hardware, software, networks, HL7 “standard”

- **Semantic interoperability**
  Communicates meaning - e.g., data content terminologies (e.g., ICD-10, SNOMED, LOINC)

- **Process interoperability**
  Coordinates work processes - e.g., workflow, user roles, real-time data

*NOTE: These three types of interoperability are all required for consistent and timely exchange of health information among partners*
The Strategy: Real-Time Aggregation of Data

• **Take EMRs’ Interoperability Out of the Equation**
  Meet the EMR where they can meet you
  Use their own HL7, CCD, C-CDA Processes, Extracts
  for Data Aggregation

• **Create a Rosetta Stone of Terminology**
  By using an Ontology, Data becomes an Asset which can be re-used

• **Drive Change into the Workflow of Clinicians**
  Utilize all components, Care Management, Patient Data, Analytics, and
  Clinical Information to Notify Clinicians in Real-Time of Critical Data and DO
  NOT Overload the Workflow
The How: Use an Ontology On Top of the “Rosetta Stone”

• **Ambiguity** - Two or more terms can be used to represent a single concept
  – Lack of consensus, variation from one location to the next, or one time period to the next (e.g., salinity and saltiness)

• **Polysemy** (homograph)
  – multiple meanings - e.g., mercury (planet), mercury (metal), mercury (automobile), mercury (mythical being)

• **Synonymy**
  – AMI=Acute Myocardial Infarctus=Infarctus of the Myocard =Heart Attack
The How: Apply Population Rules in One Place

Has at least one ‘Diabetes Mellitus’ problem (excluding ‘Gestational Diabetes’)??

<table>
<thead>
<tr>
<th>Condition Description</th>
<th>Code</th>
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<tbody>
<tr>
<td>Brittle diabetes</td>
<td>11530004</td>
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<tr>
<td>Diabetes mellitus AND insipidus with optic atrophy AND deafness</td>
<td>70694009</td>
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<tr>
<td>Diabetes mellitus NOS with no mention of complication</td>
<td>190324002</td>
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<tr>
<td>Diabetes mellitus associated with genetic syndrome</td>
<td>5955009</td>
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<tr>
<td>Diabetes-deafness syndrome maternally transmitted</td>
<td>23759009</td>
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<tr>
<td>Hyperproinsulinemia</td>
<td>23751005</td>
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<td>Maturity onset diabetes mellitus in young</td>
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<td>Diabetes mellitus autosomal dominant type II</td>
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<tr>
<td>Polyendocrine autoimmune syndrome, type 2</td>
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<td>Diabetes mellitus due to structurally abnormal insulin</td>
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<tr>
<td>Diabetes mellitus during pregnancy, childbirth and the puerperum</td>
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<td>Diabetes mellitus type 1</td>
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<td>Carpenter syndrome</td>
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<tr>
<td>Diabetes mellitus, juvenile type, with hyperosmolar coma</td>
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<tr>
<td>Insulin dependent diabetes mellitus type IA</td>
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<tr>
<td>Insulin dependent diabetes mellitus type 18</td>
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<td>Insulin-dependent diabetes mellitus secretary diabetes syndrome</td>
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<td>Polyendocrine autoimmune syndrome, type 2</td>
<td>83730000</td>
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<tr>
<td>Pre-existing diabetes mellitus, insulin-dependent</td>
<td>190229001</td>
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<tr>
<td>Type I diabetes mellitus - poor control</td>
<td>190371008</td>
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<tr>
<td>Type I diabetes mellitus maturity onset</td>
<td>190372001</td>
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<tr>
<td>Type I diabetes mellitus with arthropathy</td>
<td>31493005</td>
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<tr>
<td>Type I diabetes mellitus with neuropathic arthropathy</td>
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<tr>
<td>Type I diabetes mellitus with gangrene</td>
<td>190309008</td>
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<tr>
<td>Type I diabetes mellitus with hypoglycemic coma</td>
<td>314771000</td>
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<tr>
<td>Type I diabetes mellitus with ulcer</td>
<td>190348003</td>
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<tr>
<td>Type I diabetes mellitus without complication</td>
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<td>Unstable type I diabetes mellitus</td>
<td>290020030</td>
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<tr>
<td>Diabetes mellitus type 2</td>
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<td>Diabetes mellitus due to insulin receptor antibodies</td>
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<td>Diabetes mellitus type 2 in nonobese</td>
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<td>Diabetes mellitus type 2 in obesity</td>
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<td>Diabetes mellitus, adult onset, with hyperosmolar coma</td>
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<td>Insulin-resistant diabetes mellitus AND acanthosis nigricans</td>
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<tr>
<td>Insulin-treated non-insulin-dependent diabetes mellitus</td>
<td>227389002</td>
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</tbody>
</table>
The Solution: Data Design for Population Management

Community Environment
- eClinicalWorks
- GE Centricity
- AC, AHS, NextGen, PF, AP

Care Planning
- Care Coordination

Consumer Engagement
- Patient Portal

Acute & Ambulatory Environment
- EMRs & Ancillary

Clinical Analytics Gateway
- Clinical Analytics

Financial Claims
- Population Financial Analytics

Population Clinical Analytics
- Client Custom Data Warehouse

Longitudinal Clinical Platform
- Clinical Data

Outcomes
Case Study:
University of Pittsburgh Medical Center
UPMC Today: Snapshot

- **$12 billion integrated global health enterprise**
- **60,000 employees**
- **22 academic, community, and regional hospitals with more than 4,200 licensed beds**
- **More than 187,000 inpatient admissions and 165,000 surgeries performed annually**
- **Each year, more than 4.5 million outpatient visits and 480,000 emergency visits**
- **More than 40 UPMC Cancer Centers with 180 affiliated oncologists**
- **UPMC Health Plan: 2.4 million total members, a network of more than 125 hospitals and other facilities and more than 11,500 physicians**
UPMC Three Node Deployment

PA SIIS (State Immunizations)
Quest
Labcorp

Altoona Regional Hospital
Armstrong County Hospital
Butler Hospital
The Children’s Institute
Excella Health System
• Westmoreland Hospital
• Excella Health-Frick Hospital
Heritage Valley Health System
• Heritage Valley Sewickley
• Heritage Valley Beaver
Jefferson Regional Hospital
Pediatric Alliance
St. Clair Hospital
The Washington Hospital

Children’s Hospital of Pittsburgh of UPMC
Magee-Womens Hospital of UPMC
UPMC Bedford Memorial
• UPMC East
• UPMC Hamot
• UPMC Horizon
UPMC McKeesport
• UPMC Mercy
• UPMC Montefiore
• UPMC Northwest
• UPMC Passavant
• UPMC Presbyterian
• UPMC Shadyside
• UPMC St. Margaret
Western Psychiatric Institute and Clinic of UPMC

UPMC Health Plan
Western Pennsylvania Data Aggregation
Domains of the UPMC Longitudinal Record

**Allergies**
- **4,652,223**
  - EpicCare, Cerner, Homehealth,
  - Historic: Meditech

**Care Providers**
- **640,458**
  - Identifiers from EpicCare, Medipac, Achieve, Cerner, Homehealth

**Conditions**
- **64,708,411**
  - Cerner, EpicCare, Medipac, Achieve, Homehealth, HealthPlan

**Encounters**
- **93,522,430**
  - Epic, Medipac, Achieve, Homehealth, Altoona SMS
  - Historic: SMS, Meditech, Star

**Immunizations**
- **7,653,478**
  - EpicCare, Cerner, PA-State, Health Plan

**Laboratory**
- **472,928,559**
  - Sunquest, QuestLabs, Orchard, SafeTrace, LabCorp, HealthPlan
  - Historic: Meditech, Star

**Medications**
- **20,890,686**
  - EpicCare, Cerner, Frameworks, Health Plan

**Organizations**
- **61,316**
  - Identifiers from over 40 contributing systems

**Patients**
- **12,970,500**
  - Epic, Medipac, Achieve, Homehealth
  - Historic: SMS, Meditech, Star

**Procedures**
- **7,213,294**
  - Medipac, Homehealth, Health Plan

**Relationships**
- **906,581**
  - Patient provider relationship

**Measurements**
- **New**
  - Ejection Fraction
  - Blood pressure
  - Temperature
  - Heart Rate
  - Height/Weight/BMI
  - SpO2

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Baylor, Scott & White
Dallas, Texas
Baylor Scott & White Health

- Baylor Scott & White Health was born from the 2013 combination of Baylor Health Care System and Scott & White Healthcare.
- The largest not-for-profit health care system in Texas
- One of the largest health systems in the United States
- Baylor Scott & White Health includes 46 hospitals
- More than 500 patient care sites
- More than 6,000 affiliated physicians
- 34,000 employees
- Scott & White Health Plan.
- Baylor Scott & White Quality Alliance (ACO)
Q & A
Thank You for Your Time!
Community EHR Agent
Acute EHR Agent
Care Coordination Platform
Client Data Warehouse: Reporting
Cost & Utilization - Dashboards
Patient Engagement