Patient Records Matching
Overcoming the largest obstacle to health information exchange: One HIE’s story

Daniel Chavez, Executive Director, San Diego Health Connect
Brent Williams, Founder and CTO, Verato
Agenda

- The challenges with patient record exchange
- Changing the way we match patient records
- Applying improved record matching across different healthcare scenarios
- Futures
- Questions
“The sheer volume and velocity of data at our fingertips today is unprecedented… As we build a Culture of Health—a nation where everyone has the opportunity to live longer, healthier lives—it will be critical to ensure communities can effectively use and manage this information in ways that help people get healthy and stay healthy.”

~ Risa Lavizzo-Mourey, MD, MBA, President and CEO, Robert Wood Johnson Foundation
The SDHC mission

Our Mission
To connect healthcare stakeholders to deliver quality, comprehensive information for better care.

When every individual’s health information is securely available to their doctors when and where they need it:

• Doctors can provide better, more informed care.
• Duplication of tests and procedure decreases.
• Costs go down.
A sample of SDHC’s 25 participating organizations
HIE Value to San Diego Healthcare

**Payors**
- Improves payor/provider workflow
- Lowers utilization
- Reduction of network leakage
- Care coordination improved

**Public Health**
- Automated real time reporting
- Standardized data
- Single platform for community health
- Achieve population health and wellness

**Community Clinics**
- Access to relevant patient information
- Great access to specialty care
- Speeds referral process

**Health Systems**
- Improves care coordination
- Reduces preventable admissions
- Improves MU compliance
- Improves patient outcomes

**Physicians**
- Strengthens provider engagement
- Office visit improved
- Expands physician reach.
- Reduces costs

**Consumers**
- Care is more coordinated
- Improves office visit
- Strengthens patient engagement
- Less duplicate tests and procedures
- Fewer errors and safer care
- Lower out-of-pocket costs
- Less paperwork
- Important health information is accessible when and where it is needed

**Public Health**
- Automated real time reporting
- Standardized data
- Single platform for community health
- Achieve population health and wellness
Today, the HIE is not:

• A Clinical Data Repository
• Patient facing
• A research tool
• Big Data
• An aggregation tool
• An EHR
SDHC uses an MPI as a record locator service

25 Provider institutions

3.2 M patients

SAN DIEGO HEALTH CONNECT

Mirth Match

Mirth MPI

At providers A,B

At provider C

At providers A,B

25

Provider institutions

3.2 M patients

7.5 M transactions / month

SAN DIEGO HEALTH CONNECT

Better Information • Better Care
When records do not match, records end up in an “Exception queue”
Each new provider led to more backlog, due to data quality and differences in governance.

Exception queue

Manual effort
- 2 FTEs, 4 months
- 2 FTEs, 1 year
- 2 FTEs, 2 years

Ultimately:
187,000 tasks
2 FTEs, 8 years
Might be obvious, but the use case is the same across the board...

Large Provider Organization built from diverse clinical apps

ACO Data from Feds and Providers

Cancer  Inpatient  Pediatrics
Labs  PT

CMS
Clinic  Clinic  IHS  Hospital
Rural Clinic
Might be obvious, but the use case is the same across the board…

Large Integrated Health System

Region A
Region B
Region C
Region D
Region E
Outsourced Partner

Admin & Enroll

National Scale

CMS
DoD
VA

Large Hospital

HIE
IHS

$
The community decided we needed a better way to match.
Our working group was key in making this decision

41 Total members

13 Different organizations

2 Meetings per month
How Verato is different

Verato

Algorithm RICH
Data RICH

Referential Matching + Complete, Unified Data

Cloud-based

MPI Technologies

Algorithm RICH
Data poor

Probabilistic Matching

Information Providers

Data RICH
Algorithm poor

Fragmented Data

Acxiom
TransUnion
Experian | Equifax

IBM | Informatica
Oracle | SAP
Identity data is a collection of attributes which often change over time

- **Bio graph**
  - Name(s), Address, Gender, Birthdate

- **Family graph**
  - Parents, Siblings, Spouses, Children

- **Cyber graph**
  - Phone, Email, Social IDs, Device IDs, IP

- **Government graph**
  - SSN, National Benefits ID, Drivers’ Permits, Legal Records

- **Social graph**
  - Friends, Roommates, Associations

- **Professional graph**
  - University, Degrees, Employers, Coworkers, Prof credentials, Associations

- **Commercial graph**
  - Loyalty cards, Purchases

- **Financial graph**
  - Fin. Accounts, Homes, Cars, Boats, Mortgages, Loans, Credit
Title: Time, errors, and governance lead to multiple "identities" for one person

<table>
<thead>
<tr>
<th>One person...</th>
<th>...can be represented by old, incorrect, or incomplete data...</th>
<th>...resulting in different identities across provider systems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Name change Address change Phone/email change Married</td>
<td>Divorced Birth</td>
</tr>
<tr>
<td>Ambiguity</td>
<td>Hyphenated name Nicknames Jr/Sr, Twins Default entries</td>
<td>Missing data</td>
</tr>
<tr>
<td>Errors</td>
<td>Spelling error Transcription error Homonym error Data quality Data content Privacy controls Formatting</td>
<td></td>
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<tr>
<td>Data Gov.</td>
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<td>2</td>
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**Notes:**
- Time, errors, and governance can lead to multiple "identities" for one person.
- The figure illustrates the various types of errors and their impact on data representation.
- Data quality, content, and governance controls play crucial roles in maintaining accurate and complete records.
CARBON™ – the most comprehensive reference database of identities in the US

Identity Assembly Algorithm

Credit Header Data
Telco Records
Gov’t & Legal Records

300M+ Identities

Correct and incorrect data
Referential matching is a revolutionary new way to match patient records.

MPI matching (deterministic or probabilistic) can’t see through different or bad identity data.

Referential matching works despite different or bad identity data.
Verato automatically resolved 75% of SDHC’s manual tasks

Exception queue (187,000 tasks)

90s run time

95% pediatrics
5% very ambiguous data

45,000 tasks

142,000 new matches
Verato also found 126,000 additional matches in the MPI
In total, SDHC increased the number of matches in its MPI by 110%
Of the new matches identified by Verato...

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1.3%</td>
<td>Had conflicting birthdates</td>
</tr>
<tr>
<td>7%</td>
<td>Had a last name difference</td>
</tr>
<tr>
<td>13.1%</td>
<td>Had a different address</td>
</tr>
<tr>
<td>&gt;20%</td>
<td>Had at least one of those three critical errors</td>
</tr>
</tbody>
</table>
Futures – Improve edge case matching

1. Incorporate relationship data in ADTs

2. Pediatrics: add twins identifiers to patient data model at institutions

3. Develop twin inference algorithm for newborns to support twin analysis for adults
Futures – Accommodating varying data governance models

1. Understanding an organization’s identity data governance model

2. Demonstrating proof for non-obvious matches while maximizing privacy

3. Accommodating variations in transport protocols
Futures – Connect the Community

Connecting All for Better Health & Wellness

ConnectWellSD
Connect • Collaborate • Empower

LIVE WELL
SAN DIEGO

COMMUNITY INFORMATION EXCHANGE

SAN DIEGO HEALTH CONNECT
Better Information • Better Care

2-1-1 SAN DIEGO
Futures – Connect the eHealth Exchange

HIOs and other Communities

Kaiser

SDHC

State / Local Governments

Academic Medical Centers

SSA VA / DOD

CDC
A national patient ID is untenable

1. Unique enumerators are notoriously prone to entry errors

2. Patients can’t always communicate an enumerator to the provider

3. Hundreds of legacy health systems would still need to be linked to the correct patient
Trusted health information exchange...

Is built on technical interoperability

- HL7
- FHIR
- ISO

Uses document standards to achieve functional interoperability

- CCR
- SNOMED
- DICOM
- LOINC
- NCPDP
- RxNorm
- CPT
- ICD-9/10

Is enabled by semantic interoperability

Patient Matching:
- No false positives
- Minimal false negatives
“Better is possible. It does not take genius. It takes diligence. It takes moral clarity. It takes ingenuity. And above all, it takes a willingness to try.”

Atul Gawande