Using Da Vinci Quality Measures and Event Notification for Payor-Provider Communication

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  Anthem, Inc., Enterprise Data Analytics

• Vik Kheterpal
  CareEvolution, Principal
• Established 1902
• Main hospital 886 licensed beds, Level 1 Trauma Center
• 3 smaller community hospitals
• 14,500 employees
• 2,500 medical staff, 300 residents and fellows, 3,500 nurses, 2,500 volunteers
• Epic Systems HIS/EMR fully deployed
• HIMSS Stage 7 as of March 2014
• US News “Best Hospitals 2019-2020” #8

• Research Institute
• Comprehensive Cancer Center
• Comprehensive Transplant Center
• Smidt Heart Institute
• Neurosurgical Institute
• California Rehabilitation Institute (joint venture with UCLA)
• Rapidly expanding outpatient footprint
• Active community outreach programs (e.g. COACH for Kids)
• Leading health benefits company dedicated to improving lives and communities
• Independent licensee of the Blue Cross and Blue Shield Association in 14 states
• Conducts business through our subsidiaries in over 25 states across the country
• Serves more than 108 million people
• Offers wide range of specialty products
• Digital-first, human-centered approach putting consumers at the center of everything that we do
• Using technology to help close gaps in care and better support the populations we serve
The Vivity HMO is a partnership of Anthem and seven large Southern California provider organizations: Cedars-Sinai, UCLA, MemorialCare, Dignity Health, Huntington, PIH, Good Samaritan (https://www.vivityhealth.com/)

The Anthem/Vivity clinical repository is managed by CareEvolution (https://careevolution.com/)
CareEvolution: We Connect Healthcare Across Public, Provider, Payer, and Consumer Markets

- 160+ million patients’ data
- 2800+ hospitals
- 800+ HIT System Interfaces
- 220+ FQHC, SNF, home health
- 320,000+ active users
CareEvolution HIEBus™: The Universal Translator for Health Data Enables the Lifetime Patient Record

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Content &amp; Structure</th>
<th>Transport</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOMED</td>
<td>HL7 2.x</td>
<td>SMTP/SMIME</td>
<td>“Direct”/messaging</td>
</tr>
<tr>
<td>NPI/NPPES</td>
<td>HL7 CCDA</td>
<td>HTTP/RESTful</td>
<td>IHE XDR</td>
</tr>
<tr>
<td>ICD10</td>
<td>CDA BPPC Etc.</td>
<td>SOAP</td>
<td>PIX/PDQ</td>
</tr>
<tr>
<td>LOINC</td>
<td>NCPDP / SCRIPT</td>
<td>TLS</td>
<td>XDS/XCPD (NwHIN)</td>
</tr>
<tr>
<td>RxNorm</td>
<td>HL7 2.5.1</td>
<td></td>
<td>FHIR/SMART</td>
</tr>
<tr>
<td>HCPCS/CPT</td>
<td>DICOM (MWL)</td>
<td></td>
<td>HPD/HPD+</td>
</tr>
<tr>
<td>HL7 and other Value Sets</td>
<td>FHIR</td>
<td></td>
<td>DICOM (MWL)</td>
</tr>
</tbody>
</table>

[CareEvolution logo]

[CareEvolution Healthcare Technology logo]
The Da Vinci Project

- The Da Vinci Project is a collaborative effort of payors, healthcare organizations, and EMR vendors to standardize secure, high-performance, interoperable interfaces based on FHIR between payors and healthcare organizations.

- Anthem served as a founding Da Vinci member.

- Cedars-Sinai joined the Da Vinci Project as a healthcare organization member sponsored by Anthem.

- The work product of Da Vinci is being balloted by HL7 and will become part of the HL7 FHIR standard.
The project team selected two use cases that would require minimal workflow changes or application “build” in Epic:

- Notifications for outside encounters delivered to a CSHS endpoint and thence to a PCP InBasket in Epic
- Quality Measures delivered to an Anthem endpoint for plan members
Event Notifications for PCPs


- Encounter events from the CareEvolution repository are posted to the CSHS endpoint using FHIR.
- The JSON is parsed, flattened, and inserted into tables in the enterprise data warehouse.
- The event data is processed and filtered to minimize InBasket “noise”.
- InBasket messages are formatted based on the event data and other EDW data.
- InBasket messages are delivered to the PCP via an Epic web service.
Cedars-Sinai implemented the following categories of filtering on the data received from Anthem:

<table>
<thead>
<tr>
<th><strong>Patient Identity</strong></th>
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</thead>
<tbody>
<tr>
<td>The Anthem patient identifying information must be consistent with the Cedars-Sinai MRN, patient name, date of birth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Encounter Types Notified</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Notifications are delivered for inpatient admissions, outpatient office visits, and emergency department registrations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Encounters Types Bypassed</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Notifications are bypassed for lab and imaging procedures, preadmissions, and outpatient therapy visits.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Content Filtering</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Notifications are bypassed if the Anthem encounter data does not include an organization and location, an attending MD, and at least one coded diagnosis or procedure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PCP Identity</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Notifications are only delivered to the PCP assigned in Epic if the patient has an encounter within the last 3 years</td>
</tr>
</tbody>
</table>
Event Notifications at a Glance

How Much Gets Filtered? (Typical Weekday)

- **Live since May 2020**
- **44,588 Notifications Sent to Cedars-Sinai**
- **5.1% Accepted and Delivered to PCP InBasket**

<table>
<thead>
<tr>
<th>Filter Type</th>
<th>Acceptance Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Mismatch DOB (when MRN matches all DOBs matches)</td>
<td>-&gt; 0%</td>
</tr>
<tr>
<td>% Mismatch Name (when MRN matches all names matches)</td>
<td>-&gt; 0%</td>
</tr>
<tr>
<td>% Mismatch Anthem Member Number (where Member Number not null)</td>
<td>-&gt; 0.5%</td>
</tr>
<tr>
<td>% Mismatch Anthem Patient Roster (MRN in message always matches our MRN...however we don’t have Anthem as primary payor for some)</td>
<td>-&gt; 12%</td>
</tr>
<tr>
<td>% Defective Content (missing diagnosis, provider, etc.)</td>
<td>-&gt; 0%</td>
</tr>
<tr>
<td>% Rejected (non-clinical) Encounter Type</td>
<td>-&gt; 0.5%</td>
</tr>
<tr>
<td>% No PCP Identified in Epic</td>
<td>-&gt; 90.1%</td>
</tr>
</tbody>
</table>
Example InBasket Notification of Outside Encounter

- Notification is delivered to PCP InBasket
- Notification includes encounter type, organization name and location, physician, and diagnoses &/or procedures on claim
Data Flow for Event Notifications

Provider Organization
→ Anthem Receipt of ADT event or CCDA document
→ Internet
→ Enterprise Data Warehouse
→ PCP Inbasket in EMR

Cedars-Sinai

Validate Patient
Discard Nonclinical Encounters
Identify PCP

Filters

CareEvolution

CareEvolution Repository
→ CSHS AWS API Gateway
→ MIRTH Interface Engine
→ CSHS Data Warehouse (Oracle)
→ Epic Interconnect Server
→ Epic Transactional Database (Cache)
→ Epic GUI (Hyperspace)

Epic
Transactional
Database
(Cache)

FHIR
→ FHIR
→ SQL
→ Epic Web Service

FHIR

Encrypted

Internet

Firewall

Discard Nonclinical Encounters

Identify PCP
2.2 Preconditions and Assumptions

**Preconditions**

- There is an event or request that drives the generation of the Notification.
- A Notification will be generated for each patient separately.
  - The event can be for one or more patients.
- The Sender has access to the Recipients/Intermediary FHIR endpoints.
  - Typically the discovery and management of this is an ‘out-of-band’ process
- System level trust exists between the actors (refer to the Security Page for additional guidance).
  - Clients have been authorized by the servers.
- A secure information transport mechanism exists between the actors (refer to the Security Page for additional guidance).
- Patient consent allows exchange of data between the relevant systems.
  - It is assumed that consent is managed elsewhere.
- Trading partners (in other words: Senders, Intermediaries, and Recipients) will use data use agreements (DUA)s, business associate agreements (BAAs) and/or contracts to specify the use cases and scope and potential reuse or repurposing of data shared between two parties. These agreements can be directly between trading partners or at a trusted exchange level. See the HL7 Da Vinci Guiding Principles for further details.
  - Any such agreement should clearly indicate how the Intermediary will handle sensitive information, determine what to remove, and how it will notify the recipient of the removal.

**Assumptions**

- Based on FHIR R4 and US Core R4 profiles where applicable.
- The Sender shall provide structured data whenever possible.
- Notifications are transacted to the `$process-message` operation endpoint.
- The Da Vinci Notification Message Bundle Profile is the FHIR object that is exchanged for all notification transactions.
- Considerations for sensitive data when triggering a Notification need to be taken into account and hence not all events may trigger a notification.
Under the Hood – What does “Scan Events” Mean?

Identify Members
- 100+ million anthem members in the LPR of which 41 million are “active”
- Identify which of them are associated with Cedars Sinai
- Potentially narrow to specific plan type
- For each such member:

Identify Events
- Any “clinical” encounter in the last 24 hours
- That happens to not be at a Cedars Sinai facility
- Data may be received from state HIEs, cloud based EMR vendors, CVS Minute Clinics, specific provider contracts, tele-health encounters (Live Health Online)
- Source data may be IHE CCDA, HL7, flat files etc.

Collect Metadata
- Ensure patient identifier sent back includes Cedars MRN
- Gather metadata to populate encounter, patient, locations, caregivers, problems, insurances
Tech Reflections And FHIR Paths Not Taken

- Security/privacy – how to scope patient
- Scaling and performance to respond
- Burden on Cedars to implement member filtering
- Get data for each encounters separately

- Theoretically available in v.4 (since 2) in reference implementations
- Being reworked by HL7 to be more robust for the underlying event triggers definition for real world use cases

Pull - FHIR Standard Search For Encounters in last 24 hours

FHIR Subscriptions (essentially Solicited Notifications)

Pull – Daily Poll for Each Cedars Patient

Bundles and History Operation (retrospective only)

- complex and suffers from same scaling, privacy, and implementation burden
- Security/privacy concerns
- Scaling on both ends
- Would receive all encounters including Cedars

Pull – FHIR Standard Search For Encounters in last 24 hours

FHIR Subscriptions (essentially Solicited Notifications)

Pull – Daily Poll for Each Cedars Patient

Bundles and History Operation (retrospective only)
Da-Vinci Unsolicited Notifications Implementation Highlights

• Transport: HTTPS

• Authentication: SMART (back end services authentication); OAUTH2

• Frequency: choice to implement as a “frequent batch” – delivered once daily in the morning as needed by the use case

• Data Payload; required resources vs. optional following US Core Profiles already implemented in the CE FHIR Server (encounter, patient, locations, caregivers, problems)

• Pre-processing: population refinement and event trigger definition
Anthem collects quality measures for members to identify gaps in care and notify the care team accordingly.

The legacy solution for communication from Cedars-Sinai to Anthem was a real-time HL7 version 2.x ADT interface from Cedars-Sinai to Anthem, and a clinical summary in the form of a CCDA document sent to Anthem automatically several days after discharge via an HIE interface.

Anthem processed the CCDAs to extract, map, and code CCDA structured data for rules engines and to make the narrative reports in the CCDA available for abstraction.

Anthem quality measures documentation for California can be found at: https://mediproviders.anthem.com/ca/pages/quality-improvement-program.aspx
Legacy Quality Measures Interfaces

Cedars-Sinai

EMR

Real-time ADT

Post-Discharge CCDA Documents

Internet

Encrypted XDS.b

HL7 v2.5

VPN Tunnel

Real-time ADT

Post-Discharge CCDA Documents

Anthem Clinical Repository

CareEvolution
The FHIR standards for this data exchange are published by HL7: https://build.fhir.org/ig/HL7/davinci-deqm/
<table>
<thead>
<tr>
<th>Measure (FHIR resource/type)</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diabetes (observation/lab)</td>
<td>Hemoglobin A1C test result, LOINC and date</td>
</tr>
<tr>
<td>2. Blood Pressure (observation/vital signs)</td>
<td>Systolic and diastolic measurement, LOINC and date</td>
</tr>
<tr>
<td>3. immunizations (observation/immunization)</td>
<td>Administration date (Pneumovax, HPV, Meningococcal, Tdap, Dtap, HIB, Hep A, Hep B, IPV- Inactive Polio, Influenza, Measles, Mumps, MMR, Rubella, Rotavirus, Varicella Zoster (VZV)-Chickenpox)</td>
</tr>
<tr>
<td>4. Colon cancer screening – Fecal occult blood (observation/lab)</td>
<td>Test result, LOINC and date</td>
</tr>
<tr>
<td>5. Colon cancer screening – colonoscopy (diagnostic report)</td>
<td>CPT and date</td>
</tr>
<tr>
<td>6. Colon cancer screening – flexible sigmoidoscopy (diagnostic report)</td>
<td>CPT and date</td>
</tr>
<tr>
<td>7. Weight (observation/vital signs)</td>
<td>Measurement, LOINC, Snomed and date</td>
</tr>
<tr>
<td>8. Height (observation/vital signs)</td>
<td>Measurement, LOINC and date</td>
</tr>
<tr>
<td>9. BMI (observation/vital signs – calculated)</td>
<td>Ratio, LOINC and date</td>
</tr>
<tr>
<td>10. Depression screening (observation/survey)</td>
<td>PHQ-9 score, LOINC and date</td>
</tr>
<tr>
<td>11. Eye exam (observation/diagnostic report)</td>
<td>CPT and date</td>
</tr>
<tr>
<td>12. Breast cancer screen (observation/diagnostic report)</td>
<td>CPT and date</td>
</tr>
<tr>
<td>13. COVID-19 (observation/laboratory)</td>
<td>Test result, LOINC and date</td>
</tr>
<tr>
<td>14. Rheumatoid arthritis</td>
<td>Condition, CPT, and date</td>
</tr>
<tr>
<td>15. Osteoporosis</td>
<td>Fracture condition followed by bone mineral density (BMD or Dxa Scan) CPT within 6 months</td>
</tr>
</tbody>
</table>
### QM Typical Weekday Traffic: CSHS -> Anthem

<table>
<thead>
<tr>
<th>GROUP</th>
<th>DATE</th>
<th>COUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTRITION</td>
<td>6/10/2020</td>
<td>4156</td>
</tr>
<tr>
<td>COLONOSCOPY</td>
<td>6/10/2020</td>
<td>22</td>
</tr>
<tr>
<td>COVID</td>
<td>6/10/2020</td>
<td>511</td>
</tr>
<tr>
<td>DIABETES</td>
<td>6/10/2020</td>
<td>249</td>
</tr>
<tr>
<td>MAMMO</td>
<td>6/10/2020</td>
<td>110</td>
</tr>
<tr>
<td>PNEUMOCOCCAL</td>
<td>6/10/2020</td>
<td>6</td>
</tr>
<tr>
<td>EYE_EXAM</td>
<td>6/10/2020</td>
<td>48</td>
</tr>
<tr>
<td>DEPRESSION</td>
<td>6/10/2020</td>
<td>294</td>
</tr>
<tr>
<td>RHEUMATOID ARTHRITIS</td>
<td>6/10/2020</td>
<td>7</td>
</tr>
</tbody>
</table>
FHIRE Data Exchange for Quality Measure (DEQM): Under The Hood

- Like Event Notification except direction is Cedars Sinai Initiated and mediated by Apigee layer for auth
- Each Measure is distinct transaction with distinct payload
- CE worked in 2019 San Antonio and other Connectathons
Lessons Learned

• Da Vinci/HL7 documentation (IG’s) are a good starting point but only defines one stage of the pipeline – end-to-end actualization of a use case will likely involve integration with multiple downstream systems

• Validation of use cases against legacy solutions may be labor-intensive and complex

• Implementation team requires a diverse set of skills and knowledge of the local environment, systems, clinical data, and standards

• Profiles may not be fully adequate for the data needed for actual measure calculation

• Engage downstream end users (QM team) early in project to ensure data payload is adequate for compliance
Next Steps

- Onboarding additional provider partners for notifications
- Continue analysis and refinement of DEQM use case to move into production; Identify other Quality Measures
- Build upon existing relationship between Anthem and Cedars-Sinai to explore other Da Vinci use cases
- Collaborate with other provider partners that are interested in exploring Da Vinci use cases with Anthem
Thank You to...

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Anthem
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Sarah Young

CareEvolution
Vik Kheterpal
Michele Mottini
Melissa Benzie

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