## Agenda

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Topic</th>
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<tbody>
<tr>
<td>3:00 – 3:02</td>
<td>Roll Call, Michelle Lenox (MITRE)</td>
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<td>3:02 – 3:05</td>
<td>Review of the Agenda, Maria Michaels (CDC)</td>
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<tr>
<td>3:05 – 3:40</td>
<td>A FHIR-Based CDS Sandbox, Andrey Soares, Ph.D.</td>
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<tr>
<td>3:40 – 3:50</td>
<td>What's New with CDS Connect This Month (MITRE)</td>
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<tr>
<td>3:50 – 4:00</td>
<td>Open Discussion and Close Out, Maria Michaels (CDC)</td>
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<td></td>
<td>Open discussion and announcements</td>
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<tr>
<td></td>
<td>Concluding comments, review next steps and adjourn</td>
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Objectives

• Discuss a FHIR-based CDS sandbox, Andrey Soares, Ph.D.
• Share lessons learned for use of the CDS Connect
• Share new features and resources available for CDS Connect
• Discuss topics of interest to members relating to opportunities for CDS Connect
A FHIR-BASED CDS SANDBOX

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Data Science to Patient Value (D2V)
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CDS Sandbox

CDS DEVELOPMENT  INDUSTRY STANDARDS  INTEROPERABILITY WITH FHIR

OPEN SOURCE TOOLS  INTEGRATION WITH EHR  EHR AGNOSTIC
Knowledge translation in CDS

Boxwala et al. (2011)
Open-Source CDS Sandbox

1. HAPI-FHIR Server
2. clinFHIR Synthea
3. CDS Authoring Tool
4. CQL Engines
5. CDS Hooks
6. SMART on FHIR Apps

- Patient Data in FHIR
- Create Patient Profiles
- Create Rules Artifacts
- Process Rules and Data
- Trigger CDS
- External Apps
CQL Engine: Form 1

1) AHRQ-CDS-Connect-CQL-SERVICES

Source: https://github.com/AHRQ-CDS/AHRQ-CDS-Connect-CQL-SERVICES
2) cql-execution

Source: https://github.com/cqframework/cql-execution
3) `cql_execution_service`

Source: [https://github.com/DBCG/cql_execution_service](https://github.com/DBCG/cql_execution_service)
## Summary

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>AHRQ-CQL-Services</th>
<th>cql-execution</th>
<th>cql_execution_service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FHIR Data Model</strong></td>
<td>DSTU2, STU3 and R4</td>
<td>DSTU2, STU3 and R4</td>
<td>DSTU2, STU3 and R4</td>
</tr>
<tr>
<td><strong>API Endpoint</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Patient Data</strong></td>
<td>Sent to the engine via API</td>
<td>Sent to the engine via script</td>
<td>Retrieved from FHIR server by the engine</td>
</tr>
<tr>
<td><strong>Use of CQL Artifacts</strong></td>
<td>Pre-Loaded to the engine</td>
<td>Sent to the engine via script</td>
<td>Sent to the engine via API</td>
</tr>
<tr>
<td><strong>Convert CQL to ELM</strong></td>
<td>Convert CQL to JSON</td>
<td>Convert CQL to COFFEE or JSON</td>
<td>The engine handles the conversion</td>
</tr>
<tr>
<td><strong>Import Libraries</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Latest Commit</strong></td>
<td>November 22, 2019</td>
<td>March 20, 2020</td>
<td>April 02, 2020</td>
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Presentation/Demos at the University

- **CQL Authoring**
  - Mammography Screening

- **CQL Engine**
  - Statin Therapy

- **CDS Hooks**
  - Statin Therapy

- **SMART on FHIR**
  - Pain Management
  - ASCVD Risk Calculator
CDS Authoring tool in a graduate course

- **Course Instructor**: Mustafa Ozkaynak, PhD
- **Degree**: MS in Nursing – Health Care Informatics
- **Course**: Decision Support Systems and Data Management
- **Module**: #3 Decision Support Tools
- **Assignment**: Decision Tool Description or Development

  - Students have two options: (1) Describe a CDS in their clinical settings
  - (2) Use CDS Authoring Tool
Building CDS

Diabetes
If the patient meets any one or more of these clinical definitions:

Definition 1:
► Has any lab result (LOINC: 4548-4, 17856-6, 4549-2) GHBA1C greater than or equal to 7

-or-

Definition 2:
► Has 2 or more billing codes matching 250, 250.0, 250.00, 250.01, 250.02, 250.03, 250.1, 250.10, 250.11, 250.12, 250.13, 250.2, 250.20, 250.21, 250.22, 250.23, 250.3, 250.30, 250.31, 250.32, 250.33, 250.4, 250.40, 250.41, 250.42, 250.43, 250.5, 250.50, 250.51, 250.52, 250.53, 250.6, 250.60, 250.61, 250.62, 250.63, 250.7, 250.70, 250.71, 250.72, 250.73, 250.8, 250.80, 250.81, 250.82, 250.83, 250.9, 250.90, 250.91, 250.92, 250.93. (Diabetes) in his or her problem list.

-or-

Definition 3:
► At least one medication in:
  - ETC classes:
    - 5886 (Injectable Antidiabetic Agents)
    - 154 (Oral Antidiabetic Agents)

Source: https://www.ncbi.nlm.nih.gov/pubmed/22215056
Future Plans

• Develop a hands-on workshop to disseminate these technologies
  ► AMIA CDS Working Group submitted a workshop to AMIA 2020 Symposium

• Build CDS to demonstrate the sandbox tools
  ► Currently building an app

• Support research and innovations
  ► R&D environment
DISCUSSION:
A FHIR-BASED CDS SANDBOX
WHAT’S NEW WITH CDS CONNECT

David Winters and Chris Moesel, MITRE
Updates and New Features

• Authoring Tool
  ► Updated User Guide documentation
  ► Added support for FHIR R4
  ► CPG-on-FHIR alignments in CQL-to-ELM Translator

• Prototype Tools
  ► CQL Services
    – Version 1.5: Added support for FHIR STU3 and FHIR R4
  ► Pain Management Summary App
    – Versions 0.3.2: Update table of local codes in documentation

• Repository
  ► Updated and expanded use of "Join Work Group" button
  ► Additional general text updates on various pages (e.g., Work Group, etc.)

• Artifacts
  ► Factors to Consider in Managing Chronic Pain: A Pain Management Summary
    – DSTU2 update and R4 representation
  ► AHRQ stewarded L3 artifacts receive updated test patient packages

Link to CDS Connect: https://cds.ahrq.gov/cdsconnect
ANNOUNCEMENTS, OPEN DISCUSSION AND CLOSE-OUT

Maria Michaels
Office of Public Health Scientific Services
Centers for Disease Control and Prevention
Announcement

• Host: Sunil Rajaraman
  ▶ https://www.distancedpod.com