Advancing Evidence into Practice Through Shareable Clinical Decision Support

Edwin Lomotan, MD, FAAP, FAMIA
AAMC’s Research on Care Community Webinar
February 27, 2019
Overview

• Describe AHRQ’s clinical decision support (CDS) program
• Introduce CDS Connect, its use cases, and associated tools
• Raise awareness about AHRQ CDS funding opportunities
• Describe how you can become involved
• Discuss and learn from you
AHRQ Clinical Decision Support

• Long history of investment in CDS research
  ► Investigator-initiated research
  ► Demonstration contracts (2008-2013)
    – GuideLines Into DECision Support
    – Clinical Decision Support Consortium

• Tools and training
  ► Improving Outcomes with CDS: An Implementer’s Guide
    – CDS “Five Rights” (Osheroff et al.)
  ► Foundational work on data models to support both CDS and electronic quality measurement
    – “eRecommendations” (2009-2011)
    – Quality Data Set (2009)
New CDS Initiative (2016- )

Advancing evidence into practice through CDS and making CDS more shareable, standards-based and publicly-available

1. Engaging a stakeholder community
2. Creating prototype infrastructure for sharing CDS and developing CDS
3. Advancing CDS through grant-funded research
4. Evaluating the overall initiative

https://cds.ahrq.gov
In 2016, AHRQ launched a program of grants and contracts aimed at helping health care providers move patient-centered outcomes research (PCOR) evidence into practice through clinical decision support (CDS). AHRQ advances the science of CDS by supporting implementers, clinicians, and technology vendors in developing CDS tools that are shareable, standards-based, publicly-available, and patient-centered. The four components are detailed below:

### Learning Network
AHRQ awarded RTI International a cooperative agreement to become the Patient-Centered Clinical Decision Support Learning Network (PCCDS-LN). The PCCDS-LN is building a community of researchers, clinicians, professional societies, and others that is exploring and advancing patient-centered CDS.

[https://pccds-ln.org](https://pccds-ln.org)

### CDS Connect
AHRQ awarded the MITRE Corporation a contract to develop "CDS Connect", an online web presence that will function as a repository of CDS artifacts and create prototype infrastructure for sharing CDS across different health care settings and technologies. MITRE will also develop, pilot, and share CDS artifacts on CDS Connect as a proof of concept.

[https://cds.ahrq.gov/cdsconnect](https://cds.ahrq.gov/cdsconnect)
PCCDS is CDS that supports individual patients and their approved care givers and/or care teams in health-related decisions and actions by leveraging information from PCOR findings and/or patient-specific information (e.g. patient-generated health data).
CDS Connect – Activities

Repository
- Building and managing a platform for sharing CDS

Authoring
- Developing open-source software for building CDS

Artifacts
- Demonstrating the infrastructure by developing CDS in select use cases

Pilot
- Learning by implementing in live production environment

Workgroup
- Gathering input from diverse perspectives
CDS Connect – Concept of Operations
A Broad View of Clinical Decision Support…

• CDS “Five Rights”
  ► CDS should deliver the *right information*, to the *right person*, in the *right format*, in the *right channel*, at the *right time* during work flow.

• CDS as an enabler and tool for quality improvement
  ► Not just an app, widget, alert, or reminder
  ► Not just for physicians at the point of care
  ► Can represent the “actionable” side of quality measurement

Knowledge Translation into CDS

Recommendation
The USPSTF recommends that adults without a history of cardiovascular disease (CVD) (ie, symptomatic coronary artery disease or ischemic stroke) use a low- to moderate-dose statin for the prevention of CVD events and mortality when all of the following criteria are met: 1) they are aged 40 to 75 years; 2) they have 1 or more CVD risk factors (ie, dyslipidemia, diabetes, hypertension, or smoking); and 3) they have a calculated 10-year risk of a cardiovascular event of 10% or greater.
ARTIFACT REPRESENTATION

Triggers
Trigger Type: Named event
Trigger Event: Provider opens an outpatient encounter

Inclusions
Patient is >=40 and <=75 years of age
AND 1 or more risk factor:
- LDL-C lab result > 130 mg/dL (MOST RECENT value within the past 6 years)
- OR HDL-C < 40 mg/dL (MOST RECENT value within the past 6 years)
- OR Diabetes (Type 1 or Type 2)
- OR Hypertension
- OR Smoking (MOST RECENT value within the past 6 years)
- AND 10-Year CVD risk score >=10% (MOST RECENT value within the past 6 years)

Exclusions
Diagnosis of CVD
- OR LDL-C lab result >190 mg/dL (MOST RECENT value within the past 6 years)
- OR Known Familial Hypercholesterolemia
- OR Diagnosis of Active Pregnancy OR Pregnancy Observation in the past 42 weeks
- OR Diagnosis: Breastfeeding OR Breastfeeding Observation in the past year
- OR Diagnosis of End Stage Renal Disease
- OR Actively undergoing dialysis (i.e., within past 7 days)
- OR Diagnosis of Active Cirrhosis
- OR Already receiving a statin (Medication is Active or has been Ordered)
### Disease Management Advisor

#### Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>57</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>255</td>
</tr>
<tr>
<td>HDL Cholesterol</td>
<td>46</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>No</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>150</td>
</tr>
</tbody>
</table>

#### Risk Scores

- Probability of a Cardiovascular Event Occurring Within 10 Years: 13.5%

#### Score Interpretation

- **Status**:
  - **Interpretation**:
    - **< 10%**: Moderately Low Risk
    - **10%**: Low Risk

#### Recommendation

- **Current Recommendation**: Moderate to High Intensity Statin
Complexity and Computability
CDS Artifacts on CDS Connect

Statin Use for the Primary Prevention of CVD in Adults

Presented to the United States Preventive Services Task Force (USPSTF) statin therapy recommendation for adults aged 40 to 79 years without a history of cardiovascular disease (CVD) who have 1 or more CVD risk factors (i.e., dyslipidemia, diabetes, hypertension, or smoking) and a calculated 10-year CVD event risk score of 7.5% or greater.

Artifact Type
- Event-Condition-Action (ECA) rule

Creation Date
Mon, 07/10/2017 - 12:30

Version
0.1.0

Identifier
CDS 005

Status
Experimental

Active
False

ARTIFACT CREATION AND USAGE

Steward
Agency for Healthcare Research and Quality

License
AHRO Government Unlimited Usage Rights

IP Attestation ID
Yes (Report infringement)

Clinical Domain
- Preventive Medicine
- Internal Medicine
- Family Medicine
- Cardiology

Keywords
ASCVD, CVD, cholesterol, 10-year ASCVD risk, risk assessment, preventive screening, statin therapy

PROMINENT REPORTS
Detailed report on the pilot implementation of this artifact (DOC 3.3MB)
Artifact enhancements based on pilot implementation findings (DOC 91KB)

Recommendation is copyrighted by USPSTF and administered by AHRO.
CDS Connect Use Case 2018: Pain Management Summary

- Consolidates patient-specific information normally found on different tabs and screens into a single view
- Launched by clicking a link from the home screen within a patient record in the EHR
- Uses SMART on FHIR health IT standard for interoperability
- Informed by 2016 CDC guideline
- Piloted in a community health center
Pain Management Summary:
Pertinent Medical History

Factors to Consider in Managing Chronic Pain

- **Conditions Associated with Chronic Pain**
  - **Fibromyalgia (disorder)**
    - Status: active
    - Start: 2012-Apr-05 (age 58)
    - End:
    - Recorded: 2012-Apr-05

- **Risk Factors for Opioid-related Harms**
  - **Agoraphobia with panic attacks (disorder)**
    - Status: active
    - Start: 2014-Sep-01 (age 60)
    - End:
    - Recorded: 2015-Feb-12
  - **Suicide attempt, initial encounter**
    - Start: 2015-Feb-01 (age 60) - ongoing

Pain Assessments (3)
Pain Management Summary:
Target Population

Frankie Jackson
8 YRS  MALE

Factors to Consider in Managing Chronic Pain

WARNING: This summary applies to patients 18 years or older who meet at least one of the following criteria:

- Has a condition likely to indicate chronic pain
- Has an active opioid medication in the last 180 days
- Has an active adjuvant analgesic medication in the last 180 days

This patient does not meet the applicable criteria.

Please see the CDC Guideline for Prescribing Opioids for Chronic Pain for additional information and prescribing guidance.

Development Tools  [show/hide]
These development tools are for troubleshooting issues and intended to be used by technical support.
Pain Management Summary:
Risk Considerations

<table>
<thead>
<tr>
<th>Most Recent MME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Result</td>
</tr>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Morphine Milligram Equivalent (MME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MME/day</td>
</tr>
<tr>
<td>2018-Apr-30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Urine Drug Screens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Result</td>
</tr>
<tr>
<td>Interpretation</td>
</tr>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opiates (Presence) in Urine by Screen method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2300 ng/mL</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>2017-Oct-20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benzodiazepine Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>-------</td>
</tr>
</tbody>
</table>

| Diazepam 5 MG Oral Tablet |
| Statement                  |
| 2018-Apr-30                |
| Order                      |
| 2018-Mar-05                |

<table>
<thead>
<tr>
<th>Naloxone Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Start</td>
</tr>
<tr>
<td>End</td>
</tr>
</tbody>
</table>

| Naloxone Hydrochloride 40 MG/ML Nasal Spray |
| Order                                       |
| 2018-Apr-20                                 |
| Statement                                   |
| 2018-Apr-10                                 |
Opioid CDS – What’s Available

• CDS Connect Pain Management Summary
  ► Description of CDS, including all relevant metadata
  ► Technical files
    – Clinical Quality Language (CQL) code
  ► Reports
    – Implementation guidance
    – Pilot report, including enhancements made
    – Yearly project final report
  ► Open source on GitHub
    – SMART on FHIR app specifications and code
  ► Try it out! https://apps.smarthealthit.org/app/cds-connect

• ONC/CDC opioid CDS
  ► Recommendations 4, 5, 7, 8, 10, and 11 from CDC guideline
  ► Links to primary CDC FHIR site

Goal: Give health care systems and CDS developers a “head start” with interoperable building blocks
CDS Connect Use Case 2019: U.S. Preventive Services Task Force

- Focusing on USPSTF grade A and B recommendations
- Delivering recommendations through a patient-facing platform
- Partnering with b.well
  - Mission: To reduce the prevalence of avoidable chronic disease and make health care simple, personal, and affordable.
  - Offers a personalized health management platform for consumers and caregivers, to help self-manage the entire health care process, with a focus on lifelong health and wellness

https://www.icanbwell.com/
CDS Authoring Tool

- Helps non-software engineers write standards-based CDS logic (i.e., CQL, FHIR)
- Leverages existing and re-usable resources (e.g., NLM’s Value Set Authority Center)
- Open source and freely available to use
  https://cds.ahrq.gov/authoring/
- Recent training webinar:
  https://healthit.ahrq.gov/events
CDS Sharing Community

CDS Connect lifecycle

1. Source(s)
   - Clinical practice guidelines
   - Peer reviewed articles
   - Local best practices
   - CQM(s)

2. Build the CDS artifact using CDS authoring

3. Publish artifact in CDS Connect

4. Implement in health IT system and collect feedback

5. Identify need for a new CDS tool (known as an artifact)

6. Artifact is improved for the CDS community to use
Quantifying Efficiencies through Shareable, Interoperable CDS

• One-year contract with Medstar (PI: Kristen Miller)

• Background
  ► Translating guidelines-based care recommendations into CDS occurs in silos and is very expensive (est. $25B nationally)

• Goal
  ► Quantify potential efficiencies gained through shareable, interoperable CDS resources such as those available through CDS Connect

• Method
  ► Case studies using four health care systems and resources available on CDS Connect
Recommendations for Building and Maintaining Trust in Clinical Decision Support Knowledge Artifacts

Blackford Middleton, MD, MPH, MSc
Jody Plott, PhD, MPH
Joshua E. Richardson, PhD, MS, MLIS
Barry H. Blumenfeld, MD, MS

On behalf of the Patient-Centered Clinical Decision Support Learning Network

September 21, 2018

https://pccds-ln.org/tfwg
Supporting CDS Research

Advancing Evidence into Practice through Shared, Interoperable Clinical Decision Support Resources (U18)

Program Announcement (PA): PA- 18-792

• Purpose:
  ► This FOA invites U18 cooperative agreement applications for innovative research on disseminating evidence into practice through shared, interoperable clinical decision support (CDS) resources

• Eligibility:
  ► A wide range of applicants, including for-profit private institutions, are encouraged to respond (see Section III Eligibility)

• Award Budget:
  ► The total costs (direct and indirect) for a project awarded under this FOA will not exceed $500,000 in any given year or $1 million for the entire project period.

• Award Project Period:
  ► The project period may not exceed 2 years.

How You Can Become Involved

ClinicalDecisionSupport@ahrq.hhs.gov

• Join the CDS Connect work group
  ► Meets virtually once a month
• Join the Patient-Centered CDS Learning Network
  ► Work groups for this year are forming
  ► Attend the annual in-person meeting
• Contribute to the CDS Connect repository
• Become a CDS Connect consumer
  ► Inspect, download, and provide feedback on CDS artifacts
• Use and improve the open source tools
  ► CDS Authoring tool, CQL Services, Pain Management Summary
  ► https://github.com/AHRQ-CDS
Thank you!

Edwin.Lomotan@ahrq.hhs.gov