CDS (Clinical Decision Support) Connect Work Group
Meeting Summary
June 17, 2021
3:00-4:00 pm ET

Attendees: 41 people, including 3 phone dial-ins

Organization	Attendee Names
AHRQ Sponsors	Edwin Lomotan; Mario Teran; Roland Gamache; Steve Bernstein (4)
Work Group (WG) Members	Alison Kemp; Andrew Romero; Bryan Kim; Christopher d'Autremont; Dan Malone; Danny van Leeuwen; Jeremy Michel; Jerry Osheroff; Joe Bormel; Joshua Richardson; Laura Marcial; Linda Wedemeyer; Maria Michaels; Mario Macedo; Matt Storer; Melanie Combs-Dryer; Michael Wittie; Neeraj Ojha; Nitu Kashyap; Noam Arzt; Patrick O'Connor; Peter Muir; Preston Lee; Raajiv Ravi; Randolph Barrows; Richard Boyce; Sandra Lewis (27)
MITRE CDS Connect Members	Allie Rabinowitz; Chris Moesel; Dylan Mahallingam; Lacy Fabian; Michelle Lenox; Noranda Brown; Susan Haas (6)
Guests	Max Sibilla (1)

MEETING OBJECTIVES

- Welcome and brief review of meeting objectives and agenda
- Overview of CDS Connect tools that aim to reduce harm from potential drug-to-drug interactions (PDDI)
- Update CDS Connect Authoring Tool development and Repository enhancements
- Close

ACTION ITEMS

- WG members should review and provide suggestions/feedback regarding the CDS Connect PDDI tools

MEETING SUMMARY

Following roll call and review of agenda, Dr. Richard Boyce from the University of Pittsburgh and Dr. Dan Malone from the University of Utah reviewed CDS artifacts created using CDS Connect. The CDS artifact incorporates the complexities of drug and patient characteristics to calculate the individual patient risk based on the PDDI safety profile and patient risk factors. After, MITRE updated the Work Group on the progress of developing the Authoring Tool and the ongoing enhancements to the Repository.

Review of Two CDS Connect Case Studies

Using CDS to Reduce Harm from PDDI:
Case study of Warfarin and Non-Steroidal Anti-Inflammatory Drugs (NSAID)

Dr. Boyce explained that PDDI labeling includes chemically or biologically known interactions between drugs; their interaction may not result in a clinically meaningful effect. Many levels of risk review have been established for potentially clinically harmful PDDIs. Those reviews occur at the points of prescriber knowledge, computer screening of electronic health records (EHR), pharmacist screening, patient risk factors, drug administration, patient education, and monitoring. The CDS Connect artifact examined in this WG meeting enhances risk identification during the computer screening of an EHR.

Current EHR systems produce clinician alerts whenever *any* PDDI is reported, regardless of the level of risk it poses to the patient. Clinicians might not recognize if the PDDI alert is relevant; an estimated 80 – 90% of PDDI EHR alerts are overridden. EHR systems may have overly sensitive alert settings or deliver alerts too frequently; in addition, PDDI alerts may be insufficiently precise and/or accurate in detecting the risk to the patient. To address this problem, research teams at the University of Pennsylvania and University of Utah created a contextualized PDDI CDS algorithm that can accurately identify a PDDI and produce a visual display of the level of risk it poses to a patient. Two examples currently exist on the CDS Connect Repository: Warfarin and NSAIDs and Warfarin and antidepressants. Additional PDDI-oriented CDS are under development (see ddi-cds.org).

Dr. Boyce described authoring the contextualized PDDI CDS artifact. The CDS artifact targets HL7-standardized CDS hooks—points in the clinical-care pathway that provide a way to trigger CDS within the process of care. The tool targets the point at which the clinician opens a patient chart (known as the "patient-view hook") to enable shared decision making (SDM) on the benefits and risks of the PDDI with the patient. The CDS artifact also targets the point when the clinician selects or signs for the treatment (known as the "order-select hook" or "order-sign hook"). The CDS artifact rules were tested within the Authoring Tool environment by building a patient bundle and testing it against a specified server. The CDS artifact was used retrospectively on established EHRs to confirm the results.

The CDS artifact is a logic model-building tool for use by drug experts who are not versed in FHIR. Dr. Boyce illustrated the process of building a contextualized PDDI CDS, demonstrating the ease of creating a logical flow chart. Dr. Boyce reviewed the results of testing an example CDS artifact showing that the CDS artifact decreased the need for a PDDI alert: Under normal circumstances, a sample of 35 patients would receive an alert; once the contextualized tool was implemented, only 6 individuals were alerted to minimize risk, with another 2 advised to avoid the drug combination altogether.

DDInteract™: A SDM App

Dr. Malone defined the goal of the SDM App—to engage providers and patients to understand PDDIs, especially in instances where the benefits of some drug combinations might outweigh the risks they pose. DDInteract™ that improves clinician and patient understanding of the potential harm posed by select PDDIs; it also facilitates conversations about preferences and treatment options. Designed using the CDS Connect Authoring Tool, the app populated patient baseline information from the EHR, retrieved data from the FHIR server, and fed patient-visit information in real time into a single resource. Dr. Malone then illustrated the app's activity based on a prototypical situation of an elder patient on Warfarin. The app imports patient

characteristics from the EHR and weighs the risk factors to produce a risk array that visually represents the estimated risk of an adverse side effect.

Using another example (treatment of pain), Dr. Malone reviewed how the app assesses patient preference for medication or non-medication management. Each choice has a different logic tree and follow-up options according to patient response. Finally, the app features an auto-populated "After Visit Summary" element that captures information from the clinical visit and allows the clinician to copy and paste the summary into the patient's chart.

The presenters encouraged WG members to pilot DDInteract™ and the CDS Connect PDDI artifacts, and to provide feedback.

Discussion

- A WG member asked about plans for developing, testing, and employing these tools. The CDS research team continues to evaluate these tools and secure approvals for production. The team will identify the ideal location for the tools to reside so that they do not interrupt the clinician workflow. Ultimately, the team hopes the DDInteract™ app will reside within the Epic Systems App Orchard.
- MITRE asked for general feedback regarding additional features that could be incorporated into the CDS Connect Authoring Tool. The CDS research team recommended designing an easier way to create the flow of the logic model—potentially with prompts, suggestions, or automations to further build branches. The team also noted that most CDS artifacts will be piloted in a testing (or "shadow") mode; it would be useful if the Authoring Tool enabled piloting this proof of concept with testing options.
- In response to a WG member question, the CDS research team clarified that these tools are open-source and available for public use.
- A WG member suggested that, once medication is ordered, the app might deliver a "red flag" passive alert when a risk or safety issue occurs, giving the clinician an option to open the alert. The CDS research team agreed with the approach to create a notification that is noticeable but not required to act upon (thereby not interrupting clinician workflow).
- MITRE inquired about the level of patient input and feedback on the tools. The team continues to evaluate the tools by running visit simulations with patients and providers; to date, few lessons have been learned regarding patient needs. The team also runs usability testing with patients and clinicians in separate events. The tool creators have incorporated patient input and reactions to better capture patient needs. The team believes this tool will be useful in SDM conversations between the patient and provider, but that it is too early in the evaluation to find robust results. The team also believes that the visual risk assay produced by the app will better engage clinicians and patients alike than the traditional text-only warnings.
- AHRQ echoed the presenters' request that WG members test these tools and provide any feedback.

Updates on CDS Connect Authoring Tool Development and Repository Enhancements

MITRE described the developments of the CDS Connect Authoring Tool, as well as the continuing enhancements to the CDS Connect Repository.

The CDS Authoring Tool has expanded to include:

1. Support for invoking external CQL functions, using the results of other elements as input arguments
2. Support for adding in Strength of Recommendation and Quality of Evidence in the Clinical Practice Guideline forms
3. Updates to the design and interaction of the Value Set Authority Center integration, with a different presentation approach based on usability feedback
4. Indicators on every tab indicating whether errors exist in the section, as well as whether content appears within each section (these tabs are "sticky," in the sense that they stay at the top of the page when scrolling down, remaining in view to orient the user as well)
5. Bug fixes and other updates to support and reusability and maintainability.

MITRE informed the WG that the Authoring Tool is on Github, and that production tools will be deployed in short order.

The Repository likewise has been updated to include:

1. Changes to CDS application programming interface (API) artifact searches to enable a return of the title, ID, and URL for each related artifact
2. User interface (UI) changes at the front end of the Repository
3. Ongoing work improving CPG-on-FHIR to support easy use of artifacts
4. Updates to user documentation
5. Software and security patching for Drupal 9 and Acquia Dev Desktop cloud replacements
6. Additional technical support for Repository contributors.

Announcements / Other Questions

No announcements were made or other questions posed.

Closing