CDSC Dashboards Demo

Jonathan S. Einbinder, MD MPH
Senior Corporate Manager
Team Lead, Dashboards Team
CDS Dashboards: Purpose

Dashboard will be developed to inform the end user as to his or her use of decision support and compliance with CDS recommendations, and provide feedback to the research team about CDS performance characteristics.

- Feedback data on CDS usage and compliance rates
- Summary of the user’s performance for key metrics
- Comparison of the user’s performance with other users or reference benchmarks
Reminder Lifecycle

- T₀: Measurement Period
- T₁:

- Patient becomes member of eligible population
- Reminder logic becomes true
- Reminder displayed
- Reminder accepted
- Right action documented
- Clinical outcome

“Prevalence”
- Patients with Type2 DM

“Logic”
- Overdue for A1C Test

“Display”
- Reminder displayed to user

“Acknowledged”
- User clicks on reminder and chooses coded response

“Performance”
- A1C test result documented

“Outcome”
- A1C ≤ 7.0
Designing Decision Support Dashboards

• Two perspectives
  – Clinicians
  – CDS Designers

• What do they care about?
Clinician view – “How am I doing?”

- Clinician’s performance (clinical) for his/her patients
  - By condition (not by reminder) – Diabetes, Hypertension, Coronary Artery Disease
  - Compared to peers

- Contribution of CDS to clinical performance?
  - Relevant if clinical performance poor
  - Compared to peers
CDS Designer’s view – “How well are the reminders working?”

- Response to CDS (by reminder)
  - Overall
  - Variability among users
- Breakdown of CDS Performance by patient group
  - PCP patients, patients with visits, other patients
- Effectiveness of CDS
  - Display (Counts)
  - Acknowledged (%)
  - Performance (Direct, Indirect)
  - Contribution to Clinical Performance
    - Number Needed to Remind (NNTR)
### Specifying Reminder Measures “Prevalence”

<table>
<thead>
<tr>
<th>CDS Concept</th>
<th>Description</th>
<th>Count</th>
<th>Measure</th>
<th>Eye Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence</td>
<td>Clinically eligible population, a.k.a. the “denominator”</td>
<td>#patients eligible to be assessed by decision support logic</td>
<td>N/A</td>
<td>Patients with Type 2 Diabetes Mellitus</td>
</tr>
</tbody>
</table>
## Specifying Reminder Measures

### “Presentation”

<table>
<thead>
<tr>
<th>CDS Concept</th>
<th>Description</th>
<th>Count</th>
<th>Measure</th>
<th>Eye Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Presentation of the reminder to the user</td>
<td>#times reminder displayed to the user (for a specified time frame)</td>
<td>N/A</td>
<td>#times eye exam reminder displayed</td>
</tr>
</tbody>
</table>
# Specifying Reminder Measure

## “Acknowledged”

<table>
<thead>
<tr>
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<th>Description</th>
<th>Count</th>
<th>Measure</th>
<th>Eye Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledged</td>
<td>User clicks on a reminder and chooses a response</td>
<td>#times user clicks on a reminder and chooses a response</td>
<td>( \frac{\text{CDS Ackn.}}{\text{CDS displayed}} )</td>
<td>( \text{#times reminder displayed AND acknowledged/} \text{#times reminder displayed} )</td>
</tr>
</tbody>
</table>
### Specifying Reminder Measures

#### “CDS Performance”

<table>
<thead>
<tr>
<th>CDS Concept</th>
<th>Description</th>
<th>Count</th>
<th>Measure</th>
<th>Eye Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDS Performance</td>
<td>Of times CDS presented, how often the correct action was taken (directly or indirectly)</td>
<td>#times correct action taken AFTER CDS was presented</td>
<td>= CDS displayed AND correct action taken / CDS presented</td>
<td># times reminder displayed AND eye exam subsequently done / # times reminder displayed</td>
</tr>
</tbody>
</table>
Specifying Reminder Measures “Clinical Performance”

<table>
<thead>
<tr>
<th>CDS Concept</th>
<th>Description</th>
<th>Count</th>
<th>Measure</th>
<th>Eye Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical performance</strong></td>
<td>Patients get the “right” action, irrespective of CDS presentation and/or acknowledgement</td>
<td># eligible patients who get the correct action taken (during the measurement period)</td>
<td>= Clinical Performance Prevalence</td>
<td># patients with diabetes who have an up-to-date eye exam / patients with Type 2 DM</td>
</tr>
</tbody>
</table>
Database Design

• Identify and load activity data for reminders – displays, acknowledgements
  – Roll up reminder activity at the provider-day level
• Define **performance** for each reminder in terms of data available to us
• Create new concepts (tables) for **measures** and associated **denominators**.
  – Reminders are mapped to measures (and to conditions)
• Keep things simple
  – Ignore timing
  – Use one-month measurement periods
  – Look for acknowledgement/performance within **30 days** of the reminder display
Reminder Activity

• A Reminder has:
  – RuleID
  – MetricID (corresponds to measure)
  – DenomID (corresponds to denominator)

• We obtain Reminder Activity
  – For a measurement period (usually one month)
  – For the combination of a patient-provider
  – Count #displays, look for acknowledgement, look for performance
  – Store Acknowledgement coded response entries
Clinical Performance (Total)

- We calculate overall performance (irrespective of reminders) – this requires a measure and a denominator.
  - For a specified measurement period, usually one month
Clinical Performance (Provider)

- We also calculate performance at the PROVIDER level
  - For specified measurement period
  - For specified clinic
  - For specific reminder
  - Total displays (reminders and providers)
  - Total performance
  - Break down by reminder and performance
  - (4 combinations)
Reminder Measures and Counts

• Finally, get detailed counts for each reminder
  – Time period
  – Metric
  – Reminder
  – Count
  • Patients, performance, displays (total and physicians), acknowledgement (total and physicians)
  • 2x2x2 – reminder, acknowledgement, performance
  • 2x2 – reminder, performance
What this Means

• For each reminder, each patient in the Denominator falls into one of eight categories (2 x 2 x 2)
  – Display (y/n), Acknowledged (y/n), Performed (y/n)
  – We allow for the possibility that a reminder may be displayed and/or acknowledged and/or performed – in any order, multiple times.
Dashboard: CAD and no aspirin

Total Count Displays across providers: 166,568
- Patient (months with reminders displayed): 36,846
  - Patient (months w/ reminder and part): 27,862
  - Patient (months w/ reminder and no part): 23,794
- Reminders acknowledged: 238
  - Reminders acknowledged and part: 110
  - Reminders acknowledged and no part: 128

NNRT (Total): 29.82
NNRT (1X per month): 4.37

Total Performance is the clinical performance for the measure across all LMR patients in the denominator for that period. The patient is counted in the numerator if the patient record shows compliance with the measure’s numerator criteria within 30 days of the reporting period.

Reminder Performance is the performance for patients where a reminder was displayed to a physician during the reporting period. The denominator is reminders (one per patient. If the patient clinical data shows that the criteria for the measure is met, the performance is counted in the numerator.

Acknowledgment
- Optional
- Patient declined
- Patient does not have CAD
- Patient refuses
- Will begin therapy today

Data: All users of LMR: From 1-68 thru 12-09.
Dashboard: CAD and no aspirin

Single Month View For Month: 12/2009

Condition: CAD
Measure: Patient has CAD and aspirin on the med list

Reminder: Patient has CAD, aspirin on problem list and aspirin not on the med list. Recommend aspirin.

Date Range: 12/2009

Reminder Performance

Reminder Acknowledgement

Total Acknowledged: 17

Acknowledgement Performance

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12/26/10
Reminder: CAD and no aspirin

% patients with CAD that have aspirin on the LMR Med List

% reminders with “performance” within subsequent 30 days
Reminder: CAD and no aspirin
Reminder: CAD and no aspirin
(Coded acknowledgement responses)
Reminder: CAD and no aspirin (Dec 2009)
Reminder: CAD and no aspirin (Dec 2009)

NNTR is:

- 2757 patients with reminder displayed
- divided by 713 patients who had reminder displayed and then had aspirin added to the Med List

\[ \frac{2757}{713} = 3.87 \]

(If look at total #reminder displays rather than #patients, then NNTR is 20.96)
# Clinician’s Dashboard

This report provides information on clinical performance measures and feedback on your response to LMR reminders. The patient population measured for performance is your current patient panel as defined in Report Central (see the My Panel report). Reminder performance is calculated relative to patients where you have been displayed a reminder during the reporting period.

**Current performance rate** is the performance on the clinical measure for the last measurement month. **Performance trend** is a display of the performance value by month in a graph for the overall report time frame.

**Reminder Historical Performance** shows the denominator (times displayed) as total patients over the report time period where reminders have been shown to you in LMR for this measure. If the patient was in compliance of the measure within 30 days of the reminder then they appear in the numerator (times performed). The same patient may appear across multiple months in the total.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Measure</th>
<th>Current Patient</th>
<th>Number in Compliance</th>
<th>Ny Rate</th>
<th>My Rate</th>
<th>Ny Performance Trend</th>
<th>Wv Performance Trend</th>
<th>Reminder for this measure</th>
<th>Times Displayed</th>
<th>Times Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>Diabetes with poor management, HbA1C completed in the past 3 months</td>
<td>2</td>
<td>0</td>
<td>0.0 %</td>
<td>0.9 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>Diabetes, Foot exam completed in the past year</td>
<td>34</td>
<td>5</td>
<td>14.7 %</td>
<td>2.3 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>Diabetes, HbA1C completed in the past 8 months</td>
<td>34</td>
<td>15</td>
<td>44.1 %</td>
<td>34.9 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>Diabetes, MicroAb completed in the past year</td>
<td>34</td>
<td>16</td>
<td>47.1 %</td>
<td>44.1 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes w Renal Failure</td>
<td>Diabetes, microalbumin/creatinine ratio &gt;30 and on ACEI</td>
<td>14</td>
<td>12</td>
<td>65.7 %</td>
<td>71.2 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes w Renal Failure</td>
<td>Diabetes, microalbumin/creatinine ratio &gt;30 and on ACEI, ARB</td>
<td>14</td>
<td>12</td>
<td>65.7 %</td>
<td>93.3 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes w Renal Failure</td>
<td>Diabetes, microalbumin/creatinine ratio &gt;30 and on ARB</td>
<td>14</td>
<td>4</td>
<td>26.5 %</td>
<td>33.1 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>Diabetes, Ophthalm exam completed in past year</td>
<td>34</td>
<td>0</td>
<td>0.0 %</td>
<td>3.0 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Generated by LINDER, JEFFREY A, M.D., M.P.H. on 01/27/10

* Based on Report Central panel definition
** Based on evaluation during the last month as the reporting period

Reporting period: 01/01/2009 TO 02/01/2010

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<table>
<thead>
<tr>
<th>Condition</th>
<th>Measure</th>
<th>Current Patients*</th>
<th>Number in Compliance**</th>
<th>My Rate</th>
<th>My Clinic Rate</th>
<th>My Performance Trend</th>
<th>Reminder for this measure</th>
<th>Times displayed</th>
<th>Times Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>Current Patients</td>
<td># in compliance</td>
<td>My Rate</td>
<td>My clinic Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes, HbA1C completed in the past 6 months</td>
<td>34</td>
<td>15</td>
<td>44.1%</td>
<td>34.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**My performance trend**

<table>
<thead>
<tr>
<th>Reminder for this Measure</th>
<th>Times Displayed</th>
<th>Times Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic overdue for HbA1C</td>
<td>378</td>
<td>220</td>
</tr>
<tr>
<td>Diabetic almost due for HbA1C</td>
<td>252</td>
<td>182</td>
</tr>
</tbody>
</table>
Lessons Learned (challenges)

• Reality was much more complex than the model
  – Grouping events – multiple sessions, providers per patient per day
• Lots of detective work to obtain and understand the data
  – Where are the acknowledgements? (And, where are the reminders?)
  – What is a “display?”
• Try to design with generalizability in mind
  – Simplify the design and measures. See what questions emerge when Consortium members see Version 1. But, try to design the database flexibly.
  – Led to a new model in our warehouse for representing measures and denominators – hope that we will be able to leverage for other projects.
• We don’t know what to expect with regard to looking at reminders.
  – Exciting: new insights.
  – Makes design harder – don’t know if it will be useful.
Future Plans

• Complete development for Partners.
• Feedback from Consortium
  – Revisions to dashboards
• Evaluation
  – User surveys, usage data
• Publish specification to other Consortium members
• Design approach for implementation with other EMRs and at other sites