Health IT and Implementation, Part II

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CDS for optimizing hospital medication cost
- Nizatidine for oral H2 blocker, ranitidine for IV
- Dosage guidance and limits
- Frequency of ondansetron (tid vs. qid)

Coupled with education
**Figure 3.** Change in use of nizatidine, as a percentage of all oral histamine₂-blocker orders, after the computer intervention was introduced (Week 0).

**Figure 4.** Normalized mean dose and SD of doses, compared to the pre–order entry (pre-OE) period. The mean dose did not change significantly, but the distribution of doses narrowed considerably immediately after the use of computer ordering (post-OE) began, and decreased further in subsequent years.

**Figure 5.** Percentage of medication orders with doses exceeding the recommended maximum.

**Figure 6.** Change in proportion of 3-times-daily (3×/d) and 4-times-daily (4×/d) dosing of ondansetron hydrochloride, before and after the computer intervention was introduced (week 0).
Documenting “Exceptions” to CDS

- Alerts for 16 chronic disease and prevention quality measures, with optional box to document exceptions
  - e.g. pt. doesn’t have diagnosis, pt. has advanced CA or dementia, etc.
  - 94% of 614 documented exceptions judged appropriate
  - 3% inappropriate, 3% uncertain appropriateness
    - e.g. Lipid-lowering drug not prescribed in CHD due to stable compensated cirrhosis

- Peer feedback for inappropriate exceptions
  - Management change in 8 of 19 cases (42%) after 3 mo.
16 preventive and chronic disease care QMs

- “Minimally interruptive” point of care reminders
- Capture exceptions to suppress further alerts; peer review
- Monthly list of patients needing action
Multifaceted Intervention

- Time-series analysis results:
  - For 9 measures: acceleration of improvement
  - For 4 others: rates improved, not stat. significant

<table>
<thead>
<tr>
<th>Measure</th>
<th>Preintervention</th>
<th>Postintervention</th>
<th>Modeled Difference in Rate of Change Between 2008–2009 and 2007–2008*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary heart disease</td>
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<td>Antiplatelet drug</td>
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<td>Lipid-lowering drug</td>
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<td>Beta blocker in MI</td>
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<td>ACE inhibitor or ARB</td>
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<td>Heart failure</td>
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<tr>
<td>ACE inhibitor or ARB in LVSD</td>
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<tr>
<td>Beta blocker in LVSD</td>
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<tr>
<td>Anticoagulation in atrial fibrillation</td>
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<td>Diabetes mellitus</td>
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<tr>
<td>HbA1c control</td>
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<td>LDL-C control</td>
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<tr>
<td>Aspirin for primary prevention</td>
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<tr>
<td>Nephropathy screening or management</td>
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</table>

Table 3: Percentage of Patients Meeting Quality Measures and Modeled Rates of Change for Quality Measures in the Year Before and the Year During the Intervention
Further Optimization

- Paper pre-visit reminders added to same program

![Graph showing physician number vs. percentage of certain conditions being treated.](image)
Clinical Decision Support (CDS)

Diagnostic expert systems

- **Concept:** Make a table of all symptoms and diseases
  
  [Ledley & Lusted, 1959]

- **Attempts**
  
  - Input symptoms, get list of possibilities
  
  - Internist (1972-1984)
    - 600 diseases, 4250 findings
      - Converted to “QMR” electronic textbook, 1985
  
  - DXPlain, Illiad

- More recent: Isabel
Diagnostic CDS

Performance

- 105 “difficult” cases input into 4 DSS
  - each with “correct” and “relevant” dx’s
- 52-71% of lists included correct dx
- < 50% of all “relevant” dx’s included
- 19-37% of suggested dx’s “relevant”
  - 2 extras/case “relevant” in retrospect
- No differences among systems

[Berner, 1994]
Definition of CDS Gaps and Goals for Clinical Specialties

RAND Team:
TL: Cheryl Damberg, PhD
◆ Eric Schneider, MD, PhD
◆ Justin Timbie, PhD
◆ Liisa Hiatt, MS
◆ Douglas Bell, MD, PhD

AMA-PCPI Team
◆ K. Kmetik
◆ M. Antman
◆ C. Carlucci
◆ D. Heldt

CDS Clinical Consultant
J. Windle (U. Nebraska)
Objectives

◆ Problem: Specialists lag in EHR use
  – Workflows can differ substantially from primary care
  – Paucity of CDS support for many specialties
◆ Develop a protocol for engaging specialists in developing future meaningful use objectives related to Clinical Decision Support (CDS)
◆ Pilot test the process among four specialties
  – Oncology
  – Orthopedics/Hip replacement
  – Cardiology/PCI
  – Pediatrics
Conceptual Approach

- Quality Measures
- Clinical Performance Gaps
- Performance Gaps having effective and feasible CDS
- Opportunities
Connecting Gap with Opportunity

Clinical performance gap
The presence of pain and its intensity are inadequately assessed or quantified in cancer patients receiving chemotherapy or radiation therapy, and pain management plans are not routinely documented.

Clinical actions that could address the gap
Elicit pain intensity; document pain intensity; develop pain management plan.

Consider EHR data needed
* Prior Rx history
* Allergies / intolerances

Consider possible CDS tools
* Order sets
* “Smart form” documentation templates

Consider workflow insertion points
* Chemotherapy planning visit
* Nursing rounds

CDS Opportunity: Smart form that captures pain intensity and generates pain management plan.
2-Step Modified Delphi Protocol

**Teleconference #1**
- Introduction to CDS opportunities
- Orientation to panel protocol and demo of rating process
- Panelists review candidate list of clinical performance gaps
- Panelists nominate additional clinical performance gaps

**Teleconference #2**
- Panelists discuss clinical performance gap ratings; clarify areas of disagreement
- Panelists re-rate performance gaps on “importance” criterion (WAVE 1, ROUND 2)
- Review of CDS opportunities
- Panelists review rating criteria for CDS opportunities

**Teleconference #3**
- Panelists discuss CDS opportunity ratings; clarify areas of disagreement
- Panelists re-rate CDS opportunities on “compatibility” and “impact” criteria (WAVE 2, ROUND 2)
- Panelists offer feedback on panel process
# Top CDS Opportunity Ratings for Oncology

<table>
<thead>
<tr>
<th>Clinical performance gaps</th>
<th>CDS Opportunity</th>
<th>CDS Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many patients receiving chemotherapy are at risk of experiencing adverse events due to errors in chemotherapy ordering</td>
<td>Smart ordering forms that help reduce errors. Alert at time of ordering or infusion if chemotherapy orders differ from accepted standards.</td>
<td>Order set or ordering tool Alerts/reminders</td>
</tr>
<tr>
<td>Cancer patients often have poorly documented information on staging.</td>
<td>Cancer-specific documentation template that supports accurate staging for the type of cancer. Info button to check latest staging criteria at the time that cancer diagnoses are being entered.</td>
<td>Documentation forms/templates Smart links to reference information</td>
</tr>
</tbody>
</table>
## Top CDS Opportunity Ratings for PCI

<table>
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<th>Clinical performance gaps</th>
<th>CDS Opportunity</th>
<th>CDS Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearly half of patients with STEMI receive no reperfusion therapy or receive delayed reperfusion (&gt;12 hours after onset).</td>
<td>Display ECG data, TIMI/GRACE scores, and likely time of symptom onset. Alert to inform ED physician and staff of possible ACS diagnosis triggered by abnormal biomarkers</td>
<td>Relevant data presentation Alerts/reminders</td>
</tr>
<tr>
<td>Many patients undergoing PCI are not prescribed statins at discharge despite having no contraindications.</td>
<td>Order set that includes statins along with other medications commonly prescribed at discharge from the cath lab Reminder followed by alert to prescribe statin prior to discharge if not yet ordered</td>
<td>Order set or ordering tool Alerts/reminders</td>
</tr>
</tbody>
</table>
## Top CDS Opportunity Ratings for Orthopedics

<table>
<thead>
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<th>Clinical performance gaps</th>
<th>CDS Opportunity</th>
<th>CDS Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients are not always assessed pre-operatively for their bleeding and VTE risks resulting in prophylaxis that does not match the patient’s risk.</td>
<td>Smart form that captures bleeding and VTE risk factors and recommends a prophylaxis strategy in accordance with guidelines.</td>
<td>Documentation forms/templates</td>
</tr>
<tr>
<td>Patients undergoing total hip or total knee replacement surgery may not receive VTE prophylaxis when it is indicated.</td>
<td>Order set for VTE prophylaxis that recommends treatment customized to patient’s bleeding risk and that conforms to guidelines.</td>
<td>Order set or ordering tool</td>
</tr>
</tbody>
</table>
# Top CDS Opportunity Ratings for Pediatrics

<table>
<thead>
<tr>
<th>Clinical performance gaps</th>
<th>CDS Opportunity</th>
<th>CDS Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children and adolescents fail to receive all recommended immunizations.</td>
<td>Display immunization history and highlight missing immunizations.</td>
<td>Relevant data presentation</td>
</tr>
<tr>
<td></td>
<td>Order set that includes all recommended immunizations.</td>
<td>Order set or ordering tool</td>
</tr>
<tr>
<td></td>
<td>Alert for missing immunizations, with link to order set.</td>
<td>Alerts/reminders</td>
</tr>
<tr>
<td>Children with asthma are not routinely monitored for control of their condition.</td>
<td>Pathway to guide dose escalation or medication substitution.</td>
<td>Protocol or pathway support</td>
</tr>
</tbody>
</table>
### High Level Summary of Results

<table>
<thead>
<tr>
<th>Four Panels</th>
<th>CDS Opportunity Sets*</th>
<th>CDS Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Considered</td>
<td>Rated <strong>high priority</strong></td>
</tr>
<tr>
<td>Oncology (breast/CRC)</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Orthopedics (hip/knee surgery)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Cardiovascular (PCI)</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Pediatrics (general)</td>
<td>11</td>
<td>3</td>
</tr>
</tbody>
</table>

* A **set** is a collection of CDS opportunities that address a specific clinical performance gap.
Opportunities to Enhance Future Panels

1. Convene a multistakeholder “steering committee” with broad representation of potential end-users to select the specialties, subspecialties, and clinical content topics to be addressed by future specialty panels.

2. Panels should be constituted based on the intersection of four dimensions of interest: (1) specialties, (2) conditions, (3) treatments or procedures, (4) care delivery settings.

3. In identifying the preliminary list of performance gaps, draw on population health and clinical delivery system gaps that may not yet be codified in performance measures.

4. Develop a method for querying practicing clinicians or their representative societies about performance gaps that have not yet been identified in peer-reviewed literature or reflected in nationally-endorsed quality measures.
Opportunities to Enhance Future Panels

5. Develop templates for describing CDS tools in a standardized format so that panelists are fully informed during discussion and rating tasks.

6. Enhance panelist knowledge and consideration of clinical workflows before rating CDS opportunities.

7. Create opportunities for panelists and outside experts to nominate additional CDS opportunities for the candidate performance gap statements.

8. Consider convening separate panels to prioritize performance gaps and CDS opportunities.

9. Allow adequate time within the Modified Delphi process to enable thorough discussion of the performance gaps and CDS opportunities between rating tasks.