Clinical Decision Support
What Is It? Where Is It? Where Is It Going?

Goals and Objectives
• Name the different types of clinical decision support
• Recall the “Five Rights” of clinical decision support
• Identify the differences between different types of clinical decision support

Hospital Information
• 451 Licensed beds including 24 nursery beds
• 331 adult beds (46 ICU beds)
• 96 Pediatric Beds (41 NICU, 22 PICU)
• Centralized med distribution model with the exception of some pediatric meds and adult hematology/oncology
• Decentralized pharmacists
• First full-service private hospital in Boston – Founded in 1796 as the Boston Dispensary
• Affiliated with Tufts University – primary teaching facility

Hospital Information – Technology
• BCMA in all inpatient areas – integrated with pharmacy system
• CPOE (Soarian) for all adult beds
• ADCs in all inpatient and procedural areas including the O.R.
• Smart Pumps throughout the hospital
• Medication Carousel

What Is It? - Definition
Clinical Decision Support is a process for enhancing health-related decisions and actions with pertinent, organized clinical knowledge and patient information to improve health and healthcare delivery. (From Osheroff et al., Improving Outcomes with Clinical Decision Support: An Implementers’s Guide, Second Edition – HIMSS)

Computer-based Clinical Decision Support is the use of the computer to bring relevant knowledge to bear on the health care and well being of a patient. (From Greenses, Robert A., Clinical Decision Support – The Road Ahead - Academic Press)

What Is It? – Purpose
• Answering questions
• Making decisions
• Optimizing process and workflow
• Monitoring actions
• Focusing Attention
### What Is It? – Purpose: Answering questions

Provide context-specific information via:
- Hyperlinks and infobuttons
- Link to lab results
- Link to med list
- Information agents and brokers
  - Actively request information
  - Provide additional resources with the information

---

### What Is It? – Purpose: Making Decisions

Provide help in analyzing information for:
- Making diagnosis
- Selecting tests
- Planning therapy
- Estimating prognosis

---

### What Is It? – Purpose: Optimizing process and workflow

Multistep algorithms, guidelines and protocols for:
- Progression of tests and procedures
- Single drug therapy vs more complex regimens for hypertension based on response
- Tracking patient status changes
- Assure adherence to protocols

---

### What Is It? – Purpose: Monitoring actions

Works in the background with no overt user request for information for:
- Guarding against errors
- Providing warnings, alerts, reminders or feedback
- May be real-time and tied to user actions
- May be asynchronous and decoupled from user actions

---

### What Is It? – Purpose: Focusing attention

Encouragement of best practices through use of techniques to facilitate good choices through:
- Use of order sets
- Use of structured data entry forms
- Generation of reports from structured elements

---

### What Is It? – Ten Commandments for Effective Clinical Decision Support

1. Speed is everything
2. Anticipate needs and deliver in real time
3. Fit into the user’s workflow
4. Little things can make a big difference
5. Physicians resist stopping
6. Changing directions is fine
7. Simple interventions work best
8. Asking for information is OK – but be sure you really need it
9. Monitor impact, get feedback, and respond
10. Knowledge-based systems must be managed and maintained

---

*Greene, Robert A., Clinical Decision Support – The Road Ahead - Academic Press*

What Is It? – Speed is everything

- Goal is subsecond screen flips
- Number of screens should be minimized

What Is It? – Anticipate needs and deliver in real time

- Example is showing relevant lab values when a drug that affects them is ordered

What Is It? – Fit into the user’s workflow

- Suggestions that come out of left field or at a time when the user is focused on something else are not likely to be heeded.

What Is It? – Little things can make a big difference

- Default settings have an impact on frequency of choosing specific actions
- Set defaults to actions most likely to be correct

What Is It? – Physicians resist stopping

- If you suggest not taking action but do not provide an alternative the initial action is likely to be continued

What Is It? – Changing directions is fine

- If you suggest a superior clinical alternative it will likely be accepted
<table>
<thead>
<tr>
<th>What Is It? – Simple interventions work best</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Straightforward guidelines have a higher rate of success than do complex ones</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What Is It? – Ask for additional information only when you really need it</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Some CDS requires information not already available</td>
</tr>
<tr>
<td>• Effort in supplying this information may be disproportionate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What Is It? – Monitor impact, get feedback, and respond</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Additional changes are required for most implemented CDS</td>
</tr>
<tr>
<td>• Failure to make changes may result in lack of benefit or in errors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What Is It? – Manage and maintain your knowledge-based systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Routinely track how often each CDS piece is triggered</td>
</tr>
<tr>
<td>• Ensure each rule has an owner and gets periodic follow-up</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What is it? - Five Rights of Clinical Decision Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Right Information (delivered to the)</td>
</tr>
<tr>
<td>• Right Person (in the)</td>
</tr>
<tr>
<td>• Right Intervention Format (through the)</td>
</tr>
<tr>
<td>• Right Channel (at the)</td>
</tr>
<tr>
<td>• Right Point in the Workflow</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>What is it? - Right Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Evidence-based</td>
</tr>
<tr>
<td>• Suitable to guide action</td>
</tr>
<tr>
<td>• Pertinent to the circumstances</td>
</tr>
</tbody>
</table>

What is it? - Right Person

- Physicians
- Nurses
- Pharmacists
- Other clinicians
- Patients
- Patient caregivers


What is it? - Right CDS Intervention Format

- Alerts
- Order sets
- Documentation tools
- Data displays
- Reference information


What is it? - Right CDS Intervention Format

The Law of the Instrument

"I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail." – Abraham Maslow

What is it? - Right Channel

- Electronic Health Record
- Personal Health Record
- Website
- Mobile application


What is it? - Right Time in the Workflow

- Must understand workflow and process for appropriate care and clinical decision-making
- Workflow analysis and mapping can help
- Example – allergy alert should fire when med is selected – not after order details completed.


What is it? - Different Types of CDS

- Passive – directs the user toward the most appropriate practices unobtrusively
  - Order sets
  - Selection limitations in dropdowns or checkboxes
- Active
  - Interruptive – just-in-time alerts presented directly to the user and requiring action
  - Non-interruptive – new patient information posted to work queues or forms for resolution at the convenience of the provider

What is it? - Active Interruptive CDS

- Database-driven alerts
  - Use a large database containing drug interaction, allergy interaction and dose range and condition information
  - Sold by drug database vendors and incorporated into clinical information systems by EHR vendors
- Free-form rule-based alerts
  - Give users more flexibility in developing the characteristics of messages
  - Presentation of alerts may be limited by constraints in EHR functionality

Where is it? - CDS Effectiveness

- Favorable effect on prescribing treatments
- Favorable effect on ordering clinical studies
- Favorable effect on facilitating preventative care
- Little evidence of positive effect on clinical or economic measures
- Findings applicable to both academic and non-academic settings


Where is it? - CDS Tools Available in certain EMRs

- Passive
  - Order sets
  - Selection limitations
  - Reference information
- Active
  - Documentation tools
  - Alerts powered by knowledge content vendor
  - Workflow/Rules Engine
  - Provider work queues

Order Set – Dabigatran

- Tufts FC restrictions/warnings:
  - Dabigatran only allowed for patients with 0.5 – 3.0 eGFR
  - For patients > 80 years, use with extreme caution or consider other treatment options.

Order Set – Heparin

- Heparin Protocols
  - Full Dose Heparin Weight Based Protocol
  - Low Dose Heparin Weight Based Protocol
  - Heparin
Alerts – Therapeutic Duplication Strategy

- Determine which categories to screen for duplicate therapy
- Unassign all medication classes for therapeutic duplicate checking
- Reassign only those classes you have chosen
- Fine tune by assigning generic drug pairs not to fire duplicate alerts
Alerts – Therapeutic Duplication

<table>
<thead>
<tr>
<th>Selected Visit</th>
<th>A1AH Inpatient</th>
<th>03/21/11 09:50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication/TD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurax (Piram) 5000 Units = 1 mL, Intravenous ONE TIME for 1 Dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurax, Porcine (FP) High Intravenous GHKT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workform 5 mg Oral ONE TIME for 1 Dose, Target INH 2-2-Indication_AFB/06/2012 18:09</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Where is it going? - Combating Alert Fatigue

- Research and efforts exist to incorporate more context into firing alerts
- Changing the timing of when alerts fire is being considered as an option
- Knowledge content vendors developing tools that allow customization of clinical data by end users

Where is it going? - Clinical Content Customization

- Examples of clinical content customization tools and their functionalities
- Images showing search interfaces and results for customized clinical data

Tufts Medical Center

3/17/2014
Conclusion

- Clinical Decision Support is more than just alerts
- There are a variety of ways to incorporate clinical decision support into an EMR
- While “alert fatigue” is a problem, there are tools available to help alleviate the problem
- Ongoing efforts involving multiple stakeholders have the potential to greatly improve clinical decision support tools.