National Nursing Informatics
Deep Dive Program

Designing Effective Safeguards and Decision Making

Marisa L. Wilson, DNSc, MHSc, CPHIMS, RN-BC

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I have no relevant financial interest to disclose nor am I endorsing any commercial products identified in this presentation.
Objectives

1. Define and describe Clinical Decision Support (CDS).
2. Determine impact of CDS on safety and support.
3. Outline a process for integrating CDS at the point of care.
4. Provide information and exemplars for teaching content to prelicensure students.
Definition of CDS

• Is a tool that provides clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. (HealthIT.gov)

• CDS is a strategic tool.
Description of CDS

• CDS systems are active knowledge systems using patient specific data to generate case specific advice.
• CDS systems use evidence based practice findings and applies that to the patient.
• CDS systems also provide quality judgment based on economic and cultural values.
• CDS systems are implemented with stakeholders and are led by champions.
CDS Tools

• Computerized alerts
• Reminders to care providers and patients
• Clinical guidelines
• Condition specific order sets
• Focused data reports and summaries
• Documentation templates
• Diagnostic support
• Contextually relevant reference information
How does CDS Happen

- During data entry – documentation, order sets, care plans
- During data review – single patient summaries, multi patient displays, predictive analytics
- During assessment – filtered reference material or knowledge resources
- Not During a Task – alerts triggering asynchronously (ex: lab results)
What Are the Purposes?

• Assists in problem solving
• Supports but does not replace clinical judgment and reasoning
• Improved the decision making process
Why CDS?

- Increased quality of care
- Enhanced outcomes
- Avoidance of errors and adverse events
- Improved efficiency
- Cost effectiveness
- Provider and patient satisfaction
How Does CDS Work?

• CDS processes require:
  • “Actionable” evidence
  • Embedded and accurate person specific data
  • Technical reasoning mechanisms that combine evidence based knowledge and data to form information that can be acted upon
  • A method to filter and display information that supports workflows
  • Enough information to allow for quick decision making
The CDS Five Rights

- Rights information
- Right person
- Right intervention
- Right channel
- Right point in the workflow

www.himss.org
CDS Model
The Informatics Model Behind CDS
Alignment with Underpinnings of Informatics

<table>
<thead>
<tr>
<th>Look to the Past</th>
<th>Look to the Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gathering</td>
<td>Learning</td>
</tr>
<tr>
<td>Know-Nothing</td>
<td>Know-What</td>
</tr>
<tr>
<td>Know-How</td>
<td>Know-Why</td>
</tr>
<tr>
<td>Know-Best</td>
<td></td>
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</tbody>
</table>

- **D**: Data (numbers, symbols, facts)
- **I**: Information (data processed and organized to describe who, what, where and when)
- **K**: Knowledge (collected information, instructs how)
- **E**: Experience (knowledge gained through doing)
- **T**: Theory (a framework for explaining behavior)
- **U**: Understanding (assign meaning, explain why, apply to analysis)
- **W**: Wisdom (judgment, evaluated understanding, long-term, proper, good, right)

### Extrinsic vs. Intrinsic

<table>
<thead>
<tr>
<th>Extrinsic</th>
<th>Intrinsic</th>
</tr>
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<tbody>
<tr>
<td>Analyzing</td>
<td>Deciding</td>
</tr>
<tr>
<td>Control and Efficiency</td>
<td>Value and Effectiveness</td>
</tr>
</tbody>
</table>

*Doing things right*
Exercise Scenarios

• Case 1  - Reduction in falls
• Case 2  - Prevention of Pressure Ulcers
• Case 3  - Prevention of CAUTI

You are the manager of a thirty two bed adult neurological unit. You have been tasked with building a CDS tool to assist nurses with these identified problems.
How are CDS Systems Created?
Systems Development Life Cycle

- Planning
- Analysis
- Design
- Testing
- Implementation
- Maintenance
Planning Tasks

- Aligning the mission, vision and values of the organization
- Defining the Problem
- Developing the Scope
- Review of the literature
- Determining feasibility (technical, schedule, financial)
- Producing a draft project plan
- Defining an initial team
- Present return on investment
Exercise 1

• What is your unit mission?
• What is the problem?
• What is the scope of the solution you are seeking?
• What does the literature tell us?
• Is this CDS feasible?
• Do you have a team to develop this?
• What will be the return on the investment?
The Analysis Tasks

- Analyzing the existing system
- Synthesis of evidence
- Exploring the human factors
- Developing a workflow “as is” and “to be”
- Conducting Business Process Redesign
- Crafting Prototypes or a Use Case
- Drafting requirements
- Establishing requirements (including equipment)
- Develop evaluation strategy
- Review current Policies and Procedures
Exercise 2

• What do you already have in place to address this issue?
• What does the evidence synthesis direct us to do?
• What human factors do we need to take into consideration?
• What is the workflow?
• What are the requirements of this CDS?
• Can you create a prototype?
• What will be the evaluation measures?
Tools Used in Analysis
A Workflow Diagram

- A graphical depiction of steps taken, time spent, distance traveled necessary to complete a required business process.
Workflow Diagram

VTE Risk Assessment and Prophylaxis (Post Admission) Nursing Driven

<table>
<thead>
<tr>
<th>Nursing</th>
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</thead>
<tbody>
<tr>
<td>Complete VTE Risk Assessment</td>
</tr>
<tr>
<td>Protocol allows Nurse to enter Prophylaxis Orders?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Written Order</td>
</tr>
<tr>
<td>ENTERS prophylaxis Order per protocol</td>
</tr>
<tr>
<td>Enters written order electronically or scans written order</td>
</tr>
<tr>
<td>No or Yes</td>
</tr>
<tr>
<td>Informed of Risk</td>
</tr>
<tr>
<td>Order for Prophylaxis</td>
</tr>
<tr>
<td>Written/Verbal</td>
</tr>
<tr>
<td>Written/Verbal or CPOE?</td>
</tr>
<tr>
<td>CPOE</td>
</tr>
<tr>
<td>GMS Drug Checklist and Advisor</td>
</tr>
<tr>
<td>Makes changes if required</td>
</tr>
<tr>
<td>Re-confirms dose, route, frequency, renal function</td>
</tr>
<tr>
<td>Verify medication dose, route, frequency, renal function</td>
</tr>
<tr>
<td>All parameters appropriate?</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Physician</th>
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<tbody>
<tr>
<td>Checks for 5 rights prior to administration</td>
</tr>
<tr>
<td>Abnormal lab results called to floor</td>
</tr>
<tr>
<td>Inform Physician of abnormal lab results</td>
</tr>
<tr>
<td>Continue to monitor</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Change to therapy?</td>
</tr>
<tr>
<td>Make changes to therapy</td>
</tr>
<tr>
<td>Yes</td>
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<table>
<thead>
<tr>
<th>Pharmacist</th>
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</thead>
<tbody>
<tr>
<td>Verify medication dose, route, frequency, renal function</td>
</tr>
<tr>
<td>All parameters appropriate?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Change to therapy?</td>
</tr>
<tr>
<td>Make changes to therapy</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Informed of abnormal results</td>
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Data Flow Diagram

• A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system.
A Use Case Diagram

- Use Case Diagrams graphically depict:
  - The actors that the system you are describing interacts,
  - The system itself,
  - The use cases, or services, that the system knows how to perform,
  - The lines that represent relationships between these elements.
A Use Case Diagram
The Design Tasks

• Define the input requirements
  • This includes standardized terminology, tools, and measures
• Define the output requirements
• Develop system controls
• Determine interface needs
• Create security protocols
• Draft downtime and disaster recovery processes
Exercise 3

- Do you have validated tools to use?
- Do you have standardized terminology?
- What will the input look like?
- How will you control for data entry errors?
- Will there be a need for data coming from other systems or other parts of the current system?
- What does the output look like?
- How will this fit in your desired workflow?
- Who will do this and who will not?
- Who will get the CDS messages and who will not?
The Implementation Tasks

- Develop and begin training
- Prepare equipment
- Ensure that Policies and Procedures are up to date
- Review system’s User Manuals
- Educate support and Help Desk
Exercise 4

• What type of hardware will you use?
• How will this hardware be managed?
• How will you conduct training (face to face, on line, at the elbow)?
• Will there be a need to adjust Policies and Procedures?
• What will you do with this CDS process if the system goes down?
The Maintenance Tasks

- Determine evaluation outcomes
- Analyze processes for work arounds
- Activate strategy for ensuring the evidence driving the CDS action is up to date
- Develop process for change control
The Promise of CDS

• Improved healthcare quality, safety, and cost efficiency
• Achievement of unit goals
• Engagement of evidence
• Provision of best practice
• Prevention of adverse events
• Appropriate resource utilization
The Perils of CDS

- Poor acceptance and untoward consequences
- Poorly designed interventions that create distraction
- Overuse and reliance on CDS and lack of use of clinical judgment
- Inadequate planning, analysis and development leading to lack of use
- No quality management of the CDS
Resources

• What is Clinical Decision Support (CDS)?
  http://www.healthit.gov/policy-researchers-implementers/clinical-decision-support-cds

• Clinical Decision Support Systems: State of the Art
  http://healthit.ahrq.gov/sites/default/files/docs/page/09-0069-EF_1.pdf

• Types of Clinical Decision Support: Examples from HIMSS Davies Award Winners
  http://www.himss.org/files/himssorg/content/files/typescds.pdf

• Clinical Decision Support
  http://www.himss.org/library/clinical-decision-support