

## Component 6 - Health Management Information Systems

### Unit 5-1 Clinical Decision Support Systems

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## Objectives

- Describe
  - The history and evolution of clinical decision support systems (CDSSs)
  - The fundamental requirements of an effective CDSSs
- Discuss how clinical practice guidelines and evidence-based practice affect CDSSs

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## Definition of Clinical Decision Support System (CDSS)

- Computer applications that
  - Provide knowledge and person-specific information
    - Filtered
    - Provided at suitable times
  - Assist with the clinical decision making process

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# History and Evolution of CDSS

- Late 1950s
  - Initial discussions
- Late 1960s
  - Bayesian probability theory
    - Leeds Abdominal Pain System

Shortliffe, E., Biomedical informatics: computer applications in health care and biomedicine

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# History and Evolution of CDSS

- 1970s
  - Rules-based
    - HELP
    - MYCIN

Shortliffe, E., Biomedical informatics: computer applications in health care and biomedicine

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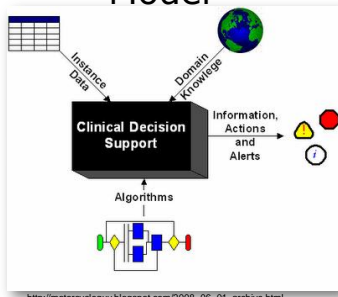
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# Clinical Decision Support Model



[http://motorcycledeguy.blogspot.com/2008\\_06\\_01\\_archive.html](http://motorcycledeguy.blogspot.com/2008_06_01_archive.html)

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# Clinical Decision Support System Requirements

- Knowledge base
- Program for combining the knowledge with patient-specific information
- Communication mechanism

[http://healthit.ahrq.gov/images/jun09cdsreview/09\\_0069\\_ef.html](http://healthit.ahrq.gov/images/jun09cdsreview/09_0069_ef.html)

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# Knowledge Base

- Rules and associations of compiled data
- Examples
  - Compiled clinical information on diagnoses, drug interactions, and clinical practice guidelines

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# Inference Engine

- The “brain”
- Program for combining the knowledge with patient-specific information

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## Communication Mechanism

- Method for
  - Input into the system
    - Import from the EMR
  - Output to the user of the system

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## Examples of CDS Interventions by Target Area of Care

Target area of care	Example
Preventive care	Immunization, screening, disease management guidelines for secondary prevention
Diagnosis	Suggestions for possible diagnoses that match a patient's signs and symptoms
Planning or implementing treatment	Treatment guidelines for specific diagnoses, drug dosage recommendations, alerts for drug-drug interactions
Followup management	Corollary orders, reminders for drug adverse event monitoring
Hospital, provider efficiency	Care plans to minimize length of stay, order sets
Cost reductions and improved patient convenience	Duplicate testing alerts, drug formulary guidelines

[http://healthit.ahrq.gov/images/jun09cdsreview09\\_0069\\_of.html](http://healthit.ahrq.gov/images/jun09cdsreview09_0069_of.html)  
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## CDS Intervention Types/Examples

Intervention Types	Examples
Relevant data presentation	Flowsheets, surveillance
Order/prescription creation facilitators	Order sentences, sets
Reference information and guidance	Infobuttons, Web
Alerts and reminders	Proactive warnings
Documentation forms/templates	Patient history, visit note
Protocol/pathway support	Pathways

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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## Relevant Data Presentation

- Benefits
- Subtypes
  - Relevant data for ordering, administration, or documentation
  - Retrospective/aggregate reporting or filtering
  - Environmental parameter reporting
  - Choice lists
  - Practice status display

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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## Order/Prescription Creation Facilitators

- Benefits
- Subtypes
  - Single-order completers including consequent orders
  - Order sets
  - Tools for complex ordering

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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## Reference Information and Guidance

- Benefits
- Subtypes
  - Context-insensitive
  - Context-sensitive

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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# Alerts and Reminders

- Benefits
- Subtypes
  - Alerts to prevent potential omission/commission errors or hazards
  - Alerts to foster best care

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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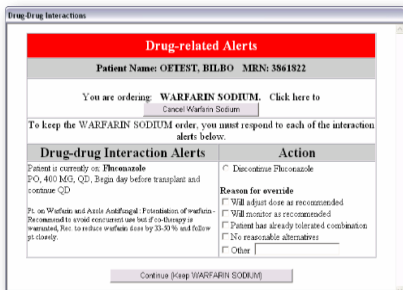
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# Drug-drug Interaction Alert



A Roadmap for National Action on Clinical Decision Support <https://www.amia.org/files/cdsroadmap.pdf>

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# Documentation Forms/ Templates

- Benefits
- Subtypes
  - Patient self-assessment forms
  - Clinician patient assessment forms
  - Clinician encounter documentation forms
  - Departmental/multidisciplinary clinical documentation forms
  - Data flowsheets

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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## Protocol/Pathway Support

- Benefits
- Subtypes
  - Stepwise processing of multi-step protocol or guideline
  - Support for managing clinical problems over long periods and many encounters

<http://healthit.ahrq.gov/images/jan09cdswebconference/textonly/index.html>

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## Knowledge and Interventions

- Knowledge base
  - Rules and associations of compiled data
  - Example
    - Clinical practice guidelines
- Interventions

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## Clinical Practice Guidelines

- Systematically developed statements
- Assist practitioners and patient decision making about appropriate healthcare
- Specific clinical circumstances

<http://www.qaproject.org/methods/resglossary.html>

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## Clinical Practice Guidelines Sources

- Government agencies
- Institutions
- Organizations such as professional societies
- Expert panels

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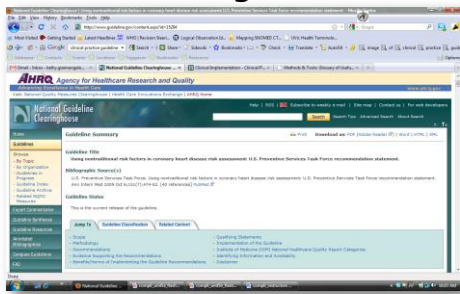
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## National Guideline Clearinghouse



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## Evidence-Based Practice Guidelines

- Validated guidelines
- Recommendations based on best available evidence
- Usually reflect a consensus by experts

<http://wellness.wikispaces.com/Tactic+-+Improve+Care+Quality+with+Evidence-Based+Practice+Guidelines>

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## Summary

- Clinical decision support system
  - Definition
  - Requirements
    - Knowledge base
    - Inference engine
    - Communication mechanism
  - Affects of clinical practice guidelines and evidence-based practice on CDSS

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