# Health Management Information Systems

Unit 5
Clinical Decision Support Systems

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# Objectives

- Describe the history and evolution of clinical decision support systems
- Describe the fundamental requirements of a clinical decision support system
- Discuss the importance of clinical practice guidelines and evidence-based practices and how these affect clinical decision support systems

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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

## 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

## History and Evolution of CDSS

- 1970s
  - Rules-based
    - HELP
    - MYCIN

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

## Clinical Decision Support Model
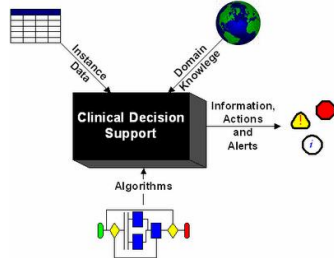


http://motorcycleguy.blogspot.com/2008_06_01_archive.html

## 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

## Knowledge Base

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

## Inference Engine

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

# Communication Mechanism

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

# 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/jun09cdsreview/09_0069_ef.html

# 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

## 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

## 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

## Reference Information and Guidance

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

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## Alerts and Reminders

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

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## Drug-drug Interaction Alert



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

## 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

## Protocol/Pathway Support

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

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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

## National Guideline Clearinghouse

## 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

# 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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