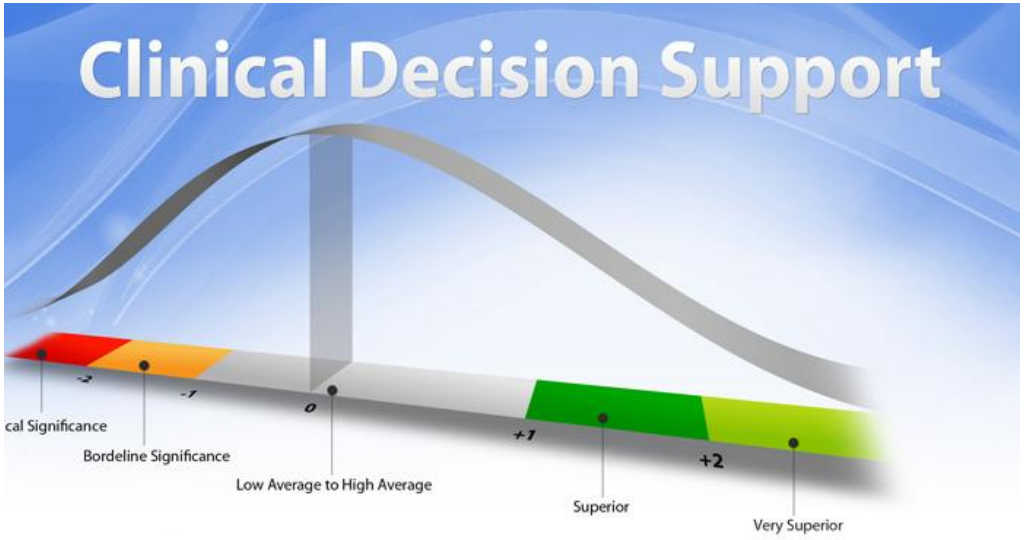
临床决策支持的种类及实践

THE TYPES OF CDS & PRACTICE



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Contents

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1 Definitions

Definitions of CDS

CMS definition：

- Clinical Decision Support – HIT functionality that builds upon the foundation of an EHR to provide persons involved in care processes with general and person-specific information, intelligently filtered and organized, at appropriate times, to enhance health and health care.
- CDS provides the right information to the right person at the right time to assist in the process of delivering quality and safe care. Aside from alerts and reminders, CDS may include templates, order sets, data display that highlights **important** information, reference information, and other tools to support optimal care within the clinical workflow.

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Definitions of CDS

Other definitions:

- Clinical decision support (CDS) is a process designed to aid directly in clinical decision making, it 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.
- CDS encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerized **alerts and reminders** to care providers and patients; clinical guidelines; **condition-specific order sets**; focused patient **data reports and summaries**; **documentation templates; diagnostic support**, and **contextually relevant reference information**, among other tools.

2 Brief History

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Brief history of CDS

- Started in the 1960s, the initial objective of introducing computers into medical practice was very clear: to provide doctors with **decision aids using AI-based medical diagnostic reasoning.**
- For 40 years, clinical decision support systems (CDSS) have promised to **revolutionize healthcare**. In fact, when the government mandated EHR systems in all healthcare facilities, one of the key objectives is to promote better and cheaper healthcare using CDSS based on the patient data collected from the EHRs.
- Two major categories of CDSS are ***diagnostic support*** tools and ***treatment support*** tools.

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Brief history of CDS

Brief evolution of CDS:

- Diagnostic and reminder CDS
  - 1980s to early 1990s
- Drug Interaction CDS
  - 1990s to Present
- Quality Indicator CDS
  - 2010 and beyond

Drug-allergy
Drug-drug
Drug-laboratory
Drug-frequency
Drug-renal function
Drug-age
Drug-disease

Evolution of CDS Architecture:

- Stand-alone systems
- Integrated systems
- Standards-based systems
- **Service models**

3 Why CDS?

Why CDS?

CDS has a number of important benefits, including:

- Increased quality of care and enhanced health outcomes
- Avoidance of errors and adverse events
- Improved efficiency, cost-benefit, and provider and patient satisfaction:

Why CDS?

CDS interventions can:

- **Gather and present** clinical and other relevant data needed for clinical decision making;
- **Detect** potential safety and quality problems and help **prevent** them;
- **Foster** the greater use of evidence-based medicine principles and guidelines;
- **Safeguard against** inappropriate utilization of services, medications, and supplies;

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Why CDS?

CDS interventions can: (Continued)

- **Organize, optimize** and **help operationalize** the details of a plan of care;
- Help **keep track of** the simple things that we sometimes forget, such as adjusting medication doses for altered renal function, or remembering to complete **Advanced Directives** for an admitted patient; and
- **Ensure** that the best clinical knowledge and recommendations are utilized to improve health management decisions by clinicians and patients.

4 Major Types

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Major Types of CDS Tools

The HIMSS CDS Implementer's Guide identifies **6** different major CDS intervention types:

1. Documentation forms and templates

Specific forms for documenting clinical visits for patients, making it easy to record **problem-specific history** and exam findings.

2. Relevant Data Presentation

Optimize decision making by ensuring all pertinent data are considered; organize complex data collections to promote understanding of overall clinical picture and to highlight needed actions.

3. Order/prescription Creation Facilitators

Standardized, evidence-based order sets for specific clinical problems. Promote adherence to standards of care by making the right thing the easiest to do.

Major Types of CDS Tools

The HIMSS CDS Implementer's Guide identifies 6 different major CDS intervention types:

4. Time-based Checks and Pathway support

Provides support for multistep care plans, pathways, and protocols that extend over time.

5. Reference Information and Guidance

Addresses recognized information needs of patients and clinicians.

6. Reactive Alerts and Reminders

Alerts about a drug allergy or dangerous drug-drug interaction when a medication is ordered using a CPOE or electronic-prescribing (eRx) device

Major Types of CDS Tools

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

5 MU & CDS

Implement Clinical Decision Support

Requirement

Implement one clinical decision support rule relevant to specialty and track compliance with that rule.

Exclusion

No exclusion.

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Objective and Measure of CDS

	Stage 1	Stage 2
Objective	Implement one clinical decision support rule relevant to specialty or high clinical priority along with the ability to track compliance that rule	Use clinical decision support to improve performance on high-priority health conditions
Measure	Implement one clinical decision support rule	1. Implement **5 clinical decision support interventions** related to 4 or more clinical quality measures, if applicable, at a relevant point in patient care for the entire EHR reporting period. 2. The EP, eligible hospital, or CAH has **enabled the functionality for drug-drug and drug-allergy interaction checks** for the entire EHR reporting period

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(i)Evidence-based CDS

- Enable a limited set of identified users to select (i.e., activate) one or more electronic clinical decision support interventions (**in addition to** drug-drug and drug-allergy contraindication checking) based **on each one and at least one combination** of the following data:

  (A) Problem list;
  (B) Medication list;
  (C) Medication allergy list;
  (D) Demographics;
  (E) Laboratory tests and values/results; and
  (F) Vital signs.

MU & CDS

(ii) 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

MU & CDS

(iii)CQM-associated CDS

- **As Himss.org advised, One way to achieve clinical decision support rule that is aligned with one of the quality metrics defined for hospitals and professionals.**
- **An EHR Vendor also advised, One way of thinking of a CDS rule is as an individual-patient prompt of a CQM item.**

If there is a list, say, of diabetics who need certain lab testing done, then for each patient on that list, there needs to be a real-time prompt – e.g. a dashboard, or a flowsheet – indicating that these tests need to be done when the patient shows up for an appointment.

If a diabetic patient, for example, comes to the office complaining of seasonal allergies, on that patient's dashboard there would be a display noting that the patient is diabetic, and is due (or past due) for particular interventions – this would be an example of CQM-driven Clinical Decision Support.

MU Stage 2 CQMs

MU 2014版CQM的6个结构域及93个CQMs

Care Coordination (3) CMS32 CMS50 CMS102
Clinical Process/Effectiveness (54) CMS9 CMS30 CMS31 CMS52 CMS53 CMS60 CMS61 CMS62 CMS64 CMS65 CMS71 CMS72 CMS73 CMS74 CMS75 CMS77 CMS91 CMS100 CMS104 CMS105 CMS109 CMS113 CMS122 CMS123 CMS124 CMS125 CMS126 CMS127 CMS128 CMS130 CMS131 CMS133 CMS134 CMS135 CMS136 CMS137 CMS140 CMS141 CMS142 CMS143 CMS144CMS145 CMS148 CMS149 CMS158 CMS159 CMS160 CMS161 CMS163 CMS164 CMS165 CMS167 CMS169 CMS182

MU Stage 2 CQMs

MU 2014版CQM的6个结构域及93个CQMs

Efficient Use of Healthcare Resources (6) CMS129 CMS146 CMS154 CMS166 CMS172 CMS188
Patient & Family Engagement (9) CMS26 CMS55 CMS56 CMS66 CMS90 CMS107 CMS110 CMS111 CMS157
Patient Safety (12) CMS68 CMS108 CMS114 CMS132 CMS139 CMS156 CMS171 CMS177 CMS178 CMS179 CMS185 CMS190
Population/Public Health (6) CMS2 CMS22 CMS69 CMS82 CMS117 CMS138 CMS147 CMS153 CMS155

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6 5 Rights

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5 CDS Rights: a best practice framework

- **Right Information**

  Evidence-based, useful for guiding action and answering questions

- **Right Person**

  Both clinicians and patients

- **Right CDS Intervention Format**

  Alerts, Order Sets, answers, etc.

- **Right Channel**

  Internet, mobile devices, EHR, clinical information systems

- **Right Point in Workflow**

  to influence key decisions/actions

Everyone on the Team needs to Respect these Rights!

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7 Examples

Examples of CDS

Example1: Examples of early CDS

❖**Several Examples of early CDS:**

- MYCIN
- INTERNIST-1/QMR
- DXplain
- Antibiotic Assistant
- Regenstrief CDS

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Examples of CDS

Example2: Two projects of AHRQ

- In 2008, the Agency for Healthcare Research and Quality (**AHRQ**) funded **two demonstration projects** in support of the design, development, implementation, and evaluation of **guidelines-based CDS**.
- The demonstration projects were awarded to **Brigham and Women's Hospital** (**Clinical Decision Support Consortium** [**CDSC**] project) and **Yale University School of Medicine** (GuideLines Into Decision Support [**GLIDES**] project).
- Each project was funded initially **for $2.5 million for a 2-year period**, with an option for AHRQ to continue funding the projects for up to an additional three years. An additional one year (Option Year 1) was funded.

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Examples of CDS

Example2: Two projects of AHRQ

Under contract, they will:

- **Incorporate CDS into electronic medical records** that have been certified by the Certification Commission for Health IT (CCHIT).
- **Demonstrate** that CDS can operate on multiple computer systems.
- **Establish lessons** learned for CDS implementation relevant to the health IT vendor community.
- **Assess potential benefits and drawbacks of CDS**, including effects on patient satisfaction, measures of efficiency, cost, and risk.
- **Evaluate methods** of creating, storing, and replicating CDS element across multiple clinical sites and ambulatory practices.

Examples of CDS

Example2: Two projects of AHRQ

- **GLIDES project (GuideLines Into Decision Support)**
- **In February 2008, AHRQ awarded a 2-year, $2.5 million contract to the Yale School of Medicine to finance the GLIDES project. This project aims to explore how the translation of clinical knowledge into CDS can be made part of routine practice and expanded to improve the overall quality of health care. It demonstrates how knowledge from clinical practice guidelines can be converted to computer-based CDS.**
- **During the first two years, GLIDES transformed narrative clinical guidelines into computer-mediated CDS for asthma and pediatric obesity and initiated implementation in specialist and primary care settings.**
- **The third year of the project focused on continuing the implementation efforts in additional sites, with changes and enhancements based on lessons learned in the first two years.**

Examples of CDS
Example2: Two projects of AHRQ

- **CDSC project (Clinical Decision Support Consortium)**
- **In March 2008, AHRQ awarded a second 2-year, $2.5 million contract to the Brigham and Women's Hospital to fund the CDSC project.**
- **The overarching goal for the CDSC project is to assess, define, demonstrate, and evaluate best practices for knowledge management and CDS across various ambulatory care settings and technology platforms at scale.**
- **At the end of the 2-year contract, a third year (Option Year 1) was funded by AHRQ to support the continuation of implementation and demonstration efforts of the CDSC team.**

Examples of CDS

Example3: CDS in a Certified EHR

- **Diabetes: Eye Exam (CMS 131, NQF 55)**

Patient is 18-75 years old with diabetes and due for retina exam.

Resolved by: Order or record a *Examination of the retina (procedure)* in the *Screenings/Interventions/Assessments* section.

- **Diabetes: Foot Exam (CMS 123, NQF 56)**

Patient is 18-75 years old with diabetes and due for foot exam.

Resolved by: Order or record a *Diabetic foot exam* in the *Screenings/Interventions/Assessments* section.

- **Diabetes: Hemoglobin A1c Poor Control (CMS 122, NQF 59)**

Patient is 18-75 years old with diabetes whose most recent structured lab result had a hemoglobin A1c > 9.0%.

Resolved by: Patient receives a new structured lab result with A1c levels < 9.0%.

Examples of CDS

Example3: CDS in a Certified EHR

- **Documentation of Current Medications in the Medical Record (CMS 68, NQF 419)**

Patient is 18 years old or older without update of current medication list recorded for this encounter.

Resolved by: Check the *Documentation of medications* box in the *Quality of Care* section.

- **Screening for Clinical Depression and Follow-Up Plan (CMS 2, NQF 418)**

Patient is 12 years old or older and not screened for clinical depression.

Resolved by: Order or record an *Adult depression screening assessment* or an *Adolescent depression screening assessment* in the *Screenings/Interventions/Assessments* section and select one of the two results "Depression Screening Negative" or "Depression Screening Positive".

8 Thinking on CDS

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Thinking on CDS
Issues, Problems, Barriers

Additional research and work are needed to address these outstanding obstacles, as they are important for the advancement of the design and implementation of CDS systems. These include:

- Guidelines should be specific, unambiguous, and clear;
- Seamless EHR and workflow integration;
- Implementation at collaborating organizations;
- Long-term evaluation to determine whether clinicians' use of the EMR and CDS systems changes or stabilizes over time;
- Effectiveness of the various CDS interventions on clinician performance and clinical outcomes;
- Legal and Regulatory Barriers

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Thinking on CDS
Issues, Problems, Barriers

Current adoption of advanced clinical decision support is limited due to a variety of reasons, including:

- **Limited implementation of EMR, CPOE, PHR, etc.**
- **Difficulty developing clinical practice guidelines.**
- **A lack of standards**
- **Absence of a central repository or knowledge resource.**
- **Limited CDS functionality in commercial EHRs.**
- **Challenges in integrating CDS into the clinical workflow.**
- **A limited understanding of organizational, and cultural issues relating to clinical decision support.**

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Thinking on CDS
Issues, Problems, Barriers

Challenges to be overcome: (Continue)

- Funding for development
- Knowledge maintenance
- Optimal timing
- Alert fatigue
- **Motivation for use**

Thinking on CDS
Advice & Recommendations

1. Speed is Everything

2. Problem-oriented!

3. Fit into the User's Workflow

4. **Little Things Can Make A Big Difference**

5. Recognize that Physicians Will Strongly Resist Stopping

6. Anticipate Needs and Deliver in Real Time

7. Simple Interventions Work Best

8. Ask for Additional Information Only When You Really Need It

9. Monitor Impact, Get Feedback and Respond

10. Manage and Maintain Your Knowledge-based Systems

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Thank you !

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