



بِسْمِ تَعَالَى



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An overview of clinical decision support systems

WHAT IS A CLINICAL DECISION SUPPORT SYSTEM?

- A clinical decision support system (CDSS) is intended to improve healthcare delivery by enhancing medical decisions with targeted clinical knowledge, patient information, and other health information.
- CDSSs today are primarily used at the point-of-care, for the clinician to combine their knowledge with information or suggestions provided by the CDSS.

WHAT IS A CLINICAL DECISION SUPPORT SYSTEM?

- Computer-based CDSSs can be traced to the 1970s. At the time, they had poor system integration, were time intensive and often limited to academic pursuits.
- There were also ethical and legal issues raised around the use of computers in medicine, physician Autonomy Presently.

CDSS Classification

CDSS are frequently classified as:

- Knowledge-based
- Non-knowledge based

CDSS Classification

- In **knowledge-based systems**, rules (IF-THEN statements) are created, with the system retrieving data to evaluate the rule, and producing an action or output.
- CDSS that **are non-knowledge based** still require a data source, but the decision leverages artificial intelligence (AI), machine learning (ML), or statistical pattern recognition, rather than being programmed to follow Expert medical Knowledge.

The scope of functions

The scope of functions provided by CDSS is vast, including diagnostics, alarm systems, disease management, prescription, drug control, and much more.

Benefits of clinical decision support systems (CDSS), possible harms

Functions and advantages of CDSS

Potential harm of CDSS

Patient Safety

Reducing incidence of medication/prescribing errors and adverse events.



Alert fatigue

A phenomenon where too many insignificant alerts or CDSS recommendations are presented, and providers start to dismiss them regardless of importance.

Clinical management

Adherence to clinical guidelines, follow-up and treatment reminders, etc.

Negative impact on user skills

One example is reliance on, or excessive trust in the accuracy of a system.



Cost containment

Reducing test and order duplication, suggesting cheaper medication or treatment options, automating tedious steps to reduce provider workload, etc.

Financial challenges

Setup can be expensive (capital or human resource), and long-term cost-effectiveness is not guaranteed.



Administrative function/ automation

Diagnostic code
selection, automated
documentation and note
auto-fill



System and content maintenance challenges

As practice changes,
there can be difficulty
keeping the content and
knowledge rules that
power CDSS up to date.

Diagnostics support

Providing diagnostic suggestions based on patient data, automating output from test results.

User distrust of CDSS

Users may not agree with the guideline provided by the CDSS.



Diagnosics Support: Imaging, Laboratory, and Pathology

Augmenting the extraction, visualization, and interpretation of medical images and laboratory test results.



Transportability/interoperability

CDSS face challenges regarding integration with other hospitals or systems.

Patient decision support

Administered directly to patients through personal health records (PHR) and other systems.

Dependency on computer literacy

CDSS may require a very high technological proficiency to use



Better Documentation

Better Documentation

**Inaccurate and poor-quality data/
documentation**

CDSS may aggregate data from multiple sources that are not synced properly.



Workflow improvement

CDSS can improve and expedite an existing clinical workflow in an electronic health records (EHR) with better retrieval and presentation of data.



Disrupted/fragmented workflow

CDSS can also disrupt existing workflows if they require interaction external to the EHR, or don't match the providers' real world information processing sequences.

PITFALLS OF CDSS

1. Fragmented workflow

- CDSS can disrupt clinician workflow, especially in the case of stand-alone systems. Many early CDSS were designed as systems that required the provider to document or source information outside their typical workspace. CDSS also disrupt workflow if designed without human information processing and behaviors in mind.
- Disrupted workflow can lead to increased cognitive effort, more time required to complete tasks, and less time face-to-face with patients.

...PITFALLS OF CDSS

2. Alert fatigue and inappropriate alerts

- Studies have found up to 95% of CDSS alerts are inconsequential, and often times physicians disagree with or distrust alerts. Other times they just do not read them. If physicians are presented with excessive/unimportant alerts, they can suffer from alert fatigue.
- Disruptive alerts should be limited to more life-threatening or consequential contraindications, such as serious allergies.

. . . PITFALLS OF CDSS

3. Impact on user skill

- CDSS can create the impression that verifying the accuracy of an order is unnecessary or automatic.

...PITFALLS OF CDSS

4. System and content maintenance

- Maintenance of CDSS is an important but often neglected part of the CDSS life-cycle.

...PITFALLS OF CDSS

Lack of transportability and interoperability

- Despite ongoing development for the better part of three decades, CDSS (and even EHRs in general) suffer from interoperability issues. Many CDSS exist as cumbersome stand-alone systems, or exist in a system that cannot communicate effectively with other systems.

. . . PITFALLS OF CDSS

Financial challenges

- Up to 74% of those with a CDSS said that financial viability remains a struggle.
- Outset costs to set up and integrate new systems can be substantial. Ongoing costs can continue to be an issue indefinitely as new staff need to be trained to use the system, and system updates are required to keep pace with current knowledge.

CONCLUSION

- CDSS have been shown to augment healthcare providers in a variety of decisions and patient care tasks, and today they actively and ubiquitously support delivery of quality care.
- Extra precautions and conscientious design must be taken when building, implementing, and maintaining CDSS.

Thank You