A STUDY ON CLINICAL DECISION TOOLS: Optimizing Clinical Outcomes with Decision Support Tools

Dr Gulab Bhimrao Tilekar[1], Dr Varun Patil[2]

1. Clinical system specialist, Pune, Maharashtra, India

2. Senior Manager Health Informatics, Pune, Maharashtra, India

ABSTRACT

Clinical Decision Support Systems (CDSS) are essential tools for improving patient care and clinical outcomes using evidence-based medicine. They provide healthcare professionals with the clinical knowledge and patient, or disease-specific information needed to make informed decisions. However, the design, development, and implementation of CDSS can be challenging due to a lack of clear success factors and other barriers. To increase usability and adoption of CDSS, we conducted a study and identified and concluded with some strategies and prerequisites for CDSS success and recommended a detailed plan for development and implementation. These recommendations are grouped into major themes, including providing relevant and reliable content, simplifying messages, saving time for users, integrating with clinical workflows, improving system response and speed, and introducing active and passive alert mechanisms. **Objective:** The study includes seeking feedback and recommendation from clinical end users about the impact of CDSS technology on everyday charting of medication orders and other information in the Electronic Health record system and feedback to optimize the CDSS and electronic health system. It also includes understanding the impact of integrating CDSS with hospital information systems. **Method of study:** We are using a combination of qualitative and quantitative methods to compare and analyze the existing design, new development, management, and utilization of a Clinical Decision Support System.

Keywords: Health Informatics; Clinical Decision Support Systems; Implementation Challenges; Hospitals, Electronic health information system

INTRODUCTION

Clinical Decision Support Systems (CDSS) are tools used to improve the quality of medical care in hospitals through the practice of evidence-based medicine. CDSS provide physicians, caregivers, and patients with the clinical knowledge and patient- or disease-specific information needed to make informed decisions that enhance patient care and improve clinical outcomes.

CDSS can take various forms, including computerized alerts and reminders, clinical guidelines, clinical pathways, patient data reports and dashboards, documentation templates, diagnostic support, and clinical workflow tools. CDSS can be classified into three levels of decision support functions: tools for clinical information management, tools for focusing the attention of users, and specific patient recommendations and advice. CDSS have been shown to improve patient outcomes and treatment costs, with therapeutic CDSS minimizing errors through alerts about potential drug-drug interactions, drug-allergy interaction, dosage alerts pregnancy or lactation alerts, duplicate medication alerts and diagnostic CDSS improving physician decision-making. Basic CDSS provide basic capabilities such as drug interactions, while advanced CDSS offer more detailed advice and features.

Despite the widespread availability of basic CDSS in many hospital information systems, dosing mistakes still occur, duplicate medications are entered in the system and allergy alerts and ignored while using the electronic health system for charting patients care.

This study focuses on the next steps in using CDSS tools and electronic health system to improve patient safety. Clinical Informatics play important role in CDSS implementation.

Poor computer literacy among physicians is a common barrier to the implementation of Clinical Decision Support Systems (CDSS). Another barrier to CDSS implementation is the perceived loss of autonomy among healthcare professionals. However, CDSS can present evidence-based practices automatically, allowing healthcare professionals to focus on

areas of special need and provide personalized care. CDSS can also improve clinical skills through the learning effects of modified messages, leading to improved professional performance over time.
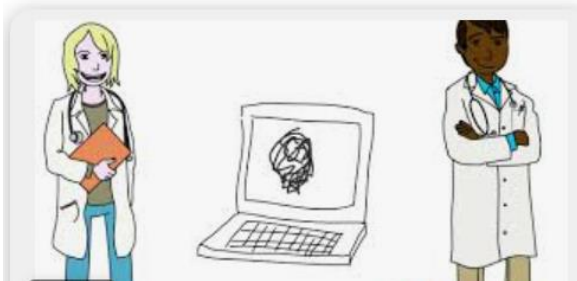

Figure No. 1: End users in a hospital

Sources: www.googleimages.com

TABLE NO. 1: GENERAL SURVEY DETAILS

Physician and Nurses Survey	No
Total number of users invited for survey	30
Total number of users responded to survey	28
Feedback and Recommendation received	08
No of users not responded	02

CASE STUDY

The survey was sent to 30 participants to learn from Clinical professional or end users in the hospital about the electronic health record system content is reliable content, patient safety message understanding is easy, feedback to eliminate unnecessary clicks, and benefits of integrating with clinical workflows, improving system response and speed, and introducing active and passive alert mechanisms for drug interactions and other patient safety alerts. This study will be beneficial to physician, nurses and other users using the electronic health record system and are experiencing difficulties using the clinical application while offering patient care.

Outcome of the Case Study

The below challenges were reported in the survey:

Critical Components of a Successful Clinical Decision Support Implementation and adoption

The use of Clinical Decision Support Systems (CDSS) can be challenging due to the need to process and transform clinical guidelines, protocols, and evidence-based recommendations into computerized formats to derive clinical rules and

integrate them into the hospital information system. This process can be complex and time-consuming, as clinical guidelines and protocols are often generic and not patient-specific and can be difficult to understand and apply. To overcome these challenges, it is important to involve an interdisciplinary team of clinical professionals in the creation, validation, and optimization of relevant clinical rules. This team should include experts from all relevant disciplines and should represent the end users of the CDSS. Involving experienced healthcare professionals in the development of clinical rules from the beginning can help increase compliance and acceptance of the guidelines and improve user involvement. It is also important for hospitals to enable various clinical pathways as part of the CDSS to standardize medical processes.

Delivering and Maintaining Integrity of Data

A simple drug ordering system can often produce many inaccurate or irrelevant false positive alerts, leading to user alert fatigue due to the high sensitivity but low specificity of the alerts. This is especially common with basic CDSS functions for detecting drug-drug interactions. A study found that more than 90% of warnings were not answered by doctors and were often overwritten without being read. The low specificity of alarms, ambiguity of information content, and high sensitivity of the system contribute to the reduced value of such systems. Physicians may not be properly trained in reading, interpreting, or responding to alerts and may rely on pharmacists to confirm drug prescriptions before dispensing. The increased number of alerts produced by basic CDSS can increase the risk of overriding potentially harmful alerts. Alert fatigue can cause doctors to disable both critical and non-critical alarms, undermining the intended safety benefits of CDSS. In fact, pharmacists have been found to nullify nearly one-third of life-threatening drug interactions. To ensure the reliability of messages and warnings, it is important to ensure the high validity of clinical rules through thorough checking before using them. Also, design the alerts with appropriate level of priorities and sensitivity to reduce the alert fatigue.

Providing timely and straightforward notifications and reminders

Clinical Decision Support Systems (CDSS) are most effective when users can easily read, understand, and act on system alerts. This can be achieved by providing clear recommendations and direct advice on how to respond to the information and what to do according to feedback received from the end users. System designers should anticipate user needs and present data in a way that can be easily interpreted into practical recommendations. For example, clinical rules may be developed to assess whether a patient needs to adjust the dose of a particular drug due to renal failure. Providing scientific references to users can also help increase understanding and adoption of CDSS. Overall, making it easy for users to understand and act on CDSS alerts can improve the effectiveness of the system.

Recommendations made based on outcome of the study:

Optimizing system performance and speed

Ensuring that a Clinical Decision Support System (CDSS) is fast and responsive is crucial for maintaining work efficiency and user satisfaction. Computer systems are considered effective if they have short response times and can meet the needs of users. CDSS should provide recommendations and advice to users in a timely manner, at the appropriate point in the decision-making process. If the system is slow to respond or slow overall, user satisfaction will be significantly reduced. Many studies have found that speed is a key factor in user satisfaction and should be a top priority when designing and implementing CDSS. Ensuring that the system can handle the required tasks quickly and efficiently can help improve the effectiveness and adoption of CDSS.

Integrating CDSS with HISs

The acceptance of Clinical Decision Support Systems (CDSS) among users often depends on their level of integration with the hospital information system (HIS). Standalone CDSS, which requires additional effort and redundant input of patient-specific data, are rarely adopted in clinical practice. To be effective, CDSS of all types and levels must seamlessly integrate with HIS and interact with all its components, particularly electronic health records. However, despite decades of development, most CDSSs lack interoperability. Computer-assisted prescription capture systems tend to have a higher success rate than standalone systems because they provide relevant information to physicians and users at the right time in the decision-making process, such as warnings or contraindications for potential drug interactions during drug prescribing or chart reviews.

Maintaining the integrity of the clinical decision support system knowledge base

Maintaining the currency of the information and knowledge content in Clinical Decision Support Systems (CDSS) is essential for long-term success and requires ongoing efforts. This includes regularly evaluating and updating clinical rules and related guidelines and pathways. Customizations and adjustments may also be necessary if users are still dissatisfied, or their expectations are not being met. To ensure the validity and accuracy of the knowledge, it is important to involve specialized physicians in the review and update process. CDSS rely on both patient-specific clinical information, which is the responsibility of the system users who enter data, and clinical knowledge of the domain or specialty, such as clinical rules, guidelines, and pathways, which inform alerts and reminders. As the size of the knowledge content grows and becomes more complex, it becomes more difficult to maintain its up-to-date status and may require dedicated resources or outsourcing to third party commercial vendors or other organizations. The trend for CDSS is to separate clinical knowledge and hospital operations from the system application, as it can be challenging to review, manage, and update knowledge if it is integrated into the application. This allows for more efficient management of the knowledge content and ensures that CDSS can provide accurate and current information to healthcare professionals.

CONCLUSION

The Clinical Decision Support System (CDSS) is a tool that provides healthcare professionals with clinical knowledge and patient-specific information to aid in decision-making and improve patient care. Based on the survey resulted, we concluded that to be effective, CDSS must be integrated with the hospital information system (HIS) and have a high level of user acceptance. Proper management of knowledge and system is also important. To increase user satisfaction, CDSS should minimize effort and time required to understand and act on alerts. Maintaining the currency of the knowledge content is essential for long-term success and may require dedicated resources or outsourcing. It is also important to separate clinical knowledge from the system application for efficient management.

REFERENCES:

1. Chien S C, Chen Y L, Chien C H, Chin Y P, Yoon C H, Chen C Y, Yang H C, Li Y J. Alerts in Clinical Decision Support Systems (CDSS): A Bibliometric Review and Content Analysis. Healthcare (Basel). 2022 Mar 23; 10(4): 601. doi: 10.3390/healthcare10040601. PMID: 35455779; PMCID: PMC9028311.
2. Yoshida E, Fei S, Bavuso K, Lagor C, Maviglia S. The Value of Monitoring Clinical Decision Support Interventions. Appl Clin Inform. 2018 Jan; 9(1):163-173. doi: 10.1055/s-0038-1632397. E pub 2018 Mar 7. PMID: 29514353; PMCID: PMC5842071.