

# Chapter 26

## Methodologies of Legacy Clinical Decision Support System: A Review

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### ABSTRACT

*Information technology playing a prominent role in the field of medical by incorporating the clinical decision support system (CDSS) in their routine practices. CDSS is a computer based interactive program to assist the physician to make the right decision at right time. Nowadays, clinical decision support systems are a dynamic research area in the field of computers, but the lack of understanding, as well as functions of the system, make adoption slow by physicians and patients. The literature review of this article focuses on the overview of legacy CDSS, the kind of methodologies and classifiers employed to prepare such a decision support system using a non-technical approach to the physician and the strategy-makers. This article provides understanding of the clinical decision support along with the gateway to physician, and to policy-makers to develop and deploy decision support systems as a healthcare service to make the quick, agile and right decision. Future directions to handle the uncertainties along with the challenges of clinical decision support systems are also enlightened in this study.*

### 1. INTRODUCTION

With the advancement of the technology, the information technology plays a vital role in the field of healthcare sector (Abidi, 2011; Fairchild, 2006). Nowadays, with the progression of the technology in the domain of healthcare, the medical services become diversify for handling the patients more effectively and efficiently with improvement in the patient outcomes (Liu & Hua, 2013) by diagnose of disease at-

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tributes at the early stage (Yang & Lee, 2014). In earlier years the decision support systems (DSS) were usually utilized for the retrospective analysis of administrative and financial databases (Cheung, Leung, & Tam, 2005). With the advent of data mining and NLP techniques in domain of medical, incorporates the DSS for the prediction of diseases, medical test and for prescription of medicine etc. Clinical decision support system (CDSS) is a computer based interactive program to assist the physician to make the appropriate decision at appropriate time. Physicians are familiar with HER (electronic health records), e-prescription, DICOM (Digital Imaging and Communications in Medicine) images and it has been implemented at some extent of success (Cohen, Grieger, & Krusch, 2015; Sharma & Aggarwal, 2016). Normally CDSS operate as the milieu appliance and assist the physicians by providing the information relevant to patient state through alert message and e-mail's.

Normally, the operational characteristics of CDSS are classified into four foremost division:

1. **Input Information:** Information provided for the functionality of CDSS for diagnose about the patient, vary from system to system. Preferably in form of controlled vocabulary (e.g. attributes like age, gender, reports);
2. **Knowledge Base:** Can include compiled information in form of rules (e.g. if-then rules) or probabilistic alliance of a disease in form of signs and symptoms (e.g. drug–food interactions);
3. **Inference Engine:** It associate the input patient data and knowledge base by using some rules and schemes to provide output;
4. **Presented Choices:** After the utilizing the functionality of CDSS the physician can provide the recommendation, alerts or diagnosis report.

On the basis of above mentioned operational exclusivity the CDSS can be implemented in form of:

1. **Active System:** These system are triggered automatically by taking the input from EHR/CPOE (computerized physician order entry), KB (knowledge base) include the drug database and provide the decision in form of output like alert (e.g. drug interaction) without the involvement of physician;
2. **Passive System:** Also known as stand-alone system, in which the user personally entered the data and make the request for the support. These kinds of system are mainly prevalent.

The patient outcomes (Houlihan, Balas, & Lobach, 2012) and quality of care can be improved with the adoption of CDSS however in spite of this CDSS's have been not widely adopted within the medical practice. In medical journals the methodology, detail discussion along with simulation of CDSS is missing that can be the one cause of slow adoption. Mostly the journals are published either in form of systematic review (summarized the earlier publish CDSS), randomized trials (discuss the testing phase result) (Fairchild, 2006) or in form of editorial comments (In future the impact of technology in medical field) but technical aspects to evaluate the decisions are absent (Adhikari, McDonald, Rosas-Arellano, Devereaux, & Beyene, 2013). Conversely, in the field of computer- science and Healthcare journals the CDSS are extensively published. With the expansion of Artificial Intelligent(AI), analysis techniques and computing algorithm, the CDSS's are providing the better diagnosis results as compared to earlier CDSS (Kong, Xu, & Yang, 2008). During the design and development phase of CDSS, the involvement of physician and staff is required for the proper adoption of the CDSS. In the rest of the sections, we have

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