

What Factors Determine The Success of Clinical Decision Support Systems?

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Abstract Computerized decision support systems (CDSS) which improve the quality of patient care are strong and necessary incentives for clinicians to use electronic medical records. We have noted previously that the logical path of CDSS design, which would be to determine the factors that predict success before the system is designed, appears rarely to have been followed. In this overview update of the literature on predictors of successful CDSS, we conclude that the predictors have not been adequately identified and the success of CDSS may improve when they are.

Background Several systematic reviews suggest that computerized decision support systems (CDSS) can improve the quality of physicians' care with a select few demonstrating improved patient outcomes. Factors that predict the success of CDSS remain unclear. In a previous review¹ we noted that the predictors of success, although unconfirmed, appeared to include point-of-care access, integration into workflow, and fast provision of valuable information.

Methods An update of our previous review was planned. We undertook a systematic overview of the literature using MEDLINE and EMBASE since January 1999 using terms "decision support systems, clinical" combined with "computers"; or "expert systems" or "computer assisted decision making" or "computer assisted diagnosis" or "computer assisted therapy" or "computer assisted drug therapy" or "artificial intelligence" or "computerised medical records". Systematic overviews of trials on CDSS were also reviewed. Although the target was randomized trials where predictors of success or failure were specifically measured, we also accepted prospective studies that empirically tested a CDSS, measured clinical outcomes and quantitatively analyzed factors related to its success or failure.

Results As with the 1999 review, no randomized trials were found that focused on factors predicting success versus failure of CDSS. Five systematic reviews on the effect of CDSS and 9 study reports on CDSS were found. The study interventions included sharing patient records between Emergency Departments, a thrombolytic predictive program for acute ST-elevation MI, reminders that a laboratory test might be redundant, warfarin dosing recommendations, vascular risk calculation, personalized schizophrenia education for patients, preventive care reminders, guideline support for asthma and differential diagnosis of chest pain. All CDSS interventions were meant to be applied in real time during the clinical encounter. Seven of the 9 studies reported negative results. The 2 positive trials addressed relatively simple interventions. One of the 2 trials specifically measured predictors of success of the CDSS and found that unidentified physician characteristics and the patient's degree of clinical need for the intervention were the main predictors of success. Most authors expressed opinions regarding the lack of success of their CDSS, which included information coming too late to be useful, failure to remember computer passwords, too little time to use computer, the CDSS was too difficult to understand, inadequate integration of CDSS into clinical workflow, preference not to use computers, inadequate integration of CDSS with electronic medical record and failure to select a high need area of care.

Conclusions Well-done trials of point-of-care CDSS continue to produce mixed results, perhaps because factors that would predict successful CDSS still have not been adequately identified.

References

1. Holbrook AM, Sullivan S, Keshavjee K, Hunt DL for COMPETE Project. Predictors of Success in Electronic Decision Support for Prescribing. *Can J Clin Pharmacol* 2000;7:61.