

A computer-based decision support system and risk chart did not reduce cardiovascular risk or blood pressure in hypertension

Montgomery AA, Fahey T, Peters TJ, MacIntosh C, Sharp DJ. Evaluation of computer based clinical decision support system and risk chart for management of hypertension in primary care: randomised controlled trial. *BMJ*. 2000 Mar 11;320:686-90.

QUESTION

In patients with hypertension, do a computer-based clinical decision support system (CDSS) and a cardiovascular risk chart help reduce absolute cardiovascular risk and blood pressure?

DESIGN

Cluster-randomized (allocation concealed*), unblinded,* controlled trial with 1-year follow-up.

SETTING

27 general practices in Avon, England, United Kingdom.

PATIENTS

614 patients who were 60 to 80 years of age (mean age 71 y, 54% women), had a diagnosis of hypertension, and were prescribed antihypertensive drugs in the previous year. Follow-up was 86% at 1 year.

INTERVENTION

General practices were allocated to a CDSS plus a risk chart (10 practices, 229 patients); a risk chart only (10 practices, 228 patients); or usual care (7 practices, 157 patients). The CDSS required patient information to be entered; the patient's 5-year absolute risk for a cardiovascular event was calculated and presented numerically. The risk chart

showed a color-coded grid of the ranges of absolute risks for cardiovascular events corresponding to patient risk factors.

MAIN OUTCOME MEASURES

The proportion of patients with 5-year cardiovascular risk $\geq 10\%$. Secondary outcomes included blood pressure levels.

MAIN RESULTS

Analysis was by intention to treat. After adjustment for type of computer system and baseline absolute risk, more patients in the CDSS group than in the chart-only group were at high risk for a cardiovascular event at 12 months ($P = 0.02$); no differences existed between the intervention groups and usual care (Table). After adjustment for type of computer system and baseline blood pressure, the chart-only group

had a lower mean systolic blood pressure than did the usual-care group (mean difference 4.6 mm Hg, 95% CI 0.8 to 8.4, $P = 0.02$).

CONCLUSIONS

In patients with hypertension, a computer-based clinical decision support system did not reduce the 5-year absolute risk for cardiovascular events or elevated blood pressure levels. The use of a risk chart alone reduced systolic blood pressure.

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*See Glossary.

Computer-based decision support system plus risk chart (CDSS), risk chart alone, and usual care for hypertension†

Outcome at 12 mo	Comparisons	Event rates	RRI (95% CI)	NNH (CI)
At high risk for cardiovascular events	CDSS vs chart	89% vs 85%	9% (1 to 13)	13 (9 to 86)
	CDSS vs usual care	89% vs 88%	5% (-5 to 10)	Not significant
			RRR (CI)	NNT
	Chart vs usual care	85% vs 88%	5% (-5 to 8)	Not significant

†Abbreviations defined in Glossary; RRI, RRR, NNH, NNT, and CI calculated from adjusted odds ratios in article. Adjustment was made for computer system and baseline cardiovascular risk.

COMMENTARY

CDSSs facilitate the integration of health-related information for individuals with an underlying knowledge base so that patient-specific recommendations can be provided to health care practitioners to assist with their decision making. These systems are beneficial when used to facilitate preventive health care delivery and to assist with the dosing of medications with narrow therapeutic windows. The potential for these systems to improve outcomes in other aspects of health care, however, remains unclear: Some studies have shown a benefit while others have not.

The study by Montgomery and colleagues is an important contribution to this area. The trial was well designed and included clinically important end points. The study also included a non-computer-based decision aid that was used by itself in 1 of the study groups. The results, including the finding that the CDSS did not lead to improved cardiovascular risk profiles or blood pressure control and that a simple cardiovascular risk chart used alone led to

an improvement in systolic blood pressure, have implications for both clinical practice and future research on CDSSs. For clinicians, it is clear that CDSSs designed to assist with the management of complex medical conditions still require additional development and evaluation before being introduced into routine clinical practice. Inexpensive, non-computer-based approaches that can be easily integrated into a clinic should also be considered. For researchers, increasing efforts should now focus on identifying those factors that predict whether a CDSS will have a clinically important effect when introduced into clinical practice.

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Reference

- Hunt DL, Haynes RB, Hanna SE, Smith K. Effects of computer-based clinical decision support systems on physician performance and patient outcomes: a systematic review. *JAMA*. 1998;280:1339-46.