Home Blood Pressure Monitoring and Pharmacist Management Improved Blood Pressure Control Among Adults With Uncontrolled Hypertension

Margolis KL, Asche SE, Bergdall AR, et al. Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control. JAMA 2013;310:46–56.

Study Overview

Objective. To determine if home blood pressure telemonitoring combined with pharmacist case management improves blood pressure control when compared with usual care.

Design. Cluster randomized clinical trial.

Setting and participants. 450 adults with uncontrolled blood pressure were recruited from 14,692 patients across 16 primary care clinics at HealthPartners Medical Group, an integrated health system in the Minneapolis-St. Paul, Minnesota, metropolitan area. Electronic medical records were used to identify adult patients with elevated blood pressure (systolic ≥ 140 mm Hg or diastolic ≥ 90 mm Hg) at the 2 most recent primary care visits within the previous year. Patients received up to 2 recruitment mailings followed by telephone calls to identify patients to be screened for inclusion. Inclusion criteria were an average of 3 blood pressure readings of ≥ 140/90 mm Hg (or ≥ 130/80 mm Hg in the setting of diabetes or chronic kidney disease). Exclusion criteria included stage 4 or 5 kidney disease, acute coronary syndrome, coronary revascularization or stroke within previous 3 months, advanced heart failure, known secondary causes of hypertension, and pregnancy. Patients needed to have a landline in early part of the trial and later permitted to have only a cellular phone. 8 clinics were randomized to usual care and 8 to the telemonitoring intervention.

Intervention. Each intervention patient received a home blood pressure monitor that stored and transmitted data via modem to a secure website. Patients received instruction from pharmacists who met with patients for an hour-long in-person visit on how to use the home telemonitoring system. The target home blood pressure goals were 5 mm Hg lower than clinic blood pressure goal. Patients were instructed to transmit 3 morning and 3 evening blood pressure measurements per week, and patients and pharmacist met every 2 weeks via telephone until blood pressure goal was attained, at which time frequency became monthly. Treatment intensification was done according a predetermined algorithm when fewer than 75% of readings met the blood pressure goal. Pharmacists also emphasized lifestyle changes and medication adherence during telephone visits. At months 7 through 12, telephone visits occurred every 2 months. After 12 months patients discontinued use of the telemonitors. Usual care patients received care from their primary care physicians as they had previously.

Main outcome measures. Controlled blood pressure (≤ 140/90, or ≤ 130/80 mm Hg for those with diabetes or chronic kidney disease) measured in the clinic at 6 and 12 months. Secondary outcomes were blood pressure control at 18 months (6 months post-intervention) and patient satisfaction. Generalized linear mixed models were used to model the effect of the intervention on the outcomes of blood pressure control at each time point and at composite time points of 6 and 12 months and 6, 12, and 18 months.

Main results. Mean age of the patients was 61.1 years with a standard deviation (SD) of 12.0 years; 44.7% were female and 81.8% were white; 19.1% had diabetes and 18.6% had chronic kidney disease. Mean number of antihypertensive drug classes at baseline were 1.5 with an SD of 1.2. Mean systolic blood pressure at baseline was 147.9 mm Hg (SD 13.0) and diastolic blood pressure was 84.7 mm Hg (SD 11.6).

Among participants in the intervention group, 90%, 86%, and 82% followed up at 6, 12, and 18 months respectively, whereas 89%, 86%, and 82% followed up in the usual care group. At baseline, all patients had uncontrolled blood pressure; at 6- and 12-month visits, 57.2% (95%

confidence interval [CI] 44.8% to 68.7%) had controlled blood pressure at both visits among the intervention group, whereas only 30.0% (95% CI 23.2% to 37.8%) had controlled blood pressure in usual care group ($P = 0.001$). At 6 months, blood pressure was controlled in 71.8% (95% CI 65.6% to 77.3%) of patients in the telemonitoring intervention group when compared with 45.2% (95% CI 39.2% to 51.3%) of patients in the usual care group ($P = 0.001$); at 12 months, blood pressure was controlled in 71.2% (95% CI 62.0% to 78.9%) of patients in the telemonitoring intervention group when compared with 52.8% (95% CI 45.4% to 60.2%) of patients in the usual care group ($P = 0.005$). At 18 months (6 months of postintervention follow-up), blood pressure was controlled in 71.8% (95% CI 65.0% to 77.8%) of patients in the telemonitoring intervention group when compared with 57.1% (95% CI 51.5% to 62.6%) of patients in the usual care group ($P = 0.003$). Overall satisfaction with care was similar in both groups.

Conclusions. Home blood pressure telemonitoring coupled with pharmacist management resulted in improvements in blood pressure control. Number needed to treat to attain blood pressure control in 1 patient at 6 months was 3.8. The effects of home blood pressure monitoring extended beyond the intervention period to 6 months post-intervention.

Commentary

Margolis et al reported on the potential benefits of home telemonitoring of blood pressure and pharmacist management in improving blood pressure control among adults with uncontrolled blood pressure. The results are encouraging and represent avenues through which blood pressure management can be improved. Their results are consistent with a systematic review that demonstrated that an organized system of regular review and follow-up and vigorous antihypertensive drug therapy yielded benefits in improving blood pressure control [1]. Other studies have also demonstrated that home blood pressure monitoring coupled with communication with pharmacists through e-mail or other means also demonstrated similar benefits [2,3]. Other studies, however, were less successful when home monitoring of blood pressure were coupled with other nurse-led or patient self management [4,5]. Thus, these results suggest that benefits seen in this study are likely the combination of home monitoring and the pharmacist intervention with well defined and organized intensification of antihypertensive treatment.

Although this is not a study with a robust cost-benefit analysis, the authors estimated intervention costs based on the direct costs incurred in the study. They found that home monitoring costs would total about $1350 per patient for the 12-month intervention period. A more rigorous cost-benefit analysis accounting for costs averted by reducing hypertension-related adverse events needs to be conducted to demonstrate the overall costs and benefits for the intervention. This would be important information for health systems to have in order to determine which intervention would best be adopted to maximize benefit with minimal costs.

Applications for Clinical Practice

This study adds to the current understanding of methods to improve hypertension management and demonstrated for the first time that the impact of the intervention can be sustained 6 months beyond the end of the intervention. It also confirmed that home telemonitoring coupled with pharmacist management has large effects on improving blood pressure control. For clinicians with patients who have uncontrolled hypertension, this study offers additional evidence for consideration of alternative models that can yield better patient outcomes. For health systems that already have instituted home telemonitoring, adding a component with a structured intervention such as pharmacist management with treatment intensification using algorithms may be of benefit and can be considered.

—William Hung, MD, MPH

References

1. Glynn LG, Murphy AW, Smith SM, et al. Interventions used to improve control of blood pressure in patients with hypertension. Cochrane Database Syst Rev 2010;(3):CD005182.
2. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of home blood pressure monitoring, web communication and pharmacist care on hypertension control: a randomized controlled trial. JAMA 2008;299:2857–67.
3. Magid DJ, Olson KL, Billups SJ, et al. A pharmacist-led, American Heart Association Heart 360 Web-enabled home blood pressure monitoring program. Circ Cardiovasc Qual Outcomes 2013;6:157–63.
4. McManus RJ, Mant J, Bray EP, et al. Telemonitoring and self-management in the control of hypertension. Lancet 2010;376:163–72.
5. Artinian NT, Flack JM, Nordstrom CK, et al. Effects of nurse-managed telemonitoring on blood pressure at 12-month follow up among urban African Americans. Nurs Res 2007;56:312–22.