Hypertension Outcomes Through Blood Pressure Monitoring and Evaluation by Pharmacists (HOME Study)

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OBJECTIVE: To evaluate the effectiveness of a community pharmacist-based home blood pressure (BP) monitoring program.

DESIGN: Trial of a high-intensity (HI) versus low-intensity (LI) intervention randomized in 12 community pharmacies. The HI intervention comprised 4 face-to-face visits with a trained pharmacist. Pharmacists provided patient-specific education about hypertension. Following the first and third visits, patients were provided with a home BP monitoring device and instructed to measure their BP at least once daily for the next month. Home BP readings were used by the pharmacists to develop treatment recommendations for the patient's physician. Recommendations were discussed with the physician and, if approved, implemented by the pharmacist. In the LI intervention, pharmacists measured patients BP in the pharmacy and referred them to their physician for evaluation.

PARTICIPANTS: Patients with uncontrolled BP at baseline.

MEASUREMENTS: The main outcomes were the differences in systolic and diastolic BP (SBP and DBP) from baseline to follow-up between the HI and LI patients.

RESULTS: The study enrolled 125 patients, 64 in the HI and 61 in the LI group. From baseline, SBP declined 13.4 mmHg in the HI group and 9.0 mmHg in the LI group. At the final visit, the difference in SBP/DBP change between the HI and LI group was $-4.5/-3.2$ mmHg ($P=.12$ for SBP and $P=.03$ for DBP).

CONCLUSIONS: The HI intervention achieved a lower DBP and this model could be a strategy for patients with hypertension.

KEY WORDS: hypertension; pharmaceutical care; community-based intervention.

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Hypertension is a chronic disease affecting over 65 million Americans and an established risk factor for heart failure, myocardial infarction (MI), and stroke.^{1,2} Estimated annual costs associated with hypertension treatment are \$55.5 billion.³ Unfortunately, only 31% of patients with hypertension have their blood pressure (BP) controlled (defined as $<140/90$ mmHg).⁴

Health care access, medication nonadherence, and physician's practice patterns have been identified as reasons for poor control rates.⁵ A survey of primary care physicians found

33% do not recommend treatment in patients with a diastolic BP (DBP) between 90 and 100 mmHg. A higher percentage of physicians would not treat nor intensify treatment in patients with systolic BP (SBP) between 140 and 160 mmHg.⁶ Reliability of the BP reading(s) taken during the office visit is a possible explanation for the physician's decision.

Criticisms about office-based BP measurement include observer variability and training, terminal digit bias, and white-coat hypertension.⁷ When making therapeutic decisions, these factors present a dilemma for physicians. The Joint National Committee on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure advocate ambulatory BP monitoring and self-blood pressure measurement (SBPM) at home.² In theory, home SBPM appears ideal to overcome difficulties interpreting office BP readings; however, SBPM is not routinely utilized. Frequently, patients cannot perform SBPM and monitors may be cost prohibitive.⁸ Patients receive little education about how and when to properly perform home SBPM.

Community pharmacists are uniquely positioned to overcome these problems. Home BP monitors are sold in community pharmacies. Moreover, patients receiving BP medications visit their pharmacy almost monthly, more frequently than any other health care facility.⁹ Furthermore, some community pharmacists are developing collaborative relationships with physicians to improve hypertension management.¹⁰ However, few studies have evaluated community pharmacy-based hypertension programs.¹¹⁻¹⁴ In general, previous studies were small and lacked rigorous evaluation. The primary objective of the Hypertension Outcomes through BP Monitoring and Evaluation by pharmacists (HOME) study was to evaluate a community pharmacy-based intervention to improve BP control.

METHODS

Study Design and Interventions

This study was conducted in 12 community pharmacies located in Eastern Iowa. Pharmacies were allocated to high-intensity (HI) group or low-intensity (LI) group using a randomized block design. Pharmacies were recruited based on commitment and willingness to participate. The pharmacies belonged to a network of community pharmacies that provided novel patient care programs. Compensation was provided to phar-

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macists at \$75.00/hour. Randomization occurred at the pharmacy level to prevent contamination of the intervention.

Following randomization, both HI and LI pharmacists received training on proper BP measurement using an automated home monitoring device. Additionally, HI pharmacists received an educational program that reviewed evidence-based guidelines. The program enabled pharmacists to provide patient and physician education about hypertension treatment and monitoring.

After pharmacist training, patients were recruited for participation. The study protocol was approved by an Institutional Review Board. All patients provided written informed consent. Patients receiving antihypertensive medications from participating pharmacies were informed of the study from a pharmacist or technician during medication refills. Interested patients were screened for study inclusion. Timing for screening was at the discretion of the patient and pharmacist to accommodate both pharmacist workload and patient convenience. Generally, screening occurred during an agreeable day/time on a return visit to the pharmacy.

At the screening visit, patients were assessed for study eligibility. Patient inclusion criteria were: (1) greater than 20 years of age with a diagnosis of hypertension, (2) taking 1–3 BP medications with no changes in the regimen or dose within the past 4 weeks, (3) receiving BP medication from the same physician for at least 2 consecutive months, and (4) nondiabetic patients with SBP (average of 2 readings separated by 5 minutes using a validated BP monitor) between 145 and 179 mmHg or DBP between 95 and 109 mmHg; or diabetic patients with SBP between 135 and 179 or DBP between 90 and 109. The BP values for inclusion were chosen to avoid patients who may be termed “borderline controlled.” The rationale for these values stems from evidence that a barrier to adequate BP control are physicians who are satisfied with poorly controlled BPs, including “borderline” BP.⁶ Patients were excluded for: (1) BP greater than 180/110 mmHg, (2) a recent MI or stroke (within the past 6 months), (3) serious renal or hepatic disease, (4) pregnancy, or (5) dementia/cognitive impairment.

Patients at HI pharmacies were scheduled to meet face-to-face with a pharmacist 4 times over 3 months (Fig. 1). At each visit, pharmacists provided patient-specific education about hypertension, including: (1) disease process and complications, (2) medication use and adherence, (3) lifestyle modification, and (4) home SBPM technique. Visits lasted 15 to 60 minutes. Educational and behavioral information was tailored to patients according to pharmacists' professional judgment. For example, if a patient mentioned difficulty taking a medication in the evening, the pharmacist suggested strategies to remember that medication dose (i.e., pillbox, routine pairing). Supportive handouts were provided such as “Facts about lowering blood pressure” booklet from the National Institutes of Health.¹⁵ Following the baseline and third visits, patients were provided with a validated, fully automated home SBPM (Omron HEM-737A, Vernon, Ill).¹⁶ In the seated position, patients were instructed to perform 2 home BP measurements, separated by 5 minutes of rest at least once daily in the morning. Home BP readings were recorded by the patient in a log book.

During the second and fourth visits, logs and monitors were returned to the pharmacist who calculated weekly BP averages and used the measurements to develop written treatment recommendations for the patient's physician. Treatment recommendations followed current national guidelines but

FIGURE 1. High- and Low-Intensity Intervention Study design.

*Reliable data on the number of patients screened are not available.

were specific for individual patients.² If home BP weekly averages exceeded 140/90 mmHg (130/80 mmHg for patients with diabetes and/or kidney disease), the pharmacists' recommended intensification of the medication regimen. The BP cut-offs for treatment recommendations did not include the more stringent BP control threshold for home-based measurement.¹⁷ Investigators wanted to avoid situations where physicians may not be familiar with this guideline and ensured that treatment intensification was justified on the basis of home-based measurements. Recommendations and BP logs were sent via facsimile to the physician and followed by a telephone call. Physicians were asked to consider the recommendation(s) and reply to the pharmacist. Mutual treatment plans were developed between the physician and pharmacist. Then, the pharmacist educated the patient about the treatment plan, provided medication counseling, and reinforced lifestyle modification. If the treatment plan included changes in the medication regimen, a new prescription was obtained from the physician. After the fourth visit, additional recommendations could be made by the pharmacist to adequately control the patients' BP. However, evaluation of study outcomes concluded at the fourth visit.

Patients at LI pharmacies met face-to-face with a trained pharmacist 3 times over 3 months (Fig. 1). At each visit, patients' BP was measured by the pharmacist. In most cases, patients were told that their BP was above normal and they should contact their physician. These patients did not receive

any other pharmacist education or home BP monitors. The BP measurements were sent via facsimile to the patients' physician without treatment recommendations. There was no other contact with physicians.

Outcome Measurements

Blood pressure, medication adherence, and health resource utilization were assessed during the second and final visits for both groups. Blood pressure measurements were performed by the trained pharmacists according to American Heart Association recommendations.¹⁸ Pharmacists used dedicated SBPMs identical to machines provided to patients in the HI group. Self-reported medication adherence was assessed using a validated 4-item questionnaire developed by Morisky.¹⁹ One point was given for each "yes" answer. Adherence was categorized as high for a score of 0 and low for a score ≥ 1 . Health resource utilization was collected by self-report as the number of hospitalizations, emergency room (ER) visits, and physician office visits during the study period. Pharmacist recommendations were collected, categorized, and evaluated for physician acceptance.

Statistical Analyses

The primary outcome variable was the change in SBP and DBP between the HI and LI groups. A nested design compared change in SBP and DBP between the 2 groups controlling for baseline BP, age, gender, and cardiovascular comorbidities. Pharmacy site was modeled as a random effect and assumed a constant pharmacist effect within the same pharmacy. Missing data were minimal and statistical imputation methods were employed but did not affect analysis results. Data were analyzed using SAS software (Cary, NC).

Difference in BP was modeled using multivariate regression. Examination of residuals revealed no significant departures from normality. Medication adherence was analyzed using logistic regression models controlling for covariates. Health resource utilization was analyzed using the Mann-Whitney test for nonparametric data. Within-group comparisons were performed using a paired *t* test for continuous variables and χ^2 test for dichotomous variables.

RESULTS

One hundred twenty-five patients were enrolled, 64 patients in the HI group and 61 in the LI group. Analysis of baseline characteristics did not suggest differences between the HI and LI groups (Table 1). A majority of subjects were white and elderly with at least 1 cardiovascular risk factor. Characteristics of the pharmacists and pharmacies are presented in Table 2. High-intensity pharmacists were younger and received more training, but not statistically different than LI pharmacists. However, HI pharmacies filled more prescriptions per hour and employed more technicians than LI pharmacies ($P < .05$).

The difference in change of SBP at the final visit between the HI and LI groups was -4.5 mmHg ($P = .12$, $R^2 = 0.45$; Fig. 2 and Table 3). The difference in change of DBP between groups was -3.2 mmHg ($P = .03$, $R^2 = 0.46$). From baseline, SBP declined 13.4 mmHg in the HI group and 9.0 mmHg in the LI group ($P < .01$ for within-group comparison from baseline to final visit). Similarly, DBP declined significantly from baseline in each group ($P < .01$ for within-group comparisons). The pro-

Table 1. Baseline Participant Characteristics

Characteristic	Low-Intensity Group (n=61)	High-Intensity Group (n=64)
Age, mean $\pm$ SD (y)	66.1 $\pm$ 13.8	64.0 $\pm$ 11.1
Women, no. (%)	39 (64)	37 (58)
White, no. (%)	60 (98)	62 (97)
Selected coexisting conditions, no. (%)		
Diabetes mellitus	20 (33)	15 (23)
Renal disease	0 (0)	1 (1)
Heart disease*	23 (38)	19 (30)
Cerebrovascular disease	3 (5)	5 (8)
Dyslipidemia	27 (44)	32 (50)
Current smoker, no. (%)	7 (11)	6 (9)
Family history of cardiovascular disease, no. (%)	24 (39)	18 (28)
Systolic BP, mean $\pm$ SD (mmHg)	151.6 $\pm$ 12.9	151.5 $\pm$ 15.6
Diastolic BP, mean $\pm$ SD (mmHg)	85.3 $\pm$ 10.7	85.3 $\pm$ 11.6

*Includes angina, arrhythmias, previous coronary artery bypass graft/angioplasty, previous MI, or heart failure.

BP, blood pressure; MI, myocardial infarction.

portion of patients at the final visit achieving controlled BP was 42% ($n=27$) in the HI group and 30% ($n=18$) in the LI group ($P = .45$).

Pharmacist recommendations about antihypertensive therapy were provided for 57 of the 64 patients in the HI group. Almost 60% of recommendations included additional antihypertensive medication or increased dosage of existing medication. Additionally, 7.0% of recommendations included interchange of drugs within therapeutic class. Pharmacists recommended discontinuation or maintaining current antihypertensive medication 29.9% of the time. Forty-three recommendations (75.4%) were accepted by the physician as stated. Six recommendations (10.5%) were discussed with the physicians and an alternative decision was reached. Eight recommendations (14.1%) were not accepted. No alternative decision was reached.

During the study, 38 patients in the HI group had antihypertensive medication added or increased. Conversely, 16

Table 2. Baseline Pharmacist and Site Characteristics

Characteristic	Low-Intensity Group (n=10)	High-Intensity Group (n=15)
Age, mean $\pm$ SD (y)	38.9 $\pm$ 10.2	32.5 $\pm$ 8.5
Male sex, no. (%)	4 (40)	6 (40)
Years in practice, mean $\pm$ SD	14.0 $\pm$ 11.8	8.2 $\pm$ 8.0
Education/training, no. (%)		
BS Pharmacy	7 (70)	6 (40)
Pharm D	4 (40)	11 (73)
MS	0 (0)	1 (7)
PhD	1 (10)	0 (0)
Residency	2 (20)	8 (53)
Weekly hours worked, mean $\pm$ SD	42.3 $\pm$ 10.8	38.9 $\pm$ 3.4
Prescriptions filled/hour, mean*	16.7	20.9
Pharmacists on duty, mean $\pm$ SD	1.9 $\pm$ 0.6	2.4 $\pm$ 1.0
Technicians on duty, mean $\pm$ SD*	2.4 $\pm$ 0.7	3.6 $\pm$ 1.8

* $P < .05$ for the comparison between groups.

FIGURE 2. Mean systolic and diastolic blood pressure (BP) during study. ●, high intensity; ○, low intensity.

*Blood pressure values calculated based on the analysis model. Error bars indicate the standard deviation.

† $P < .05$ for the change in BP from baseline to final visit in each group.

‡ $P < .05$ for the difference in BP at the final visit between patients in the high- and low-intensity groups.

patients in the LI group had antihypertensive medication added or increased. Twenty-nine separate antihypertensive medications were added in the HI group compared with 14 in the LI group. Likewise, 29 dosage increases occurred in the HI group compared with 6 in the LI group. Finally, antihypertensive medication was discontinued for 9 patients in the HI group and 3 patients in the LI group.

Medication adherence was grouped into high or low using the Morisky scale.¹⁹ No significant differences in medication adherence occurred between groups at any time point ($P = .38$ for comparison at final visit). However, there was a significant improvement in adherence from baseline to final visit for the HI group ($P = .004$) but not the LI group ($P = .07$). At baseline, 61.3% of patients in the HI and 74.1% in the LI groups report-

ed high medication adherence. The percentage of patients with high medication adherence at the final visit increased to 87.7% in the HI group and 84.2% in the LI group.

Four ER visits and 4 hospitalizations occurred in the LI group and none in the HI group. There were no significant differences in hospitalizations or ER visits between the groups. However, there were 56 physician office visits in the LI group compared with 20 visits in the HI group ($P = .007$). It is not known how many visits were specifically for hypertension and/or related complications.

DISCUSSION

No significant difference occurred in SBP between HI community-pharmacy intervention and LI intervention. However, there was a significant difference in DBP between the groups. Other pharmacist-directed hypertension programs have found more impressive differences between intervention and control groups. One older study and 3 recent studies found that BP control improved when community pharmacists assisted with patient education, BP monitoring, drug therapy management and medication adherence.¹¹⁻¹⁴ In 2 studies, BP control, based on physicians' office measurements, improved.^{11,14} Our intervention lasted 3 months while other studies found additional BP reduction beyond 3 months. Therefore, differences between groups may have been greater with longer follow-up. Our study adds to this literature and includes use of home SBPM with pharmacists' recommendations to physicians in an effort to improve BP control. This is one of the largest hypertension management studies ever conducted in community pharmacies.

The BP reductions in this study are clinically meaningful. In a study on the prognostic value of home BP readings, each 10 mmHg increase in SBP provided 17.2% increased risk of cardiovascular events.²⁰ Similarly, meta-analysis of 30 clinical trials concluded that 5 mmHg reduction in SBP lowered risk of cardiovascular events and stroke by 25% to 30%.²¹ Finally, reduction in DBP of 5 mmHg is associated with 34% less stroke and 21% less coronary heart disease.²²

Eighty-six percent of physicians accepted the recommendations of the pharmacist or developed mutual treatment plans. Likewise, pharmacists recommended that patients in the LI group see their physician for BP follow-up. In this group, there were significantly more physician office visits compared with the HI group (56 vs 20; $P = .007$). These data suggest that both patients and physicians followed advice provided by pharmacists. However, not all pharmacists were as assertive as possible as 28% of recommendations were to maintain the existing regimen. Some of these cases may have benefited from more intense antihypertensive therapy as all patients at baseline had uncontrolled BP.

It is interesting to consider the context of the HI and LI interventions to patient care. In the HI group, pharmacists served as a care facilitators between the patient and the physician. From the patient perspective, pharmacists provided tailored educational services and home BP monitoring equipment to engage them in their hypertension care. From the physician perspective, pharmacists provided information regarding medication use and home BP measurements and collaborative patient care occurred. In fact, 59.3% of patients in the HI group had antihypertensive medication changes. Importantly, physicians were willing to work with pharmacists to

Table 3. Results of the Mixed-Effects Models

Covariate	Effect Size	P Value
<i>Difference in change of systolic blood pressure</i>		
Intercept	55.88	<.01
Treatment group		0.12
High intensity	18.64	
Low intensity	0.00	
Age	0.26	.05
Gender		.03
Male	6.75	
Female	0.00	
Comorbid dyslipidemia	7.25	.02
Baseline systolic blood pressure	-0.68	<.01
<i>Difference in change of diastolic blood pressure</i>		
Intercept	53.06	<.01
Treatment group		.03
High intensity	9.55	
Low intensity	0.00	
Age	-0.21	<.01
Baseline diastolic blood pressure	-0.60	<.01

improve patient care. Clearly, this strategy would not be effective if either the physician or pharmacist was not willing to collaborate.

Using this approach to care, patients' BP can be monitored regularly and conveniently. Physician time for BP follow-up is conserved without requiring multiple office visits. However, the design of this trial could not determine which aspect(s) of the intervention produced improvement in BP, including the role of pharmacist recommendations, patient education, self-monitoring, and the number of visits. It is possible that simply pharmacist measurement of BP and referral to the physician would improve control. The HI intervention may not be suitable for all community pharmacies. Prescription processing demand and workload may prevent implementation of this time-intensive program. High-intensity pharmacists spent an average of 100 minutes/patient to provide the intervention, whereas less than 15 minutes was required per patient in the LI group. Pharmacists were compensated at \$75/hour. Analysis of the cost-effectiveness of this trial is needed to determine the relative value of the HI intervention.

Limitations

Interpretation of this study should be considered in the context of several limitations. First, although this study was larger than similar studies of community pharmacies, the number of pharmacies (and number of individuals recruited within pharmacies) was modest. The study did not have adequate power to detect the smaller difference in SBP between the 2 groups. However, this should not detract from the significant difference in DBP between the groups. The HI intervention was design as a novel, multifaceted method for care of patients with hypertension, yet the duration of the study was also limited. A longer trial may achieve more sustained lowering of BP in the HI group. A larger, longer, randomized, well-controlled trial is needed to corroborate results of this study.

Second, the trial did not have a true control group. By design, the LI group provided BP measurements to a similar group of patients. But, BP measurement by community pharmacists is not considered "usual care." The study could not determine which aspect(s) of the intervention contributed to BP improvement. Therefore, reductions in BP may be attributed to several factors including the LI intervention. Additional factors such as regression to the mean, Hawthorne effect, and secular effects may contribute to the findings. No data were collected on insurance and income status of the patients, which may effect BP changes between the 2 groups.

Last, selection bias may minimize the ability to generalize this study. Recruitment and participation of both pharmacies and patients was voluntary and unblinded. It is possible that pharmacists in the HI group recruited patients whom they felt would be the best participants in the intervention. Furthermore, monetary compensation was provided to pharmacists for program participation. Also, it is possible that patients who did not participate were systematically different from those patients who participated. Reliable data on the number of patients who were initially approached and screened for the study are not available. Similarly, pharmacies who participated may be different from pharmacies that did not participate. Finally, the patient population selected for inclusion had high BP at baseline but patients with "borderline" high BP were ex-

cluded. Therefore, results are only generalizable to this patient population.

CONCLUSIONS

The HI intervention achieved lower DBP and could be a strategy used in the care of patients with hypertension. However, consideration for implementation of the HI intervention must be weighed with the pharmacists' time to provide the service and the relationship between the pharmacist and physician.

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REFERENCES

1. **Fields LE, Burt VL, Cutler JA, Hughes J, Roccella EJ, Sorlie P.** The burden of adult hypertension in the United States 1999 to 2000: a rising tide. *Hypertension*. 2004;44:398-404.
2. **Chobanian AV, Bakris GL, Black HR, et al.** Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42:1206-52.
3. **American Heart Association.** Heart Disease and Stroke Statistics—2004 Update. Dallas, TX: American Heart Association; 2003.
4. **Hajjar J, Kotchen TA.** Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. *JAMA*. 2003;290:199–206.
5. **Cabana MD, Rand CS, Powe NR, et al.** Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA*. 1999;282:1458–65.
6. **Oliveria SA, Lapuerta P, McCarthy BD, L'Italien GJ, Berlowitz DR, Asch SM.** Physician-related barriers to the effective management of uncontrolled hypertension. *Arch Intern Med*. 2002;162:413–20.
7. **Jones DW, Appel LJ, Sheps SG, Roccella EJ, Lenfant C.** Measuring blood pressure accurately: new and persistent challenges. *JAMA*. 2003;289:1027–30.
8. **O'Brien E, Beevers G, Lip GY.** ABC of hypertension: blood pressure measurement. Part IV—automated sphygmomanometry: self blood pressure measurement. *BMJ*. 2001;322:1167–70.
9. **Knapp KK, Paavola FG, Maine LL, Sorofman B, Politzer RM.** Availability of primary care providers and pharmacists in the United States. *J Am Pharm Assoc*. 1999;39:127–35.
10. **Carter BL, Zillich AJ, Elliott WJ.** How pharmacists can assist physicians with controlling blood pressure. *J Clin Hypertens*. 2003;5:31–7.
11. **McKenney JM, Slining JM, Henderson HR, Devins D, Barr M.** The effect of clinical pharmacy services on patients with essential hypertension. *Circulation*. 1973;48:1104–11.
12. **McKenney JM.** Pharmacy management of hypertensive patients. *J Am Pharm Assoc*. 1974;14:190–5.
13. **Park JJ, Kelly P, Carter BL, Burgess PP.** Comprehensive pharmaceutical care in the chain setting. *J Am Pharm Assoc*. 1996;36:443–51.
14. **Carter BL, Barnette DJ, Chrischilles E, Mazzotti GJ, Asali ZJ.** Evaluation of hypertensive patients after care provided by community pharmacists in a rural setting. *Pharmacotherapy*. 1997;17:1274–85.

15. **U.S. Department of Health and Human Services, Public Health Service.** Facts About Lowering Blood Pressure. NIH publication No. 01-3281; June 2001.
16. **O'Brien E, Waeber B, Parati G, Staessen J, Myers MG.** Blood pressure measuring devices: recommendations of the European Society of Hypertension. *BMJ*. 2001;322:531-6.
17. **Staessen JA, Thijs L.** Development of diagnostic thresholds for automated self-measurement of blood pressure in adults. First International Consensus Conference on Blood Pressure Self-Measurement. *Blood Press Monit*. 2000;5:101-9.
18. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. *Arch Intern Med*. 1997;157:2413-46.
19. **Morisky DE, Green LW, Levine DM.** Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*. 1986;24:67-74.
20. **Bobrie G, Chatellier G, Genes N, et al.** Cardiovascular prognosis of "masked hypertension" detected by blood pressure self-measurement in elderly treated hypertensive patients. *JAMA*. 2004;291:1342-9.
21. **Staessen JA, Wang JG, Thijs L.** Cardiovascular prevention and blood pressure reduction: a quantitative overview updated until 1 March 2003. *J Hypertens*. 2003;21:1055-76.
22. **MacMahon S, Peto R, Cutler J, et al.** Blood pressure, stroke, and coronary heart disease. Part 1, Prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias. *Lancet*. 1990;335:765-74.

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