The Factors Contributing to whether or not Hypertensive Patients Bring Their Home Blood Pressure Record to the Outpatient Clinic

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Abstract

Objective We investigated the factors contributing to whether or not hypertensive patients brought their home blood pressure records to the outpatient clinic.

Method We studied 325 hypertensive patients [169 men (66.3±11.4 years old) and 156 women (68.1±11.2 years old)] who had received medical treatment for hypertension in our outpatient clinic from June to August 2006.

Results Of the 325 patients studied, 206 (63.4%, 101 men, 105 women) brought their home blood pressure records to our outpatient clinic. Logistic analysis showed age [odds ratio (OR) =0.95; 95% confidence interval (CI): 0.93-0.98; p=0.0002], systolic blood pressure in outpatient clinic (OR=1.02; 95% CI: 1.00-1.04; p=0.0488) and the number of medicines prescribed (OR=1.94; 95% CI: 1.37-2.75; p=0.0002) were independent factors contributing to whether or not hypertensive patients bring along their home blood pressure records to the outpatient clinic.

Conclusion The contributing factors determining whether the patients bring their home blood pressure records to the outpatient clinic were: younger age, higher systolic blood pressure in the outpatient clinic, and a higher number of antihypertensive drugs. In conclusion, our results suggest that physicians should further motivate older patients, with well-controlled blood pressure in the outpatient clinic, to bring their home blood pressure records to the outpatient clinic.

Key words: home blood pressure record, antihypertensive treatment, number of antihypertensive drugs

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Introduction

Home blood pressure (BP) measurements are very useful to identify white-coat hypertension, masked hypertension and morning hypertension, which cannot be identified by only measuring the outpatient clinic BP. White-coat hypertension and masked uncontrolled hypertension are often observed in the outpatient clinic. Physicians need to understand the prevalence of such patients to prevent inadequate diagnosis and treatment (1). Recently, it was reported that the prognosis for masked hypertension is poor (2). Several prospective studies have indicated that morning hypertension and morning BP surge are important risk factors for stroke and cardiovascular events. Cardiovascular events occur most frequently in the morning hours (3, 4). Kario et al reported that, in older hypertensive subjects, a higher morning BP is associated with a risk of stroke (5). If hypertensive patients do not bring their home BP records to the outpatient clinic, physicians can not identify white-coat hypertension, masked hypertension and morning hypertension.

Ohkubo et al reported that home BP is an independent predictor of hemorrhagic and ischemic stroke in the general population (6), and also reported that home BP measure-
iment has a stronger predictive power for mortality than screening BP measurement in the general population (7). The level and variability of hypertension as assessed by ambulatory BP and home BP are independent predictors of cardiovascular mortality (8). Kamoi et al reported that repeated home BP measurements in the morning for a long period had a stronger predictive power for mortality in patients with hypertension than occasional casual and/or clinic BP measurements (9). These results indicate the usefulness of home BP measurements for the prediction of stroke risk in individuals (10).

Although these home BP measurements are useful, the percentage of hypertensive patients bringing their home BP records to the outpatient clinic is very low. In our previous study, only 43.6% of treated hypertensive patients brought their home BP records to our outpatient clinic (11). There have been no reports about the factors contributing to whether or not patients bring home BP records to the outpatient clinic; therefore, in this study, we assessed these factors.

Methods

Study population

The study subjects had received medical treatment for hypertension in our outpatient clinic from June to August 2006. These 325 hypertensive subjects (169 men, 156 women) gave informed consent for this study, and 206 of them brought their home BP records to the outpatient clinic. This study was approved by the Institutional Review Board of Kohka Public Hospital (Nos. 17-21, 2005).

BP measurements and biochemical examinations

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured twice using a standard sphygmomanometer on the right arm while the subject was seated after having rested for at least 5 minutes. Korotkov’s first and fifth sounds were used for measuring the SBP and DBP, respectively, and the BP was measured by a well-trained nurse. The mean of the 2 measurements in each subject was used for analysis. Home BP measurements were taken using home-use electronic sphygmomanometers, which patients purchased themselves, before going to bed and in the morning before breakfast. In case the doctor changed, to maintain the same recommendation of the self measurement of home BP, the patients were repeatedly asked to measure home BP at every outpatient clinic. Briefly, the subjects were repeatedly asked to measure their BP at home in the sitting position once every morning within 1 h after waking, after urination but before taking medications, and before breakfast and after more than 2 minutes of rest, and before going to the hospital. Moreover, subjects were asked to measure their BP once every evening after urination, just before going to bed. We used the evening BP of the day before the clinic, and the morning BP of the clinic day. The body mass index (BMI) was calculated as the weight (kg) divided by the square of the height (m).

Statistical analysis

Data are expressed as the mean ± SD. All statistical analyses were performed using the JMP software version 6.0 for Windows (SAS Institute Inc., Cary, NC, USA). Two-way ANOVA and the χ² test were used to assess differences among subjects. To examine the independent contributory factors of bringing their home BP to the outpatient clinic while adjusting for the effects of other clinical characteristics, logistic analysis was used with the following variables as covariates: sex, age, BMI, SBP in outpatient clinic, alcohol and smoking habits, number of hypertensive drugs. All p values were two-tailed, and p<0.05 was considered significant.

Results

Table 1 summarizes the characteristics of patients divided into two groups: patients who brought their home BP records to the outpatient clinic and patients who did not. Of the 325 subjects, 206 (63.4%) brought their home BP records to the outpatient clinic (101 men, 105 women). Sex, outpatient DBP, alcohol and smoking habits did not differ significantly between the two groups; however, BMI, systolic outpatient BP and number of hypertensive drugs were significantly higher in the group who brought their home BP records. The number of younger hypertensive patients who brought their home BP records to the outpatient clinic was significant compared to older patients (p=0.0003). The average number of antihypertensive drugs was about 1.7±0.7 agents.

Figure 1 shows the relationship between the self-measured morning SBP and outpatient clinic SBP. Ninety patients (43.7%) demonstrated morning hypertension, defined as SBP >135 mmHg, and only 47.1% of the patients demonstrated normal SBP both at the clinic and in the morning at home. Table 2 summarizes the multiple logistic regression analysis, which showed that the associations with those who bring home BP records to outpatient clinic were significant for age (OR=0.95; 95% CI: 0.93-0.98; p=0.0002), systolic BP in the outpatient clinic (OR=1.02; 95% CI: 1.00-1.04; p=0.0488) and the number of medicines (OR=1.94; 95% CI: 1.37-2.75; p=0.0002) prescribed; however, sex, BMI, alcohol drinking and smoking habits were not associated with bringing home BP records to the outpatient clinic (p=0.5427, p=0.7079, p=0.1246 and p=0.6729, respectively).

Discussion

The Japan Home versus Office Blood Pressure Measurement Evaluation (J-HOME) study was conducted to assess BP control as evaluated by home BP measurement (12). Generally, it reported that BP levels were not adequately controlled among approximately 60% of patients, according
Figure 1. Relationship between morning systolic blood pressure and outpatient clinic systolic blood pressure.

Table 1. Comparison of Patients’ Characteristics between with and without Home BP Record

<table>
<thead>
<tr>
<th>N (325)</th>
<th>with home BP record</th>
<th>without home BP record</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>rx</td>
<td>206</td>
<td>119</td>
<td>0.1584</td>
</tr>
<tr>
<td>M/W</td>
<td>101/105</td>
<td>68/51</td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td>65.5±10.6</td>
<td>70.2±11.8</td>
<td>0.0003</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>24.1±3.7</td>
<td>23.1±3.8</td>
<td>0.0207</td>
</tr>
</tbody>
</table>

SBP, mmHg
DBP, mmHg
Alcohol, (P/N)
Smoking, (P/N)
Number of drugs

BP: blood pressure
with (without) home BP record: home BP measurements bring (not bring) to outpatient clinic
N: number of subjects, Values are the means ± SD
M/W: men/women
BMI: body mass index
SBP: systolic blood pressure, DBP: diastolic blood pressure
Alcohol: alcohol drinking habit, P/N: positive/negative, Smoking: smoking habit
Number of drugs: number of treated antihypertensive drugs

BP is important for preventing hypertensive complications, but it has been reported that many patients remain uncontrolled despite regular care. In our 206 study subjects, 71.4% demonstrated normal BP, defined as SBP <140 mmHg, in the outpatient clinic, and only 47.1% demonstrated normal SBP both at the outpatient clinic and in the morning at home. There was no significant difference in the BP control in the outpatient clinic and home BP, comparing with our previous study results (11).
In the JSH2004 guidelines, more positive intervention for BP was proposed. Berlowitz et al suggested that uncontrolled hypertension can also be attributed to physicians’ lack of aggressiveness in treating hypertension in patients with good adherence to treatment (14). Ono and Fujita reported that multivariate analysis indicated that inadequate BP control (≥140/90 mmHg) was associated with different physicians, number of antihypertensive drugs, and increased therapy (15). These reports suggest that physicians’ attitudes toward antihypertensive therapy play a crucial role in adequate BP control. Similarly, in our study subjects, SBP in the outpatient clinic was much higher in subjects who brought their home BP records to the outpatient clinic than in the patients who did not. Patients who brought their home BP to outpatient clinic seemed to have a positive attitude toward antihypertensive therapy and they received more intensive therapy than those who did not. From our results, it seems that the number of antihypertensive drugs contributed to increasing a patient’s motivation to bring their home BP records to the outpatient clinic. Indeed, Ashida et al recommended home BP measurement for patients treated with antihypertensive drugs, because there is a possibility that home BP measurement improves medication compliance (16). Vetter et al also reported that home measurement of BP can improve compliance (17).

In general, it seems that older patients have better compliance for checking their home BP than younger patients. In fact, in the J-HOME Study (12), older patients had better compliance and checking frequency of their home measurement BP than younger patients, and office SBP values increased with age; however, the results of the present study were opposite. These discrepant results may be difficult to reconcile. There is a possibility that, in our study, aggressive investigators more strongly recommended poor BP controlled young patients and resistant hypertensive patients to bring their home measurement BP than older patients with mild hypertension or well-controlled hypertensive patients.

There are some limitations of our study. First, not all patients in our outpatient clinic were enrolled in this study. We studied 325 subjects who had received medical treatment for hypertension in our outpatient clinic from June to August in 2006, so the research period was only two months; however, we could not study the remaining patients who had received hypertensive therapy in our outpatient clinic, whose compliance may not have been as good as the studied patients. Second, we did not consider the patients’ history of coming to the hospital. Patients with a long history of coming to the hospital had been more frequently asked by the physician to bring their home BP to the outpatient clinic than those whose outpatient treatment period was short. Third, more than one investigator participated in this study, so patients might not have received the same recommendation to self-measure home BP at the outpatient clinic.

In conclusion, younger age, higher systolic blood pressure in outpatient clinic, and higher number of treated antihypertensive drugs were the contributing factors determining whether or not the patient brings their home blood pressure records to the outpatient clinic. In particular, our results suggest that physicians should further motivate older patients with well-controlled blood pressure in the outpatient clinic, to bring their home blood pressure records to the outpatient clinic. Further investigations are needed for large scale populations.

**References**


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