Patient self-monitoring of blood pressure in general practice: the 'inverse white-coat' response

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SUMMARY

Self-monitoring of blood pressure may give a truer estimate of usual blood pressure than readings by a doctor in the surgery, and may save time for health professionals. This study aimed to determine the accuracy of self-monitoring in the surgery using a wrist oscillometric sphygmomanometer (Omron RX). One hundred and seventy-three patients were taught to record their own blood pressure with the Omron RX. One hundred and nineteen patients recorded three self-measurements at monthly intervals, and their readings were compared with those of an experienced nurse using the Omron RX and a mercury sphygmomanometer. On average, patients' readings were higher than the nurse's readings (mean difference in phase 1 = systolic pressure 4.7 ±13.1 mmHg, diastolic pressure 2.7 ±9.3 mmHg [both P<0.001]). Only half of the patients' readings were within 10 mmHg systolic and 5 mmHg diastolic of the nurse's readings. The readings by the nurse using both devices did not differ.

Keywords: *blood pressure; self-monitoring; hypertension; white-coat hypertension.*

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Introduction

HOME self-monitoring of blood pressure improves patient compliance and the effectiveness of treatment,[1] but it is not always accurate.[2] On average, self-measurements are lower than those recorded in the clinic by a health care professional ('white-coat hypertension'). Some patients' own blood pressure recordings are higher than that of health care professionals in the clinic ('inverse white-coat hypertension'), which may result from an 'alerting response' to using an inflating device[3] or to being in the clinic setting.[4,5] Self-monitoring in the surgery could be valuable in reducing the need for consultations and the loan of sphygmomanometers, but there has been limited research.[3,6] This study investigated the accuracy of patient self-monitoring in the surgery.

Method

Recruitment

Consecutive patients over the age of 20 years attending a surgery gave informed consent to participate in the study. Patients on treatment for hypertension were included, but those with an irregular pulse were excluded.

Measurements

A nurse taught each patient how to take their own blood pressure using the validated Omron RX. The nurse recorded the blood pressure with a mercury sphygmomanometer and the unobserved patient with the Omron RX, and they were unaware of each other's readings (Phase 1). When the patient returned after one month and two months (Phases 2 and 3) to record their own blood pressure with the Omron RX, there was no further teaching, and the nurse made measurements with mercury and Omron RX devices. Patient recordings within 10 mmHg systolic and 5 mmHg diastolic of the nurse's measurements using the mercury sphygmomanometer were considered acceptable.

Results

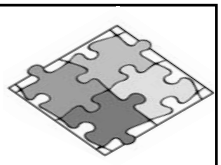
Participants

One hundred and seventy-three eligible patients (95 females, mean age = 58.1 ±15.2 years) took part. One hundred and nineteen patients completed all three phases of the study.

Differences between the patients' and the nurse's readings

The numbers of patient recordings within 5 mmHg and 10 mmHg of the nurse's readings, both systolic and diastolic, are shown in Table 1. The actual mean readings for

HOW THIS FITS IN



What do we know?

On average, home self-monitoring of blood pressure results in lower measurements than those of a doctor in the surgery, avoiding a 'white-coat response'. However, some patients have higher home readings ('inverse white-coat response').

What does this paper add?

This research shows that using intermittent, less frequent readings by patients in the surgery, as compared with those by a nurse, more patients have an 'inverse white-coat response'. This technique cannot be recommended as a way of blood pressure self-monitoring.

the three phases and the significance of the differences between these readings are shown in Table 2. In Phase 1 the patients recorded, on average, both systolic and diastolic blood pressures significantly higher than the nurse using the mercury sphygmomanometer. The mean difference in the systolic pressure was 4.7 ±13.1 mmHg (n = 173, P<0.001) and for the diastolic pressure it was 2.7 ±9.3 mmHg (n = 172, P<0.001), using the Wilcoxon two-tailed test.

In Phase 2 the patients' recordings (n = 137) were higher than those of the nurse using the Omron RX: the mean difference in systolic pressure was 6.9 ±13.8, and for diastolic pressure it was 3.2 ±8.0 (P<0.001). There was no significant difference between the nurse's mercury and oscillometric readings.

Discussion

This study shows that only about half the patients measured their blood pressure within the criteria set, and there was no real improvement over time. Some patients' readings were very different to those of the nurse. This might have been because of incorrect wrist positioning of the device or not having the device at the level of the heart. On average, patient recordings were higher than those of the nurse, suggesting 'inverse white-coat hypertension'. This could be as a result of patient anxiety[3] or incorrect patient technique.[2] Higher patient readings have not been found in every study.[4] In this study, the interval of one month between recordings could have made measurement stressful on each occasion. The rationale of the study was to find out whether patients could remember how to monitor their own blood pressure from one month to the next, because it was thought that this is how self-monitoring in the surgery would be performed. In

Table 1. Numbers of patients with self-recorded systolic/diastolic pressure within 10 mmHg of, within 5 mmHg of, and higher than, the nurse's readings for the three phases of the study.

	Systolic within 10 mmHg (%)	Systolic within 5 mmHg (%)	Diastolic within 10 mmHg (%)	Diastolic within 5 mmHg (%)
Phase 1	103 (59.5)	54 (31.2)	129 (75)	77 (44.8)
Phase 2	68 (49.6)	40 (29.2)	106 (77.4)	58 (42.3)
Phase 3	69 (58)	41 (34.4)	100 (84)	65 (54.6)

Table 2. Actual mean blood pressure readings for patients (oscillometric) and nurse (mercury and oscillometric). Phases 1 to 3 (rounding affects differences).

	Patient's oscillometric reading	Nurse's mercury reading	Nurse's oscillometric reading	Difference between patient's oscillometric and nurse's mercury reading	Difference between patient's oscillometric and nurse's oscillometric reading	Difference between nurse's mercury and nurse's oscillometric reading
Phase 1 systolic (n = 173)	149.0 ±22.5	144.1 ±24.3	Not recorded	4.6 ±13.7 P<0.001	Not recorded	Not recorded
Phase 1 diastolic (n = 173)	87.4 ±11.8	84.7 ±11.9	Not recorded	2.7 ±9.3 P<0.001	Not recorded	Not recorded
Phase 2 systolic (n = 137)	144.7 ±23.1	138.7 ±21.9	138.3 ±20.1	6.4 ±16.4 P<0.001	6.9 ±13.8 P<0.001	0.7 ±13.6 P = 0.36
Phase 2 diastolic (n = 137)	85.6 ±12.2	83.8 ±11.0	82.6 ±10.8	1.9 ±9.0 P = 0.025	3.2 ±8.0 P<0.001	1.3 ±8.0 P = 0.11
Phase 3 systolic (n = 119)	142.6 ±19.8	139.8 ±22.1	138.3 ±19.3	3.1 ±13.1 P = 0.002	4.4 ±11.8 P<0.001	1.3 ±12.7 P = 0.3
Phase 3 diastolic (n = 119)	84.6 ±11.1	82.3 ±10.8	80.7 ±9.8	2.2 ±8.3 P<0.001	3.7 ±7.2 P<0.001	1.4 ±7.3 P = 0.04

future research it would be valuable to observe patients self-recording their blood pressure in order to monitor their technique, to make measurements of patient anxiety, and to reduce the time interval between readings.

Conclusion

Self-monitoring of blood pressure by patients in the surgery at monthly intervals is not accurate enough to be used for screening or monitoring purposes.

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