Reliability of patients measuring blood pressure at home: prospective observational study

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Measuring blood pressure at home is recommended to distinguish sustained hypertension from white coat hypertension and to monitor treatment.[1 2] Blood pressure measured at home is a better predictor of 24 hour ambulatory blood pressure monitoring, target organ damage, and cardiovascular mortality than that measured by a doctor.[3–5] We aimed to assess the accuracy of patients measuring blood pressure at home, to identify predictors of poor accuracy, and to determine if poor accuracy impairs assessment of hypertension.

Subjects, methods, and results

We asked 54 consecutive patients with hypertension or suspected hypertension (aged 30-83 years), who had been referred for 24 hour ambulatory blood pressure monitoring, to measure their blood pressure at home twice daily between 0600 and 1000 for 30 days, and to record the time and readings. All agreed to participate. A nurse instructed each patient in the use of fully automated oscillometric blood pressure monitors with integrated memory devices (Omron-IC, Advance AG, Switzerland). To comply with the hospital's ethics committee, we informed patients (only cursorily) about the device's memory capacity. They were unaware that we would compare the device's stored measurements with their reported measurements. We classified measurements as correct if the timing of measurements (within 15 minutes) and single self reported values were identical to those recorded by the device, or if the average of multiple measurements differed by ≤3 mm Hg for systolic or diastolic pressure.

Overall, 2915 (89.9%) of 3240 requested measurements were performed of which 2121 (72.8%) were reported correctly. Thirty four patients (63%, 95% confidence interval 49% to 76%) reported 80%-100% of measurements correctly, 20 (37%) reported <80% correctly, and 12 (22%) reported ≤50% correctly. The table lists the types of mistakes. Differences of >5 mm Hg between means of reported versus recorded systolic (range 5-28 mm Hg) or diastolic (5-11 mm Hg) home blood pressure values occurred in only eight patients (15%, 7% to 27%), and there was no preference for inadequately reporting lower or higher values.

Using multiple regression analysis we identified low educational level as the only independent predictor of poor reporting accuracy (<80% of measurements correct, P=0.004). Patients who had had 8 or less school years had a relative risk of 3.39 (χ^2 test, 1.54 to 7.46) for reporting ≤80% of measurements correctly compared with patients of a higher educational level.

Types of mistakes in incorrectly reported measurements of blood pressure (n=794) taken at home (27% of all performed measurements)

Mistake	No (%) of mistakes	No of patients (n=54)
Timing	270 (34)	27
Averaging	231 (29)	25
Single measurements:	209 (26)	23
False high systolic values	50 (6)	14
False high diastolic values	51 (6)	18
False low systolic values	48 (6)	13
False low diastolic values	60 (8)	16
Invented measurements	57 (7)	9
Measurements not reported	13 (2)	7
Miscellaneous	14 (2)	7

Comment

Our study suggests that reporting accuracy of blood pressure measurements taken at home is acceptable in most patients, but that some patients of low educational level may have poor reporting accuracy, which may affect the assessment of blood pressure.

There are some potential limitations with generalising our study. Although the number of participants was small, we suggest that most patients accurately measure blood pressure at home for two reasons. Firstly, we found only eight patients (15%, 7% to 27%) with poor reporting accuracy and, secondly, we rarely identified differences of >5 mm Hg in mean systolic or diastolic blood pressure between reported and recorded measurements. Participants were informed about the capability of the device to record measurements and this may have influenced reporting accuracy. Participants were not aware of our aim to compare their measurements with those recorded by the device, therefore a substantially biased reporting accuracy seems unlikely.

In summary, it is possible but unlikely that poor reporting accuracy of blood pressure measurements taken at home affects the assessment of hypertension. In less educated patients ambulatory blood pressure monitoring may be preferable to self reported measurements.

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