

# Home Measurement of Blood Pressure: Training of Relatives

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Home recording of blood pressure facilitates the diagnosis and management of hypertension<sup>1-9</sup> is acceptable to patients<sup>7-9</sup> and may reduce the amount of medical supervision required.<sup>8</sup> Objections to home recording are that it may cause anxiety, that patients have difficulty with cuff adjustment and that the isometric exercise in inflating the cuff may raise the blood pressure.<sup>10</sup> For these reasons and because other studies<sup>7-9</sup> have shown that the help of a friend is often enlisted, we chose to train a friend or relative rather than the patients.

## Methods

**Patients:** Twenty-one patients attending the Blood Pressure Clinic who had a relative or friend (the LAY OBSERVER) willing to undergo training and measure the patient's blood pressure over a three-month period, participated in the study. Patients participating in ongoing studies were excluded.

**Training:** Patients and their relatives were asked to attend a training session in groups of five and six. The training was conducted by a nurse and doctor whose accuracy in blood pressure measurement had been previously assessed. The training consisted of a brief introductory talk on hypertension, its aetiology, complications and treatment, as well as the objectives of the study. A training film (Blood Pressure Film, MI/582, NCDC) illustrating a falling mercury column synchronised with the Korotkoff sounds was followed by individual demonstrations using a binaural stethoscope. The fifth phase, i.e. disappearance of Korotkoff sounds, was taken as the diastolic pressure. A booklet with written instructions on blood pressure measurement was also given to each observer. The initial training session lasted approximately 90 minutes.

**Assessment of accuracy:** The ability

of the lay observer to measure and record blood pressure was assessed one week after the initial training session. The lay observer was asked to interpret different blood pressure levels on the training film and to measure the blood pressure of the patient simultaneously with a nurse or doctor using a binaural stethoscope. If the level of accuracy deviated by 5 mm Hg or more for either systolic or diastolic values, further training was given.

**Home recording:** Lay observers were given a mercury (n, 11) or aneroid (n, 10) sphygmomanometer. They were instructed to measure the patient's blood pressure at home, morning and evening. Blood pressure was taken with the patient sitting after a 3-minute rest. The arm was supported at heart level and all measurements were made on the same arm for each patient. Readings were recorded in a diary.

**Hospital clinic follow-up:** Blood pressure was measured and recorded by a medical observer in the hospital clinic at fortnightly intervals without sighting the previous measurements either in the home or clinic. At the end of 6 clinic visits (3 months), the accuracy and competence of the lay observer was reassessed as before but, in addition, they measured blood pressure in a second patient.

**Questionnaire:** A questionnaire was completed by patients and their relatives at the end of the study. The questionnaires sought to determine their views on the technique and their attitudes to long-term home blood pressure recording.

## Results

**Recruitment:** Fifty-eight patients who had attended the hypertension clinic were invited to participate in the study. Of these, 27 were willing to participate and, of those who refused, 12 were unable to attend the clinic frequently, 14 did not have a relative or friend to

take their blood pressure and five did not wish to know their blood pressure. One patient was excluded because of marked physical disability. Twenty-one patients entered the study.

**Training:** Twenty relatives were judged to be competent to measure blood pressure after the initial training session and one observer required extra instruction. Lay observer values for systolic and diastolic blood pressure sequences on film compared well with actual values both on initial and final assessment. Mean film values were 125/77 mm Hg, mean lay observer values were 124/78 after training and 124/79 at the end of the study period.

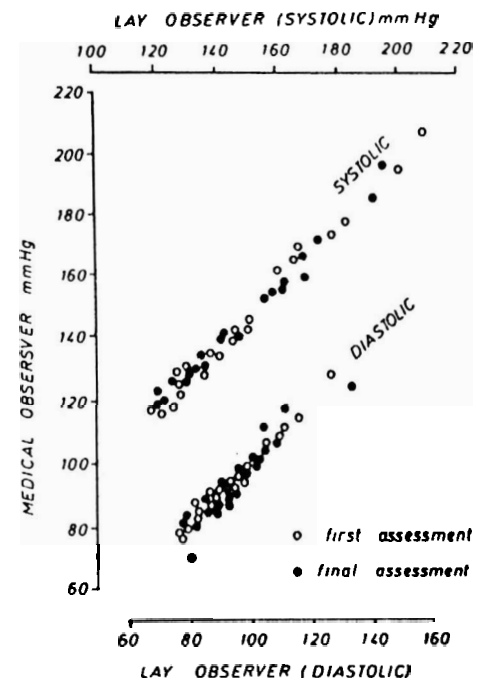


Fig. 1. — Comparison of simultaneous measurements of systolic and diastolic blood pressure by medical and lay observers in 21 patients.

There was a linear correlation ( $r$  values, all greater than 0.97) of blood pressure readings recorded by the lay

and medical observers for both systolic and diastolic pressures after the training period and when repeated at the end of the study (Fig. 1). The agreement was equally good when the accuracy of the lay observer was assessed on a second patient.

**Home versus Clinic measurements:** The mean clinic systolic blood pressure readings over 12 weeks were higher than the means of the corresponding home values for the 21 patients (Fig. 2), the difference being 9.2% ( $p < 0.005$ ). The mean difference for diastolic pressures (3.7%) was not statistically significant ( $p > 0.05$ ). Clinic and home values for individual patients are given in Fig. 3. Systolic readings for most patients at the clinic were higher than the pressures recorded at home. Diastolic values were spread roughly in equal numbers above and below the line of identity. There were no statistically significant differences between morning and evening pressures recorded at home.

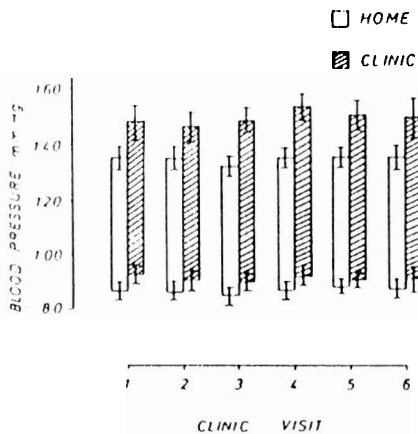


Fig. 2. - Comparison of the mean ( $\pm$ SEM) systolic and diastolic blood pressure in 21 patients over each 2-week period at home and at the corresponding clinic visit.

**Questionnaire response:** Measurement of blood pressure twice daily took an average of 7 minutes. In one case home recording interfered with the observer's work. All but one of the lay observers were willing to continue home recording after the study. Fifteen expressed preference for self-measurement of blood pressure rather than inconveniencing a relative.

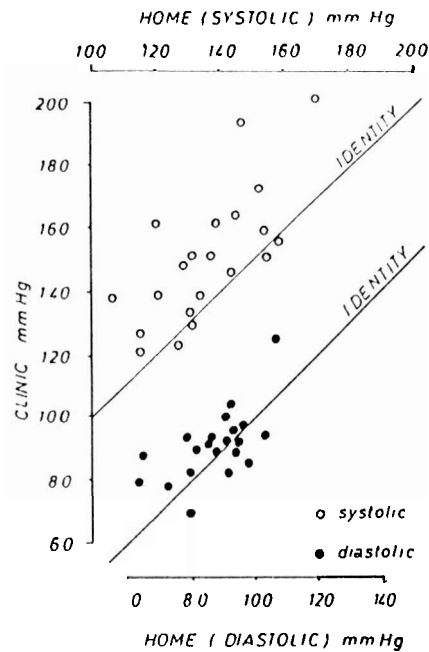


Fig. 3. - Correlation of the mean systolic and diastolic pressures recorded in the clinic over 6 weeks compared with the mean systolic and diastolic pressures recorded at home over the same period in 21 patients.

### Discussion

It is possible to train non-medical people in the measurement of blood pressure, as has been the experience in home dialysis units and hypertension trials. However, in most studies of home blood pressure recording<sup>1-10</sup> there are few guidelines on training requirements, or on methods for assessing observer competence. Home recording is not widely accepted in clinical practice, an important factor probably being the time and facilities required to train patients in the technique. We have demonstrated that it is possible to train non-medical people to an acceptable level of accuracy. Furthermore, the accuracy was maintained throughout the 3-month study period.

In our training session, we used both an audio-visual technique and the binaural stethoscope. We found the film helpful in training groups, but the necessity for projection facilities limits the use of this technique. The binaural stethoscope is easy to make and is

particularly useful for individual instruction and assessment.

As many patients may prefer and often seek help with the technique,<sup>7-9</sup> it is important when home recording is being planned to determine if the patient would prefer to measure his own blood pressure or have a friend or relative do so. The disadvantage of this method is the time commitment of the lay observer, whereas the advantages are that less anxiety may be caused to the patient, it is technically easier and the rise in pressure associated with isometric exercise is avoided.

### Summary

In this study the feasibility and accuracy of home blood pressure measurement by a relative or friend (lay observer) were assessed in 21 hypertensive patients.

There was excellent agreement between lay and medical observers both for simultaneously measured systolic and diastolic blood pressures. Systolic and diastolic blood pressure measurements were higher in the clinic than when taken at home—the mean percentage difference being 9.2 and 3.7 respectively.

We conclude that it is feasible to train lay observers to measure blood pressure accurately in the home.

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