

# How accurate are home blood pressure monitors used by patients?

<b>Submission date</b> 17/03/2016	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 17/03/2016	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 26/01/2018	<b>Condition category</b> Circulatory System	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

The heart is responsible for pumping blood around the body to deliver oxygen-rich blood. In order to do this a certain amount of pressure is needed in the blood vessels, but if this pressure is too high, then it puts a great strain on the arteries and heart. This is called hypertension (high blood pressure), which is very common and often long-term (chronic). Many people with hypertension are unaware of it, as it rarely causes any noticeable symptoms. If left untreated however, it dramatically increases the risk of heart disease, kidney disease and stroke, earning it the nickname of the “silent killer”. It is therefore very important to monitor these people in order to ensure that they do not develop these complications. There is a wide range of blood pressure monitors available for use at home, although it is not known how accurate the measurements are. The aim of this study is to find out how well home blood pressure monitors work at measuring blood pressure.

### Who can participate?

Adults with high blood pressure who own a home blood pressure monitor.

### What does the study involve?

Participants are sent a letter by their GP practice asking if they would like to have their home blood pressure monitor tested for accuracy. Those who respond are asked to drop off their blood pressure monitor to their practice on a prearranged day. Monitors are tested and returned to participants, complete with testing results, within 2 weeks. The study team tests the patients' blood pressure monitors using the OMRON PA350 digital BP tester (a specialised piece of equipment designed to measure how accurately blood pressure monitors can measure pressure). Monitors are inflated following a standard process as recommended by each monitor manufacturer and the British Hypertension Society. Monitors that have a 3mmHg or greater difference from the PA350 reading at any blood pressure level are rated as having failed. The study team also assess whether cuffs are working properly.

### What are the possible benefits and risks of participating?

Participants will benefit from learning how accurate their home blood pressure monitor is and so it can be replaced if it is inaccurate. There are no direct risks of taking part, although some participants may find it difficult not having their monitor available while it is being tested.

Where is the study run from?

The testing takes place at the University of Birmingham and participants are recruited from GP practices in the Midlands (UK)

When is the study starting and how long is it expected to run for?

February 2016 to December 2016

Who is funding the study?

National Institute for Health Research (UK)

Who is the main contact?

Dr James Hodgkinson

j.a.hodgkinson@bham.ac.uk

## Contact information

### Type(s)

Scientific

### Contact name

Dr James Hodgkinson

### Contact details

University of Birmingham

Department of Primary Care & General Practice

Primary Care Clinical Sciences Building

Edgbaston

Birmingham

United Kingdom

B15 2TT

+44 1214 148842

j.a.hodgkinson@bham.ac.uk

## Additional identifiers

### Protocol serial number

20163

## Study information

### Scientific Title

Accuracy of patient-owned blood pressure monitors compared to Omron PA350 monitor checker

### Acronym

ACCU-RATE

### Study objectives

Primary aim:

To determine how accurate are home digital upper arm and wrist blood pressure monitors.

## Secondary aims:

1. To find out which digital blood pressure monitors are currently used by patients
2. How well they perform;
3. Is there any evidence of decreasing accuracy over time, or with greater usage, or by validation status, or cost (recommended retail price) of device

## Ethics approval required

Old ethics approval format

## Ethics approval(s)

15/NW/0828

## Study design

Non-randomised diagnostic accuracy study

## Primary study design

Interventional

## Study type(s)

Treatment

## Health condition(s) or problem(s) studied

Topic: Primary Care; Subtopic: Primary Care; Disease: All Diseases

## Interventions

Eligible patients are sent a letter asking if they are interested in having their monitor tested for accuracy. Those who respond (by telephone or post) will be asked to drop off their monitor to the practice on a prearranged day. Monitors will be tested and returned to participants with results within 2 weeks.

The procedure will be to test patients' blood pressure (BP) monitors using the OMRON PA350 digital BP tester. Monitors will be inflated following a standard process as recommended by each monitor manufacturer and the British Hypertension Society, with a pass rate of  $\pm 3$  mmHg or less from the PA350 reading.

## Intervention Type

Other

## Primary outcome(s)

Blood pressure monitor accuracy is determined by recording the proportion of devices with  $<3$  mmHg error compared to reference device (PA 350) at all BP ranges.

## Key secondary outcome(s)

1. Mean, standard deviation, median and interquartile range of mean absolute error (MAE) – i.e. the mean difference between the values reported by the test device and reference device over the pressure ranges tested.
2. Association between mean absolute error and:
  1. Number of usages of device
  2. Length of time in service of device
  3. Validation status of device
  4. Recommended retail price of device

**Completion date**

31/12/2016

## **Eligibility**

**Key inclusion criteria**

The inclusion criteria to receive the one page survey are:

Patients on the hypertension register.

The additional inclusion criteria for the monitor testing element:

1. Patients owning blood pressure monitors used at home
2. Participant is willing to take part in the study

**Participant type(s)**

Patient

**Healthy volunteers allowed**

No

**Age group**

Adult

**Sex**

All

**Key exclusion criteria**

Exclusion criteria for the monitor testing element:

1. Unable to provide consent
2. Patients who do not use home blood pressure monitors
3. Housebound patients who are unable to arrange for their monitor to be dropped off at the practice

**Date of first enrolment**

11/02/2016

**Date of final enrolment**

31/10/2016

## **Locations**

**Countries of recruitment**

United Kingdom

England

**Study participating centre**

**University of Birmingham**

Department of Primary Care & General Practice  
Primary Care Clinical Sciences Building  
Edgbaston  
Birmingham  
United Kingdom  
B15 2TT

## Sponsor information

**Organisation**

University of Birmingham

**ROR**

<https://ror.org/03angcq70>

## Funder(s)

**Funder type**

Government

**Funder Name**

National Institute for Health Research

**Alternative Name(s)**

National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

**Funding Body Type**

Government organisation

**Funding Body Subtype**

National government

**Location**

United Kingdom

## Results and Publications

Individual participant data (IPD) sharing plan

The reason for the non-availability of participant level data is simply that our unit of analysis is the blood pressure monitor rather than the human owner of the monitor, so we haven't recorded the characteristics of the owners as they're not relevant to our study.

## IPD sharing plan summary

Not expected to be made available

## Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Basic results</a>		20/12/2017	26/01/2018	No	No
<a href="#">HRA research summary</a>			28/06/2023	No	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes