

# Effectiveness of a multifactorial intervention, consisting of self-management of antihypertensive medication, self-measurement of blood pressure, hypocaloric and low sodium diet, and physical exercise, in patients with uncontrolled hypertension taking 1 or more antihypertensive drugs: the MEDICHY study

<b>Submission date</b> 23/07/2018	<b>Recruitment status</b> No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 08/10/2018	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 05/06/2024	<b>Condition category</b> Circulatory System	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

High blood pressure can lead to an increased risk of heart attack, stroke, kidney damage and damage to the arteries. Mortality due to hypertension is high. There are treatments for hypertension which can reduce this risk; however, incorrect doses, inadequate treatments, not taking medication, smoke, alcohol abuse, excess fat and salt in the diet, sedentary lifestyle and being overweight, hinder the proper control of hypertension. There are many studies that show the benefit of taking care of all aspects related to treatment and healthy living. This study aims to look at the effects of patients self-monitoring their blood pressure, self-managing their antihypertensive medication and following a healthy lifestyle on improvements in the control of high blood pressure.

### Who can participate?

Adults between the ages of 35 and 75 years for whom a hypertension treatment strategy with one or more drugs fails to lower office SBP and DBP values to <140 mmHg and/or <90 mmHg, respectively

### What does the study involve?

Participants are allocated to one of two groups - the intervention or the control group. Those in the control group continue to with their usual care for high blood pressure. Those in the intervention group will receive the intervention, which consists of the following parts:

Blood pressure measurements: The patient will be asked to record their weekly blood pressure averages 2 times a month during the 6 month study period.

Medication management: Patients will be shown how to adjust their medication for hypertension.

Lifestyle changes: Patients will be asked to follow the DASH diet, which involves reduced fat and salt intake, fewer calories and no alcohol. They will also be asked to perform either moderate exercise for 30 minutes, 5 times a week, or intense exercise for 20 minutes 3 times per week.

a) DASH Diet: We propose a diet that contains less fat, lower salt intake, fewer calories and avoiding alcohol consumption. b) Physical exercise: according to the patient's condition (as a general rule at least, moderate exercise 30 minutes 5 times a week or intense 20 minutes 3 times a week). An educational session will be conducted with a nurse to learn how to use the tensiometer and the step counter that will be delivered to the patients of the "intervention" group, and another session to improve the knowledge related to diet and exercise.

Participants will be asked to complete tests including blood pressure measurements, questionnaires, BMI measurements and blood and urine samples at the start of the study and at the end of the 6 month study period.

What are the possible benefits and risks of participating?

Participating in a study could improve control of blood pressure, regardless of the assigned group. The risks of participating in the study include side effects of medications when receiving higher doses or muscle injuries when performing physical exercise. If the blood pressure reduces a large amount, it can cause dizziness, sweating and paleness.

Where is the study run from?

Balearic Islands Primary Care (Spain)

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

January 2018 to June 2022

Who is funding the study?

Institute of Health Carlos III (Spain)

Who is the main contact?

Fabián Unda Villafuerte

frunda@ibsalut.caib.es

## Contact information

**Type(s)**

Public

**Contact name**

Mr Fabian Unda Villafuerte

**ORCID ID**

<https://orcid.org/0000-0003-0064-5813>

**Contact details**

C/ Escola Graduada 3

Palma

Spain

07003  
+34 (0)636962218  
frunda@ibsalut.caib.es

## **Additional identifiers**

### **Protocol serial number**

PI17/02108

## **Study information**

### **Scientific Title**

Effectiveness of self-adjustment medication, self-monitoring, diet, and physical exercise to reduce systolic blood pressure in difficult to control hypertensive patients

### **Acronym**

MEDICHY (Monitoring, Exercise, Diet, Difficult Control. Hypertension)

### **Study objectives**

Current study hypothesis as of 27/03/2019:

In patients that treatment strategy by two or more drugs fails to lower office SBP and DBP values to <140 mmHg and/or <90 mmHg, respectively, an intervention based on self-adjustment of antihypertensive medication, self-monitoring of blood pressure and a lifestyle intervention aimed at increasing physical exercise, caloric restriction and reduction in salt intake reduces systolic blood pressure and is effective.

Previous study hypothesis:

In patients with difficult to control hypertension (defined as hypertension that cannot be controlled by three or more drugs), an intervention based on self-adjustment of antihypertensive medication, self-monitoring of blood pressure and a lifestyle intervention aimed at increasing physical exercise, caloric restriction and reduction in salt intake reduces systolic blood pressure and is effective.

### **Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

Balearic Islands Research Ethics Committee (CEI), 18/06/2018, IB 3682/18 PI

### **Study design**

Interventional two-arm parallel multi-centre randomized cluster trial

### **Primary study design**

Interventional

### **Study type(s)**

Prevention

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

Hypertension

## Interventions

Current interventions as of 27/03/2019:

Participant's GPs will be randomly allocated to either the intervention or control group by the coordinating centre using computer-generated random number tables.

Participants whose GPs are in the intervention group will receive an intervention involving self-monitoring of antihypertensive medication, self-measurement of blood pressure and diet and physical exercise. Patients will receive a blood pressure monitor, which they will be trained to use correctly. Blood pressure will be measured twice a day (morning and afternoon) for the first and third week of each month of the 12 month study duration. Patients will be asked to record their weekly average blood pressure in a table.

The current medication of the patient will be registered. Self-adjustment of medication was completed according to the following algorithm:

Step 1: A dual combination of ACEI or ARA II + CCB or diuretic, unless concomitant conditions or diseases (angina, post-myocardial infarction, heart failure, or heart rate control) are present that require beta-blockers combined with any of the other major drug classes.

Step 2: Add a third drug: ACEI or ARA II + CCB and diuretic.

Step 3: Start the dose increase by diuretic up to 50%, provided there is no hyperuricemia or diabetes. In this case, the first drug to be increased will be ACEI or ARA II

Step 4: The second drug to increase for patients aged over 60 years is CCB; for patients under 60 years, increase the ACEI or ARA II

Step 5: The third drug to increase is the remaining drug (CCB, ACEI or ARA II)

Step 6: In the same order, the 3 drugs will be increased to MRD (if this is adequately tolerated)

Step 7: When the 3 drugs have been increased to optimal doses and control values are not obtained, add spironolactone. In patients aged over 60, the dose increase will be slower, rising first to half of the standard dose, standard dose and double standard dose.

Patients will also be asked to follow the DASH (Dietary Approaches to Stop Hypertension), and will be prescribed moderate or intense aerobic exercise according to the patient's condition.

This will generally be moderate exercise for 30 minutes 5 times a week, or intense exercise for 20 minutes 3 times per week. If the agreed exercise is walking or running, a step counter will be provided for patients. An educational session will be conducted with a nurse to learn how to use the tensiometer and step counter, along with another session to improve knowledge related to diet and exercise.

Participants whose GPs are in the control group will receive usual care for hypertension.

## Previous interventions:

Participant's GPs will be randomly allocated to either the intervention or control group by the coordinating centre using computer-generated random number tables.

Participants whose GPs are in the intervention group will receive an intervention involving self-monitoring of antihypertensive medication, self-measurement of blood pressure and diet and physical exercise. Patients will receive a blood pressure monitor, which they will be trained to use correctly. Blood pressure will be measured twice a day (morning and afternoon) for the first and third week of each month of the 12 month study duration. Patients will be asked to record their weekly average blood pressure in a table.

The current medication of the patient will be registered. Self-adjustment of medication was completed according to the following algorithm:

Step 1: If between the 3 drugs there is no diuretic, use a thiazide diuretic at a dose equal to 50% of the maximum recommended dose (MRD). If there are no contraindications, remove the non-BCC, ACEI or ARA II

Step 2: If any of the 3 active principles are prescribed at <50% of the MRD, increase it to 50% of the MRD. If there are 2 or 3 drugs at sub-optimal doses, follow the same order as recommended below.

Step 3: Start the dose increase by diuretic up to 50%, provided there is no hyperuricemia or diabetes. In this case, the first drug to be increased will be ACEI or ARA II

Step 4: The second drug to increase for patients aged over 60 years is BCC; for patients under 60 years, increase the IECA or ARA II

Step 5: The third drug to increase is the remaining drug (BCC, ACEI or ARA II)

Step 6: In the same order, the 3 drugs will be increased to MRD (if this is adequately tolerated)

Step 7: When the 3 drugs have been increased to optimal doses and control values are not obtained, add spironolactone. In patients aged over 60, the dose increase will be slower, rising first to half of the standard dose, standard dose and double standard dose.

Patients will also be asked to follow the DASH (Dietary Approaches to Stop Hypertension), and will be prescribed moderate or intense aerobic exercise according to the patient's condition.

This will generally be moderate exercise for 30 minutes 5 times a week, or intense exercise for 20 minutes 3 times per week. If the agreed exercise is walking or running, a step counter will be provided for patients. An educational session will be conducted with a nurse to learn how to use the tensiometer and step counter, along with another session to improve knowledge related to diet and exercise.

Participants whose GPs are in the control group will receive usual care for hypertension.

## **Intervention Type**

Mixed

## **Primary outcome(s)**

Blood pressure, measured at the baseline 12 months after the start of the intervention, carried out by external personnel who remain blind to the group of the patients. A reduction of at least 5 mmHg in systolic pressure at the end of the study will be considered significant. Blood pressure will be measured while the patient is sitting, using a standardized automated sphygmomanometer (OMROM 7 intelli IT) after a 5-minute period of rest. Two blood pressure readings will be taken 1 to 2 minutes apart and the average will be recorded. The width of the cuff will adapt to the perimeter of the arm and placed on the middle third of the arm. The patient must be seated comfortably and without crossing the legs and with the arm resting on a table and placed at the level of the heart. The patient will be relaxed, with the urinary bladder empty and without having previously smoked or ingested stimulating substances.

## **Key secondary outcome(s)**

Current secondary outcome measures as of 13/05/2021:

1. Percentage of patients who have reached systolic and diastolic blood pressure levels considered to be under control ( $< 140/90$  mm Hg) after 6 months, assessed as per primary outcome measure
2. Quality of life, assessed using the EuroQol-5D questionnaire at the baseline and after 6 months
3. Proportion of people showing a significant reduction in baseline cardiovascular risk, assessed using the REGICOR risk score at the baseline and after 6 months
4. Adherence to the hypertensive medication, assessed using MPR "Medication Possession Ratio" of the antihypertensive medication registered in the electronic prescription of the patient's medical record, assessed after 6 months
5. Body mass index, assessed by dividing weight in kg by height in metres at the baseline, and after 6 months
6. Physical exercise, assessed using the International Physical Activity Questionnaire (IPAQ) at the baseline and after 6 months
7. Safety of the proposed intervention:
  - 7.1. Percentage of patients with hypertensive crises, assessed by a clinical record review after 6

months

7.2. Number of episodes of hypotension, assessed by a clinical record review after 6 months

7.3. Hypotension requiring visits to the emergency room, assessed by a clinical record review after 6 months

7.4. Adverse effects related to antihypertensive medication, recorded by the GP at each visit and by a clinical record review after 6 months

Previous secondary outcome measures:

1. Percentage of patients who have reached systolic and diastolic blood pressure levels considered to be under control ( $< 140/90$  mm Hg) after 12 months, assessed as per primary outcome measure

2. Quality of life, assessed using the EuroQol-5D questionnaire at the baseline and after 12 months

3. Proportion of people showing a significant reduction in baseline cardiovascular risk, assessed using the REGICOR risk score at the baseline and after 12 months

4. Adherence to the hypertensive medication, assessed using MPR "Medication Possession Ratio" of the antihypertensive medication registered in the electronic prescription of the patient's medical record, assessed after 12 months

(5. Salt intake (grams of sodium in urine), measured using the Kawasaki equation in a fasting urine sample at the baseline and after 6 and 12 months) - outcome measure removed as of 27/03/2019

6. Body mass index, assessed by dividing weight in kg by height in metres at the baseline, and after 6 and 12 months

7. Physical exercise, assessed using the International Physical Activity Questionnaire (IPAQ) at the baseline and after 12 months

8. Safety of the proposed intervention:

8.1. Percentage of patients with hypertensive crises, assessed by a clinical record review after 12 months

8.2. Number of episodes of hypotension, assessed by a clinical record review after 12 months

8.3. Hypotension requiring visits to the emergency room, assessed by a clinical record review after 12 months

8.4. Adverse effects related to antihypertensive medication, recorded by the GP at each visit and by a clinical record review after 12 months

## **Completion date**

01/06/2022

## **Eligibility**

### **Key inclusion criteria**

Current inclusion criteria as of 13/05/2021:

1. Aged 35-75 years old

2. Diagnosed with hypertension

3. Taking 1 or more antihypertensive drugs

4. Systolic and diastolic blood pressure  $\geq 130/80$  mmHg in 24-hour ambulatory blood pressure monitoring

5. Written informed consent

Previous inclusion criteria from 27/03/2019 to 13/05/2021:

1. Aged 35-75 years old

2. Diagnosed with hypertension

3. Taking 2 or more antihypertensive drugs
4. Systolic and diastolic blood pressure  $\geq 130/80$  mmHg in 24-hour ambulatory blood pressure monitoring
5. Written informed consent

Original inclusion criteria:

1. Aged 35-75 years old
2. Diagnosed with hypertension
3. Taking 3 or more antihypertensive drugs
4. Systolic and diastolic blood pressure  $\geq 130/80$  mmHg in 24-hour ambulatory blood pressure monitoring
5. Written informed consent

### **Participant type(s)**

Patient

### **Healthy volunteers allowed**

No

### **Age group**

Adult

### **Sex**

All

### **Key exclusion criteria**

Current exclusion criteria as of 27/03/2019:

1. Pregnancy or breastfeeding
2. Dialysis or with diagnosis of renal failure
3. Myocardial infarction, heart bypass, angioplasty, stroke, peripheral arterial disease, heart failure, advanced liver disease or atrial fibrillation
4. Institutionalized in a socio-health center indefinitely
5. Severe prognosis that makes it impossible to follow-up during study period
6. Chronic ingestion of corticosteroids
7. Albumin  $>300$  mg/24 hours, glomerular filtration  $< 45$  ml/min $1,73$  m $^2$

Previous exclusion criteria:

1. Pregnancy or breastfeeding
2. Dialysis or with diagnosis of renal failure
3. Myocardial infarction, heart bypass, angioplasty, stroke, peripheral arterial disease, heart failure, advanced liver disease or atrial fibrillation
4. Institutionalized in a socio-health center indefinitely
5. Severe prognosis that makes it impossible to follow-up during study period
6. Chronic ingestion of NSAIDs or corticosteroids
7. Albumin/creatinine ratio  $> 1$

### **Date of first enrolment**

20/09/2021

### **Date of final enrolment**

01/07/2022

# Locations

## Countries of recruitment

Spain

## Study participating centre

### Balearic Islands Primary Care

C/Escuela graduada, 3

Palma

Spain

07003

# Sponsor information

## Organisation

Primary Care Management of Mallorca

## ROR

<https://ror.org/00d9y8h06>

# Funder(s)

## Funder type

Government

## Funder Name

Institute of Health Carlos III

## Alternative Name(s)

SaludISCIII, InstitutodeSaludCarlosIII, Instituto de Salud Carlos III | Madrid, Spain, Carlos III

Institute of Health, Institute of Health Carlos III, Carlos III Health Institute, La misión del Instituto de Salud Carlos III (ISCIII), ISCIII

## Funding Body Type

Government organisation

## Funding Body Subtype

National government

## Location

Spain



# Results and Publications

## Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request from Dr Fabian Unda. The dataset will consist of anonymized patient data (ID, allocated group, age, sex, baseline characteristics, primary and secondary outcomes) stored in an SPSS file. All request will be considered if the scientific questions are reasonable.

## IPD sharing plan summary

Available on request

## Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>		21/05/2024	05/06/2024	Yes	No
<a href="#">Protocol article</a>		24/04/2020	21/11/2023	Yes	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes