

## Developing an appropriate model for self-care of hypertensive patients: first experience from EMRO

Masoumeh Sadeghi<sup>(1)</sup>, Mansoor Shiri<sup>(2)</sup>, Hamidreza Roothafza<sup>(3)</sup>, Fatemeh Rakhshani<sup>(4)</sup>, Sadaf Sepanlou<sup>(5)</sup>, Nizal Sarrafzadegan<sup>(6)</sup>

### Original Article

#### Abstract

**BACKGROUND:** Cardiovascular diseases (CVDs) constitute 53% of deaths above the age of 30; 54% of these deaths are attributed to high blood pressure. Coronary artery disease (CAD) is the main cause of mortality in the world. Hypertension accounts for 13% of mortalities and 6% of morbidities and is one of the main risk factors that cause loss of healthy life years. Blood pressure is not optimally controlled even among those who are aware of their disease. Previous studies showed that apart from pharmacological treatment, lifestyle improvement can also play a significant role in the prevention of high blood pressure CVDs. Self-care among them has been addressed in several previous studies. There are few self-care programs in Iran, but no study has been conducted on blood pressure.

**METHODS:** In this study the primary model is designed and then revised, and in the pilot study the feasibility of the project was approved and the final model presented.

**RESULTS:** The current project proposes a model for self-care of hypertensive patients and their families, and is based on education of health care providers and patients in such a way that patients can control their illness.

**CONCLUSION:** The model can be implemented at a national scale.

**Keywords:** Self-Care, Hypertension, Model

*Date of submission:* 18 Feb 2013, *Date of acceptance:* 22 Apr 2013

#### Introduction

Cardiovascular diseases (CVDs) are among the most common causes of mortality and morbidity in both developed and developing countries.<sup>1</sup> Among them, coronary artery diseases (CADs) are the leading cause of premature mortality and morbidity in developed countries.<sup>2</sup>

The main risk factors of CVDs include hypertension, smoking, diabetes, and hypercholesterolemia.

Hypertension accounts for 13% of mortalities and 6% of morbidities and is one of the main risk factors that cause loss of healthy life years.<sup>3,4</sup> It is estimated that one billion people all over the world suffer from hypertension which is projected to

afflict 1.56 billion people in 2025.<sup>5</sup>

In individuals who have blood pressures above 115/75 mmHg, with each 20/10 mmHg increase in blood pressure, the risk of CVD will be doubled.<sup>6</sup>

The prevalence of hypertension varies in different regions of the world. However in the current decade, it has shown substantial increase in many countries even in low-income ones.<sup>7-10</sup>

Many studies have demonstrated that a large proportion of patients are not aware of their high blood pressure. Moreover, blood pressure is not optimally controlled, even among those who are aware of their disease; they do not adhere to their treatment regimen. The rate of control for hypertension varies in different countries: 37% in

1- Associate Professor, Cardiac Rehabilitation Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

2- Vice-chancellery for Health, Department of Health Education, Isfahan University of Medical Sciences, Isfahan, Iran

3- Assistant Professor, Department of Mental Health AND Isfahan Cardiovascular Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

4- Professor, Health Education and Promotion Bureau, Ministry of Health, Tehran, Iran

5- PhD Candidate, Tehran University of Medical Sciences, Tehran, Iran

6- Professor, Isfahan Cardiovascular Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

Correspondence to: Mansoor Shiri, Email: shiri@mui.ac.ir

Saudi Arabia, 20% in Romania, 12% in China, and 7% in India.<sup>11-14</sup> Results of a multi-national study in 35 countries, show that prevalence, awareness, treatment, and control of hypertension among men are 40.8%, 49.2%, 29.1%, and 10.8% in developed countries and 32.2%, 40.6%, 29.2%, 9.8% in developing countries, respectively. The relevant figures among women are 33.0%, 61.7%, 40.6%, and 17.3% in developed countries and 30.5%, 52.7%, 40.5%, and 16.2% in developing countries, respectively. There was no significant difference in any of the above indicators between developed and developing countries.<sup>15</sup>

As a result, health policy-makers are apt to design new methods for secondary prevention of hypertension. Self-care for chronic diseases has recently been suggested as a plausibly effective method.

Self-care programs are reported to decrease emergency visits by 40% and outpatient visits by 17%.<sup>16</sup> In self-care programs, it is expected that patients become aware of their health status, know when they need care, and gain adequate knowledge regarding the necessity and mode of treatment. Patients should be able to monitor their symptoms and refer in time for routine examinations without needing to refer to their physician.

Hypertension is among the diseases that can be successfully controlled by performing self-care activities.<sup>17</sup> Effectiveness of self-care in hypertension is more significant for the elderly.<sup>18</sup> Different patterns of self-care for hypertension have been observed including knowledge about the disease and its symptoms, adherence to treatment, adopting a healthy lifestyle, and blood pressure monitoring.<sup>19</sup> A study in 2008 in the United Kingdom showed that hypertensive patients used different methods of self-care including blood pressure monitoring at home, complementary treatment, and better adherence to treatment.<sup>20</sup> Home blood pressure monitoring can be even more effective than monitoring by physicians.<sup>17,21</sup> The health personnel including physicians, nurses, nutritionists, and pharmacists play a pivotal role in self-care.<sup>22-25</sup> Cappuccio et al. conducted a meta-analysis of 18 randomized, controlled trials on various patterns of self-care for hypertension. Results showed that both systolic and diastolic blood pressures were lower, and the proportion of patients with controlled hypertension was higher in the intervention group compared to the control group.<sup>26</sup> Blood pressure was controlled better in home monitoring compared to monitoring in clinics.<sup>17</sup> Padfield also reported that home monitoring was the

best pattern of self-care for hypertension.<sup>21</sup>

Glynn et al. conducted a meta-analysis on 72 clinical trials. Interventions examined in these trials included: self-monitoring, educational interventions directed at health professionals, nurse- or pharmacist-led care, and a systematic reminder of appointments. Results showed that self blood pressure monitoring can lead to most prominent decreases in systolic and diastolic blood pressures.<sup>27</sup> However, some studies have shown that self-care strategies may not be as effective beyond six months.<sup>28-31</sup> There are a number of controversial reports stating that cost-efficiency of self-care programs may be even less than usual care.<sup>31</sup> Further research is needed to achieve conclusive results on the effectiveness and cost-efficiency of self-care for hypertension.<sup>32-36</sup>

There is not much evidence on self-care in Iran. A study, as a part of the Isfahan Healthy Heart Program (IHHP), investigated the effects of comprehensive self-care programs on improving the knowledge, attitude, and treatment among patients with hypertension. Adherence to treatment significantly increased, especially among obese patients and those above 40 years of age. At the beginning of the study, adherence to treatment varied from 10% to 56%. After 4 years of intervention, adherence to treatment significantly improved, and participants increased their physical activity and lived on a healthy diet.<sup>37</sup> To the best of our knowledge, no other study on self-care in Iran has been published.

The incidence of CAD in Iran is estimated to be approximately 181.4 per 100,000 and CVDs are the cause of 46% of total deaths in Iran and their prevalence is increasing. The Isfahan Cohort Study (ICS) has reported that the relative risk of cardiovascular events is highest for hypertension.<sup>38</sup> Therefore, improved control of hypertension can significantly prevent cardio-vascular events.

The prevalence of hypertension among men and women has been estimated by Tehran Lipid and Glucose Study to be around 23% and 20%, respectively.<sup>39</sup> The prevalence of hypertension has been reported about 26.6% by the Third National Surveillance of Risk Factors.<sup>40</sup> The IHHP showed that the knowledge, adherence to treatment, and percentage of hypertension control were 49.9%, 43.8%, and 15.8%, respectively. The rate of control has increased from 7.1% in 2001 to 15.8% in 2007.<sup>41</sup> Still, it is less than the majority of developed countries, where coverage is over 30%, and just slightly higher than India and China.

Based on the existing data, no project has been conducted in Iran regarding self-care for hypertension until today. Regarding the high prevalence of hypertension and inadequate control level, the current protocol is presented for the design of a self-care model for hypertension. The current proposal is developed to design a model for self-care of hypertensive patients and to examine its feasibility.

### Materials and Methods

As a first step, a steering committee was formed in 2011 in order to determine the priorities and devise an action plan for preparing a model for hypertension self-care. This committee encompassed a wide range of experts of self-care and hypertension including director general of Health Education and Promotion of the Ministry of Health of Iran, some of the academic members and prominent experts of Health Education and Promotion, two cardiologists, and the Head of the Isfahan Cardiovascular Research Institute (ICRI). Moreover, the executives of the program arranged interviews with some of the experienced experts in this field to take advantage of their knowledge and experience. It was determined that the project be designed and examined exclusively in urban areas, as the health system in urban areas in spite of having high proportion of population and high prevalence of hypertension, is not comprehensive enough.

After gathering the related data and considering viewpoints of consultant experts a primary model was designed based on the education of care providers, patients, and their families. The suggested model was tested in some of the care delivering units as follows: 1) The Khaneh Isfahan Health Center, an urban health center for controlling NCDs, mainly diabetes. 2) The Khajoo Health Center, a traditional urban health center 3) some Private offices and 4) The Ghahjavarestan Health Center, a rural health center near Isfahan city, Iran.

Information was given to patients through lectures, questions and answers, face to face training, and follow-up. Due to a large number of patients who refer to private offices, the private sector is the important part of the project. Physicians believe in the effectiveness of self-care. As for pharmacies and laboratories, leaflets were utilized but were not as effective as face-to-face consultation.

In rural areas the project can be quite successful if health workers in Health Houses (Behvarzan) are trained and capable of controlling blood pressure.

Overall, in all of the four aforementioned units, patients were significantly satisfied of the program

and many of them expressed in interviews that they have learned points of which they were never aware. Patients demanded further and earlier additional sessions.

As for health care providers, the level of satisfaction was also significant as said in their interviews. The main barriers declared by health personnel were large number of patients, lack of suitable physical space, and inadequate equipment and time for visits that reduced the quality of consultation and led to long waiting time.

Overall, the results of the pilot demonstrated the feasibility and necessity of integrating self-care programs in the health system, which requires providing the needed infrastructure. It can be planned based on mandatory periodical education settings to empower health personnel.

An important part of this project is providing self-care education in aforementioned units. Parts of the project are focused on empowerment of health care providers. Although the researchers tried to cover all domains of self-care, the project has certain defects, which will hopefully be corrected in future.

### Stakeholders' Analysis

As shown in table 1, there are different stakeholders who can be involved in the project. This analysis helps to do efficient advocacy with these stakeholders to have their collaboration in the project.

In general, it seems apart from secondary beneficiaries and some of the partners; others do not have adequate knowledge of and attitude toward self-care. For each subgroup, a relevant and appropriate message was devised. Techniques of encouragements of stakeholders were also developed.

### Results

#### The suggested model

The practical goals of the study included: 1) to present an appropriate model of self-care for similar studies; 2) to present the methodology and results of the project to legislators and policy-makers; 3) to improve the lifestyle of participants if the model be implemented; and 4) the project could be generalized to large provincial or national scales.

Inclusion criteria were 30 to 60 year-old patients residing in Isfahan, Iran, with approved cardiovascular diseases (Atrial fibrillation, hypertension, ischemic heart disease, or chronic heart failure).

Exclusion criteria were refusing to participate and change of address. Convenience sampling was conducted in two health centers (Khaneh Isfahan, and Khajoo Urban Health Centers). The

**Table 1.** Stakeholders' Analysis

	Stakeholder categories		Subgroups	Barriers to make contact
1	Beneficiaries	Primary	Individuals at risk, Hypertensive patients, and their families	Large group, Moderate access, Relatively difficult message development
		Secondary	Medical universities and the relevant offices in MOHME, Insurance companies, Pharmaceutical companies, Private sector	Large group, Inadequate access, Relatively difficult message development
2	Decision-makers	Legislators	Members of Islamic Parliament, Members of city councils	Small group, Difficult access, Difficult message development
		Policy-makers	MOHME and all the subordinates, the Mayor, Heads of mass media	Small group, Easy access, Easy message development
		Executers	Provincial and district health centers in Isfahan	Moderate group, Easy access, Difficult message development
3	Partners		Public and private health centers, Hospitals, Pharmacies, Private Clinics, Physicians of Private sector	Large group, Relatively easy access, Relatively easy message development
4	Opponents		Unhealthy food industries and Tobacco companies	Large group, Difficult access, Difficult message development

MOHME: Ministry of Health and Medical Education

methodology included development of educational contents, conducting pilot, stakeholders' analysis, comprehensive advocacy for stakeholders, and development of techniques for encouragement.

### **The operational model for self-care in hypertensive patients**

In the beginning, it should be determined where hypertensive patients should be referred: public, or private sections, or non-governmental organizations. The health care providers who should be educated include: physicians, nurses, nutritionists, and consultants for physical activity and mental health. They should be capable of diagnosing hypertension, examining complications, providing pharmaceutical and non-pharmaceutical treatment, correct blood pressure measurement, and appropriate referral of patients in need. Skills for providing education, treatment, and follow-up will be taught based on the approved curriculum.

In the next step, hypertensive patients will be invited to participate in the project through public announcements, general practitioners, and health centers. History taking, physical examination, and diagnosis of patients should be carried out by the physician. Thereafter, the physician should teach the patient the correct method of blood pressure measurement and inform him/her that the disease is asymptomatic and may end in inevitable complications if left untreated, lasts till the end of life, and it should be controlled by pharmaceutical and non-pharmaceutical treatment. Other non-

pharmaceutical advices are provided by nurses, nutritionists, and consultants of physical activity and mental health. A file should be filled out for the patient including the contact information, the date of the next appointment, and if necessary referral of the patient to specialists such as cardiologist, nephrologist, endocrinologist, hospitals, or consultants for cessation of addiction, nutrition, mental health, or rehabilitation.

The following resources are needed for the implementation of this project: 1) human resources: the least is a physician capable of follow-up, treatment, and consulting for nutrition, life-style, and quitting smoking; 2) appropriate physical space: for physical examination, education, and follow-up; and 3) equipment: manual or electronic file for patients, sphygmomanometer, and etcetera.

The project can be integrated in other programs such as diabetes control.

The importance of situation analysis lies in the feasibility of integrating the project into the family physician program.

In the final model, two educational packages have been developed:

1) Improving the capabilities of health care providers for controlling hypertension.

2) Educating hypertensive patients, their families, and people who are high risk for hypertension.

The education requirements that care providers should meet include: 1) access to information; 2)

acceptance and participation; 3) responsiveness; and 4) developing local structural capacity.

The educational curriculum for health care providers consists of two parts:

1) Curriculum to increase capabilities in teaching (30-40 hours) including:

a) Mandatory skills: education planning, needs assessment, communication skills, overall view of behavioral models, and general principles of behavioral change

b) General training: general concepts of health, self-empowerment, quality of life, life skills, and supportive laws and systems

2) Curriculum for capabilities in fields specific to hypertension (30-40 hours) including:

a) Goals, strategies, and activities in the project

b) Duties of health personnel in various levels of the health system

c) Rights of patients

d) Symptoms of hypertension

e) The necessary diagnostic measures, and the importance of preventing hypertension and its acute and chronic complications

f) Diagnosis of disease, and guidelines for completion of files for patients

g) Methods of preventing hypertension

h) Correct measurement of blood pressure

i) The principles of controlling hypertension

j) Method for monitoring and self-care for hypertensive patients and their families, and the correct usage of sphygmomanometers

k) Pharmacological treatment

l) Non-pharmacological treatment

m) The characteristics of the disease

n) Methods to cope with the disease

o) Social support

p) Referral in necessary cases

q) Guidelines for follow-up and care for patients

r) Methods for saving and delivering the information

s) Prevention and control of hypertension in specific groups of patients such as the elderly and children

The educational curriculum for patients and their family members:

Education is the basis of care for hypertension. The first step is to understand the situation of the patient and his family members and friends, to assess their knowledge, attitude, beliefs, and skills. Each patient has unique needs and capacity for learning and patients should be considered independently.

The self-care program takes place in many

settings such as offices of general physicians, health care organizations, health centers, health houses, hospitals, pharmacies, state and private institutes, and etcetera. For all of these settings a specific chart of delivering service is prepared. One of these charts is given in table 2.

#### **Educational methods**

Face to face consultation and group education and for non-attending classes: leaflets, books, pamphlets, electronic books, CD, and etcetera.

#### **The self-care project for hypertension in family physician program**

Considering the implementation of the family physician program in rural areas and its extension to urban areas, the self-care model has been developed to be integrated into the family physician program.

#### **Duties of non-physician health care providers such as nurses, health workers and nutritionists, for controlling hypertension**

1) Filling out the form for hypertensive patients who are approved by the physician

2) History taking

3) Physical examination and measurements

4) Referral of the patient to physician based on symptoms

5) Educating the patient: disease description, its complications and dangers, the necessity of controlling blood pressure and complications of hypertension, change of lifestyle

6) Non-pharmacological treatment and follow-up

7) Follow-up: monthly visits

8) Documenting of measures taken in the file

9) Non-pharmacological treatment, follow-up and education of specific groups of patients such as the elderly, children, and their families

#### **Treatment and follow up of hypertension in specific groups of patients such as the elderly and children**

1) Consultation and referral to a specialist

2) Supervising other personnel of the team

3) Completing tasks that have not been done by other personnel

4) Documenting of measures taken in the household

#### **The system for monitoring and evaluation of the self-care project**

The program is evaluated based on the satisfaction of patients and health care providers, the number of referrals, the method of distributing information, the coverage of the program, and the overall rate of hypertension in the area.

Evaluation includes the three categories of process, effect, and result.

**Table 2.** Providing the service expected by physicians in private offices (including general or specialized, and family physicians) regarding hypertension (HTN) self-care training

Service recipient	Methods of training	The place of service	Content of the curriculum	Assessment
<ul style="list-style-type: none"> <li>• Patient</li> </ul>	<ul style="list-style-type: none"> <li>-Face to face training</li> <li>-Pamphlets and brochures designed in simple language</li> <li>-Patients' index card</li> <li>-Training CDs</li> <li>-SMS</li> <li>-Follow-up by phone calls</li> </ul>	<ul style="list-style-type: none"> <li>-Physicians' office</li> <li>-Service provider: physicians or their trained secretaries</li> </ul>	<ul style="list-style-type: none"> <li>-The importance and necessity of treating HTN</li> <li>-Complications of HTN</li> <li>-The importance of non-medical therapy and suitable lifestyle</li> <li>-The significance of salt consumption incidence and exacerbation of HTN</li> <li>-Medical therapy and correct administration of drugs including type of drug, dose of drug, and the way of storing drugs</li> <li>-Familiarity with important side effects of the drugs</li> <li>-Normal blood pressure does not mean stopping administration of drugs</li> <li>-Control of other cardiovascular factors</li> <li>-Follow-up with the required tests in time according to the relevant physician</li> <li>-Training correct measurement of blood pressure at home</li> <li>-The necessity to know symptoms of HTN that require visiting a physician</li> <li>-The importance of going to the service providing unit regularly</li> <li>-Requesting the physicians or nurses to measure blood pressure in every visit to an office or a hospital</li> </ul>	<ul style="list-style-type: none"> <li>-Number of patients covered by self-care program</li> <li>-Number of distributed training printed aids</li> <li>-Study of patients' KAP</li> <li>-Counting the pills remaining at the end of each period</li> <li>-Patients' satisfaction</li> <li>-Number of files related to HTN self-care in the office</li> <li>-Physician's satisfaction</li> <li>-Number of referrals by physicians</li> <li>-Number of regular visits of patients</li> <li>-Number of patients under care that suffer complications</li> <li>-Number of patients under care with controlled HTN</li> <li>-Number of patients referred to higher levels of service providers</li> </ul>
<ul style="list-style-type: none"> <li>• Patients' family members</li> </ul>	<ul style="list-style-type: none"> <li>-Face to face training</li> <li>-Pamphlets and brochures</li> <li>-Training CDs</li> </ul>	<ul style="list-style-type: none"> <li>-Physicians' office</li> <li>-Service provider: physicians or their trained secretaries</li> </ul>	<ul style="list-style-type: none"> <li>-The importance and necessity of treating HTN</li> <li>-Complications of HTN</li> <li>-The existence of family history in incidence of HTN</li> <li>-The importance of non-medical therapy and suitable lifestyle</li> <li>-Encouraging the patients to follow the physicians' instructions</li> <li>-The importance of measuring blood pressure of patients' families</li> <li>-The importance and how to measure blood pressure of the patients</li> <li>-Knowing the patients' drugs</li> <li>-The importance of appropriate support by family</li> <li>-Being in touch with the patients to follow up their process of treatment</li> <li>-Being in touch with the therapists to follow up the process of treatment</li> </ul>	<ul style="list-style-type: none"> <li>-Performing the non-medical therapeutic recommendations at home</li> <li>-Satisfaction of the patients' families of the training</li> <li>-Number of patients covered by self-care program</li> <li>-Number of distributed training aids</li> <li>-Study of KAP of patients' families</li> </ul>
<ul style="list-style-type: none"> <li>• People at high risk (including those with obesity, diabetes, a sedentary lifestyle or any other factor causing HTN)</li> </ul>	<ul style="list-style-type: none"> <li>-Face to face training</li> <li>-Pamphlets and brochures designed in simple language</li> <li>-Patients' index card</li> <li>-Training CDs</li> <li>-SMS</li> <li>-Follow-up by phone calls</li> </ul>	<ul style="list-style-type: none"> <li>-Physicians' office</li> <li>-Service provider: physicians or their trained secretaries</li> </ul>	<ul style="list-style-type: none"> <li>-The importance of preventing HTN</li> <li>-Risk factors of HTN</li> <li>-A suitable lifestyle including appropriate nutrition, suitable physical activity, control of stress, smoking cessation</li> <li>-Requesting the physicians to measure blood pressure in every appointment with a physician for other reasons</li> <li>-Training the use of appropriate social support</li> <li>-Doing necessary tests periodically</li> <li>-Measurement of blood pressure at home</li> </ul>	<ul style="list-style-type: none"> <li>-Examining the visits done at the appointed time</li> <li>-Smoking cessation and controlling obesity</li> <li>-Number of people covered by self-care program</li> <li>-Number of distributed training aids</li> <li>-Study of people s' KAP</li> <li>-Performing the non-medical therapeutic recommendations at home</li> <li>-Satisfaction of the people under training</li> <li>-Rate of controlling other diseases</li> <li>-Number of people affected with HTN</li> </ul>

\*Execution of this program does not need superordinates; HTN: Hypertension; KAP: Knowledge, Attitudes, Practice

**A) Process evaluation:**

- 1) Evaluation of planning
- 2) Evaluation of pilot study
- 3) Evaluation of the executive phases of the project
- 4) Evaluation of information distribution
- 5) Evaluation of needs assessment of participants

**B) Effect Evaluation:**

- 1) KAP study on participants, before and after, regarding concepts and importance of self-care and the levels of health care system
- 2) Assessment of clients who referred to specialized health centers
- 3) Assessment of clients who referred to consulting centers
- 4) Assessment of clients who joined self-help groups
- 5) Assessment the various costs of care among clients
- 6) Assessment of the number of referrals
- 7) Assessment of the treatment results in clients
- 8) Assessment of the satisfaction of clients
- 9) Assessment of the satisfaction of health care providers

**C) Result Evaluation:**

- 1) The percentage of patients with controlled blood pressure
  - 2) The percentage of patients who were afflicted by ultimate complications of hypertension including stroke, renal failure, or visual defects
  - 3) Assessment of the change in the quality of life among clients
  - 4) Assessment of cost-efficiency of the project
- Each of these evaluations consists of three main components of tool, standards, and protocol.

**Discussion**

The model of self-care could be implemented and generalized to large provincial or national scales in Iran to improve the lifestyle of participants. The program should be implemented in different settings based on resources and capabilities present in different areas. Though government sector plays a major role in this program, the potential role of the private health sector cannot be ignored.

Full report of this project is available in [http://www.icrc.ir/images\\_/selfcare.pdf](http://www.icrc.ir/images_/selfcare.pdf)

**Acknowledgements**

The study was supported by the Health Education and Promotion Bureau of the Iranian Ministry of Health and Medical Education, and a grant from the office of WHO in Iran.

We express our gratitude to the Provincial Health Center of Isfahan and the Cardiovascular Research Institute of Isfahan, for their technical and executive support. We would also like to thank Mrs. Sousan Fadaie, Mrs Safoura Yazdekhsti, and the workers of the Khaneh Isfahan, Khajoo, and Ghahjavarestan Health Centers who cooperated in conducting this study.

**Conflict of Interests**

Authors have no conflict of interests.

**References**

1. Vasan RS, Sullivan LM, Wilson PW, Sempos CT, Sundstrom J, Kannel WB, et al. Relative importance of borderline and elevated levels of coronary heart disease risk factors. *Ann Intern Med* 2005; 142(6): 393-402.
2. Sarrafzadegan N, Talaei M, Kelishadi R, Toghianifar N, Sadeghi M, Oveisgharan S, et al. The influence of gender and place of residence on cardiovascular diseases and their risk factors. The Isfahan cohort study. *Saudi Med J* 2012; 33(5): 533-40.
3. World Health Organization. *The World Health Report 2002: Reducing Risks, Promoting Healthy Life*. Geneva, Switzerland: World Health Organization; 2002.
4. Sarrafzadegan N, AminiNik S. Blood pressure pattern in urban and rural areas in Isfahan, Iran. *J Hum Hypertens* 1997; 11(7): 425-8.
5. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet* 2005; 365(9455): 217-23.
6. Lenfant C, Chobanian AV, Jones DW, Roccella EJ. Seventh report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7): resetting the hypertension sails. *Hypertension* 2003; 41(6): 1178-9.
7. Robitaille C, Dai S, Waters C, Loukine L, Bancej C, Quach S, et al. Diagnosed hypertension in Canada: incidence, prevalence and associated mortality. *CMAJ* 2012; 184(1): E49-E56.
8. Wang Y, Wang QJ. The prevalence of prehypertension and hypertension among US adults according to the new joint national committee guidelines: new challenges of the old problem. *Arch Intern Med* 2004; 164(19): 2126-34.
9. Gus I, Harzheim E, Zaslavsky C, Medina C, Gus M. Prevalence, awareness, and control of systemic arterial hypertension in the state of Rio Grande do Sul. *Arq Bras Cardiol* 2004; 83(5): 429-33.
10. Ulasi II, Ijoma CK, Onwubere BJ, Arodiwe E, Onodugo O, Okafor C. High prevalence and low

- awareness of hypertension in a market population in enugu, Nigeria. *Int J Hypertens* 2011; 2011: 869675.
11. Saeed AA, Al-Hamdan NA, Bahnassy AA, Abdalla AM, Abbas MA, Abuzaid LZ. Prevalence, Awareness, Treatment, and Control of Hypertension among Saudi Adult Population: A National Survey. *Int J Hypertens* 2011; 2011: 174135.
  12. Dorobantu M, Darabont RO, Badila E, Ghiorghe S. Prevalence, Awareness, Treatment, and Control of Hypertension in Romania: Results of the SEPHAR Study. *Int J Hypertens* 2010; 2010: 970694.
  13. Cai L, Liu A, Zhang L, Li S, Wang P. Prevalence, awareness, treatment, and control of hypertension among adults in Beijing, China. *Clin Exp Hypertens* 2012; 34(1): 45-52.
  14. Kaur P, Rao SR, Radhakrishnan E, Rajasekar D, Gupte MD. Prevalence, awareness, treatment, control and risk factors for hypertension in a rural population in South India. *Int J Public Health* 2012; 57(1): 87-94.
  15. Pereira M, Lunet N, Azevedo A, Barros H. Differences in prevalence, awareness, treatment and control of hypertension between developing and developed countries. *J Hypertens* 2009; 27(5): 963-75.
  16. NHS. Supporting people with long term conditions to Self Care A guide to developing local strategies and good practice [Online]. 2006; Available from: URL: [http://selfmanagementsupport.health.org.uk/media\\_manager/public/179/SMS\\_resource-centre\\_publications/Self\\_care\\_-\\_a\\_guide\\_to\\_developing\\_local\\_strategies\\_and\\_good\\_practice.pdf/](http://selfmanagementsupport.health.org.uk/media_manager/public/179/SMS_resource-centre_publications/Self_care_-_a_guide_to_developing_local_strategies_and_good_practice.pdf/)
  17. DAFNE. Type 1 diabetes [Online]. 2013; Available from: URL: <http://www.dafne.uk.com/>
  18. Klymko KW, Artinian NT, Price JE, Abele C, Washington OG. Self-care production experiences in elderly African Americans with hypertension and cognitive difficulty. *J Am Acad Nurse Pract* 2011; 23(4): 200-8.
  19. Warren-Findlow J, Seymour RB, Brunner Huber LR. The association between self-efficacy and hypertension self-care activities among African American adults. *J Community Health* 2012; 37(1): 15-24.
  20. Gohar F, Greenfield SM, Beevers DG, Lip GY, Jolly K. Self-care and adherence to medication: a survey in the hypertension outpatient clinic. *BMC Complement Altern Med* 2008; 8: 4.
  21. Padfield PL. The case for home monitoring in hypertension. *BMC Med* 2010; 8: 55.
  22. Carter BL, Rogers M, Daly J, Zheng S, James PA. The potency of team-based care interventions for hypertension: a meta-analysis. *Arch Intern Med* 2009; 169(19): 1748-55.
  23. Victor RG, Ravenell JE, Freeman A, Leonard D, Bhat DG, Shafiq M, et al. Effectiveness of a barber-based intervention for improving hypertension control in black men: the BARBER-1 study: a cluster randomized trial. *Arch Intern Med* 2011; 171(4): 342-50.
  24. Carter BL, Ardery G, Dawson JD, James PA, Bergus GR, Doucette WR, et al. Physician and pharmacist collaboration to improve blood pressure control. *Arch Intern Med* 2009; 169(21): 1996-2002.
  25. Woodward A, Wallymahmed M, Wilding J, Gill G. Successful cardiovascular risk reduction in Type 2 diabetes by nurse-led care using an open clinical algorithm. *Diabet Med* 2006; 23(7): 780-7.
  26. Cappuccio FP, Kerry SM, Forbes L, Donald A. Blood pressure control by home monitoring: meta-analysis of randomised trials. *BMJ*. 2004; 329(7458): 145.
  27. Glynn LG, Murphy AW, Smith SM, Schroeder K, Fahey T. Self-monitoring and other non-pharmacological interventions to improve the management of hypertension in primary care: a systematic review. *Br J Gen Pract* 2010; 60(581): e476-e488.
  28. McManus RJ, Mant J, Roalfe A, Oakes RA, Bryan S, Pattison HM, et al. Targets and self monitoring in hypertension: randomised controlled trial and cost effectiveness analysis. *BMJ* 2005; 331(7515): 493.
  29. Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer PJ, et al. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. *JAMA* 2003; 289(16): 2083-93.
  30. Verberk WJ, Kroon AA, Lenders JW, Kessels AG, van Montfrans GA, Smit AJ, et al. Self-measurement of blood pressure at home reduces the need for antihypertensive drugs: a randomized, controlled trial. *Hypertension* 2007; 50(6): 1019-25.
  31. Green B, Anderson M, Catz S, Ralston J. PS2-14: Self-Reported Use of Home Blood Pressure Monitoring Does Not Predict Improved Hypertension Control. *Clin Med Res* 2011; 9(3-4): 152-3.
  32. Reed SD, Li Y, Oddone EZ, Neary AM, Orr MM, Grubber JM, et al. Economic evaluation of home blood pressure monitoring with or without telephonic behavioral self-management in patients with hypertension. *Am J Hypertens* 2010; 23(2): 142-8.
  33. Becker MH. The health belief model and personal health behaviour. *Health Educ Monogr* 1974; 2(4): 324-508.
  34. Leiva A, Fajo M, Escriche L, Audera FJ, Lopez S, Martin MC, et al. Efficacy of a brief multifactorial adherence-based intervention on reducing the blood pressure of patients with poor adherence: protocol for a randomized clinical trial. *BMC Cardiovasc*



- Disord 2010; 10: 44.
35. Thiboutot J, Stuckey H, Binette A, Kephart D, Curry W, Falkner B, et al. A web-based patient activation intervention to improve hypertension care: study design and baseline characteristics in the web hypertension study. *Contemp Clin Trials* 2010; 31(6): 634-46.
  36. McManus RJ, Bray EP, Mant J, Holder R, Greenfield S, Bryan S, et al. Protocol for a randomised controlled trial of telemonitoring and self-management in the control of hypertension: telemonitoring and self-management in hypertension. [ISRCTN17585681]. *BMC Cardiovasc Disord* 2009; 9: 6.
  37. Sadeghi M, Ramezani J, Sanei H, Rabeiee K, Gharipour M, Toghianifar N. Adherence to evidence-based therapies and modifiable risk factors in patients with coronary artery disease - the hlcp project. *ARYA Atheroscler* 2006; 2(3): 147-51.
  38. Talaie M, Sadeghi M, Marshall T, Thomas GN, Kabiri P, Hoseini S, et al. Impact of metabolic syndrome on ischemic heart disease - a prospective cohort study in an Iranian adult population: Isfahan Cohort Study. *Nutr Metab Cardiovasc Dis* 2012; 22(5): 434-41.
  39. Bozorgmanesh M, Hadaegh F, Sheikholeslami F, Azizi F. Cardiovascular risk and all-cause mortality attributable to diabetes: Tehran lipid and glucose study. *J Endocrinol Invest* 2012; 35(1): 14-20.
  40. Esteghamati A, Meysamie A, Khalilzadeh O, Rashidi A, Haghazali M, Asgari F, et al. Third national Surveillance of Risk Factors of Non-Communicable Diseases (SuRFNCD-2007) in Iran: methods and results on prevalence of diabetes, hypertension, obesity, central obesity, and dyslipidemia. *BMC Public Health* 2009; 9: 167.
  41. Khosravi A, Mehr GK, Kelishadi R, Shirani S, Gharipour M, Tavassoli A, et al. The impact of a 6-year comprehensive community trial on the awareness, treatment and control rates of hypertension in Iran: experiences from the Isfahan healthy heart program. *BMC Cardiovasc Disord* 2010; 10: 61.

**How to cite this article:** Sadeghi M, Shiri M, Roohafza H, Rakhshani F, Sepanlou S, Sarrafzadegan N. **Developing an appropriate model for self-care of hypertensive patients: first experience from EMRO.** *ARYA Atheroscler* 2013; 9(4): 232-40.