



Effect of a Primary Care-Based Chronic Disease Management Program for Hypertension Patients in South Korea

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Abstract

Background: Recently, the South Korean government has adopted a primary-care-based chronic disease management program as a national task. This study aimed to evaluate this program by focusing on hypertension patients and examine the effect of this program on their health.

Methods: Overall, 863 subjects who responded to a survey and 1,716 subjects in administrative data were included. Effects of the program were evaluated based on intermediate outcomes (motivation for self-management, changes in health behavior, medical service utilization, duration of consultation with physicians, and medication compliance) and outcomes (disease management, service satisfaction, and physician-patient relationship, change of blood pressure). Furthermore, we compared study participants' baseline systolic and diastolic blood pressure with corresponding measurements obtained at examinations conducted at 3 and 6 months after baseline measurements.

Results: Patients' motivation for self-management of hypertension, health behaviors (smoking, drinking, and exercise), regular clinic visit, and medication compliance were improved after participating in the program. Furthermore, patients' blood pressure levels were decreased while their satisfaction with physician-patient relationships was increased.

Conclusion: Primary-care-based chronic disease management program is effective for managing hypertension. Therefore, it is essential to reinforce the role of community-based primary care to improve the health of patients with hypertension.

Keywords: Hypertension; Primary care; Chronic disease; Education; Community medicine

Introduction

The worldwide prevalence of hypertension among adults aged more than 25 yr is almost 40%. Hypertension is also a major factor influencing the incidence of cardiovascular and cere-

brovascular diseases. To manage chronic diseases including hypertension as a worldwide public health issue that increases disease burden, coun-



tries from all over the world are initiating various policies and programs (1-5).

In line with these worldwide trends, the prevalence and disease burden from chronic diseases, particularly hypertension, are reported to be very high in South Korea (hereafter Korea). As of 2015, 10.76 million South Korean (hereafter Korean) adults aged more than 30 yr had hypertension (prevalence rate: approximately 30.5%). About 33% (one out of three) patients are not aware of their condition and 40% (four out of ten) patients with hypertension are not treated. Moreover, cardiovascular and cerebrovascular diseases caused by hypertension are top and second top causes of deaths, respectively. Total medical cost for hypertension was \$2,536 million in 2016 (6-8).

To tackle this problem, WHO has proposed Innovative Care for Chronic Conditions model which places “informed, activated patient” and “prepared, proactive practice team” at the core of chronic disease management (9, 10). Several countries are making efforts to strengthen foundations of primary care in their national healthcare systems (11, 12). The United States (US) has been performing pilot projects to promote the quality of primary care based on Patient-Centered Medical Home (PCMH) which focuses on patient-centered and multidisciplinary team approaches. It also systematically evaluates cost changes and quality of care every year. Consequently, 30% of fee-for-practice in Medicare was successfully replaced with alternative payment models in 2016. Medical expenditure is expected to be reduced by \$34 billion from 2017 to 2026 (13-15). Canada has implemented Chronic Disease Prevention and Management (CDPM) framework which manages and prevents chronic diseases through interactions among individuals, public health professionals, and local communities (16, 17).

However, a recent Organization for Economic Cooperation and Development (OECD) report has pointed out that vulnerability of primary care is one problem faced by Korea’s healthcare system. This OECD report identified absence of gatekeeping function of primary care and transfer

to tertiary care as problems in Korea. Accordingly, it advises Korea to systematize the structure of clinics and design community-based primary care models to prepare for rapidly growing aging population and manage chronic diseases appropriately (18, 19).

To solve this problem, the Korean government has adopted the primary-care-based chronic disease management program as a national task. The objectives of this program were to reinforce the role of primary care, build a foundation for chronic disease management, and maximize its effectiveness, especially on hypertension and diabetes care. This program was the only policy that aimed to strengthen primary care. It was also the first nationally-implemented government-funded program that aimed to improve services provided by medical clinics. Additionally, it was the first pilot project to pay separate monetary rewards to primary care physicians for education and consultation.

The present study evaluated primary care-based chronic disease management program, focusing on hypertension patients participating in the program. This study also examined the effect of this program on their health.

Methods

Primary care-based chronic disease management program

The core content of this program was to reinforce the role of primary care physicians and establish a self-management support system tailored to regional conditions. It included provision of comprehensive consultation by primary physicians and educational consultation (on physical activity, nutrition) implemented using community resources. Specifically, physicians informed their patients about the program and confirmed their interest in participating (Fig. 1). Subsequently, physicians registered patients with hypertension or diabetes in the program’s patient registration system if they confirmed their intent to participate. Physicians then devised an individual plan for treatment, education, and consultation for

each registered patient. Education and consultation comprised provision of information about the disease and consultation with the patient to help him/her to understand the disease better.

Additional health-related education and consultations (e.g., on nutrition, exercise, and smoking cessation) were conducted by physicians or community-based primary care support centers.

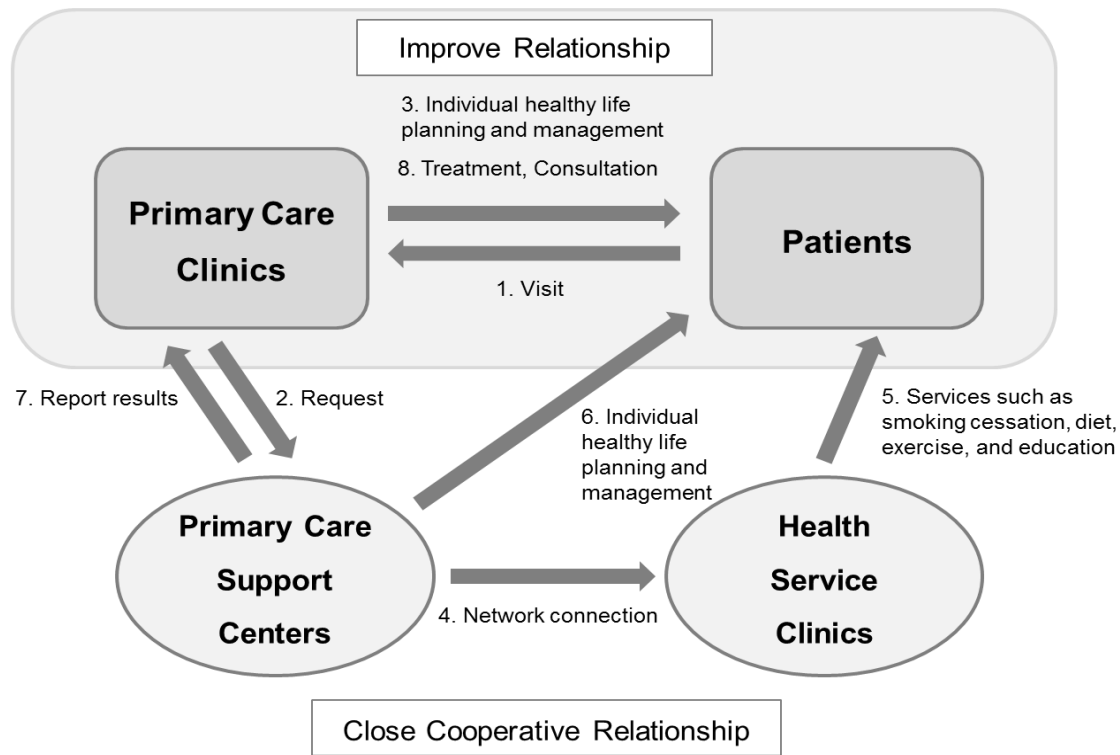


Fig.1: Procedure of the Program

To provide an incentive for physicians to participate actively and take initiative in the program, they received monetary rewards corresponding to health insurance charges appropriate for their work related to patient registration and designing of treatment plans, disease education and consultation, health education and consultation conducted by them, consultations on feedback from center-based education after requesting the centers' support, and comprehensive consultation after the end of a cycle of education and consultation.

Impact Analysis Model

Fig. 2 illustrates the analysis model used to investigate effects of the program. The analysis model was designed using evaluation indices summarized based on the logic model of the program (20). The present study investigated motivation for self-management, changes in health behavior, medical service utilization, duration of consultation with physicians, and medication compliance as intermediate outcomes. Disease management, service satisfaction, and physician-patient relationship, change of blood pressure were used as outcomes (Fig. 2).

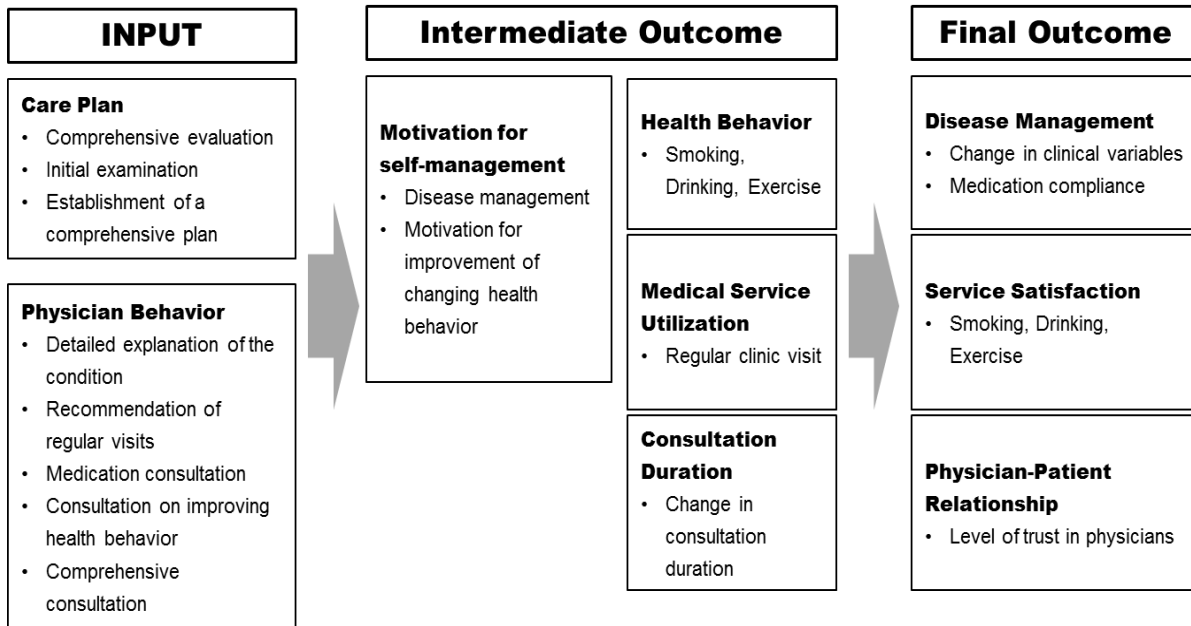


Fig. 2: Impact analysis model

Study Variables

Variables related to motivation for self-management used to assess intermediate outcomes included disease management (recognition of hypertension and blood pressure level) and motivation for changing health behavior (importance of changing health behavior, motivation for changing health behavior, and confidence with changing health behavior). Changes in health behaviors of smoking, drinking, and exercise were evaluated. Medical service utilization included regular clinic visits and consultation duration (minute). Outcome variables included disease management (subjective medication compliance, and changes in blood pressure and blood glucose levels), service satisfaction, and physician-patient relationship (level of trust in physicians).

Study Participants and Analysis

To evaluate the effects of the program, this study surveyed patients and analyzed data extracted from administrative databases. The survey was conducted with patients visiting primary care institutions who participated in the program. Among 117 clinics participating in the program, 22 (18.8%) clinics with at least 50 patients partic-

ipating in the program monthly for 6 months between Aug 2015 and Jan 2016 were selected. Of these 22 clinics, 18 consenting clinics (one in Muju County, three in Wonju, seven in Jeonju, and seven in Jungrang-gu) participated in the survey. Of all patients visiting these participating clinics, 9,722 participated in the program and 868 answered the survey (50 from Muju County, 156 from Wonju, 312 from Jeonju, and 345 from Jungrang-gu), with a response rate of 8.9%. Five participants with unclear disease status were excluded. Thus, 863 participants were included in the final analysis. The survey was conducted using a self-administered structured questionnaire from Apr 4 to Apr 29, 2016, at each clinic. In this study, we surveyed participants if there was a change in their health behaviors (smoking, drinking, and physical activity), recognition of hypertension, recognition of blood pressure level, importance of changing health behavior, motivation for changing health behavior, confidence with changing health behavior, actual change of health behavior, regular clinic visits, and subjective medication compliance, satisfaction, and physician-patient relationship. To prevent median-skewed distribution in the evaluation of satisfaction, a four-point Likert scale (strongly agree, agree, dis-

agree, and strongly disagree) was used. For statistical analysis, all answers were coded as 4 for “strongly agree,” 3 for “agree,” 2 for “disagree,” and 1 for “strongly disagree.” To identify the significance of pre-post changes, paired t-test and Chi-square tests were used.

In addition to patient survey outlined above, administrative data were analyzed in this study. From Nov 2014 (when patients first registered for the program) to Mar 31, 2017, 16,758 patients were registered in four communities. Among these patients, those who did not have blood pressure measurements at baseline and those who registered for less than 6 months without blood pressure measurements for 3- and 6-month follow-up examinations were excluded. Thus, 1716 patients were included in the analysis. Subsequently, we compared study participants’ baseline systolic (SBP) and diastolic blood pressure (DBP) with corresponding measurements obtained at examinations conducted at 3- and 6- months after baseline measurements. Paired t-test was used to analyze changes in blood pressure levels at follow-ups compared to baseline levels. Changes in blood pressure levels between the two follow-up

examinations were also checked. Subsequently, a repeated-measures analysis of variance (ANOVA) was used to assess the statistical significance of changes in blood pressure levels. To exclude the influence of patients’ characteristics on the evaluation of the program’s effectiveness, patients’ sex, age, region, and comorbidity status were adjusted when conducting repeated-measures ANOVA.

Ethical issues were reviewed and approved by the Institutional Review Board of National Evidence-based Collaborating Agency (approval No. NE-CAIRB16-006).

Results

Characteristics of Study Subjects

Table 1 presents general characteristics of study participants upon registration for the program. Of all participants, 64.8% were more than 60 yr old. There were 48.3% males and 51.7% females. Patients residing in Jeonju had the highest proportion (41.3%).

Table 1: Baseline characteristics of study subjects (n=1,716)

Characteristics	n (%)	SBP, mm Hg		DBP, mm Hg	
		Mean (SD)	P-value	Mean (SD)	P-value
Age			.000		.000
Under 60 years	604 (35.2)	131.5 (12.8)		81.8 (8.9)	
Over 60 years	1112 (64.8)	129.2 (11.6)		77.7 (8.1)	
Sex			.000		.000
Male	828 (48.3)	131.4 (12.4)		80.3 (8.8)	
Female	888 (51.7)	128.7 (11.6)		78.0 (8.3)	
Region *			.000		.000
Muju County	162 (9.4)	128.2 (15.3)		73.7 (10.5)	
Jeonju	709 (41.3)	129.7 (10.8)		80.2 (8.1)	
Jung-rang-gu	424 (24.7)	129.1 (8.7)		78.2 (5.8)	
Wonju	421 (24.5)	132.1 (15.1)		80.2 (9.9)	

* P-value of Scheffe test for homogeneous subsets.

SBP, systolic blood pressure; DBP, diastolic blood pressure; SD, standard deviation.

Intermediate Outcomes

Increase in disease recognition and motivation of changing behavior

Results of analysis on participants’ recognition of disease and motivation of changing behavior are

presented in Table 2. Mean scores for all items were greater than 2.5 points (median point=2.5), indicating that participants perceived that their recognition and motivation had increased after

participating in the program compared to those before participation.

Table 2: Increases in disease recognition, motivation for changing behavior, regular clinic visit, subjective medication compliance, and physician-patient relationship (median point = 2.5)

<i>Survey items</i>	<i>Scores (mean ± SD)</i>
Disease recognition	
Recognition of hypertension	3.51±0.52
Recognition of blood pressure level	3.51±0.52
Motivation for changing behavior	
Importance of changing health behavior	3.53±0.53
Motivation for changing health behavior	3.51±0.52
Confidence with changing health behavior	3.46±0.55
Regular visit and medication compliance	
Regular clinic visits	3.56±0.54
Subjective medication compliance	3.60±0.50
Physician-patient relationship	
Trust in physicians	3.54±0.52
Service satisfaction	3.54±0.51

Pre-post changes in health behavior

There were significant changes in participants’ health behaviors before and after participating in the program. Smoking and drinking decreased significantly while exercise behavior improved significantly. Specifically, consultation duration increased by more than 4 min as compared to that at baseline (Table 3).

Increase in regular clinic visits and subjective medication compliance

Regarding questions assessing whether participation could lead to increase in regular clinic visits and subjective medication compliance, the score

for regular clinic visits was 3.56 and that for subjective medication compliance which assessed disease management was 3.60 (median point=2.5). Participants perceived that their regular clinic visits and subjective medication compliance had improved after participation in the program (Table 2).

Pre-post changes in consultation duration

The mean score for consultation duration was 5.23 min before participation and 9.58 min after participation. Difference between the two was statistically significant (P=0.001) (Table 3).

Table 3: Changes in health behavior and duration of physician consultation before and after participating in the program (unit: %, mean ± SD)

<i>Survey items</i>	<i>Before</i>	<i>After</i>	<i>P-value *</i>
Changes in health behavior			
Smoking (Yes)	11.4%	8.5%	.001
Smoking amount (number of cigarettes per day)	17.05±8.49	12.34±6.15	.001
Drinking (Yes)	32.0%	30.4%	.021
Drinking frequency (per week)	3.28±2.01	2.52±1.69	.001
Engaging in exercise (Yes)	69.5%	85.1%	.001
Exercise frequency (per week)	3.70±2.03	4.23±1.90	.001
Use of medical service			
Consultation duration (min)	5.23±3.56	9.58±5.00	.001

* χ^2 or paired t-test

Outcomes

Changes in blood pressure level

Results of comparisons between participants' baseline measurements and follow-up examinations at 3- and 6-month are presented in Table 4. Participants' mean SBP decreased significantly ($P<0.001$) from a baseline mean of 130.00 mmHg to 126.15 mmHg at 3-month follow-up. SBP value at 6-month follow-up examination was 124.53 mmHg. It was significantly lower than that at baseline and 3-month follow-up (both $P<0.001$).

Participants' DBP showed a significant ($P<0.001$) decrease from baseline average of 79.12 mmHg

to 77.74 mmHg at 3-month follow-up. DBP value at 6-month follow-up was 76.85 mmHg. It was significantly lower than that at baseline and 3-month follow-up (both $P<0.001$).

To assess statistical significance of changes in participants' mean blood pressure levels at three measurements, we conducted a repeated-measures ANOVA after adjusting for sex, age, region, and comorbidity status. Both SBP and DBP were significantly decreased at 3- and 6-month follow-ups compared to those at baseline (Table 4).

Table 4: Changes in mean blood pressure (mmHg) from baseline to 3- and 6-month follow-ups

Blood pressure	Time	Mean (SD)	P-value	
			Paired t-test	Repeated-measures ANOVA*
Mean SBP	Baseline	130.00 (12.07)		<.001
	3 months	126.14 (10.13)	<.001	
	6 months	124.53 (10.80)	<.001	
Mean DBP	Baseline	79.12 (8.59)		<.001
	3 months	77.74 (7.24)	<.001	
	6 months	76.85 (7.79)	<.001	

*Adjusted for sex, age, region, and comorbidity status.

SBP, systolic blood pressure; DBP, diastolic blood pressure; SD, standard deviation.

Increase in service satisfaction and trust in physicians

Participants' perception and satisfaction were increased as shown in Table 2. Mean scores on all items were more than 2.5 points (median point=2.5), indicating that participants perceived an increase in their trust in physicians with higher service satisfaction after participation in the program.

Discussion

Primary care is the core of a country's healthcare system (21, 22). Several countries are making efforts to reinforce the foundation of primary care in their healthcare systems (11, 12). The present study was the first to evaluate effects of primary care-based chronic disease management program in Korea. To assess the impact and effectiveness

of this program, this study measured pre-post changes in health behaviors, perception, satisfaction, and blood pressure levels of participating patients with hypertension. Reinforcing the role of community-based primary care could significantly improve the health of patients with hypertension.

Previous studies on primary care-based management of chronic diseases also showed similar findings. According to Korean studies on primary care-based management of chronic studies, patients registered and managed by primary care institutions have better control of blood pressure and significant decrease in blood pressure levels (23). Primary care can promote continued care and outpatient visits (24, 25), physical exercise (26), and awareness of blood pressure levels (27). Studies conducted in other countries have reported various findings on effects of primary

care-based intervention programs in communities. In Canada, multidisciplinary primary care-based intervention programs can significantly increase the rate of reaching blood pressure goals in one year (28). Additionally, one study on low- and middle-income countries has reported that intervention programs can lead to significant decrease in blood pressure levels of patients with hypertension (29). When home-based interventions are provided for patients admitted for uncontrolled hypertension in the US (30), a randomized controlled trial conducted on patients with cardiovascular disease diagnosed <6 months ago revealed that the intervention program could lead to significant decrease in blood pressure levels and improvement in blood pressure management (31).

The present study used a logic model to analyze overall effects of the program. Findings revealed that participation in the program increased patients' motivation for self-management of hypertension, which led to improvements in health behavior (including smoking, drinking, and exercise) and medical service utilization including medication compliance. Such improvements in health behavior and medical service utilization might have decreased patients' blood pressure levels and increased their satisfaction with physician-patient relationship. This possibility is evidenced by findings of previous studies. For instance, motivating patients through intervention, education from physicians, and physician consultation can influence the improvement of patients' motivation for self-management (32, 33). Such measures to promote motivation will lead to improvement of health behavior and medication compliance (34-36), the latter of reported to be higher when health literacy and self-efficacy are high (37). Moreover, patients who believe that life habits can influence hypertension are more likely to attempt to change their habits (35). Further, those with positive attitudes toward health have higher medication compliance and those with higher knowledge scores have better compliance to changing life habits (36). Improvement of health behavior and medication compliance can lead to decrease in blood pressure levels (38,

39) and positively influence satisfaction with the physician-patient relationship (27, 33). Effects of the present study can be explained effectively according to the logic model suggested in this study.

This study has some limitations. First, although the total number of patients participating in the program was 16,758, the final number of participants included in this analysis was 1,716 (10.2%). The present analysis only included patients who satisfied conditions of having blood pressure measurements at the time of registration (baseline) and 3- and 6-month follow-up examinations. Most patients who participated in the program did not meet these conditions due to various reasons, such as falling short of the required number of visits and dropping out of the program halfway, resulting in a small number of participants who qualified for the study. The second limitation was that there was no control group for comparison with participating patients. We used administrative data to track patients' blood pressure and a cross-sectional survey for measuring other variables. In the survey, we asked patients' recognition of change. Therefore, there might be a possibility of recall bias or bias due to generous answers.

Conclusion

This study is significant in that it is the first to evaluate the effect of Korea's first primary care-based chronic disease management program that reinforces the role of primary care. This study measured blood pressure levels of participants with hypertension and tracked changes over time. Reinforcing the role of community-based primary care could significantly improve the health of patients with hypertension. Present results provide critical information for supporting primary care reinforcement which is gaining importance globally. Furthermore, such information may be valuable to reinforce primary care or to reform healthcare systems in other developing countries that have vulnerable primary care or healthcare systems similar to Korea.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

None declared.

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