A comparison of the medication cost and incidence rate of cardiovascular events between intensive and standard antihypertensive pharmacotherapies in Japan

Hiroshi Yoshihara [1], Ataru Igarashi [1], Tohru Tonoike [2], Hiromitsu Ohno [2], Susumu Nishiuchi [2]
1 The University of Tokyo, Tokyo, Japan, 2 Allied Medical K.K., Tokyo, Japan

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Objective

Hypertension is a major health challenge, imposing an enormous economic burden as well as health burden worldwide.

In Japan, the economic burden of hypertension and related diseases is estimated to be JPY 1.7 trillion (USD 13 billion) per year. When indirect costs such as productivity losses are taken into account, the economic burden increases even significantly.(Asakura et al. 2021) Thus, a more cost-effective management of hypertension is of great importance.

The purpose of this study is to compare health outcomes such as cardiovascular events, along with drug costs and total medical cost for patients with hypertension from two aspects: type of antihypertensive medication and outpatient visit interval, using real world electronic health record data in Japan.

Design and method

For this study, anonymized real-world dataset were provided by Allied Medical K.K. The dataset is based on actual medical practice information collected by electronic medical record software developed by Allied Medical K.K., comprising 58,682 patients from 34 primary care clinics located in Japan.

The outcome measured in this study was the incidence of cardiovascular events (cerebral infarction, myocardial infarction , angina pectoris , and transient ischaemic attack).

Medical costs were also calculated and compared in our analyses. Costs were gathered until the occurrence of the events.

This study compared outcomes between groups with high and low consumption of health care resources on two axes: drug mechanism and visiting interval to clinics. The patients were split into ARB arm and CCB arm based on their prescription history.

Propensity score matching was used to mitigate influences of confounding factors.

A survival time analysis was conducted using a multivariable Mixed Effects Cox-proportional hazards (CoxME) model. To adjust for regional differences, we incorporated each patient's primary clinic as the random effect. A total of seven covariates (age, gender, baseline systolic blood pressure, renal and hepatic disease history, visiting interval to clinic, mechanism of drug action) were included in the CoxME model as the fixed effect. The impact of mechanism of drug action, visiting interval, as well as other covariates on the occurrence of cardiovascular events was assessed using hazard ratio.

Results: patient characteristics and survival analysis

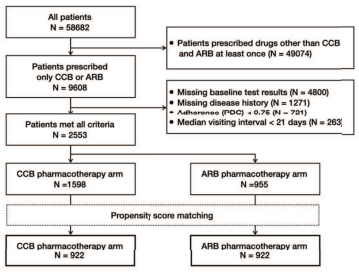

Figure 1

A total of 2,553 patients met inclusion and exclusion criteria (**Figure 1**). **Table 1** shows the baseline characteristics of the enrolled patients.

	Before PS matching			After PS matching		
	ARB arm (N=955)	CCB arm (N=1598)	p value	ARB arm (N=922)	CCB arm (N=922)	p value
Age, mean (SD)	65.0 (12.4)	67.2 (13.0)	<0.001	65.5(12.2)	65.2 (13.2)	0.99
Female, n (%)	482 (50.5)	888 (55.6)	0.001	475 (51.5)	473 (51.3)	0.96
BPS, mean (SD)	139 (18.2)	144 (19.5)	<0.001	140 (18.0)	140 (18.5)	0.87
PDC, mean (SD)	0.929 (0.059)	0.924 (0.058)	0.01	0.929 (0.060)	0.925 (0.057)	0.03
Events, n (%)	35 (3.67)	62 (3.88)	0.87	35 (3.79)	36 (3.91)	1.00
			Disease history			
Renal disease, n (%)	60 (6.28)	87 (5.44)	0.43	53 (5.75)	51 (5.53)	0.92
Hepatic disease, n (%)	172 (18.0)	234 (14.6)	0.03	157 (17.0)	151 (16.4)	0.75
Cardiac disease, n (%)	2 (0.209)	14 (0.876)	0.07	2 (0.217)	1 (0.108)	1.00

Table 1

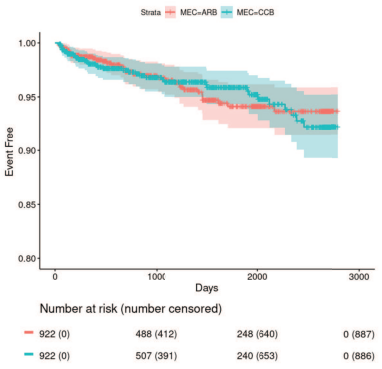

Figure 2

During 6,629 person-years of follow-up, 71 cardiovascular events were observed. The median follow-up period was 3.3 years.

Table 2 shows multivariate-adjusted hazard ratios and 95% CIs obtained from CoxME model. While age at the beginning of treatment had significant impact on the incidence of cardiovascular events, no associations with cardiovascular events were found for mechanism of drug action (= CCB) , for short visiting interval (≦ 36 days), and for all other covariates.

As **Table 3** shows, the groups with longer visiting intervals and the groups prescribed CCB drugs were found to have lower annual healthcare costs than their counterparts.

Variable	Hazard ratio (95%CI)	p value
Age at treatment initiation	1.04 (1.02 - 1.07)	<0.001
Gender	0.975 (0.602 - 1.58)	0.92
BPS at treatment initiation	1.00 (0.989 - 1.02)	0.71
History of kidney-related diseases	1.06 (0.414 - 2.70)	0.91
History of liver-related diseases	1.06 (0.583 - 1.92)	0.85
Drug mechanism = CCB	1.00 (0.603 - 1.66)	1.00
Mean prescribing interval ≦ 36 days	1.72 (0.906 - 3.28)	0.10

Table 2

Total medical costs (JPY)	Drug = ARB	Drug = CCB
Long visiting interval	85702	64302
Short visiting interval	112526	89946

Table 3

Conclusion:

Our results suggest that hypertension can be controlled at a lower cost by using conventional therapeutics and/or longer visiting intervals.

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