

# **DECREASING SYSTOLIC BLOOD PRESSURE VIA INCREASE PATIENTS ADHERENCE BY SHORT TEXT MESSAGES (SMS) AND USUAL CARE OF PHARMACIST ON AMBULATORY HYPERTENSION MANAGEMENT AT INTERNAL DISEASE POLYCLINIC, PKU MUHAMMADIYAH BANTUL HOSPITAL, INDONESIA**

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## **Abstract**

**Background.** Prevalence of hypertension increased in line with changes of life style as smoking, obesity, non physical activity, psycho-social stress in many countries. One of the pharmacist intervention for hypertension management is counseling. This purpose to increase therapeutic outcome and adherence in medicine. World Health Organization (WHO) has suggested that usage text message costly more effective for increasing the adherence to improve the health quality of patients.

**Objective.** This study aim to reveal the impact of pharmacist counseling and reminder motivation via short text messages (SMS) on the adherence and decrease systolic blood pressure of ambulatory hypertension patients in the internal disease polyclinic at PKU Muhammadiyah Bantul Hospital, Indonesia.

**Methods.** Sixty patients were devide into 2 groups, 30 (50%) patients were received pharmacist counseling and reminder motivation via SMS (intervention group) and 30 (50%) were not received pharmacist counseling and reminder motivation via SMS (control group). The ambulatory hypertension patients data were collected prospectively during the period of January until April 2013. Exclusion criteria were patients with pregnant, deaf, illiterate, and have not hand phone. Data were collected by interview and take the questioner Morisky Medication Adherence Scale (MMAS). Blood pressure data were taken from medical records.

**Outcome Measured.** Adherence and systolic blood pressure of ambulatory hypertension patientns.

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**Result.** The results showed that pharmacist counseling and reminder motivation via SMS could improve the patients adherence in the intervention group (83.3%) in comparison to the control group (20%) ( $p=0.000$ ). Pharmacist counseling and reminder motivation via SMS could also decreased the systolic blood pressure in the intervention group ( $15.37\pm23.69$  mmHg;  $p=0.001$ ). There was no decreasing the systolic blood pressure ( $1.27\pm18.89$  mmHg;  $p=0.730$ ) in the control group. But, there were no correlation between MMAS and systolic blood pressure ( $p=0.649$ ;  $r=0.008$ ).

**Conclusion.** In conclusion, the pharmacist counseling and reminder motivation via SMS can improve adherence on antihypertension management, and decrease systolic blood pressure as well.

**Keywords** hypertension, pharmacist counseling, adherence, systolic blood pressure, short text messages (SMS).

## INTRODUCTION

Hypertension is one of the main factors of coronary heart disease and stroke occurrences. WHO has estimated that about 62% of cerebrovascular disease and 49% of ischemic heart disease all across the world may be caused by blood pressure level. The high blood pressure is estimated to have caused 7.1 million deaths per year (WHO, 2003). Hypertension is also one of the causes of death. Vascular complication caused by hypertension may lead to coronary heart disease, myocardial infarction, stroke, and kidney failure.

The hypertension prevalence increases in line with lifestyle changes such as smoking, obesity, physical inactivity, and psychosocial stress in many countries. Hypertension has become a public health problem and will become even into a bigger one if it is not addressed early on.

Health People 2010 for Hypertension suggests the need for a more comprehensive and intensive approach in order to achieve optimal blood pressure control. Thus, to achieve this objective, active participation of peer pharmacists practicing their profession is needed in every single health care (Ministry of Health, 2007).

One of the possible interventions by pharmacists for the hypertension patients' handling is counseling which is intended to

improve therapy result by maximizing the appropriate medications (Rantucci, 1997). One of the benefits of counseling is to improve the patients' adherence of drugs usage. Therefore, mortality rate and losses (both cost and productivity) can be abated (Palaian *et al.*, 2006).

The patients' adherence affects on the success of a treatment. The therapy result will not reach the optimal level without the patients' awareness, in fact, it may lead to a treatment failure, and it may also cause complication which is very harmful, then eventually becomes fatal (Hussar, 1995). The safe and effective drugs therapy will happen if the patients are given proper information about the treatment and the usage (Cipolle, Strand and Morley, 2004).

Based on the research result conducted by Palanisamy and Sumathi in 2009, it explains that the intervention by providing education and counseling to the patients is able to improve adherence in the treatment. Pharmacists' intervention improves blood pressure's control in hypertensive patients who have uncontrolled blood pressure (Mehos *et al.*, 2000). It is also mentioned in the research of Faekeh *et al.*, 2008 which shows that adherence in the treatment is important to control blood pressure.

*World Health Organization* (WHO) has also prioritized the new technology usage to help health improvement (WHO; 2010). The potential for benefits is recently being developed in the

mobile phone technology usage to affect health in developing countries (Lester and Karanja 2008). *Mobile text messages* which uses cheap *short message service* (SMS) as well as communications; are able be used to convey health messages to mobile phones' owners (Kaplan, 2006).

Other studies on *text messaging* usage to improve adherence as the primary service has showed that SMS usage has cost effectiveness (*cost effective*) than phone calls usage (Leong, Chen *et al.* 2006). Dunbar, Madigan *et al.* have reported high patients' satisfaction with two lanes SMS, this indicates that SMS application is easier in health improvement.

The research on the effectiveness of information delivery intervention and SMS reminders via *mobile phone* reminders to hypertensive patients in *comparative, controlled, multicenter cluster randomized study* has been conducted by Contreras, Marquez, *et al.*, 2004. The research by messages intervention provision (*messages*) and message reminders (*reminders*), which are sent through *mobile phones*, providing adherence level research result of 85.1% (CI 74.9% - 95.3%) in the overall research subjects (N = 67 ), 85.7% (CI, 70.5% -100.9%) in the control group and 84.4% in the intervention group (CI, 70.7% -95.3%) (Contreras, Marquez, *et al.*, 2004).

*Self-report* scale to assess adherence in antihypertensive drugs usage has been developed by Morisky *et al.*, (2008). The research to examine psychometric and validity prediction of *self-report medication adherence*'s structure was tested to hypertensive patients in 2007 and was published in January 2008. *Self-report* of drugs usage adherence was measured with new 8 item *self-report Morisky Medication Adherence Scale* (MMAS).

Based on the above, it is necessary to conduct a research to find out the effect of motivational reminders provision via SMS and pharmacy counseling (*usual care*) on adherence of antihypertensive therapy result in internal

medication polyclinic in PKU Muhammadiyah Bantul Hospital, Yogyakarta.

## OBJECTIVE

The objective of this study was to determine the effect of motivational reminders provision via SMS and pharmacy counseling (*usual care*) on adherence of antihypertensive and systolic blood pressure therapy in hypertensive patients in internal medication polyclinic in PKU Muhammadiyah Bantul Hospital, Yogyakarta

## METHODS

The research was conducted prospectively, with a quasi experimental design. The research subjects were divided into two groups, namely the group which received pharmacists counseling (*usual care*) and motivational reminders via SMS (intervention group) and the other one which did not receive counseling and motivational reminders via SMS (control group). The inclusion criteria were adult patients, both men and women; aged between 18 year-old - 65 year-old, who conducted control in internal medication polyclinic in PKU Muhammadiyah Bantul Hospital, Yogyakarta, they were diagnosed by a doctor to have suffered levels I and II hypertension with or without dyslipidemia and diabetic mellitus ( DM), they got more antihypertensive drugs more than or equal to 1 antihypertensive drug, they had a mobile communication device in the form of hand phones and they were literate, they were willing to join the research. The exclusion criteria were patients with pregnancy, deaf, illiterate and did not have mobile phones. The data was collected by conducting interviews and filling the adherence questionnaire of Morisky Medication Adherence Scale (MMAS), while blood pressure value was taken from medical records.

Statistical analysis used normality test, if  $P > 0.05$  normally distributed, independent t-test and paired t-test, whereas if  $p < 0.05$  distribution is not normal; Mann Whitney and Wilcoxon test

is used.  $p < 0.05$  significance indicates significant different result between groups.

## RESULT AND DISCUSSION

### The Patients' Demography

The research was conducted during January to April 2013 in internal medication polyclinic in PKU Muhammadiyah Bantul Hospital, Yogyakarta. The research was conducted prospectively toward hypertension outpatients. Sampling was done by consecutive sampling method, whereas all subjects came sequentially and met the selection criteria were included in the research until the number of the subjects required fulfilled. The subjects' selection for each group was done randomly, whereas all subjects who met the research criteria were divided into two groups by putting the odd-numbered subjects into the control group, while even-numbered subjects were included into the treatment group.

The research subjects obtained 60 patients who were included in the inclusion criteria. The subjects who joined the research from the beginning to the end of the research were 60 patients, consisting of 30 patients who received pharmacist counseling and motivational reminders via SMS (treatment group) and 30 patients who did not receive pharmacist counseling and motivational reminders via SMS (control group). The socio-demographic and clinical data both on control and treatment groups are on table I. In this research, the relationship of the various subjects' characteristics in the treatment and the control groups obtains a non-significant relationship ( $P>0.05$ ) among the characteristics of gender, age, education, employment, payment, history of hypertension, smoking habits, and hypertension level (Table I.).

In this research, based on the data characteristics of the patients, it can be seen that

the majority of the research subjects; both control and treatment groups are women, each amounted to 21 (70.0%) in the control group and 22 (73.3%) in the treatment group, with the most dominating age is in the range of 50-59 year-old; i.e. 16 (53.3%) in the control group and 13 (43.3%) in the treatment group. The patients' education level dominates on educational age of 0-9 years, 20 (66.7%) in the control group and 14 (46.7%) in the treatment group.

This research also conducted assessment whether there was or there was not an existence of cardiovascular risk factors, namely smoking habits and hypertension history. The majority of the patients did not have smoking habits both in control and treatment groups (90%, 93.3%), while for hypertension history in the treatment group shows higher number; i.e. 66.7% compared to the control group which dominates the patients with no hypertension history previously, which is 30%. Either on the control group or the treatment group shows to have patients with hypertension degree I, whereas 19 (63.3%) in the control group and 17 (56.7%) in the treatment group.

### Adherence Assessment

The patients' adherence affects on to the success of a treatment. The therapy result will not reach the optimal level without the awareness of the patients themselves, in fact, it may lead into a treatment failure, and it may also cause highly harmful complication and eventually becomes fatal (Hussar, 1995). Thus, it requires outpatients' non adherence identification to determine the effectiveness of the hypertension control level improvement.

In this research, the patients' adherence parameter was measured using the MMAS both on the control group and the treatment group. MMAS score assessment result is shown in Table II, as following.

**Table I. Socio demography**

Patients characteristics	Intervention group		control group		P Spearman/ Pearson
	(n=30)	%	(n=30)	%	
<b>sex</b>					
men	8	26.7	9	30.0	0.604
woman	22	73.3	21	70.0	
<b>Age (years old)</b>					
18-29					0.619
30-39	1	3.3			
40-49	9	30.0	5	16.7	
50-59	13	43.3	16	53.3	
60-65	7	23.3	9	30.0	
<b>education level</b>					
0-9 years	14	46.7	20	66.7	0.423
10-12 years	8	26.7	6	20.0	
>12 years	8	26.7	4	13.3	
<b>Job</b>					
Employment civil servants	7	23.3	7	23.3	0.536
entrepreneur	21	70.0	16	53.3	
Labor	2	6.7	5	16.7	
Not work			2	6.7	
<b>payment</b>					
General	10	33.3	12	40.0	0.833
Askes	13	43.3	9	30.0	
Jamkesmas	4	13.3	8	26.7	
Other insurance	3	10.0	1	3.3	
<b>History of hypertension</b>					
Yes	20	66.7	9	30.0	
No	10	33.3	21	70.0	0.097
Smoking habit					
Smoking	2	6.7	3	10.0	0.053
No smoking	28	93.3	27	90.0	
<b>Degree of hypertension</b>					
Level 1	17	56.7	19	63.3	0.864
Level 2	13	43.3	11	36.7	

**Table II. MMAS score assessment**

Group	Skor MMAS					
	High Adherence		Moderate adherence		Low adherence	
	Σ	%	Σ	%	Σ	%
Control (n=30)	6	20	16	53.3	8	26.7
Intervention (n=30)	25	83.3	3	10.0	2	6.7
P	0.000*					

The results shows that high MMAS score (MMAS = 8) is bigger in the treatment group than the control group ( $83.3\% > 20.0\%$ ). This suggests that pharmacists counseling and motivational reminders provision via SMS have

a positive impact in adherence improvement in the treatment group. It is also in accordance with the meta-analysis of the research result on the effect of reminder system on patients' adherence, whereas in the research mentions that the

reminder system may be in the form of via telephone calls, text messages, pagers, video telephone calls, etc. They can significantly improve adherence in treatment group (which received the reminders) compared to the control group (66.61%, 54.71%) (Sarah DF, *et al*, 2012).

Statistical comparison between MMAS value in the control group and the treatment group is done by testing the normality. Kolmogorov Smirnov normality test result shows that the data of control group and the treatment group are not normally distributed; therefore, non-parametric Mann-Whitney test is conducted. Mann-Whitney test result indicates significance of 0.000 ( $P < 0.05$ ), this shows that there is a significant difference between MMAS scores in the control and treatment groups.

Approach to assess treatment adherence may use self-report, pill counts, pharmacy records, drug levels. Measurement uses patient self-report is more concise, quicker and easier to use, but the drawback is more subjective (Cook *et al*, 2005; Garber *et al*, 2004). Currently, a more effective way in more effective measurement has been developed to evaluate the adherence, namely the new 8-item self-report Morisky Medication Adherence Scale (MMAS) (Morisky, *et al*, 2008; Garber, *et al*, 2004).

MMAS categorizes the patients' adherence into 3 categories: high (score 8), moderate (grades 6 - <8), and low (score < 6). The research result also shows the patients are included in low adherence category. This becomes a challenge for pharmacists and clinicians in the future to determine effective treatments. The research result suggests many

factors that can affect lower adherence in the patients, for example the factors of negligence, depression, the lack of the patients' knowledge about hypertension and its treatment, clinical condition (TD) which is already improved makes the patients decide stopping their treatment, the drugs' side effect, economic factor, as well as excessive prescribing which makes the patients feel tired to take their medication and the patients' life quality themselves.

### Blood Pressure Assessment

Hypertension level was assessed at the beginning when the patients entering the research, which was measured by systolic blood pressure and diastolic blood pressure at the first control or disease treatment in internal medication polyclinic in PKU Muhammadiyah Bantul Hospital, Yogyakarta. Hypertension degree identification after systolic and diastolic blood pressure measurement was done on the patients who became the research subjects based on JNC VII classification.

In this research, the majority of the patients were included in the hypertension level 1 and 2. The research result shows that there is no difference in early hypertension level (pre) from the treatment group and the control group based on Mann Whitney analysis (blood pressure systole  $P = 0.343$ ), Table III.

The research result on systolic blood pressure at the beginning of the research (pre) both in the control and treatment groups shows no significant difference in the mean of systolic blood pressure either on the control group

**Table III. Adherence and blood pressure in intervention and control group pre counseling and motivational reminders via SMS**

Patients characteristics	Intervention group		Control Group		P
	(n=30)	%	(n=30)	%	
Adherence	30	6.45±1.77	30	5.8±1.86	0.172
Blood Pressure	30		30		
Sistole	30	153.53±19.67	30	148.53±20.83	0.343
Diastole	30	89.73±10.34	30	83.76±10.26	0.029*

**Table IV.** the different of blood pressure pre and post in intervention and control group.

Patients characteristics	Intervention group (n=30)			Control group (n=30)		
	Pre	Post	P	Pre	Post	P
	mean±SD	mean±SD		mean±SD	mean±SD	
Tekanan darah						
Sistol	153.53±19.67	138.17±17.64	0.001	148.53±20.83	147.27±20.79	0.730
Diastol	89.73±10.34	83.00±10.22	0.018	83.77±10.26	83.33±9.31	0.786

(148.53 mmHg) and the treatment group (153.53 mmHg) ( $P = 0.343$ ) Table III.

Systolic blood pressure; both before and after treatment in the control group and the treatment group is shown in Table IV below. Wilcoxon analysis result shows that in the treatment group; significant systolic blood pressure changes happen before and after the pharmacists' counseling (pre) and motivational reminders provision via SMS ( $P = 0.001$ ), than in the control group ( $P = 0.730$ ).

This suggests that pharmacists' counseling and motivational reminders via SMS affect on the patients' adherence and they give effect of systolic blood pressure reduction in the treatment group.

Significant blood pressure change in the treatment group is indicated by systolic blood pressure reduction prior to the research / treatment (pre) until after the research / treatment (post) which is of 15.37 points, while the control group experiences non significant reduction of 1.27 points (Table V).

Significant systolic blood pressure reduction in the treatment group shows the influence of the pharmacists' counseling on blood pressure control. This is consistent with the previous research which states that pharmacists' intervention can improve blood

pressure in hypertensive patients (Mehos *et.al*, 2000).

## CONCLUSION

Based on this research, it can be concluded that counseling provision (usual care) and motivational SMS reminders by pharmacists to hypertensive patients can improve the patients' adherence in undergoing the drugs' therapy, as shown by the reduction of the patients' systolic blood pressure ( $p < 0.05$ ).

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**Table V.** the different of blood pressure pre and post in intervention and control group

Patients characteristics	Intervention group (n=30)		Control group (n=30) mean±SD	P
	mean±SD			
Blood Pressure				
Sistole	15.37±23.69		1.27±19.89	0.015*
Diastole	6.73±14.72		0.433±8.66	0.048*

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