

Brief Counseling and Mobile Phone Short Message Service (SMS) Increase Patient Compliance

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Abstract—Chronic Obstructive Pulmonary Disease (COPD) is a chronic inflammatory lung disease that is irreversible and progressive. One of the factors that plays a role in the success of COPD disease control is compliance in taking the drug. This research aimed to know the effect of SMS and brief counseling on compliance level in COPD outpatient at Pulmonary special Hospital in Bantul Yogyakarta. The research was conducted between the December 2014 and January 2015. This research used experimental study with pre and post controlled group design. There were 33 patients for each group. The intervention group received SMS and brief counseling, while the control group received standard care. The level of compliance data was collected based on interviews using Morisky Medication Adherence Scale (MMAS) questionnaire. The results showed that from 66 patients, 49 patients (72.2%) had a high level of compliance, 12 patients (18.2%) a moderate compliance and 5 patients (7.6%) a low compliance. MMAS analysis results showed that there was significant difference $p = 0.000 (<0.05)$ between before and after intervention. For the control group there was no significant difference $p = 0.306 (> 0.05)$. SMS and brief counseling in patients with COPD effectively enhanced the patient's compliance.

Index Terms—COPD, MMAS, SMS, brief counseling, patient's compliance

I. INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) was a chronic lung disease characterized by irreversible airflow resistance in the airways. Airflow resistance usually associated with pulmonary inflammatory response [1]. World Health Organization (WHO) estimates that COPD as the most common disease suffered [2]. Its ranking will rise from 12th into 5th in 2020 [2], [3]. The increase COPD cases in Indonesia are caused by the increase in the number of risk factors, life expectancy, smoking and air pollution [1], [2], [4]. In last

decade, tobacco smoke population and air pollution in Indonesia increased significantly [4]-[6].

COPD is a lung disease that is not completely curable. Pharmacological therapy for COPD aimed at relieving symptoms, improving quality of life, and preventing or treating exacerbations [1], [3]. COPD management can be complex. Lifestyle behaviors and pharmacological treatments can affect the control of COPD, which are primarily the responsibility of those affected. Successful management of COPD requires individuals to commit to drug using and lifestyle changes such as healthy diet, physical activity, stop smoking and also to adhere to recommended drug therapy. Drug use was carried out in patients with COPD in long time as long as the disease. In COPD patient drug is used to reduce symptoms and inhibit the rate of damage to the lungs. Throughout his life, the patients will depend on the drugs [1]. Controlling effort is to avoid recurrence and prevent complications that could worsen the health conditions of patients with COPD [1], [6]-[8].

One of the factors that plays a role in the success of COPD control is compliance in taking medication, but not all patients are aware of their health problems, so many of them are disobedient [9]. The level of compliance in COPD is lower than that recorded for other disease. The percentage of compliant patients in COPD is much lower (10-40%) than that reported in the literature (40-60%) and that recorded in clinical trials (70%-90%)[10]. According to the guidelines of asthma diagnosis and management, this could be due to: 1) Drug factors such as difficulty in using inhaled medications, drugs use daily, expensive price and not like medicine; 2) Non drug factors such as misunderstanding or lack of information, fear of side effects, skeptics, forget and not solve the problem that patient suffers [11].

Patient's compliance in taking medication is one of the crucial factors in determining the success of COPD patients therapy [12]-[14]. Brief counseling has been shown as the effective method to improve patient's compliance [15]-[19]. The 5 A's brief counseling initially

are intended to provide a simple guide to brief tobacco intervention and are effective in increasing the proportion of patients who quit smoking in primary care settings. Although 5A brief counseling treatment is effective, there is a strong dose-response relationship between the intensity of counseling and its effectiveness; more frequent contact increases the odds of quitting [20].

Delivery of motivational messages and reminders via SMS increased the awareness of patients and was expected to improve patients' compliance [21]. Excess use of SMS reminders was relatively minor costs. In addition, the health care provider can send messages in many patients at once although they were spread in several different areas. Besides, appropriate counseling can reduce the anxiety of patients with COPD and enhance quality of life [13], [22]. COPD patient's adherence to the therapy was crucial to assess the success of therapy. Therefore, the study was conducted to know the effect of SMS as a reminder and motivation as well as pharmaceutical counseling "brief counseling" on the level of compliance of COPD therapy in Pulmonary special hospital in Bantul Yogyakarta.

II. METHODS

This research used pre and post test with control group design. There were 66 subject, 33 patients for each group. The treatments groups received SMS and pharmaceutical brief counseling, while the control group received hospital standard care. Pharmaceutical brief counseling used a "5A modification" technique. Brief counseling outlined in 5A strategies were assess, advise, agree, assist and arrange [21]. SMS contains a reminder and motivation to take medication delivered every day. Trained pharmacist did the SMS and brief counseling while hospital pharmacist did hospital standard care. The intervention protocol reviewed by expert panel from Ahmad Dahlan University ethic committee.

Research was conducted in December 2014 to January 2015 in Pulmonary special hospital Bantul Yogyakarta. Subjects were recruited by consecutive sampling method, in which all the subjects that come in sequence and meet the selection criteria included in the study. Inclusion criteria were COPD patients and 18-80 years old. Doctors at Pulmonary special Hospital Yogyakarta clinically determined COPD patient diagnosis. Based on the criteria COPD of GOLD [4], participants were patients who were clinically diagnosed with COPD and FEV1 < 70 %. Exclusion criteria were patients who were pregnancy, deaf, illiterate, over 80 years old and not having a mobile phone. The researcher explained the purpose and background of the research to the subject. Patients had to sign an agreement after receiving an explanation if the patient understood and agreed to participate in this study.

Patient's compliance was measured with Morisky Medication Adherence Scale (MMAS) questionnaire [14], [23]. MMAS questionnaire had been validated. MMAS often used to assess compliance with the treatment of patients with chronic diseases, such as COPD. The level

of patient compliance measured before and after intervention.

Proportion difference of demographic parameters were analyzed with chi square test. Mean difference of MMAS score were analyzed with Wilcoxon and Mann-Whitney, as obtained data were not normally distributed.

III. RESULT

A. Demographic Characteristics of Subject

There were 33 patients in the control and 33 patients in intervention groups who met the inclusion criteria during the period December 2014 - January 2015 in an outpatient Pulmonary Special Hospital Yogyakarta. Table I describes base line demographic characteristic of subject. Base line characteristics of the subjects were similar ($p>0.05$) in the two groups (Table I).

TABLE I. THE BASE LINE OF DEMOGRAPHIC CHARACTERISTIC OF SUBJECT IN OUTPATIENT PULMONARY SPECIAL HOSPITAL, YOGYAKARTA

Patient's characteristics	Control Group		Intervention Group		P Spearman
	(n=33)	%	(n=33)	%	
Gender					
Male	22	66.7	30	90.9	0.82
Female	11	33.3	3	9.1	
Age (year)					
40-50	1	3.0	2	6.1	0.73
51-60	8	24.2	5	15.2	
>60	24	72.7	26	78.8	
Education					
Low (Grammar School – junior High School)	28	84.8	26	78.8	0.70
Medium (High School)	2	6.1	7	21.2	
High (Degree)	3	9.1	0	0	
History of COPD					
There is a family history	5	15.2	9	27.3	0.86
There is no family history	28	84.8	24	72.7	
Job					
Low (not working, farmer, factory worker)	29	87.9	29	87.9	0.434
High (official, entrepreneur)	4	12.1	4	12.1	
Smoking Status					
Had smoked	15	45.5	23	69.7	0.004
Never smoked	18	54.4	10	30.3	

Based on the Table I, the highest proportion of COPD patients were male, each amounted to 22 patients (66.7%) in the control group and 30 patients (90.9%) in the intervention group. This was consistent with the prevalence of COPD in the world; the number of male patients with COPD is greater than female. The prevalence of COPD based Survey 2004 was 13 out of 1,000 inhabitants [16]. It was also associated with a high prevalence of smoking in men, where smoking was a risk factor for COPD [2], [3], [7], [24]. Based on the review

and meta- analysis, tobacco smoking has been shown to be a contributing factor and the factor of the amplifier COPD. Initially cigarette smoke irritates the epithelium of bronchi and bronchioles, followed by an inflammatory reaction. But over time due to exposure to cigarette smoke that continually leads to changes in the structure of bronchi and bronchiolus due to chronic inflammatory reactions [1], [4], [7].

By age, there was an increasing trend in the COPD patients over 60 years of age category. The majority of subjects were geriatric patients, 72.2% in control group and 78% in treatment group. This was in line with the results of Mahawati's study, where the highest proportion of old people with COPD was in the age group above 60 years (74.8) with the proportion of 54.49% male and 18.32% female[5]. Due to aging, geriatric patients have experienced a decline in physiological function. respiratory system is one of the body's organ systems are easily decreased function as a result of aging . There are two reasons why COPD is more common in the geriatric, (i) the occurrence of degenerative processes as a result of aging and (ii) failure to take medication due to a decline in memory function [6]. Poor drug compliance plays a substantial part in the progressivity of asthma disease that it's finally become COPD [3]. Studies of elderly patients have shown that majority of elderly do not take the drugs prescribed and make errors in their medication [3]. Mostly elderly patients do not understand their asthma drug regimens. More than one-third of elderly patients the resulting errors actively endanger their health [3], [4].

Based on the level of education, the majority of the control group and the intervention group were poorly educated (elementary and secondary). subjects with low education in the control group was 84.8 % and in the treatment group was 78.8 % . The results of this study were appropriate or consistent with previous studies [24]. In accordance with the level of education the majority of people's jobs were low (no work, workers, and farmers). The job as farmers' closely associated with allergy and bronchial hyperactivities, where workers worked in a dusty environment and harmful exposure to pesticides. Chemicals pesticides also affect the nervous system and are more at risk of developing of COPD. Another risk factor also associated with COPD in farmers is smoking. WHO (2010) report showed that by occupation, the most prevalence of smokers was fishermen/farmers or laborers, followed by self-employed and employees [2], [7], [24].

This study assessed the characteristics of smoking habit and family history in the diagnosis of COPD. In the control group there were 15 patients (45.5%) and 23 patients (69.7%) in the intervention group who previously had a habit of smoking but had stopped. As for family history in the intervention and control group, subjects who had no family history dominated group. This means that anyone can be at risk for COPD even though there is no history in the family.

B. Patient's Compliance in Pre and Post Intervention

Oral brief counseling and SMS reminder improve patient's knowledge about COPD disease and motivate

patients to grow awareness for adherence. Medication reminder system in previous study showed that it was one of effective method to improve patient compliance. Combination of reminder system and education & motivation provided benefits to patients to adhere to treatment [23].

In COPD patients, compliance with drug therapy is a crucial point to realize the goal of therapy. Treatment failure in patients with COPD in general is because of disobedience patients. Table II shows the level of COPD patient compliance in outpatient pulmonary special hospital Yogyakarta.

TABLE II. THE LEVEL OF COPD PATIENT'S COMPLIANCE AT THE PRE AND POST INTERVENTION IN OUTPATIENT SPECIAL PULMONARY HOSPITAL, YOGYAKARTA

Group	Level of Compliance			total n
	Low n	Medium n	High n	
Pre				
Intervention	11	7	15	33
Control	6	9	18	33
Total	17	16	33	66
Post				
Intervention	1	3	29	33
Control	4	9	20	33
Total	5	12	49	66

Based on the Table II, from the total number of 66 COPD patients, there was a positive change in the post-study comparison to the pre study. In the pre group the low compliance subjects were 17 patients, while in the post study there were 5 patients. The intervention has reduced number of the low compliance level subject. While the intermediates level of compliance with the total subject of 16 patients in pre to 12 patients in post, while at the high level of adherence total number of 33 patients to 49 patients. This shows that the treatment given can improve medication adherence in patients with COPD.

Many studies on the treatment that aims to improve compliance were developed. In addition, the role of health professionals (especially pharmacists) was needed in the process of determining patient treatment options. The pharmacists counseling increase patient's knowledge and understanding about the COPD. The COPD disease cannot return to normal. Irregular drug consumption can cause recurrence or complications that may worsen the patient's condition [21], [22], [24].

C. MMAS Score in Pre and Post Intervention

MMAS often used to assess patient compliance to take the drug treatment of patients with chronic diseases, such as COPD. The effect of brief counseling combination with reminder and motivation SMS intervention to MMAS score were observed in the control group and the intervention group at the first visit (pre) and the second visit (post). Table III describes the effect of brief counseling combination with reminder & motivation SMS intervention to the MMAS score at the first visit (pre) and the second visit (post).

Normality test showed that the data of control and intervention groups were not normally distributed so that a non-parametric test was done, namely Wilcoxon test to

determine differences in the level of compliance at the first visit (pre) and the second visit (post) and the Mann-Whitney test to know the difference of compliance rate between intervention and control groups.

TABLE III. MEAN OF MMAS SCORE IN PRE AND POST INTERVENTION OF COPD PATIENT IN OUTPATIENT SPECIAL PULMONARY HOSPITAL, YOGYAKARTA

Group	Pre	Post	p1	p2	p3
Control (n=33)	1.64 ±0.78	1.26 ±0.71	0.31 ^(a)	0.05	0.03*
Intervention (n=33)	1.56 ±0.89	1.15 ±0.44	0.00 ^{*(b)}		

Explanation: p1=(a) significance of pre and post control group, (b) significance of pre and post treatment group; p2 = significance of pre control with pretreatment; p3 = significance of post control with post treatment

The results of assessments of COPD patient's compliance grade of intervention group at the first visit (pre) and the second visit (post) showed the results of $p = 0.000 (<0.05)$. The result indicated that the grade of compliance of patients with COPD at the first visit (pre) with a second visit (post) in the intervention group had significant difference. Whereas in the control group it showed the results of $p = 0.306 (> 0.05)$, indicating that in the control group there was no significant difference between pre and post.

The result of the research was in line with that shown by Mulyanti (2014) in which the brief counseling and provision of SMS as a reminder and motivation given by pharmacists can positively improve diabetic with hypertension patient's medication adherence of outpatient in internal disease polyclinic of public district Hospital period from April to June, 2014 [19], [22], [25]. Brief counseling has been shown as the effective method to improve patient's compliance [18], [19]. Brief counseling by pharmacists proves effective in helping patients quit smoking in Qatar [26].

Delivery of motivational messages and reminders via SMS increased the awareness of patients and was expected to improve patients' compliance [20].

IV. CONCLUSIONS

Medication compliance in COPD outpatients in Pulmonary Special Hospital Bantul Yogyakarta showed that from 66 patients after a given intervention, 49 patients (72.2%) had a high level of compliance, 12 patients (18.2%) had a moderate compliance and 5 patients (7.6%) had a low compliance rate. MMAS analysis results showed a significant difference $p = 0.000 (<0.05)$ between before and after treatment. Whereas the control group showed the results of $p = 0.306 (> 0.05)$, indicating that in the control group there was no significant difference between pre and post. Thus, it can be concluded that brief counseling combination with remainder & motivation SMS intervention in patients

with COPD was effectively enhance the patient's medication compliance.

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REFERENCES

- [1] L. M. Fabbri, S. S. Hurd, and GOLD Scientific Committee. "Global strategy for the diagnosis, management and prevention of COPD: 2003 update," *European Respiratory Journal*, vol. 22, pp. 1-2, 2003.
- [2] WHO. "Indonesia Global Adult Tobacco Survey (GATS)," Indonesia report, 2011 [Online]. Available: http://www.who.int/tobacco/surveillance/survey/gats/indonesia_report.pdf.
- [3] GINA (Global Initiative for Asthma). (2014). "Pocket Guide for Asthma Management and Prevention in Children," 2014 [Online]. Available: www.ginaasthma.org.
- [4] M. D. Eisner, N. Anthonisen, D. Coultas, and N. Kuenzeli, "An official American thoracic society public policy statement: Novel risk factors and the global burden of chronic obstructive pulmonary disease," *Am J. Respir Crit Care Med*, vol. 182, pp. 693-718, 2010
- [5] E. Mahawati, "Instrumen deteksi dini paparan kronis pestisida dalam pengendalian faktor Risiko PPOK (Penyakit Paru Obstruktif kronis) pada petani di kecamatan gubuh, tanggungharjo dan tegowanu kabupaten grobogan," *Disertasi, Fakultas Kesehatan Masyarakat Universitas Dian Nuswantoro*, Semarang, 2014 (Indonesian).
- [6] D. M. Mannino and A. S. Buist, "Global burden of COPD: Risk factors, prevalence, and future Trends," *Lancet*, vol. 370, pp. 765-773, 2007
- [7] Global Initiative for Chronic Obstructive Lung Disease (GOLD), "Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease," 2014 Global Initiative for Chronic Obstructive Lung Disease, Inc, 2014
- [8] K. M. Kew, S. Dias, and C. J. Cates, "Long-acting inhaled therapy (beta-agonis, anticholinergics and steroids) for copd: A network meta-analysis," *Cochrane Database Syst Rev.*, Mar. 2014.
- [9] M. T. Brown and K. B. Jennifer, "Medication adherence: WHO cares?" *Mayo Clin Proc*, vol. 86, no. 4, pp. 304-314, 2014.
- [10] K. V. Ramanath, C. H. Nagakishore, and M. Kumar, "A study on medication adherence & quality of life in Asthma & Chronic Obstructive Pulmonary Diseases (COPD) of rural population in a Tertiary care hospital," *Indo Global Journal of Pharmaceutical Sciences*, vol. 1, no. 4, pp. 315-327, 2011.
- [11] S. K. Chhabra, "Assessment of control in Asthma: The new focus in management," *The Indian Journal of Chest Diseases & Allied Sciences*, vol. 50, pp. 109-115, 2008.
- [12] A. Sanduzzi, P. Balbo, P. Candoli, G. A. Catapano, P. Contini, A. Mattei, et al., "COPD: Adherence to therapy," *Multidisciplinary Respiratory Medicine*, vol. 9, p. 60, 2014.
- [13] M. Takemura, K. Mitsui, and R. Itotani, "Relationships between repeated instruction on inhalation therapy, medication adherence, and health status in chronic obstructive pulmonary disease," *International Journal of COPD*, vol. 6, pp. 97-104, 2011.
- [14] D. E. Morisky, A. Ang, M. A. Krousel-Wood, and H. Ward, "Predictive validity of a medication adherence measure in an outpatient setting," *J. Health-Syst. Pharm*, vol. 10, pp. 348-354, 2008.
- [15] D. Morisky and P. Munter, "New medication adherence scale versus pharmacy fill rates in senior with hypertension," *American Journal of Managed Care*, vol. 15, no. 1, pp. 59-66, 2009.
- [16] D. Touchette, "Improving adherence in the community and clinic pharmacy settings: An emerging opportunity," *Pharmacotherapy*, vol. 30, pp. 425-427, 2010.

- [17] S. S. Biradar, K. Rajasekhar, R. Srinivas, and S. A. Raju, "Assessment of pharmacist mediated patient counseling on medication adherence in hypertension patients of south Indian city," *IRJP*, vol. 3, no. 5, pp. 251-255, 2012.
- [18] S. Chhbra and A. Kotwani, "Effect of patient education and standard treatment guidelines on asthma control: An intervention trial," *WHO South-Asia Journal of Public Health*, vol. 1, pp. 42-51, 2012.
- [19] R. Mulianti, Akrom, and A. Jatiningrum, "Pengaruh brief counselling dan Short Message Service (SMS) terhadap tingkat perilaku adherensi, kepatuhan minum obat dan hasil terapi pasien diabetes melitus dengan hipertensi rawat jalan di poliklinik penyakit dalam RSUD panembahan senopati bantu Yogyakarta," Tesis, Fakultas Farmasi Universitas Ahmad Dahlan, Yogyakarta, 2014.
- [20] J. M. Williams, "Nonpharmacologic approaches to facilitate smoking cessation," *Adv Stud Pharm*, vol. 4, no. 8, pp. 221-224, 2007.
- [21] F. Sarah, "The effect of reminder systems on patients adherence to treatment," *Patients Prefer Adherence*, vol. 6, pp. 127-135, 2012.
- [22] M. L. Moy, E. Israel, and S. T. Weiss, "Clinical predictors of health-related quality of life depend on asthma severity," *Am. J. Respir. Crit. Care Med.*, vol. 163, pp. 924-929, 2001
- [23] X. Tan, I. Patel, and J. Chang, "Review of the four item Morisky Medication Adherence Scale (MMAS 4) and eight item Morisky Medication Adherence Scale (MMAS 8)," *Innovations in Pharmacy*, vol. 5, no. 3, 2014.
- [24] M. B. Ospina, D. Voaklander, A. Senthilvelan, M. K. Stickland, M. King, A. W. Harris, *et al.*, "Incidence and prevalence of chronic obstructive pulmonary disease among aboriginal peoples in Alberta, Canada," *PloS One*, April 13, 2015.
- [25] J. Bryant, V. M. McDonald, A. Boyes, R. Sanson-Fisher, C. Paul, and J. Melville, "Improving medication adherence in chronic obstructive pulmonary disease: A systematic review," *Respiratory Research*, vol. 14, pp. 109, 2013.
- [26] M. S. El Haj, R. R. Al Nakeeb, and R. A. Al-Qudah, "Smoking cessation counseling in Qatar: Community pharmacists' attitudes, role perceptions and practices," *Int. J. Clin. Pharm.*, vol. 34, no. 4, pp. 667-676, 2012.



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