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# Impact of Pharmacists' Involvement in Home Medication Review (HMR) Among Stroke Patients in Terengganu, Malaysia



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## ABSTRACT

Home medication review (HMR) is a continuity of patient's care from ward to patients' home before patient came to clinic for follow up. HMR helps to promote optimal and quality use of medication at patients' home. It is very important in helping to improve patients' and caregiver' knowledge and understanding about medicines. The objectives of this study were to determine the effectiveness of pharmacist's intervention on patients' blood pressure, glucose level and cholesterol level pre- and post-HMR. This retrospective cohort study was conducted and data of post-stroke patient from January to December 2015 who underwent HMR services in a tertiary hospital were included and had at least 2 sessions of HMR were chosen for this study.

Patients' blood pressure, glucose reading and cholesterol level pre and post-HMR were recorded together with pharmacists' intervention. Data analysis was done by using SPSS v. 21 with  $p < 0.05$  considered as statistically significant. Our study showed the significant reduction of SBP, glucose and cholesterol level before and after HMR. Thus, pharmacists' involvement and intervention during HMR visits help in reduction of blood pressure, blood glucose level as well as cholesterol level in post-stroke patients.

## INTRODUCTION:

Stroke is known to be the second and fifth leading cause of death in the population above the age of 60 years old and aged 15 to 59, respectively.(1)In Malaysia, it is the third largest cause of death and one of the top five leading causes of disease with a marked increment of incidence and prevalence of both ischemic and hemorrhagic strokes from 2010 to 2014.(2, 3)The risk of recurrent stroke is greatest in the first 6 months, with hypertension, diabetes mellitus, and elevated serum lipids remained as important risk factors.(4, 5)One study revealed that medication not taken as prescribed increased the risk of stroke by six times.(6)Despite all the evidence, the medication adherence level is still remaining low with the commonest explanation cited by patients were they did not feel the need to take the medication.(7, 8)

Home medication review (HMR) is defined by Malaysia Ministry of Health (KKM) as a form of continuity of patient's care from the ward and Medication Therapy Adherence Clinic (MTAC) to patient's home. HMR involves a multidisciplinary team consisting of pharmacists, nurses, physiotherapist and occupational therapists.(9) However, pharmacists are the one designated to conduct HMR and can carry out HMR sessions without the home care team. HMR is important in helping stroke patients to improve their knowledge and understanding about medicines and promoting the optimal and quality use of medication at patients' home.

Although this service is relatively new in Malaysia, there is increasing data to support the role and benefit of such services in this setting. (10) Several studies have reported the provision of home care pharmacy services in supporting patients after discharge from acute care.(11, 12) Other literature has affirmed the benefit of a home visit by a pharmacist after hospital discharge on patients' quality of life and outcomes such as unplanned readmissions, and out-of-hospital deaths.(13, 14)

HMR service in our set had been initiated in 2009. It is the collaboration between the pharmacist and home care team which included home care nurses, physiotherapists, and occupational therapist. The referral will be done by from the physician and the patients were telephoned one day prior to the scheduled home visit to arrange the visit.

This services targeted post-stroke patient with Modified Rankin scale (MRS) of three to five. This well-established scale used for evaluating stroke patient outcomes. It is ranging from 0

=No symptoms at all, 1 = No significant disability despite symptoms; able to carry out all usual duties and activities, 2= Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance, 3= Moderate disability; requiring some help, but able to walk without assistance, 4=Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance, 5= Severe disability; bedridden, incontinent and requiring constant nursing care and attention and 6=dead.(15) Apart MRS scale, nasogastric tube patient with multiple medications and had the history of poor compliance to medication also included.

Consent will be obtained from patient or caretaker in order for home visits to be carried out. The workflow and documentation used during this HMR service were strictly based on Home Medication Review Protocol published by Malaysia Ministry of Health.

The HMR pharmacist also has obtained the written permission from the head of the pharmacy to conduct this service. Prior to conduct the HMR service, all pharmacists must attend the short course training program under assigned senior pharmacist and received the certificate from Malaysia Ministry of Health.

#### **OBJECTIVES:**

The main aim of this study was to retrospectively evaluate the impact of HMR pharmacists' involvement in post-stroke patient's management. The specific objectives were to evaluate the effect of visit and recommendations made by pharmacists on clinical outcome (blood pressure, blood glucose, and low-density lipoprotein (LDL)).

#### **METHODOLOGY:**

Ethics approval for this study was granted by the local institutional review board approval, Malaysia Medical Research, and Ethics Committee (MREC).

The patients included in this evaluation were those who received the HMR pharmacy service from January to December 2015. These patients were originally referred to the HMR service on the basis of standard criteria.(9). During the visit, pharmacist assessed patients' medication regimen for the purposes of identifying and resolving drug-related problems, as well as reconciling the medications the patient was taking at home with what was prescribed at the time of hospital discharge. Compliance assessment also will be performed by using a tool as

provided in the HMR form. Counseling session will be conducted to the patient and/or caretaker based on standardized counseling checklist derived from Malaysia Protocol Medication Therapy Adherence Clinic, Ward & HMR:Neurology(Stroke).(16)

Information collected for review included patients' demographic background (age, gender), major risk factors for stroke, blood pressure, blood glucose, LDL, relevant laboratory results were retrieved from HMR cases and Hospital Information System (HIS) reports, whereas pharmacist recommendations to the physician or patients and pharmaceutical care issue (PCI), were extracted from pharmacist HMR reports. We included all post-stroke patients who underwent at least two sessions of HMR and received pharmaceutical interventions during the HMR. Those who were referred to other facilities were discharged or passed away after one HMR session were excluded. All clinical data provided within the HMR reports were originally compiled and documented by the accredited pharmacists undertaking the HMR reviews. During the study, a member of the research team evaluated the patients' systolic blood pressure (SBP), fasting blood glucose(FBS),HbA1cand LDL at baseline (prior to the HMR service), after the HMR service (based on pharmacist recommendations to the physician), and following physician uptake of pharmacist recommendations. The reason systolic blood pressure selected was that the elevation of systolic blood pressure (SBP) has been identified as an independent risk factor in older patients with hypertension that far exceeds the risk associated with an elevated diastolic BP.(17)

### **Statistical Analysis**

Statistical analyses were performed using SPSS statistical software 21.0 (SPSS Inc., Chicago, IL). Baseline patient characteristics for all continuous variables are presented as mean  $\pm$  SD values. Dichotomous and categorical variables are presented as frequency and percentage of the total. The patients' blood pressure, blood glucose, and LDL level were computed at baseline and after the HMR service. Normality tests were carried out on respective data and suitable tests would be used for subsequent analysis. The change of the outcomes before and after the HMR service was compared by using paired samples t-test.Categorical data were analyzed by Chi-square or Fisher's exact tests; the latter was only used when at least one of the variables had less than five patients or events. A p-value less than 0.05 was considered statistically significant.

**RESULTS**

Table 1 shows the baseline characteristics of the patients (N=43).The mean ± SD age of the patients was 64.49 ± 10.00 years, and 46.5% were male with the majority was Malay. The hypertension (n = 37; 86.0%) was the most frequently identified co-morbidity. Some participants had multiple co-morbidities and they have categorized under each comorbidity accordingly.

**Table 1: Baseline demographic characteristic data of the study participants**

Category	Frequency (%), n=43	Mean (SD)
<b>Age (year)</b>		64.49 (± 10.00)
<65	23 (53.5)	
≥65	20 (46.5)	
<b>Gender</b>		
Male	20 (46.5)	
Female	23 (53.5)	
<b>Race</b>		
Malay	41 (95.3)	
Chinese	2 (4.7)	
<b>Stroke type</b>		
Ischemic	33 (76.7)	
Hemorrhagic	10 (23.3)	
<b>Co-morbidities</b>		
Hypertension (HPT)	37 (86.0)	
Hyperlipidaemia (HPL)	25 (58.1)	
Diabetes mellitus (DM)	24 (55.8)	
Ischemic Heart Disease(IHD)	8 (18.6)	
Atrial Fibrillation (AF)	5 (11.6)	
<b>Modified Rankin Scale</b>		
1	1(2.3)	
2	5(11.6)	
3	13(30.2)	
4	15(34.9)	
5	9(20.9)	

The impact of pharmacists’ involvement in home medication review (HMR) was assessed by using systolic blood pressure (SBP), fasting blood glucose(FBS),HbA1c and LDL. As in Table 2, at the 5% level of significance, the means of SBP, HbA1c, and LDL were found to be significantly reduced after HMR visit.

By using independent-samples t-test and one way ANOVA, factors such as age, gender, stroke type, and functional status were further investigated to determine whether they may

influence the SBP, blood glucose level (FBS and HbA1c) and LDL before and after HMR. We classify the patient based on MRS to functional independence (MRS score of 1-2) and functional dependence (MRS score of 3 to 5)

From the analysis, there was a significant difference in the SBP reduction for male (M=21.13, SD=14.93) and female (M=6.82, SD=22.82);  $t(31) = 2.12, p = 0.042$ . No association was found between other variables.

**Table 2: Comparison of mean SBP, FBS, HbA1c, LDL of patient pre and post HMR**

	Pre HMR	Post HMR	Mean difference (95% CI)	t-statistic(df)	P value
Mean SBP, mmHg (SD)	152.9(25.9)	138.9(26.5)	14.0(6.75,21.25)	3.93(32)	<0.001
Mean FBS, mmol/L (SD)	9.1(6.8)	7.3(3.5)	1.74 (-0.84,4.33)	1.39(24)	0.177
Mean HbA1c, % (SD)	9.5(4.4)	7.1(2.2)	2.43(0.46,4.39)	2.71(11)	0.020
Mean LDL, mmol/L (SD)	4.1(1.5)	2.8(1.7)	1.3(0.65,1.90)	4.21(25)	<0.001

## DISCUSSION:

HMR service was one of the strategies initiated in order to assist in managing post-stroke patient especially based on the result, more than 80 percent of our patient were functional dependent with 20% was bedridden. The result from this study indicated that pharmacists' intervention during HMR brought significant difference in participants' SBP, blood glucose level specifically HbA1c and cholesterol level before and after HMR. This result was in accordance with the previous studies.(14, 18-22) All authors also agreed that pharmacists' involvement in patients' management helped to improve patients' blood pressure and blood glucose as well as overall health involvement.

Recognition of pharmacists' role in Type 2 Diabetes patients' management and the benefits it brought towards patients' health and pharmaceutical care had been highlighted in one systemic review of 36 studies about pharmacists' involvement in patient care.(23) Another meta-analysis study of pharmacist intervention on hypertension management also revealed the same conclusion.(24) One study on the role of the pharmacist in the management of dyslipidemia made a conclusion that pharmacists, regardless area of practice, either in community, ambulatory, or hospital, can play an important role as part of the multidisciplinary team in managing this healthcare problem.(25)

This is due to the role of the pharmacist to identify and resolve issues related to drug interactions, dosing problems, and adverse reactions during HMR sessions. Preventing and resolving such issues are required to ensure that the pharmacists' interventions produce positive patient outcomes. Another study on pharmacist-conducted medication review showed that medication review by pharmacists at the very least can even help to reduce prescribing which may improve their quality of life and yet able to have adequate control over their illnesses. (26)

The risk of recurrent stroke is high and will increase by time from 3.1% at 30 days, to 11.1% at one year after initial stroke. (27) Many studies shown that targeting hypertension, diabetes mellitus and hyperlipidemia carried the highest benefit in reducing stroke burden. (28-32) One study suggested that early, active, and sustained implementation of effective strategies for preventing subsequent cardiovascular events may improve long-term survival after stroke. (33) Furthermore, the disability and survival rate of recurrent stroke patients reported being more severe as compared to first stroke survival. (34) Hence, this positive finding subsequently may help in reducing the risk of a recurrent event.

Further analysis on factors associated with the reduction of systolic BP, glucose level and LDL revealed that reduction of blood pressure was affected by gender whereby age played a role in glucose level reduction which demonstrated by fasting blood glucose.

The mean  $\pm$  SD SBP for male prior HMR was  $148.20 \pm 24.68$  mmHg and female  $152.74 \pm 28.32$  mmHg. After HMR service, both were reduced to  $126.88 \pm 21.41$  mmHg and  $150.12 \pm 26.48$  mmHg, respectively. The significant reduction was seen in a male group. Data on the association of gender with hypertension control have been conflicting. Several studies found better blood pressure control in a male. (35, 36) However, other studies have reported either no difference (37) or identify female gender as a significant predictor of blood pressure control in multivariable models (38, 39) Besides gender, other studies also reported age as the contribution factor for blood pressure control. (38, 40)

Previous studies revealed that diabetes control was influenced by age, and gender (41, 42) but the present study results didn't find the association of diabetes control with gender, age as well as stroke type and functional ability status.

As for cholesterol control, our study couldn't find any association between factors investigated. The finding from a study conducted in outpatient setting shown favoring result

to male in all age group. (22, 43) Interventions such as this home medication review service to improve risk factor control should not target exclusively to patients. Family members need to expand their knowledge of the disease for proper care of their relatives. Considering more than eighty percent of our patients were functional dependent, the support of family members plays a strong role in accomplishing the treatment goal.

During this service, pharmacists' intervention only focused on medications and problems regarding medications. Other issues such as lifestyle and diet which may have the effect on reduction of blood pressure, blood glucose level, and cholesterol level were not investigated. However, a majority of our patients were on nasogastric tube feeding, this limitation was able to be controlled.

## CONCLUSION

Pharmacist involvement in HMR has an impact on the reduction of systolic blood pressure, blood glucose level, and cholesterol level. Hence, HMR service might be offered at other primary or secondary healthcare facilities provided there are enough resources to carry out HMR services to improve patients' health.

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