Original Article

TJPS
The Thai Journal of Pharmaceutical Sciences
39 (3), July-September 2015: 119-126

Preference on medication therapy management (MTM) service: results from discrete choice experiment

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Abstract

Objectives: To assess preference and estimate willingness to pay (WTP) for medication therapy management (MTM) service.

Method: A discrete choice experiment (DCE) was conducted in general population. The five relevant MTM service attributes (service setting, service provider, length of service, frequency of follow up and service fee) were identified from literature reviews, face-to-face interview and survey. The DCE included 7 choice tasks composed of five attributes, two service profiles, and none option using a statistically efficient design. Six questionnaire sets were randomly assigned to 346 samples. The multinomial logistic regression was used to estimate preferences and WTP.

Results: The totals of 265 questionnaires were included in the analysis. All five attributes had statistically significant impact on respondents' utility of MTM service ($p<0.05$). MTM service at drugstore was preferred to home visit and services provided by the same pharmacist was preferred to any available pharmacist. Moreover shorter length of service and follow up with less frequency were preferred. The highest utility model was MTM service provided by the same pharmacist at the drugstore with 20 minutes length of service, 10 weeks follow up, and 150 baht service fee.

Conclusions: MTM service was beneficial and valued by consumers. The WTP and attributes obtained from the study could be used to design pharmacy service benefit package to match with consumer needs and characteristics as well as the amount of reimbursement for pharmacy services.

Key Words: Medication Therapy Management, discrete choice experiment, willingness to pay, preference, pharmaceutical care, pharmacist reimbursement

Introduction

Medication therapy management (MTM) service by pharmacists is one strategy aiming at reducing DRPs. MTM service function encompasses review of the patient's medical history and medication profile, improving the patient's understanding of the disease state and patient drug therapy, helping patients to self-monitor for both desirable and undesirable, medication-related effects, and collaboration with other members of the health care team to optimize drug therapy [1]. Pharmacist performing MTM service offers as an all-encompassing model that incorporates the philosophy of pharmaceutical care, techniques of patient counseling, and disease management in an environment that facilitates the direct collaboration of patients, pharmacists, and other health professionals. MTM services are essential for the delineation of a viable and sustainable practice model for

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Received: 30 April 2015
Revised: 21 July 2015
Accepted: 22 July 2015

Academic Editor: Puree Anantachoti

pharmacists [2]. Several studies illustrate that MTM services can prevent medication-related morbidity, mortality, and also improve health outcomes as well as reduce health care costs especially in elderly patients [3-9].

Even though MTM services have proven essential for better therapeutic outcomes, a survey in United State showed that only 10% of surveyed pharmacies provide MTM services. The common limitations in MTM service provision are lack of time, excessive workload, and lack of personnel. Several studies indicated a lack of financial compensation as a significant barrier [1]. However, in the U.S., MTM services are required to provide for benefits in Medicare Part D plan [10].

In Thailand, MTM services are mainly provided by community pharmacists and funded as a pilot program under the National Health Security Office (NHSO), Bangkok area. The program has started from a few community pharmacists interested in providing home visit for patients with chronic conditions. Now the program has gained the attention from the policy decision makers and expanded to render services not only for chronic condition patients but also for patients confined to bed at home, not only for home visits but also for ambulatory patients visiting community pharmacies, not only in Bangkok but also other provincial areas. Even though the benefit of the MTM services on patient care is proven and needed, the value of the service has not been studied. Thus, the important goal for pharmacy professionals is not only to provide effective services, but also to prove benefits gained from pharmaceutical services by quantifying how much services are valued by the society.

This study was designed to assess societal willingness to pay (WTP) for MTM service by pharmacists that offer improved DRPs and quality of life. The marginal WTP was defined as the price increment that moves consumers from preferring one attribute to another. Furthermore, the attributes of MTM services identified from this study can be used to improve pharmacy services to meet societal needs.

Methods

The discrete choice experiments (DCE) approach is used to assess WTP for MTM services provided by community pharmacists. A DCE is an attribute-based stated preference valuation technique. Respondents are presented with hypothetical choice tasks and are asked to express a preference [11]. The approach is based on the premise that all decisions involve choice and all choices involve sacrifice [12]. In economic theory, people have clear preferences for goods or services and are able to choose preferred goods or services compared to others [13].

Defining attributes and their levels: The four attributes of MTM services including service setting, service provider, length of service and frequency of service were identified from literature reviews [4, 9, 12-14], face-to-face interviews and questionnaire survey. The service fee or cost attribute was included to address WTP for the scenario and marginal WTP for their attributes. Levels of each attribute were assigned considering 4 criteria in order to maximize efficient design [13, 15]. The 4 criteria include a) Orthogonality which means occurrences of any two levels of different attributes in the design were uncorrelated. b) Level balance: all levels of each attributes occurred with equal frequency. c) Minimal overlap: the probability that an attribute level repeats itself in each choice set should be as small as possible. d) Utility balance: options within a choice set should be equally attractive to respondents. The value of each attribute level was based on data from current practices as well as patients' preference from questionnaire survey and face-to-face interview. Moreover attribute levels were assigned to distinguish between alternatives and capturing a realistic range by using data from questionnaire survey.

Level of service setting: This study was focused on the MTM services provided by community pharmacists. This attribute followed the current practice and services provided by community pharmacists at home and at drugstore. Therefore, two levels of service setting including patient's home and drugstore were assigned.

Level of service provider: The level of this attribute referred to a regular pharmacist or any available pharmacist. Since most of patients received MTM services more than once, follow-up services could be by the same or different pharmacists.

Level of length of service: The result from questionnaire survey showed respondents preferred length of service between 30-60 minutes. The actual service duration was within one hour depending on patient's conditions. To achieve the orthogonal design, 3 levels were assigned at 20, 40, and 60 minutes.

Level of frequency of service: Ideally, patients should receive MTM services once a month or once between 2 doctor visits. The normal doctor follow-up appointment was varied between 1-6 months per visit. Three levels of frequency of service including every 2, 6 and 10 weeks were assigned.

Level of service fee: According to MTM pilot program, NHSO paid 500 baht per visit for MTM service provided at drugstore and 1,000 baht per visit for MTM service provided at patient's home. The levels of service fee were confirmed with patient's preference and questionnaire survey. Finally, four levels of service fee including 150, 300, 450 and 600 baht were assigned in DCE questionnaire.

The list of attributes and levels used in this study has been presented in **Table 1**.

Creating the choice set: Choice alternative included five attributes: service setting, service provider, length of service, frequency of follow up, and service fee. Each attribute had two to four levels. The number of possible choice sets was 144 variations (two attributes at two levels, two attributes at three levels and one attribute at four levels = 22×32×41) and 10,296 possible pairwise choices ((144×143)/2)).This possible number produced unmanageable numbers of choices for respondents to consider. The optimal scenario that a respondent can

manage before they get tired or bored is between 9 and 16 pairwise choices [13, 14, 16]. The online software, Ngene (version 1.1.1, www.choice-metrics.com/), was used to derive the orthogonal fractional factorial design. The 72 choice sets were generated and paired into 36 pairwise choices. The 36 pairwise choices were divided into 6 blocks to reduce necessary cognitive effort for each respondent and promote response efficiency. Then, respondents were randomly assigned to a block and answered the choice questions in that block instead of the entire 36 pairwise choices. In addition, the validated choice pair was added into each block for the purpose of data validation.

Developing the DCE questionnaire: The scenario on MTM services for chronic diseases including diabetes, dyslipidemia, and hypertension by community pharmacists was developed, written, and then tested for respondents' understanding regarding services, benefits, and language. Once the final vignette was agreed, a video was produced to be used for final data collection instrument. The video contained scenario on MTM services provided to patients with chronic condition. The vignette focused on the process of the services as well as the benefits for the patients.

Pretesting was conducted to ensure respondents' comprehensibility of video content and choice tasks on the questionnaire. Also, respondents were asked to evaluate the video and attributes as plausible and appropriate length for data collection.

The final survey instrument contained three parts including 5 minutes length video that described MTM services and its benefits, seven choice tasks, and demographics on age, gender, education, occupation, socioeconomic status, health status (individual and relatives) and health benefit. An example of a choice task is given in **Figure 1**.

Survey administration: Bangkok residents were targeted population and 346 volunteers were recruited from public parks. The survey questionnaire was administered during November – December 2013. Respondents were asked to watch video and then completed the survey form including seven choice tasks and demographic information.

Table 1 Attributes and levels

No.	Attributes	Levels
1	Service setting	• Drugstore • Patients' home
2	Service Provider	• Regular pharmacist • Available pharmacist
3	Length of service	• 20 minutes • 40 minutes • 60 minutes
4	Frequency of follow up	• Every 2 weeks • Every 6 weeks • Every 10 weeks
5	Service fee per time	• 150 baht • 300 baht • 450 baht • 600 baht

Statistics and data analysis: Descriptive statistics such as proportion, mean, and SD were used to describe respondents characteristics.

To assess respondents' utility, discrete choice data were analyzed using NLOGIT version 4.0.1. A multinomial logit was used to estimate the effect of attribute levels on respondents' utility. The data from incomplete choice task and/or failing on choice validation were excluded. The DCE analysis in this study assumed that the overall strength of preference for a service was defined by a linear additive model. The dependent variable was respondents' choice of service alternative A or B or C in each choice set. The independent variables were the levels of each attribute in selected choice set. The probability of choosing a given alternative was determined by an indirect utility. Thus, the regression function to estimate MTM service utility was followed.

$$V = ACS + \beta_{setting}(SETTING) + \beta_{prov}(PROV) + \beta_{length}(LENGTH) + \beta_{freq}(FREQ) + \beta_{fee}(FEE)$$

where; V is the MTM service utility derived from a given MTM service as opposed to no service, *SETTING* represents service setting, of which attributes refer to service occurring at drugstore or at home visit, *PROV* represents service provider, of which attributes refer to service provided by the same pharmacist or by any available pharmacist, *LENGTH* represents length of

Attributes	Alternative A	Alternative B	Alternative C
Service setting	Pharmacist visits you at home	Drugstore	Not prefer alternative 1 and 2
Length of service	20 minutes	40 minutes	
Frequency of follow up	Every 2 weeks	Every 6 weeks	
Service provider	Available pharmacist (You may be visited by different pharmacist each time)	Regular pharmacist (You meet same pharmacist every time)	
Service fee per time	300 baht	450 baht	
Which service do you prefer (tick one only)	☐	☐	☐

Figure 1 An example of a choice task

service, which refers to length of service (minutes) per each visit, *FREQ* represents frequency of follow up, which refers to number of weeks before the next visit or follow up period, *FEE* represents service fee, which refers to service fee (baht) per time

Willingness to pay was computed based on the marginal rate of substitution concept. The marginal rate of substitution between cost and attribute indicated that respondents were willing to pay a certain amount for an increased level in that attribute [14]. The estimate WTP of attribute *a* was expressed in the units of the cost attribute by replacing the denominator with the β estimate for the cost attribute; WTPa = - (βa / βcost) [17].

Results

A total of 346 respondents completed the DCE questionnaire. After excluding the invalid answer and incomplete response, 265 questionnaires (76.6 %) were included in the data analysis.

Most respondents were female (67 %) and single (60.4 %). The respondents' age range was between 21 to 75, with an average age (SD) of 37.1(10.81) years. The majority of respondents (82.3 %) had bachelor degree and higher. Most respondents (60.8 %) had household income of 50,000 baht and above. In term of health status, 65.3 % of respondents were familiar with chronic disease by herself/himself or their relatives had chronic disease and 78.1 % belonged to one of health benefit schemes. The respondents' characteristics have been presented in **Table 2**.

Utility for MTM services attributes: The outputs of the analysis described the significance of each attribute, the direction and the relative importance of each attribute. The coefficient estimate of the utility regression model with dummy coding has been presented in **Table 3**. All attributes were statistically significant (at 95 % confidence interval). The model fit was assessed using log likelihood. The sign on each coefficient indicated the direction of the influence of each attribute. Since the negative sign of β estimate of cost implied lower utility for higher cost, hence, the positive coefficient indicated that if level of attribute increased, utility was decreased. In other words, the negative coefficient indicated increased utility if the level of attribute decreased. The model of the study was as followed.

Table 2 Demographic and socioeconomic characteristics (n = 265)

Characteristics	Statistical	n (265)	%
Gender			
• Female		177	67
• Male		88	33
Age (Year)		265	100
• Mean (SD)	37.1 (10.81)		
• Minimum age	21		
• Maximum age	75		
Married status		160	
• Single			60.4
• Married		91	34.3
• Divorce		14	5.3
Education			
• Under high school		7	2.6
• High school		19	7.2
• Diploma		21	7.9
• Bachelor degree		164	61.9
• Master degree and above		54	20.4
Income per month (Baht)			
• 0 – 24,999		127	47.9
• 25,000 – 49,999		88	33.2
• 50,000 above		50	18.9
Household income per month (Baht)		39	14.7
• 0 – 24,999		65	24.5
• 25,000 – 49,999		161	60.8
• 50,000 above			
Health status			
• Individual or relatives do not have any chronic disease		92	34.7
• Individual or relatives have chronic disease		173	65.3
Health benefit			
• Use any health benefit scheme (CSMBS, NHS, SS)		207	78.1
• Private insurance and/or out of pocket		58	21.9

CSMBS: Civil Servants' Medical Benefit Scheme
NHS (UC): National Health Security (Universal Health Coverage)
SS: Social Security

Table 3 The regression results

Attributes	Level (dummy or quantitative code)	Coefficient	*p* (95% CI)
Constant		1.6595	< 0.0001
Service setting	• Drug store (0) • Patient's home (1)	-0.3661	< 0.0001
Service provider	• Regular pharmacist (0) • Available pharmacist (1)	-0.8221	< 0.0001
Length of service	• 20 minutes (20) • 40 minutes (40) • 60 minutes (60)	-0.0048	0.0469
Frequency of follow up	• Every 2 weeks (2) • Every 6 weeks (6) • Every 10 weeks (10)	0.0373	0.0021
Service fee per time	• 150 baht (150) • 300 baht (300) • 450 baht (450) • 600 baht (600)	-0.0034	< 0.0001

Table 4 The highest and lowest utility of MTM services

MTM service profile	The highest utility	The lowest utility
Service setting	Drugstore (0)	Patients' home (1)
Service provider	Regular pharmacist (0)	Available pharmacist (1)
Service duration	20 minutes	60 minutes
Frequency of service	Every 10 weeks	Every 2 weeks
Service fee	150 baht	600 baht
Utility	1.4237	-1.7916

$V = 1.6595 - 0.3661(SETTING) - 0.8221(PROV) - 0.0048(LENGTH) + 0.0373(FREQ) - 0.0034(FEE)$

The respondents' preference for MTM service setting was at drugstore (β = -0.3661, $p < 0.05$). Service by the same pharmacist was preferred to any available pharmacist (β = -0.8221, $p < 0.05$). Likewise, respondents preferred shorter service duration (β = -0.0048, $p < 0.05$) and less frequency of follow up (β = 0.0373, $p < 0.05$). Respondents would lose 0.0034 unit of utility for each 1 baht increase of service fee (β = -0.0034, $p < 0.05$).

The utility of different MTM service profiles were calculated by replacing attribute levels in the utility function. **Table 4** has presented the highest and lowest utilities of MTM service. The highest utility for MTM service profile was service provided at drugstore by the same pharmacist for 20 minutes service duration with 10 weeks follow up and service fee was 150 baht per visit. The lowest utility for MTM service profile was the home visit by any pharmacist for 60 minutes service duration, follow up every 2 weeks, and service fee was 600 baht per visit.

Willingness to Pay (WTP) for MTM attributes: Cost attribute was included in the study design. The estimate of willingness to pay (WTP) of attributes could be calculated based on the marginal rate of substitution concept. Simulation analyses suggested that respondents were willing to pay 108.48 baht to change service setting from home visit to drugstore. **Table 5** presented the marginal WTP estimates. Respondents were marginally willing to pay 241.78 baht, and possibly as high as 300.72 baht, for MTM service by the same pharmacist instead of any available pharmacist. The marginal WTP was 1.43 baht to decrease by 1 minute service duration. The marginal WTP to extend follow up visit by 1 week was 11.05 baht.

Table 5 Marginal willingness to pay of attributes

Change of 1 unit of attribute	Marginal WTP			
	Average	Median	Upper	Lower
Service setting	108.48	107.96	159.01	61.86
Service provider	241.78	240.64	300.72	189.56
Length of service	1.43	1.43	2.91	0.02
Frequency of follow up	-11.05	-10.93	-4.26	-18.38

The lowest utility MTM service model was assumed as a base case. Thus, the WTP of highest MTM service model was calculated. **Table 6** showed the WTP of highest utility MTM service profile calculation. The result suggested that respondents were willing to pay additional 495.86 baht for MTM service provided at drugstore by the same pharmacist with 20 minutes service duration and follow up visit every 10 weeks to trade the lowest utility MTM service model.

Discussion

The study finding indicated that the all five attributes (service setting, service provider, length of service, frequency of follow up and service fee) were affected by respondents' utility ($p < 0.05$) of MTM service.

Drugstore was the preferable setting for MTM service. Respondents were marginally willing to pay 108.48 baht to change service setting from home visit to drugstore. Even though a home visit was more convenient for patients, respondents might concern about their privacy and view drugstore as a service setting, which was appropriately equipped for service rendering like hospitals. The study result corresponded with the study by Hong and colleagues [14], which indicated that the service setting was viewed as the important attribute of MTM. The community pharmacy obtained high value compared with services provided at clinic, home and telephone consultation. The study participants were willing to pay 439.23 baht ($13.31) more for MTM at community pharmacy compared with clinics. Theoretically, MTM service could be practiced at clinic, at home, at drugstore or y telephone [12, 14]. The face-to-face MTM is ideal. However, telephone MTM was advantageous when patients could not travel easily or other option were unavailable. The results from this study suggested to consider developing more community pharmacy based MTM options.

The majority of MTM service providers are pharmacists [12]. Therefore, this study focused on MTM service provided by community pharmacists. The results showed that the same pharmacist was preferred to any available pharmacist. Respondents would lose utility if service was provided by any available pharmacists instead of the specifically assigned pharmacist. They were marginally willing to pay 241.78 baht for MTM service

Table 6 WTP of highest utility MTM service

	Service setting	Service provider	Service duration	Frequency of service	Total WTP
Lowest utility MTM (Base case) (a)	Patient's home (1)	Available pharmacist (1)	60	2	
Highest utility MTM (b)	Drug store (0)	Regular pharmacist (0)	20	10	
Level change (b-a)	-1	-1	-40	8	
WTP per 1 level change (c)	-108.48	-241.78	-1.43	11.05	
WTP of highest utility MTM (c x (b-a))	108.48	241.78	57.2	88.4	495.86

provided by the assigned pharmacist instead of any available pharmacists. Logically, people could develop trusting relationship with a familiar provider and recognize as their pharmacist, who would provide more continuity of information and services. This was in line with SPF theory, in terms of the ability to build relationships with care providers and to contribute to both physical and social well-being [17]. In comparison the patients' preference on MTM service studied by Hong *et al* [14], showed pharmacists gained 0.089-unit higher utility compared with nurses (β = 0.089, p = 0.049). Participants were willing to pay additional 269.61 baht ($8.17) for pharmacists compared with MTM provided by nurse [14]. While, study to value preferences for pharmacy services estimated the WTP for pharmacist provided medication review was 676 baht (£13) compared with general practitioner [16]. Not only pharmacists in MTM services, other care providers were identified as important attributes [17-18]. Nieboer and colleagues [17] studied general population preference for long-term care services. The results indicated that regular care providers had higher value than varied care providers. Participants were willing to pay between 1,332-5,698 baht (36-154 €) for regular care providers compared to varied care providers [18]. The results from this study suggested developing MTM service by regular pharmacist.

Respondents would lose a 0.0048 unit of utility (β = -0.0048, $p < 0.05$) for each 1 minute longer in duration of service. They were willing to pay 1.43 baht for 1-minute reduction of service length. Effect of length of service on utility in other studies indicated the same direction as in this study. Length of service was also included as a categorical variable in a study by Hong and colleagues but it was not statistically significant. The participants would have lower utility with a 30 minutes session than 15 minutes session (β = -0.0052, p = 0.8760) [14]. Amaya-Amaya and colleagues [15] included length of consultation attribute in a study to estimate patients' preference for a new pharmacist independent service. The study results presented length of consultation did not have impact on patients' preference (β = -0.005, p = 0.42). The explanation to support the result was the patients had sufficient knowledge about their conditions and management, particularly for their long term conditions such as hypertension, so the follow up consultation might be simple and not require longer duration [15]. The suggestion from this result was the optimal length of service should be considered in order to maximize patients' utility. Generally, length of service was depended on type and conditions of patients. MTM service to first time patients might consume a long time for patients' history review, investigation, detection of drug related problems, and MTM intervention. The length of service was shorter for the follow up visit. The average MTM intervention was approximately 30 minutes per patient [11]. The service provider should inform patients regarding length of service to help patient expectation management.

In contrast frequency of follow up had positive impact on utility. Respondents gained a 0.0373 unit of utility (β = 0.0373, $p < 0.05$) for each 1 week longer of next visit. The WTP of frequency of follow up was 11.05 baht to extend 1 week of follow up period. Even though there were distinct MTM benefits, time consumed was a point of concern among respondents. Payne and Elliott [13] indicated frequency of medication review as a possible attribute for medication review for the elderly service. The results showed that participants preferred longer follow up period [16]. Results from a study of Shoemaker and Hassol [9] showed that the frequency of service varied across MTM services. Some MTM programs offered quarterly or monthly visits. Some program frequencies were based on a patient's need [9]. The search for the effectiveness for different intervention frequencies was not found [9]. The suggestion from study results was frequency of follow up of MTM service should be not too frequently. The frequency of follow up might match with a patient's doctor's follow up period in order to help patients manage their time. MTM service allows patient to contact pharmacist any time (e.g. telephone) in order to help to manage patients for long follow up period.

The cost attribute is commonly added in DCE to estimate WTP [14, 20-22]. The study results presented

service fee or cost of service had negative impact on utility. Respondents would be losing a 0.0034 unit of utility (β = -0.0034, $p < 0.05$) for each 1 baht increase in MTM service fee. This result was intuitively logical. The negative impact of cost attribute was matched from other studies [14, 16, 18, 20]. However, it should be taken into account that respondents WTP might depend on cost attribute by what this commodity cost should be, rather than what they were willing to pay for it [21].

The results of the study showed that a respondent valued services provided by a community pharmacist to assist them on medication use and was willing to pay additional 495.86 baht to trade lowest utility MTM service model for highest utility MTM service model. This amount would be referenced for policy maker to reimburse of MTM services. Additionally, a service provider, specifically community pharmacist, was considered as important attribute for MTM services. Respondents would be willing to pay additional 241.78 baht to have a regular pharmacist monitor their medication use and problems at every visit. This amount could be used to support the initiation of NHSO on for continuous drug use monitoring by community pharmacists. Not only policy makers could use the WTP from the study for payment design, but community pharmacist association could also use attributes from this study to develop pharmacy benefit package to increase quality of services and patient satisfaction.

This study had some limitations. All samples resided in Bangkok metropolitan area with majority being on high socioeconomic level and having bachelor degree and above. These factors and related characteristics should be taken into account before generalization could be made. Some factors that could also affect the result of the study were understanding and experience of MTM service, as well as the difficulty of the DCE questionnaire. The number of attributes in this study was limited in order to reduce complexity of choice tasks and burden of respondent decisions [18, 19]. The other attributes, which were not included, might be important for preference.

Conclusion

Medication Therapy Management (MTM) service effectiveness, including increased adherence, improved quality of medication regimens, detection and prevention of drug-related problems, and also medical cost saving were demonstrated [7-9]. Since use of MTM service was expected to improve health outcomes, the MTM service was becoming a part of professional expectation [8]. This study assessed preference on MTM services and estimated willingness to pay using a discrete choice experiment valued by society.

The study results indicated that service setting, service provider, service duration, frequency of service and service fee were significant attributes influencing utility of MTM services. A regular pharmacist, services provided at drugstore, shorter duration of services, less frequency of visit were preferred to other alternatives.

The estimated marginal willingness to pay of each attributed indicated that a regular pharmacist was valued at 241.78 baht over any pharmacists. Whereas respondents were willing to pay MTM services provided at drugstore at 108.48 baht more than services at home, 1-minute reduction of service duration and extension of 1 week follow-up would increase service fee by 1.43 baht and 11.05 baht respectively. In conclusion, respondents were willing to pay an additional of 495.86 baht to trade the lowest utility service provided by any available pharmacist at home for 60 minutes with 2 weeks follow-up for the highest utility service provided by a regular pharmacist at the drugstore for 20 minutes with 10 weeks follow-up.

The study demonstrated that MTM service was beneficial and valued by consumers. The attributes obtained from the study could be used to design service to match with consumer needs and characteristics. The implication for a pharmacist practicing MTM service was to adopt the utility profile and plan MTM services accordingly to obtain maximum values from clients. The future research to identify more attributes and estimate their value might be useful to improve MTM service acceptance.

Acknowledgement

The study was funded by The 90th Anniversary of Chulalongkorn University Fund (Ratchadaphiseksomphot Endowment Fund).

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