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Original Research

Pharmacists' acceptable levels of compensation for MTM services: A conjoint analysis

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Abstract

Background: The Medicare Modernization Act of 2003 requires prescription drug plans to provide medication therapy management (MTM) services to Medicare beneficiaries who are at high risk for inappropriate use of medications. However, inadequate compensation has been a barrier for MTM expansion among pharmacists.

Objectives: The objective of this study was to determine pharmacists' acceptable levels of compensation for MTM services.

Methods: A preference-based fractional factorial design of conjoint analysis was used by surveying 1524 active pharmacists in Tennessee. Pharmacists were asked to select between packages (scenarios) of MTM services that represented combinations of MTM attributes (characteristics). The MTM attributes included type of patient (new or returning), patient's number of chronic conditions (1, 3, or 6), patient's number of medications (4, 8, or 16), patient's annual drug costs ($2000, $3000, or $4000), service duration (15 minutes, 30 minutes, or 45 minutes), and price of MTM services ($30, $60, or $120). A survival analysis model was used to predict pharmacists' willingness to select 1 versus another MTM service package. Pharmacists' acceptable level of compensation was estimated as the marginal rate of substitution between the parameter estimates of an attribute and the price attribute of MTM.

Results: The parameter estimates were −0.0303 ($P < .0001$) for service duration and 0.0210 ($P < .0001$) for price of MTM services, respectively, so pharmacists were willing to accept $1.44/min (0.0303/0.0210), or $86.4/h, for MTM services. Pharmacists' characteristics were associated significantly with their acceptable levels of compensation: years of practice was associated with a higher need for compensation, pharmacy ownership (vs nonowner) associated with a lower need, and having provided MTM previously (vs having not provided MTM) was associated with a higher need.

Conclusions: Pharmacists' acceptable level of compensation is in the higher part of current ranges from $30 to $100/h. To increase participation in MTM services, pharmacist compensation needs to be increased. Future studies might continue to corroborate the generalizability of findings from this study.

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Introduction

Chronic diseases have an ever-increasing impact on population health in the United States, and the management of these diseases plays an ever-increasing important role in public health. For example, according to *Healthy People 2010*,[1] chronic diseases historically have grown significantly in importance as leading causes of death in the United States. Managing chronic diseases is a complex and challenging endeavor. Patients often need to be instructed to not only comply with medication and other therapies but also modify their lifestyles, such as changing diet and starting regular exercise. Increasingly, evidence has suggested that a team approach among health care providers including pharmacists is a more effective way to manage chronic diseases such as diabetes.[2,3]

Pharmacists are the third largest workforce in health care after nurses and physicians.[4] Under the Medicare Modernization Act of 2003, prescription drug plans are required to provide medication therapy management (MTM) services for Medicare beneficiaries at high risk for inappropriate use of prescription drugs.[5] The Medicare Modernization Act of 2003 also suggested that MTM services could be provided by pharmacists and other health care providers. This has presented a historic opportunity for pharmacists to make further contributions to the management of chronic diseases.[5]

According to its most popular definition, MTM services are face-to-face interactions between patients and providers (including pharmacists).[6] The core components of MTM services include formulating a medication treatment plan and integrating medication management within the broader context of all health services provided to patients.[6] Because pharmacists are accessible and have a history of providing MTM services, they are currently provided with potentially rich opportunities to continue and expand such services. The literature has shown that community pharmacy monitoring of drug therapies is associated with reduced emergency room visits, reduced hospitalizations, improved patient outcomes, and lower health care costs.[6-14] MTM services are particularly beneficial for patients with chronic diseases, including cardiovascular disease, dyslipidemia, and diabetes.[6-10] For instance, Diabetes Ten City Challenge[9] of the American Pharmacists' Association evaluated the effect of pharmacist interventions on diabetes management. According to the final economic and clinical results of this initiative, patient health outcomes were significantly improved over an average of 14.8 months. Furthermore, patients experienced a cost reduction of $1079 per patient per year compared with the projected costs. Patients also experienced increases in influenza vaccination rate, eye examination rate, and foot examination rate during the study period. Additionally, the Asheville Project demonstrated similar positive effects of pharmacist intervention on patient outcomes, including both clinical and economic outcomes.[8,10]

A viable payment strategy is essential if MTM services are to succeed in optimizing the therapeutic outcomes of the nation's disabled citizens and elderly. However, the Medicare Modernization Act of 2003 did not provide specifics for how MTM services should be reimbursed.[5] Three Current Procedural Terminology (CPT) codes were approved in 2005 for billing, pricing, and utilization of MTM services, and pharmacists can now use these nationally recognized codes to bill third-party payers for MTM services.[15] However, these codes have not been adopted by all prescription drug plans.[15] Moreover, because payers set their own fee schedule for these codes, questions remain regarding whether current CPT codes provide adequate compensation for MTM services. Additionally, current CPT codes are defined based on only time intervals of MTM services.[15] An analogue for the current CPT codes for MTM services is the Resource-Based Relative Value Scale (RBRVS) payment system for physicians.[16] The RBRVS payment system takes into account various attributes of physicians' practices: physician work (training, skills, and time), practice expense (staff, rent, equipment, supplies, and utilities), and malpractice risk (insurance for professional liability).[16]

Indeed, the literature suggests that the current payment structure for MTM services does not provide pharmacists with adequate financial incentives. The standard for reimbursement of pharmacists for MTM services, as suggested by the opinion leaders in MTM services and summarized by the Lewin group,[17] was an hourly rate of $120 to $180. However, Boyd et al[18] reported that

current payment levels for these services vary widely from less than $30 per hour to $100 per hour. In an effort to assess through a survey in 2007 pharmacists' barriers for implementing MTM services, Lounsbery et al[19] found that compensation was among the most significant barriers for expanding MTM services: approximately 70% of the pharmacists practicing in an outpatient setting at the national level agreed that lack of sufficient compensation to cover costs was a barrier to providing MTM. Moczygemba et al[20] surveyed Texas pharmacists' opinions about and plans for providing MTM services. They also reported that pharmacists found compensation to be a barrier to providing MTM services. However, pharmacists' acceptable levels of compensation have not yet been determined adequately, particularly considering the myriad factors at play for providing such services and the types of services that may be provided.

The overall aim of this study was to determine pharmacists' acceptable levels of compensation for MTM services. Specifically, this study had the following 3 specific objectives: (1) to determine pharmacists' acceptable levels of compensation for MTM services, (2) to evaluate how pharmacists' acceptable levels of compensation vary with attributes of MTM services (examples of these attributes are new or returning patients, patient's number of chronic conditions, patient's number of medications, patient's annual drug costs, service duration, and price of MTM services), and (3) to determine how pharmacists' acceptable levels of compensation differ according to pharmacists' characteristics, such as demographics, practice setting, position, and prior experience providing MTM services.

Methods

Study sample and data collection

The study protocol was approved by the University of Tennessee Institutional Review board. This was a cross-sectional study of preference-based conjoint analysis. A total of 1524 active pharmacists in Tennessee were surveyed. The names and addresses of active pharmacists were obtained from the Tennessee State Board of Pharmacy. Based on the literature, pharmacists in independent pharmacies are more likely to provide MTM services.[20,21] Therefore, based on business names, pharmacists were eliminated from the list if they were obviously affiliated with universities, hospitals/health care systems, clinics, chain pharmacies, and grocery store/mass merchandiser pharmacies. However, because the elimination process was based on business names of pharmacist affiliations, pharmacists were kept in the sample when there was uncertainty about the nature of the businesses. Therefore, the sample included some pharmacists from settings other than independent pharmacies.

A 3-step process was followed for the survey. In the first step, a survey was mailed to all pharmacists on the mailing list; the survey included a cover letter detailing the study objectives and the importance of responding and a business reply envelope. In the second step, a reminder postcard was mailed to all pharmacists in the study sample 1 week after the initial mailing. In the third step, a second mailing of the survey instrument was sent 2 weeks after the postcards. This process was based on classical survey implementation procedures suggested by Dillman.[22] The survey materials, including postcards, survey instruments, cover letters, outgoing envelopes, and business reply envelopes, were printed and mailed by a mailing service company in Memphis, Tennessee.

A pilot test of the survey questionnaire was conducted with a group of pharmacy students. The purpose of the pilot test was to reasonably determine whether pharmacists would be willing to complete the survey instrument and whether pharmacists would be willing to trade between the chosen levels of attributes. The survey questionnaires were then revised based on feedback from the pilot test.

Designing the conjoint analysis questionnaire

The analytical technique of this study was conjoint analysis, which is based on the premise that any service can be characterized by its attributes and their associated levels, for example, duration of service (30, 60, or 90 minutes).[23] As an economic evaluation tool, conjoint analysis can be used to show how individuals are willing to trade between different attributes of services.[23] Thus, based on the concept of "marginal rate of substitution," or the ratio of the parameter of an attribute A, for example, to the parameter of the price attribute, an individual's acceptable level of compensation for providing a unit of attribute A can be calculated.[23]

Conjoint analysis consists of 5 states: attribute identification, assignment of levels for attributes, scenario presentation, preference obtainment, and data analysis.[23]

Attribute identification and assignment of levels for attributes

A set of MTM attributes were identified that measured the complexity of MTM services and levels were assigned for each attribute. These attributes (levels) included type of patient (new or returning), patient's number of chronic conditions (1, 3, or 6), patient's number of medications (4, 8, or 16), patient's annual drug costs ($2000, $3000, or $4000), service duration (15 minutes, 30 minutes, or 45 minutes), and price of MTM services ($30, $60, or $120). The first attribute, new or returning patient, was included because the current CPT codes for MTM services differentiate between new and established patients.[15] The second to fourth attributes, number of chronic conditions, number of medications, and annual drug costs, were included because they reflect the complexity of patients' medical condition(s) and medication regimens.[5] Currently, prescription drug plans are required to establish MTM programs only for Medicare Part D beneficiaries who meet the following eligibility criteria: multiple chronic conditions, multiple covered medications, and likely to incur annual drug costs more than $4000 (in 2006).[5]

The levels of the second to fourth attributes, patient's number of chronic conditions (1, 3, or 6), patient's number of medications (4, 8, or 16), patient's annual drug costs ($2000, $3000, or $4000), were set so that they overlap with the eligibility thresholds for MTM services. The eligibility thresholds for MTM services used by health plans in 2006 were 2-5 chronic conditions, 2-23 Part D medications, and $4000 in annual drug costs.[24] These thresholds were lowered in 2010 to not more than 3 chronic conditions, not more than 8 Part D drugs, and not more than $3000 in annual drug costs.[25]

The fifth attribute, duration of services, was included because MTM providers are paid by increments of 15 minutes according to current CPT codes.[15] This is also why the levels of duration were set by increments of 15 minutes. The sixth attribute, price of MTM services, was selected to reflect pharmacists' acceptable levels of compensation for a specific combination of the other 4 attributes. For example, would a pharmacist be willing to accept $30 for the following service package: MTM services for a new patient with 3 chronic conditions, taking 8 medications, with a total drug cost of $3000, and requiring MTM service for half an hour? The levels of price attribute were set approximately equal to 2-3 times of the levels of service duration attribute because according to expert opinion summarized by the Lewin Group,[17] pharmacists should be paid $2 to $3/min. The attributes for conjoint analysis selected in this study, for example, service duration and those reflective of the complexity of health issues and medication regimen, can be related. This needs to be taken into consideration in data analyses.

Assigning levels for attributes also included several other considerations.[26] Besides selecting realistic levels, the levels were set so that individuals would be willing to trade between them. For example, if the ranges for price were set too wide, individuals might not be willing to trade but always select the package with a much lower price versus packages with any other price levels. Additionally, the level for MTM price was set with a range beyond the compensation levels at the time of the study because those compensation levels may represent underpayment.

Scenario presentation and preference obtainment

The pharmacists' preferences were determined by asking them to select 1 from each pair of packages (scenarios) of MTM services. Each package included a combination of specific levels of attributes (Table 1). One potential caveat with asking people to select between pairs of packages is that when there are too many possible packages, people may become tired of comparing them or they may make inconsistent selections. For example, the attributes and levels that were selected gave $2 \times 3 \times 3 \times 3 \times 3 \times 3 = 486$ possible packages. This number of packages could produce many more possible pairs of packages. Previous research has shown that individuals may become bored by comparisons when they have to manage between 9 and 16 pairs of packages.[23,26] Therefore, a fractional factorial design was used to reduce the number of packages to a manageable level while allowing preference inference for all possible scenarios.[23,26] By using fractional factorial design, 13 packages were produced that are orthogonal with some imbalance and reasonable efficiency (A-Efficiency, D-Efficiency, and G-Efficiency ranged between 60% and 90%). One package was then selected randomly from the 13 packages as the comparison package. Twelve pairs of packages were constructed by comparing all other packages with the comparison package.

The number 13 was picked subjectively for *SAS* (SAS Institute Inc., Cary, NC, USA) program to produce packages so that number of resulting packages would not be too many for the respondents. An orthogonal design was

Table 1
An example of a pairwise comparison of packages using a discrete choice approach

Attribute	Choice 1	Choice 2	Choice 3 (neither choice 1 nor choice 2)
Patient type	Returning	Returning	
Patient's number of conditions	6	3	
Patient's number of medications	16	16	
Patient's annual drug cost	$3000	$2000	
Service duration	30 min	45 min	
Price of MTM services	$60	$60	
Please check the box of your preferred choice	Prefer choice 1 ☐	Prefer choice 2 ☐	Prefer choice 3 ☐

necessary to estimate the effects of all attributes; the resulting design was imbalanced because levels of some attributes occurred more frequently than other levels of the same attributes; design efficiency measures the quality of the resulting design.

Existing approaches of conjoint analysis include ranking, rating, and the discrete choice approach.[23] According to the discrete choice approach, respondents are asked to indicate their preferred package among each pair (or a group with more numbers) of packages. A discrete choice approach is preferred by most researchers because it most closely resembles real-life decisions where an individual makes 1 selection of 2 or more choices. In contrast, individuals seldom rank or rate all possible options for daily decision making.

Pharmacist characteristics

Based on previous literature, pharmacists' characteristics were associated with their practice of providing MTM services.[20,21] Therefore, the survey included questions on pharmacist characteristics. Specifically, the following information was collected: age, sex, race, ethnicity, highest degree received, postgraduate training, income, years in practice, practice setting (independent pharmacies vs other), position (store owner vs other), and expertise and prior experience providing MTM services. The final survey questionnaire was designed so that no more than 15 minutes would be required to complete.

Data analyses for study objectives

Objective 1 of this study was to determine pharmacists' acceptable levels of compensation for MTM services. To achieve this objective, a survival analysis model was estimated, where an event was considered having occurred when a service package was selected, otherwise an individual was considered censored.[27] A survival analysis model using "PROC PHREG", although not developed for analyzing data from conjoint analysis, can model individuals' selections of packages in conjoint analysis. The acceptable level of compensation for a certain attribute was estimated as the marginal rate of substitution of the attribute with the price attribute.[23] In other words, acceptable level of compensation was determined by calculating the ratio of the parameter estimate for an attribute to the parameter estimate for the price attribute. Acceptable levels of compensation for MTM services with certain attributes were computed by summing all values of "marginal rates of substitution" evaluated at the different levels of each attribute.[28] For example, if an MTM service package is for a new patient with 2 chronic conditions, 8 medications, an annual drug cost of $2000, and with a service duration of 30 minutes, the total acceptable level of compensation would be the absolute value of (parameter estimate for new patient vs returning patient + parameter estimate for number of chronic conditions × 2 + parameter estimate for number of medications × 8 + parameter estimate for annual drug cost × 2000 + parameter estimate for service duration × 30)/(parameter estimate for price of MTM services).

To achieve objective 2, the parameter estimates of attributes were examined. Positive estimates indicated positive effects and vice versa. The regression models were conducted in 2 ways: analyzing 1 model including all characteristics of MTM services and analyzing 1 model for each MTM characteristic. This was done so that the dominating

characteristic(s), if any, could be identified because some characteristics were related.

To achieve objective 3, the interaction terms were tested between pharmacist characteristics and the price of MTM services. The pharmacist characteristics analyzed were sex, years of pharmacy practice, pharmacist position (store owner or not), pharmacist academic degree, and prior experience providing MTM services. The reason that only the price of MTM services was included among all MTM characteristics was that this study was interested primarily in finding out the effect of pharmacists' characteristics on the acceptable price of MTM services. Not all measures of pharmacist characteristics from the survey were used; because some measures could clearly be correlated, the correlation was tested between some of them when selecting the variables for inclusion in the model. Specifically, the correlation was tested for some pairs of variables that were obviously correlated and that may be important determinants for pharmacists' preference for MTM services.[20,21] The following pairs were tested: (1) age and years of practice and (2) pharmacy practice setting (independent pharmacy or not) and pharmacist position (store owner or not).

In all analyses above, only complete cases with no missing values for the questions of interest were included in the analyses. According to the previous literature, it would make a difference on model estimation whether a quantitative variable was treated as a continuous variable or discrete variable with multiple categories.[29] In the regression models, a new or returning patient was treated as a discrete or dummy variable; all other attributes were treated as continuous variables because linear estimates seem to better reflect the relationship between levels of those variables.

Results

Demographic characteristics of the survey respondents

We received 348 responses at the time of this analysis, with a response rate of 22.2%. In the final study sample (Table 2), among the 5 age groups, the 50-59 group had the highest proportion of survey responses (34.3%); all other groups had a 10% to 20% of responses. There were more male (60.6%) than female respondents. Most survey respondents were white (97.0%) and non-Hispanic (99.3%). Slightly more than 30% of survey respondents had a Doctor of Pharmacy degree. Nearly one-fifth of respondents had postgraduate training.

Regarding practice patterns, more than half of the survey respondents had practiced pharmacy for 30 years. There were more survey respondents from urban/suburban areas (55.7%) than from rural areas. About half of survey respondents were working in independent pharmacies. Regarding the positions of the pharmacists, a quarter (25.1%) of the respondents were store owners.

Experience with MTM services

Among the survey respondents, more than 40% reported that they were familiar or very familiar with MTM services (Table 2). Slightly less than 50% of the respondents (45.21%) reported that they had previously provided MTM services or patient-centered services beyond medication dispensation. Among survey respondents who reported having provided MTM-related services, 82.1% had provided services to patients with diabetes, 80.1% had provided services to patients with hypertension, 40.0% had provided services to patients with depression, and 50.99% had provided services to patients with asthma.

When pharmacists were asked to select their top 2 challenges for providing MTM services, almost three-quarters (70.1%) reported that they did not have enough time, approximately one-third (33.9%) cited inadequate compensation, more than a quarter (31.21%) reported patients' lack of interest, and slightly more than a quarter (25.84%) reported no access to patient records. Most respondents (90.8%) thought that an annual personal medication review would benefit patient outcomes. More than two-thirds (69.9%) of respondents thought that they were qualified to provide MTM service to patients. Slightly more than one-third (34.8%) of respondents reported having participated in MTM services in 2008, and almost half (49.2%) reported that they planned to participate or would continue their participation in MTM services in 2010.

Analyses for objectives

Objective 1 was to determine pharmacists' acceptable levels of compensation for MTM services. The parameter estimates (Table 3) were −0.1449 for whether a patient was a new patient versus a returning patient ($P = .0901$), −0.0297 for number of chronic conditions ($P = .1920$), 0.0023 for number of prescription medications

Table 2
Characteristics of survey respondents

Characteristic	Number of respondents	Percentage
Age		
39 and younger	52	15.52
40-49	58	17.31
50-59	115	34.33
60-64	48	14.33
65 or older	62	18.51
Sex		
Male	203	60.60
Race		
White	325	97.01
Ethnicity		
Non-Hispanic	287	99.31
Highest degree		
Bachelor of Science in Pharmacy	223	65.40
Doctor of Pharmacy	112	32.84
Master and other	6	1.76
Postgraduate training		
Yes	67	19.25
Income		
Less than $100,000	106	32.31
$100,000-less than $150,000	157	47.87
$150,000 or more	65	19.82
Number of years in pharmacy practice		
$\leq$10 y	40	11.49
10-30 y	119	34.20
$\geq$30 y	189	54.31
Work region		
East TN	126	36.95
Middle TN	134	39.30
West TN	81	23.75
Pharmacy location		
Urban/suburban	186	55.69
Pharmacy practice setting		
Independent community pharmacy	170	50.03
Position in pharmacy		
Owner	84	25.07
Familiar with MTM services		
Yes	140	41.54
Provided MTM services before		
Yes	151	45.21
Provided MTM services for medical conditions		
Diabetes	124	82.12
Hypertension	121	80.13
Depression	61	40.40
Asthma	77	50.99
Challenges in providing MTM services		
Not enough time	209	70.13
Inadequate reimbursement	101	33.89

(*Continued*)

Table 2 (*Continued*)

Characteristic	Number of respondents	Percentage
Patients' lack of interest	93	31.21
No access to patient's medical record	77	25.84
Believed annual medication review would benefit patients		
Yes	297	90.83
Believed qualified to provide MTM services		
Yes	227	69.85
Participated in MTM services in 2008		
Yes	115	34.75
Would provide MTM services next year		
Yes	155	49.21

TN, Tennessee.

($P = .7434$), 0.0001 for annual drug cost ($P = .0010$), −0.0303 for duration of services ($P < .0001$), and 0.0210 for price of MTM services ($P < .0001$). Using the method of marginal rate of substitution, this study estimated that, for each 1 minute of service, pharmacists were willing to accept \$1.44, which was calculated as $0.0303/0.0210 = \$1.44$. Similarly, using the method of marginal rate of substitution, pharmacists' acceptable levels of compensation for a certain package of MTM services could be calculated. For example, if an MTM service package was for a new patient with 2 medical conditions, 8 medications, a drug cost of \$2000, and with service duration of 30 minutes, the total acceptable level of compensation would be the

$$\frac{-0.1449 + (-0.0297 \times 2) + (8 \times 0.0023) + (2000 \times 0.0001) + (-0.0303 \times 30)}{0.0210},$$

absolute value of which was \$42.61.

Objective 2 was to evaluate how pharmacists' acceptable levels of compensation vary with attributes of MTM services. When all 6 characteristics of MTM services were included in the regression model (Table 3), 3 attributes had significant parameter estimates: total drug cost (0.0001), service duration (−0.0303), and price of MTM services (0.0210). The parameter estimate for new patient was −0.1449, and the parameter estimate for number of chronic conditions is −0.0297, neither of which was significant. When a similar regression was run for 1 variable at a time, all characteristics had significant ($P < .0001$) parameter estimates: −0.9163 for new patient, 0.1152 for number of chronic conditions, −0.0668 for number of prescription medications, 0.0003 for annual drug cost, −0.0352 for service duration, and 0.0187 for price of MTM services.

Objective 3 for this project was to determine how pharmacists' acceptable levels of compensation differed according to pharmacists' characteristics. In this part of the analysis, the following interactions were found to have significant parameter estimates (Table 4): the interaction between years of pharmacy practice and the price of MTM service (−0.0003, $P = .0033$), the interaction between pharmacist position (store owner or not) and the price of MTM service (0.0115, $P = .0001$), and the interaction between prior experience providing MTM services and the price of MTM service (−0.0077, $P = .0009$). Regarding the interpretations of the interaction terms, for example, the positive sign of the interaction term between years of pharmacy practice and price of MTM services suggests that individuals with more years of practice would be less willing to provide MTM services at a given level of compensation or individuals with more years of practice were less willing to accept a given level of compensation. Regarding the correlation between variables, age and years of practice were found to have a strong correlation ($r = 0.87$; $P < .0001$) and pharmacy practice setting (independent pharmacy or not) and pharmacist position (store owner or not) were also found to have a strong correlation (chi-square = 2054.4; $P < .0001$). Only years of practice and pharmacist position

Table 3
Predictors of willingness to provide MTM services based on a survival analysis model[a]

Variable	Estimate	Standard error	Chi-square	*P*
Returning patient	—	—	—	—
New patient	−0.1449	0.0855	2.8732	.0901
Patient's number of chronic conditions	−0.0297	0.0228	1.7020	.1920
Patient's number of medications	0.0023	0.0069	0.1072	.7434
Patient's annual drug cost	0.0001	0.0000	10.9224	.0010
Service duration	−0.0303	0.0037	65.7514	<.0001
Price of MTM services	0.0210	0.0014	239.7639	<.0001

[a] Based on the *SAS* tutorial developed by Patetta et al[27], a survival analysis model using "PROC PHREG", although not developed for analyzing data from conjoint analysis, can model individuals' selections of packages in conjoint analysis.

were included in the final model, whereas age and pharmacy practice setting were not included (Table 4). However, when the model included these variables instead of their correlated counterparts, findings were similar.

Discussion

Using preference-based conjoint analysis, this study used a cross-sectional survey design to elicit pharmacists' preference for MTM services with different characteristics. We found that pharmacists were willing to accept $1.44/min or $86.4/h for MTM services. This is in the upper component of the current range of compensation for MTM services, which is between $30 and $100 per hour.[16] Additionally, by focusing the survey among only individuals who were more likely to provide MTM services and with a relatively low response rate, this study may have included only those pharmacists who might be willing to accept lower compensation for the same amount of services. Therefore, the findings from this study may be an underestimate of pharmacists' acceptable levels of compensation for MTM services. Nonetheless, the findings from this study still indicate that, to increase pharmacist participation in MTM services, current compensation levels of at least some prescription drug plans need to be increased. Additionally, these findings were confirmed by another aspect of the analysis: in the study sample, approximately one-third of the survey respondents reported that inadequate reimbursement was 1 of the top 2 challenges in providing MTM services.

The findings of inadequate compensation for MTM services from this study are consistent with previous studies such as those conducted by

Table 4
Predictors of willingness to provide MTM services based on a survival analysis model including interaction terms between the price of MTM services and some pharmacist characteristics[a]

Variable	Estimate	Standard error	Chi-square	*P*
Returning patient	—	—	—	—
New patient	−0.1359	0.0867	2.4540	.1172
Patient's number of chronic conditions	−0.0293	0.0231	1.6108	.2044
Patient's number of medications	0.0019	0.0070	0.0713	.7894
Patient's annual drug cost	0.0001	0.0000	11.2574	.0008
Service duration	−0.0306	0.0038	65.2456	<.0001
Price of MTM services	0.0396	0.0045	76.2613	<.0001
Male × price of MTM services	0.0018	0.0024	0.5666	.4516
Years of pharmacy practice × price of MTM services	−0.0003	0.0001	8.6194	.0033
Pharmacy owner × price of MTM services	0.0115	0.0030	15.1042	.0001
Degree (Bachelor) × price of MTM services	−0.0008	0.0030	0.0626	.8024
Degree (Master and other) × price of MTM services	−0.0026	0.0070	0.1370	.7113
Provided MTM × price of MTM services	−0.0077	0.0023	10.9478	.0009

[a] Based on the *SAS* tutorial developed by Patetta et al[27], a survival analysis model using "PROC PHREG", although not developed for analyzing data from conjoint analysis, can model individuals' selections of packages in conjoint analysis.

Lounsbery et al[19] and Moczygemba et al.[20] This study stresses that inadequate reimbursement is an important challenge in providing MTM services even among individuals who were more likely to provide MTM services or who had previously provided MTM services. It can be argued, although, that at least some progress toward compensation of pharmacist-driven MTM services has been made. In 1996, Christensen and Farris[30] described the state of community pharmacies in the United States and reported that reimbursement for cognitive services was an infrequent activity.

Regarding pharmacists' acceptable levels of compensation, previous researchers have not carried out a comprehensive assessment. Moczygemba et al[20] found that pharmacists were somewhat neutral about compensation level of $2/min for MTM services. In that study, pharmacists were asked to indicate their level of agreement (strongly disagree, disagree, neutral, agree, and strongly agree) with the following statement: "I feel that $2/min is an adequate compensation for providing MTMS (MTM services)." On a scale of 1 (strongly disagree) to 5 (strongly agree), the researchers found that pharmacists were relatively neutral about a level of compensation at $2/min. Moczygemba et al did not include a comprehensive assessment of pharmacists' acceptable levels of compensation for MTM services or examine the relationship between pharmacist characteristics and their acceptable levels of compensation.

This study found that pharmacists' willingness to provide MTM services were contingent on other attributes of MTM services. The characteristics included were all significantly associated with pharmacists' willingness to provide MTM services when they were included in the regression model individually. This attests to the quality of the selection of MTM characteristics as measures of the complexity of MTM services in this study. However, when all MTM characteristics were included in the regression model at the same time, only 3 had significant effect on pharmacists' willingness to provide MTM services: annual drug cost, service duration, and price of MTM services. The reason may be that the effects of these statistically significant variables dominate the effects of other MTM characteristics. For example, the effects of new patient versus old patient, number of chronic conditions, and number of medications may all hinge on service duration.

This study found that more than 70% of pharmacists cited not enough time as 1 of the 2 most significant challenges in providing MTM services. Moczgemba et al[20] found that as a barrier to providing MTM services, time was as important as compensation. In the study by Lounsbery et al,[19] time was not specifically included as a barrier for pharmacists to select in the survey questionnaire, but lack of additional staffing was selected as a barrier to providing MTM services by almost 90% of the pharmacists who responded to the survey. Inadequate time might reflect a lack of support from store management or the corporate office, which may result from inadequate compensation. Previous studies did cite the lack of corporate support or management support as a barrier for providing MTM services.[19,20]

It is interesting that pharmacists were more willing to accept a certain level of compensation for patients with higher total drug cost. The reason for this may be that pharmacists may reap additional financial benefit when serving patients with higher drug costs. Or it could be that pharmacists are more concerned about the increased risk of drug therapy problems among patients with higher drug costs or more complex regimen than those with lower drug costs or less complex regimen. For instance, when patients incur very high drug costs, pharmacists may be more likely to be concerned about the possibilities of polypharmacy.

Pharmacist characteristics were associated with their acceptable levels of compensation for MTM services. Pharmacists with the following characteristics were more likely to accept a lower level of compensation: fewer years of pharmacy practice, being a store owner (vs nonowner), and having not previously provided MTM services. Years in practice reflected a younger workforce versus an older workforce. It is encouraging to find that the newer pharmacists are more willing to provide MTM services compared with older pharmacists. Store owners may be willing to accept a lower level of compensation because they directly benefit from an additional revenue source for the pharmacy. It is also interesting to find that pharmacists who provided MTM services previously seemed to require higher compensation levels for a certain MTM service package. This may again suggest that the findings from this study may be an underestimate of pharmacists' acceptable level of compensation because some pharmacists in the study sample did not previously provide MTM services.

Findings from this study do not strongly support the incorporation of additional MTM attributes to the compensation system because duration of service and annual drug cost, in

addition to the price of MTM services, are the primary significant predictors of pharmacists' willingness to provide MTM services. Additionally, pharmacists' educational degree did not seem to affect their acceptable levels of compensation.

A few additional aspects of the study methods need to be discussed. First, carrying out this study in Tennessee was meaningful because Tennessee is a state with high needs for MTM services. Tennessee had the highest per capita utilization of prescription drugs (17.3 prescriptions) in the nation in 2006, and it was second highest in drug expenditures per capita ($1192.56) in the nation in the same year.[31,32]

Despite the high utilization of prescription medications and high expenditures on prescription drugs, Tennesseans' health status is worse than that of others in many other states. In 2006, the overall health status of Tennesseans was ranked 48th in the country.[31,32]

Second, the sample size was adequate because typically 300-400 subjects are adequate for preference-based conjoint analysis.[33] Response rates in previous survey studies among pharmacists have covered a wide range. In a previous survey among Tennessee pharmacists, the response rate was approximately 40%.[34] However, in the study by Lounsbery et al,[19] the final usable response rate for analysis was only 6.7%. The response rate in this study was 22.81%. The lower response rate in this study compared with the previous survey among Tennessee pharmacists may be the result of the complexity of the survey required by the nature of the research question and research methods in this study.

Third, a cross-sectional survey design was used for conjoint analysis, which has been widely used by previous researchers using conjoint analysis. For example, it was used by Szeinbach et al[35] in their study on pharmacists' willingness-to-accept service contracts. Conjoint analysis with a cross-sectional survey design also has been used in economic evaluations on other health services, such as *in vitro* fertilization and orthodontic services.[26,36]

This study was among the first steps in gathering information on the practicality of a comprehensive payment system for MTM services. It was the first study to form an exact estimate on pharmacists' acceptable level of compensation for MTM services. Additionally, the preference-based conjoint analysis exhibits a major advantage over other methods such as traditional willingness-to-accept approaches. For example, traditional willingness-to-accept analysis examines only the valuation of the whole bundle of characteristics of programs or services, which is more intellectually challenging for respondents than conjoint analysis.[23] Adequate payment can encourage more pharmacists to provide MTM services so that they can make further contributions to the management of chronic diseases. Studies on the payment systems for MTM services are valuable for Medicare, health plans, and pharmacy organizations to foster a practice environment emphasizing medication effectiveness and safety. Although the study findings were based on 1 state's experience, the survey methods and study findings may serve as a valuable model for other states and for efforts at the national level.

Regarding this study's generalizability, the study sample exhibited characteristics different from the general characteristics of Tennessee pharmacists. According to limited information on Tennessee pharmacists, close to 60% of them are female and almost 70% are older than 40 years[34]. The study sample was 40% female and almost 85% aged 40 years or older. These differences serve as a reminder that the study findings may not be generalizable to other pharmacists in Tennessee or throughout the United States; however, the consistency of the main findings from this study to previous studies attests to the internal validity of the study findings and reliability of the research methods.

Several other study limitations should be considered when evaluating the study findings. First, all attributes of MTM services in this study were reflective of the characteristics of patients, the complexity of their health issues, and the complexity of their medication regimen. The study was carried out this way mainly because of the limit of study duration and amount of funding available. The study findings would have been much more comprehensive and informative if characteristics of pharmacist practice could have been included to mimic an RBRVS system that takes into account practice expense, malpractice risk, pharmacist training, and pharmacist skills.[16] Second, conjoint analysis is a relatively new economic evaluation technique and many methodological and normative issues remain to be addressed. For example, as with traditional willingness-to-accept method, it has been shown that the levels at which the price attribute are set can affect the willingness-to-accept estimate of other attributes and thus the willingness to accept of the whole service package.[23]

Conclusion

This study found that within a group of pharmacists who were more likely to provide MTM services or who previously provided MTM services, pharmacists' acceptable levels of compensation was $86.40/h. Therefore, part of the current range of compensation for MTM services, from lower $30 to $100/h might be lower than many pharmacists' acceptable level of compensation. To expand MTM services, pharmacists' compensation needs to be increased. Future studies should continue to corroborate the generalizability of the findings from this study and should further explore strategies to establish an MTM compensation system that is truly rewarding for pharmacists.

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