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Contingent Valuation and Pharmacists' Acceptable Levels of Compensation for Medication Therapy Management Services

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Abstract

Background—Pharmacists' acceptable level of compensation for medication therapy management (MTM) services needs to be determined using various economic evaluation techniques.

Objectives—Using contingent valuation method, determine pharmacists' acceptable levels of compensation for MTM services.

Methods—A mailing survey was used to elicit Tennessee (US) pharmacists' acceptable levels of compensation for a 30-minute MTM session for a new patient with 2 medical conditions, 8 medications, and an annual drug cost of \$2,000. Three versions of a series of double-bounded, closed-ended, binary discrete choice questions were asked of pharmacists for their willingness-to-accept (WTA) for an original monetary value (\$30, \$60, or \$90) and then follow-up higher or lower value depending on their responses to the original value. A Kaplan-Meier approach was taken to analyze pharmacists' WTA, and Cox's proportional hazards model was used to examine the effects of pharmacist characteristics on their WTA.

Results—Three hundred and forty-eight pharmacists responded to the survey. Pharmacists' WTA for the given MTM session had a mean of \$63.31 and median of \$60. The proportions of pharmacists willing to accept \$30, \$60, and \$90 for the given MTM session were 30.61%, 85.19%, and 91.01%, respectively. Pharmacists' characteristics had statistically significant association with their WTA rates.

Conclusions—Pharmacists' WTA for the given MTM session is higher than current Medicare MTM programs' compensation levels of \$15 to \$50 and patients' willingness-to-pay of less than \$40. Besides advocating for higher MTM compensation levels by third-party payers, pharmacists also may need to charge patients to reach sufficient compensation levels for MTM services.

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Keywords

Medication therapy management services; contingent valuation; pharmacists; compensation; willingness to accept

Introduction

Pharmacy organizations and pharmacy practitioners have long envisioned pharmacists' expanded roles in providing patient-centered services.¹ As a result, contemporary pharmacy practice has evolved from a narrower focus of medication distribution to a more clinical paradigm where pharmacists provide patient-centered medication therapy and disease management services.² Patient-centered services provided by pharmacists historically have been referred to as pharmaceutical care, disease state management, cognitive service, clinical pharmacy service, and medication therapy management (MTM) services.¹ Besides offering increasingly established clinical and economic benefits,³⁻⁵ MTM services offer an alternative source of revenue for pharmacists.^{6,7} Currently, pharmacies keep only approximately 29% of the revenue as profit from selling merchandise; the remaining 71% covers the cost of purchasing the merchandise.^{6,7} However, all revenue from MTM services can be used to increase profit for pharmacies except for some marginal practice costs.^{6,7} Additionally, the Medicare Prescription Drug & Modernization Act (MMA) of 2003 provides a tremendous opportunity for pharmacists: MMA requires prescription drug plans for Medicare beneficiaries to offer medication therapy management services for targeted individuals;⁸ MMA mentioned only pharmacists when citing examples of types of professionals that can provide MTM services.⁸

Despite the historical opportunity for pharmacists to provide MTM services offered by MMA, it has been a consistent challenge for pharmacists to receive adequate compensation for MTM services. Because MTM services are paid out of administrative costs according to MMA, providing MTM services does mean additional costs to prescription drug plans.⁸ Nutescu pointed out the following barriers for MTM compensation for pharmacists: (1) third-party payers' lack of knowledge and understanding of pharmacists' expertise in pharmacotherapy and pharmacists' important role in patient care, (2) the lack of appropriate billing codes for pharmacists' services and the lack of the adoption of the existing billing codes for MTM services, and (3) the lack of understanding by pharmacists of reimbursement mechanisms related to MTM services.¹

One additional challenge for pharmacists when providing MTM services is compensation level. When charged with developing a payment evaluation methodology for the sustainable development of MTM services, the Lewin Group reported that the "the rule of thumb" payment service suggested by survey respondents was \$2.00 to \$3.00 per minute.⁹ In a recent study, Wang et al. reported that pharmacists' acceptable level of compensation for MTM services was \$1.44/minute or \$86.4/hour.¹⁰ The Lewin Group also reported that many of the existing payment levels for MTM services are lower than "the rule of thumb" level.⁹ The acceptable levels of compensation for MTM services reported by Wang, despite being a

possible underestimate,¹⁰ were also higher than the current payment level of \$30 to \$100 per hour as summarized by Boyd et al.¹¹

Indeed, multiple studies have all reported that inadequate compensation has become a barrier for pharmacists to provide MTM services. For example, according to Lounsbury et al., the most common barriers to providing MTM services among those providing such services with compensation were lack of adequate compensation (reported by 70.8% of survey responders), followed by the inability to obtain compensation (67.3%) and absence of recognition as a provider (62.2%).¹² The most common barriers to providing MTM services among those providing MTM services without compensation were also related to compensation.¹² For another example, Moczygemba et al. reported that pharmacists believed that compensation and time were the most challenging barriers to MTM provision.¹³ The study by Wang et al. also reported that when pharmacists were asked to select their top 2 challenges for MTM provision, 33.89% cited inadequate compensation as the second most frequently cited reason only after time, which was cited by 70.13% of survey respondents.¹⁰

Decision-makers need to consider pharmacist preferences when determining acceptable levels of compensation for MTM services. However, only one comprehensive study so far has been conducted on pharmacists' acceptable levels of compensation for MTM services.¹⁰ In that study, Wang et al. conducted a conjoint analysis based on a preference-based fractional factorial design using a mailing survey among Tennessee pharmacists.¹⁰ Conjoint analysis elicits willingness-to-pay (WTP) or willingness-to-accept (WTA), depending on whether an individual is expected to pay or to be compensated, for cost-benefit analysis (CBA).¹⁴ CBA is an economic evaluation technique that expresses both costs and benefits in monetary terms when comparing different courses of action.¹⁴ CBA enables decision makers to determine the net benefit of courses of action by subtracting costs from benefits, which makes CBA more promising among all economic evaluation techniques.¹⁴ CBA also has a firm theoretical basis in welfare economics, which proposes that "social welfare should comprise individuals' welfare and that individuals should be considered the best source of information on their own welfare."¹⁵ However, assigning monetary values to benefits of health care programs is also the most challenging aspect of conducting CBA. For example, while CBA studies can ask WTP or WTA questions, all existing approaches that elicit individuals' WTP and WTA have advantages and disadvantages.¹⁴

Conjoint analysis is a technique developed in marketing and mathematical psychology for estimating WTP and WTA.¹⁴ Conjoint analysis builds upon the premises that an individual's preference of any service or good depends on the characteristics (or attributes) of the service or good and the levels of these characteristics. Estimating WTP or WTA can be accomplished by including price as one characteristic of the service or good and calculating marginal rate of substitution of the parameter estimate of the characteristic from a regression model to the parameter estimate of price from the same model. While conjoint analysis has enjoyed increased popularity, many methodological and theoretical challenges remain.¹⁴

Contingent valuation (CV) is another technique for eliciting WTP and WTA developed in environmental economics.¹⁵ CV is built upon the utility-theory proposition that an

individual is willing to trade money for a service, product, or health status change based on the individual's net appraisal of that entity's perceived attributes.¹⁵ The CV technique is particularly useful in understanding individuals' valuation of items for which there is no private market.¹⁵ The term “contingent valuation” refers to the fact that an individual's valuation is based on the contingency of the particular scenarios presented to survey respondents.¹⁶ While having its own share of disadvantages, CV has recently enjoyed rapid growth in the health care literature and it has also been used to assign a monetary value on pharmacy services.¹⁵

Because of the challenges facing each technique producing WTP and WTA, various techniques are typically applied to the same WTP and WTA question, and the results are then compared.¹⁴ To build upon Wang et al.'s previous study on pharmacists' WTA for MTM services using conjoint analysis,¹⁰ this study sought to determine pharmacists' WTA by using a CV technique.

Methods

Survey

A cross-sectional survey of 1,524 active Tennessee pharmacists was conducted in 2009. The list of active pharmacists was obtained from the Tennessee State Board of Pharmacy with names and addresses of the pharmacists. Based on the classical survey implementation procedures suggested by Dillman, a 3-step process was followed for the survey.¹⁷ For the first step, a survey questionnaire was mailed along with a business reply envelop and a cover letter detailing the study objectives and the importance of the study. One week after the first mailing, a reminder postcard was sent. The survey instrument was mailed to pharmacists for the second time 2 weeks after the postcard. A pilot test of the survey questionnaire was conducted among a group of Pharm.D. students to determine whether the survey instrument was understandable. The instrument was then revised based on the feedback from the pilot testing. More details of the survey process can be found in the study by Wang et al.¹⁰

A sample size of 78 pharmacists was deemed sufficient based on 95% confidence level with a standard deviation of \$9 and an ambitious margin of error of \$2.¹⁸ The estimate on the standard deviation of pharmacists' WTA was from the study by Suh that reported less than \$9 in standard deviation in patients' WTP for MTM services.¹⁸

The elicitation method of this study for pharmacists' WTA was through a series of double-bounded, closed-ended binary discrete choice questions, a method that has been used widely in environmental economic evaluation.¹⁶ In essence, each survey respondent was asked to give a yes-or-no answer to a question about a specific level of compensation (“take-it-or-leave-it”). A respondent was then asked to give a yes-or-no answer to a pre-specified compensation level lower than the first question if the answer to the first question was “no.” A respondent was asked to give a yes-or-no answer to a pre-specified compensation level higher than the first question if the answer to the first question was “no.”

To obtain responses to a range of compensation levels, three different versions of the instrument were used. Using the first version of the instrument, pharmacists were asked

whether \$30 was acceptable for a 30-minute MTM service session for a new patient with 2 medical conditions, 8 medications, and an annual drug cost of \$2,000. Respondents were then asked whether \$10 was acceptable if the answer to the first question was “yes.” Respondents were asked whether \$60 was acceptable if the answer to the first question was “no.” In the other two versions of the instrument, the MTM compensation levels were changed. The compensations in the second version of the instruments for the first question and follow-up questions were \$60, \$30, and \$90, respectively. The compensation levels for the third version of the instrument for the first question and the follow-up questions were \$90, \$60, and \$120, respectively.

Regarding the identification of the MTM attributes and the assignment of the attribute levels, the first attribute, new or returning patient, was selected because current billing codes for MTM services differentiate between new and established patients.¹⁹ The next attributes, including patient's number of chronic conditions, patient's number of medications, and patient's annual drug costs, were selected to reflect the complexity of patients' medical conditions and medication regimens. These attributes were selected based on the current eligibility criteria for MTM services, which, at the time of this study, were that prescription drug (Part D) plans should offer MTM services to Medicare Part D beneficiaries who meet the following eligibility criteria: multiple chronic conditions, multiple covered medications, and likely to incur annual drug costs that exceed \$4,000 (in 2006).^{8,20,21} Regarding the attribute levels for patient's number of chronic conditions, patient's number of medications, patient's annual drug costs, and service duration, 2, 8, \$2,000, and 30 minutes were arbitrarily determined, respectively. These were determined to represent the lower range of the levels for these attributes in the conjoint analysis by Wang et al. for ease of comparison between studies.¹⁰ The MTM compensation levels were set approximately equal to or less than 1 to up to three times \$30 because, according to the Lewin Group, an acceptable level of compensation should be approximately \$2 to \$3/minute.⁹

The survey instrument also collected information on pharmacist characteristics including age, gender, pharmacy degree, years of pharmacy practice, setting of practice (independent pharmacy vs. other), practice location (urban or suburban vs. rural), position in the store (store owner vs. other), and income. Pharmacists were also asked to report whether they had previously provided MTM services, whether they planned to participate in MTM programs in 2010, and their opinions on the following two statements: “I am qualified to provide MTM service to patients,” and “An annual personal medication review would benefit patient outcomes”.²² This study defined MTM services as a pharmacist-provided patient care program consisting of the following five core elements: (1) medication therapy review, (2) a personal medication record, (3) a medication action plan, (4) intervention and referral, and (5) documentation and follow-up.^{23,24} This is consistent with the core elements of MTM services developed by the American Pharmacists Association and the National Association of Chain Drug Stores Foundation.^{23,24}

Data Analysis

Data gathered using the double-bounded discrete choice question is sometimes referred to as interval-censored survival data, which can be analyzed using survival analysis techniques.¹⁶

Specifically in this study, instead of survival time, survival was defined with respect to MTM compensation levels.¹⁶ If a pharmacist was willing to accept a specific level of compensation, she/he was considered having “survived” that level of compensation. If a pharmacist was not willing to accept a specific compensation level, she/he was considered having “failed” that compensation level. Furthermore, a yes-yes response indicated that the pharmacist's acceptable level of compensation lay between 0 and the level of compensation in the first question. A yes-no response indicated that the pharmacist's acceptable level of compensation was between the level of compensation in the first question and the lower level in the follow-up question. A no-yes response indicated that the pharmacist's acceptable level of compensation was between the level in the first question and the higher level in the follow-up question. A no-no response indicated that the pharmacist's acceptable level of compensation was between the higher level in the follow-up question and infinity.

Pharmacists' WTA was determined using a Kaplan-Meier approach. According to this approach, the mean WTA was calculated by analyzing the quantitative relationship between the proportions of pharmacists rejecting or accepting the MTM compensation levels at different values.^{14,25} The mean WTA was then produced by mathematically integrating the area under the Kaplan-Meier survival curve.^{14,25}

To examine the relationship between pharmacist characteristics and acceptable levels of compensation, a Cox's proportional hazard model was used. To test the proportionality assumption of the Cox's proportional hazard model, investigators first included interaction terms between the MTM compensation levels and all pharmacist characteristics in the model. When the interaction term between the MTM compensation level and certain pharmacist characteristics were significant in the model, they were included in the final model. Additionally, to examine the effects of pharmacist characteristics on their providing MTM services, characteristics were compared between pharmacists who planned to provide MTM services in 2010 and those who did not plan to do so. Chi-square test was used for the comparison.

Results

Pharmacists' characteristics in the study population were reported in an earlier study by Wang et al;¹⁰ as such, this manuscript includes only a brief summary. Three hundred forty-eight pharmacists responded to the survey (a response rate of 22.18%). Among 5 age groups (<40, 40-49, 50-59, 60-64, and >64), the 50-59 group represented 33% of the survey responses; all other age groups represented similar proportions between 10% and 20%. Sixty percent of the survey respondents were male. Over 95% of the survey respondents were White and non-Hispanic. Approximately 66% of the respondents possessed a bachelor of science (B.S.) in pharmacy degree. Over 50% of the survey respondents had practiced pharmacy for 30 years or more. Slightly over 50% of the survey respondents were from urban/suburban area vs. rural area. Approximately 50% of survey respondents were in independent pharmacies and 50% were store owners.

This study examined the relationship between pharmacist characteristics and whether they planned to participate in MTM programs in 2010 (Table 1). Pharmacists in older age groups

were found to have lower proportions of planning to participate in MTM programs in 2010 than did pharmacists in the younger age groups ($P=0.0294$). Male pharmacists and female pharmacists reported a similar likelihood of planning to participate in MTM program ($P=0.06$). Pharmacists with a B.S. in pharmacy were less likely to report planning to participate in MTM programs than did those with other degrees ($P=0.025$). Pharmacists with fewer years of practice reported similar likelihood of planning to participate in MTM programs as did pharmacists with more years of pharmacy practice ($P=0.153$). Pharmacists with the following characteristics had a higher proportion of planning to participate in MTM programs in 2010: working in independent pharmacies (versus those working in other settings; $P<0.0001$); pharmacists in rural areas (versus those in urban/suburban areas; $P=0.005$); pharmacists who previously provided MTM services (versus those who did not provide MTM services previously; $P<0.0001$); store owners (versus store nonowners; $P<0.0001$); pharmacists with higher income (versus those with lower income; $P=0.023$); pharmacists who agreed or strongly agreed with the statement, "I am qualified to provide MTM service to patients" (versus those neutral about the statement or disagreeing with the statement; $P<0.0001$). Similar proportions seemed to be planning to participate in MTM programs regardless of their opinion about the following statement: "An annual personal medication review would benefit patient outcomes" ($P=0.206$).

The proportions of pharmacists who were willing to accept given levels of compensation were analyzed. The proportions of survey respondents willing to accept a given level of compensation increased for \$30, \$60, and \$90 (30.61%, 85.19%, and 91.01%, respectively). Pharmacists' answers to first questions were also analyzed in combination with their responses to subsequent questions (Table 2). The proportions of survey respondents that answered yes-yes increased from version 1 (\$30 in the first question or \$30 version) to version 2 (\$60 version) and version 3 (\$90 version) of the survey instrument. The proportion to which survey respondents reported yes-no was lowest for \$30 version among all three versions. The proportions that the survey respondents reported no-yes decreased from \$30 version to \$90 version. The proportions that the survey respondents reported no-no were highest for \$30 version among all three versions of the survey instrument.

Regarding pharmacists' minimum acceptable levels of compensation, a large proportion of the survey respondents reported that \$60 was the minimum acceptable level of compensation; the 25th and 75th percentiles and the median of the distributions were all \$60, and the mean of the distribution was \$63.31 with standard deviation of \$1.21.

When analyzing the relationship between pharmacist characteristics and their WTA using Cox's proportional hazard model, all pharmacist characteristics had statistically significant effects on pharmacists' WTA in bivariate analyses (Table 3). The following variables had positive parameter estimates: age groups 40-49, 50-59, 60-64, and over 64 (compared to age group <40); male gender (compared to female gender), B.S. in pharmacy (compared to other degree), years of pharmacy practice, practicing in independent pharmacy (compared to non-independent pharmacy), pharmacy owner (compared to pharmacy non-owner), income categories \$100,000-\$150,000, and >\$150,000 (compared to income category <\$100,000), having provided MTM services previously (compared to not having provided MTM services), agree or neutral or disagree with the following statement, "I am qualified to

provide MTM service to patients (compared to strongly agree with the statement),” and agree or neutral or disagree with the following statement, “An annual personal medication review would benefit patient outcomes (compared to strongly agree with the statement).” One variable, practice location in urban or suburban areas (compared to a rural practice location), had a negative parameter estimate. However, in the multivariate analysis, only practice setting and whether pharmacists previously provided MTM services had significant effects on pharmacists' WTA (Table 4). Their effects were both positive.

Discussion

Using the CV technique, the investigators found that pharmacists' WTA of MTM compensation level for an MTM service session for a new patient with 2 medical conditions, 8 medications, an annual drug cost of \$2,000, and with duration of 30 minutes had a mean of \$63.31 and a median of \$60. Because preferences from all pharmacists need to be taken into consideration when determining pharmacists' acceptable levels of compensation, the mean value, or \$2.11 per minute should be considered a more representative estimate from this study.

The estimate of pharmacists' WTA for MTM services was higher than the previous estimate of \$1.44 per minute or \$43.2 for 30 minutes found by Wang et al.¹⁰ The estimate from the current study was higher than the lower range of \$2-\$3/minute “rule of thumb” suggested by the Lewin Group⁹ and higher than the current MTM compensation level of \$30-\$100/h, or \$15-\$50 for 30 minutes reported by Boyd.¹¹ The estimated pharmacists' WTA also was higher than Moczygemba et al.'s estimate.¹³ In the Moczygemba et al. study, pharmacists were asked to provide a response on their opinion about the following statement: “I feel that \$2/minute is an adequate compensation for providing MTMS (MTM services).” Moczygemba et al. reported that pharmacists were somewhat neutral toward that statement.¹³

The patterns of the pharmacists' responses in this study were in general consistent with the investigators' expectations. From versions 1 (\$30 version) to 3 (\$90 version) of the contingent valuation questions, the compensation levels increased from the lowest to the highest in the original questions, the proportions of yes-yes responses increased as expected; the proportions of no-yes responses decreased as expected. This evidences the internal validity of the methods and definitions used in the current study. The proportions of yes-no and no-no responses exhibited more complicated patterns because of the less straightforward nature of the combinations of the first questions and the follow-up questions for these responses.

It is important to understand the nature of the methodology in this study before determining the implication of the study findings. CV is a theoretically sound method for placing monetary values on a service, product, or health status change.¹⁶ The investigators used a series of double-bounded, closed-ended binary discrete choice questions (take-it-or-leave-it questions) where respondents were asked follow-up questions based on their responses to the original take-it-or-leave-it question.¹⁶ This method is an extension of the simple binary discrete choice question where only one take-it-or-leave-it question is asked. The extension

from the simple take-it-or-leave-it question increases the statistical power of the WTA estimate.¹⁶ For a given sample size, using such extension helps to reduce the margin of error for the WTA estimate. The use of take-it-or-leave-it questions is also consistent with the decision that pharmacists are used to making. For example, determining the dispensing fee for medications is typically based on pharmacists' responses to a take-it-or-leave-it offer by third-party payers.²⁶

Another methodological consideration is related to the choice of valuing a single MTM service package versus valuing multiple MTM service packages in one study.¹⁶ Single-good CV surveys have been shown to produce estimates that are sensitive to the attributes of the item being valued.¹⁶ Additionally, valuing one package avoids the difficulty in differentiating between multiple packages in one survey instrument.¹⁶

Closed-ended binary discrete choice questions are one of the 2 types of closed-ended questions for CV.¹⁴ Another type of closed-ended questions is a bidding game, which uses a predetermined algorithm to bid respondents down or up, depending upon whether they answer yes or no to a prompted money value.¹⁴ The bidding game introduces a starting point bias because the respondents' responses to given money values can be affected by the first numbers given in the bidding game.¹⁴ While binary discrete choice questions may involve starting-point bias as well, closed-ended binary discrete choices are more practical than are bidding games for a mailing survey that does not involve face-to-face interaction.¹⁴

In contrast to using closed-ended questions, WTP and WTA can also be obtained by asking open-ended questions.¹⁴ Open-ended questions are more cognitively challenging than closed-ended questions used, because people are not used to reporting what they are willing to pay or what they are willing to accept without being given numerical cues. Empirical evidence is that open-ended WTP and WTA questions may lead to more protest responses and non-responses than close-ended questions; additionally, open-ended WTP and WTA questions typically produce answers that range too widely to be reliable.¹⁴

This study found that pharmacists' WTA for MTM services is even higher than what was reported in previous studies. This is again concerning. The benefits of MTM services in improving patient outcomes, reducing health services utilization, and reducing health care expenditures have been increasingly documented and accepted.³⁻⁵ However, with the current MTM compensation level lower than what pharmacists consider adequate, society will inevitably be incapable of taking full advantage of pharmacists' expertise in medication management.

It is important to compare pharmacists' WTA for MTM services with patients' WTP for MTM services, because pharmacists and patients constitute the supply and demand sides of MTM services. In a study by Suh et al using a contingent valuation method, patients were reported to be willing to pay pharmacists \$0.87/minute to reduce the risk of medication-related problems.¹⁸ Hong et al found that patients reported lower (statistically insignificant) utility with a longer MTM session (30-minute session) than with a shorter MTM session (15-minute session; $P = 0.87$).²⁷ They therefore could not estimate a positive WTP value by patients for each minute of MTM services. In a study by Barner and Branvold, women were

asked to report WTP for pharmacist-provided menopause and hormone replacement therapy consultations.²⁸ Respondents were willing to pay a median of \$20-\$40 for half an hour of pharmacist-provided consultations. It seems that when patients' WTP of \$20-\$40 for MTM services and MTM programs' compensation for MTM services by pharmacists are combined, pharmacists' acceptable levels of compensation can be reached.

The issues of inadequate compensation for MTM services may be confronted by addressing internal barriers within pharmacies and optimizing the MTM market. Internally, pharmacists need to overcome their reluctance to charge for MTM services and streamline the process for documenting and billing for services. It has been reported that fewer than 40% of pharmacists were paid for MTM services provided.^{6,7,29} Externally, pharmacists need to find innovative strategies for optimizing the market for MTM services by advocating for higher compensation levels for MTM services and advocating for patient copayment or coinsurance for MTM services, because currently Medicare MTM programs offer MTM services to patients for free.

This study found that all pharmacist characteristics had statistically significant effects on their WTA levels for MTM services in bivariate analyses. In the multivariate analysis, only practice setting and pharmacists' previous experience in providing MTM services had statistically significant effects. Pharmacists who practiced in an independent pharmacy and pharmacists who previously provided MTM services were more likely to accept a given level of MTM compensation than were their counterparts. This study also found that most pharmacist characteristics were associated with pharmacists' decision to participate in MTM programs. These findings can be compared to the previous study by Wang et al., which using conjoint analysis, found that the following pharmacist characteristics were correlated with pharmacists' WTA for MTM services:¹⁰ pharmacist male gender, years of pharmacy practice, pharmacist position (store owner or not), pharmacy degree (bachelor's or master's and other compared to doctor of pharmacy), and whether a pharmacist had previously provided MTM services. While male gender and pharmacist position had positive effects on pharmacists' WTA for MTM services in that study, years of pharmacy practice and whether a pharmacist had previously provided MTM services were found to have negative effects of pharmacists' WTA for MTM services. Since this study found that all these factors had positive effects on pharmacists' WTA, these findings are not consistent across studies. The investigators are unsure of the causes for these differences. Probably these are due to the variations in modeling approach in conjoint analysis in that study and CV in this study.

In regard to sampling, this study had a larger sample size than the limited number of existing CV studies in pharmacy. For example, the study by Suh et al had a sample size of 316 when asking consumers' WTP for pharmacy services that reduced risk of medication-related problems.¹⁸ Additionally, that study used simple discrete choice questions instead of the double-bounded, closed-ended binary discrete choice questions used in this study that offered greater statistical power.¹⁸ The sample size for the study by Barner and Branvold on patients' WTP for pharmacist-provided consultations was 203, and they also used simple binary discrete choice questions.²⁸

Limitations

The findings from this study should be considered with the following limitations. First, there are potential biases due to the use of the CV method. For example, there may be strategic bias whereby pharmacists may intentionally exaggerate their WTA for a given MTM service session.¹⁵ However, because the WTA estimate from this study was only slightly higher from the previous findings by Wang et al., this potential strategic bias did not seem to be a serious issue.¹⁰ Another form of bias may stem from the range or starting point of the monetary values given in the original WTA questions and follow-up questions. Because the monetary values in this study were carefully determined based on previous literature,⁹ the effect of this potential bias should have been reduced to the lowest level possible. Nonetheless, another study using different starting points may have led to different WTA estimates. An additional study limitation is related to the use of double-bounded, closed-ended binary discrete choice questions. While such a method has distinct advantage over open-ended questions, individuals' choices of WTA values are limited. Nonetheless, this method serves at least as an alternative for producing a reasonably reliable WTA.¹⁶

Another limitation lies in the survey of pharmacists in one US state. Tennessee has unique, high needs for MTM services, with the second highest drug expenditure per capita (\$1192.56) and highest per capita utilization of prescription drugs (17.3 prescriptions) in the US in 2006.³⁰ The external validity of this study should be determined with caution. A related limitation is the difference in pharmacist characteristics in the study sample and the pharmacist characteristics in Tennessee. A previous study by Brown et al reported that Tennessee pharmacists were 60% female and approximately 70% over 40.³¹ However, in this study the sample was 40% female and approximately 85% over 40 years of age. Additionally, the proportions of independent pharmacies and pharmacists who were store owners were both as high as 50% in the sample, so this study may over-represent pharmacists with these characteristics. Because store owners were found to be more likely to accept a given level of MTM compensation according to the analysis, the study results may have underestimated the WTA for all pharmacists in Tennessee.

Conclusions

The current study found that pharmacists' WTA for a 30-minute MTM service session for a new patient with 2 medical conditions, 8 medications, and an annual drug cost of \$2,000 had a mean of \$63.31 and a median of \$60. These are higher than the ranges of the existing levels of compensation for MTM services in MTM programs and the patients' WTP for MTM services. Besides advocating for higher MTM compensation levels, pharmacists may need to charge patients for MTM services at the same time.

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Relationship between pharmacists' characteristics and their intention to participate in an MTM program during the next year.

Table 1

Characteristics	Groups	Plan to Participate		Do Not Plan to Participate	
		Number	Percentage	Number	Percentage
Age ^d	<40	32	62.75	19	37.25
	40-49	30	56.60	23	43.40
	50-59	47	44.76	58	55.24
	60-64	25	54.35	21	45.65
	>64	20	35.09	37	64.91
Gender	Male	103	53.37	90	46.63
	Female	50	42.37	68	57.63
Degree ^d	B.S. in Pharmacy	90	44.78	111	55.22
	Other	65	58.04	47	41.96
Years of Practice	<11 Years	21	63.64	12	36.36
	11-29	56	50.91	54	49.09
	>29 Years	78	45.61	93	54.39
Independent Pharmacy ^d	Yes	108	69.23	48	30.77
	No	47	29.75	111	70.25
Practice Location ^d	Urban or Suburban	72	42.35	98	57.65
	Rural	81	58.27	58	41.73
Owner ^d	Yes	63	76.83	19	23.17
	No	92	39.66	140	60.34
Income ^d	<\$100,000	39	41.49	9	58.51
	\$100,000-\$150,000	70	46.98	79	53.02
Previously Provided MTM Services ^d	>\$150,000	40	65.57	21	34.43
	Yes	115	79.86	29	20.14
Believe Qualified to Provide MTM Services ^d	No	39	23.35	128	76.65
	Strongly Agree	62	81.58	14	18.42
	Agree	72	50.7	70	49.3
Neutral or Disagree	20	22.73	68	77.27	

Characteristics	Groups	Plan to Participate		Do Not Plan to Participate	
		Number	Percentage	Number	Percentage
Annual Medication Review Benefits Patients ^a	Strongly Agree	68	56.67	52	43.33
	Agree	74	46.25	86	53.75
	Neutral or Disagree	13	46.43	15	53.57

^a $P < 0.05$.

Table 2

Responses by pharmacists to given levels of compensation for medication therapy management services.

Version	Yes-Yes (%)	Yes-No (%)	No-Yes (%)	No-No (%)
1 (\$30, \$10, \$60)	1.04	28.13	66.67	4.17
2 (\$60, \$30, \$90)	13.21	72.64	13.21	0.94
3 (\$90, \$60, \$120)	47.13	43.68	6.90	2.30

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Table 3

Association between pharmacists' characteristics and their willingness to accept given levels of compensation for medication therapy management services (bivariate analysis).

Characteristics	Groups	Estimate	Standard Error	Chi-Square	P Value	Hazard Ratio (HR)	95% Confidence Limit for HR
Age Groups	<40	--	--	--	--	--	--
	40-49	4.56	0.62	54.82	<.0001	95.67	28.60-319.97
	50-59	4.60	0.60	58.91	<.0001	99.42	30.72-321.78
	60-64	4.79	0.76	39.76	<.0001	120.16	27.12-532.38
	>64	4.56	0.72	40.70	<.0001	95.84	23.59-389.33
Compensation level (40-49)		-0.06	0.01	55.54	<.0001	0.94	0.92-0.95
	Compensation level (50-59)	-0.07	0.01	64.26	<.0001	0.94	0.92-0.95
	Compensation level (60-64)	-0.07	0.01	36.15	<.0001	0.93	0.91-0.96
	Compensation level (>64)	-0.06	0.01	37.92	<.0001	0.94	0.92-0.96
Gender	Male	3.61	0.41	77.17	<.0001	36.90	16.50-82.53
	Female	--	--	--	--	--	--
Degree	B.S. in Pharmacy	3.54	0.41	75.22	<.0001	34.36	15.45-76.41
	Other	--	--	--	--	--	--
Years of Practice	Compensation (B.S. in Pharmacy)	-0.05	0.01	80.31	<.0001	0.95	0.94-0.96
	Practice Years	0.12	0.01	123.90	<.0001	1.12	1.10-1.15
Independent Pharmacy	Compensation (Practice Years)	0.00	0.00	124.87	<.0001	1.00	0.998-0.999
	Yes	3.08	0.39	60.69	<.0001	21.69	10.00-47.05
Practice Location	No	--	--	--	--	--	--
	Compensation*Yes	-0.05	0.01	64.76	<.0001	0.96	0.95-0.97
Owner	Urban or Suburban	-3.31	0.40	67.10	<.0001	0.04	0.02-0.08
	Rural	--	--	--	--	--	--
Income	Compensation (Urban or Suburban)	-0.05	0.01	65.54	<.0001	0.95	0.94-0.97
	Yes	2.86	0.48	35.86	<.0001	17.44	6.84-44.46
	No	--	--	--	--	--	--
	Compensation *Yes	-0.04	0.01	35.54	<.0001	0.96	0.95-0.97
	<\$100,000	--	--	--	--	--	--
	\$100,000-\$150,000	4.24	0.47	82.64	<.0001	69.49	27.85-173.41

Characteristics	Groups	Estimate	Standard Error	Chi-Square	P Value	Hazard Ratio (HR)	95% Confidence Limit for HR
	>\$150,000	4.25	0.61	48.60	<.0001	69.83	21.17-230.41
	Compensation (\$100,000-\$150,000)	-0.06	0.01	82.71	<.0001	0.94	0.93-0.95
	Compensation (>\$150,000)	-0.06	0.01	48.64	<.0001	0.94	0.92-0.96
Provided MTM	Yes	1.13	0.10	134.75	<.0001	3.08	2.55-3.73
Services	No	--	--	--	--	--	--
	Compensation* Yes	-0.02	0.00	88.14	<.0001	0.98	0.97-0.98
Believe	Strongly Agree	--	--	--	--	--	--
Qualified to	Agree	3.71	0.50	56.12	<.0001	40.89	15.49-107.95
Provide MTM	Neutral or Disagree	4.40	0.56	61.02	<.0001	81.55	27.03-246.04
Services	Compensation (Agree)	-0.05	0.01	58.06	<.0001	0.95	0.94-0.96
	Compensation (Neutral or Disagree)	-0.06	0.01	57.61	<.0001	0.94	0.92-0.95
Annual	Strongly Agree	--	--	--	--	--	--
Medication	Agree	3.68	0.45	66.20	<.0001	39.75	16.37-96.51
Review Benefits	Neutral or Disagree	3.46	0.73	22.17	<.0001	31.70	7.52-133.63
Patients	Compensation (Agree)	-0.05	0.01	64.29	<.0001	0.95	0.94-0.96
	Compensation (Neutral or Disagree)	-0.05	0.01	19.41	<.0001	0.95	0.93-0.97

Table 4

Association between pharmacists' characteristics and their willingness to accept given levels of compensation for medication therapy management services using a multivariate Cox's proportional hazard analysis.

Characteristics	Groups	Estimate	Standard Error	Chi-Square	P Value	Hazard Ratio (HR)	95% Confidence Limit for HR
Age ^d	<40	--	--	--	--	--	--
	40-49	0.02	0.24	0.00	0.95	1.02	0.63-1.64
	50-59	0.05	0.34	0.02	0.89	1.05	0.54-2.04
	60-64	0.10	0.41	0.06	0.81	1.11	0.50-2.45
Gender	>64	0.07	0.50	0.02	0.88	1.08	0.41-2.85
	Male	-0.03	0.15	0.03	0.86	0.97	0.73-1.31
Degree ^d	Female	--	--	--	--	--	--
	B.S. in Pharmacy	0.06	0.18	0.10	0.75	1.06	0.74-1.51
Years of Practice	Other	--	--	--	--	--	--
	<11 Years	0.00	0.01	0.13	0.71	1.00	0.97-1.02
Independent Pharmacy ^d	Yes	1.46	0.44	11.05	<0.001	4.32	1.82-10.25
	No	--	--	--	--	--	--
Practice Location ^d	Urban or Suburban	-0.03	0.14	0.06	0.81	0.97	0.74-1.27
	Rural	--	--	--	--	--	--
Owner ^d	Yes	-0.10	0.19	0.27	0.60	0.91	0.62-1.32
	No	--	--	--	--	--	--
Income ^d	<\$100,000	--	--	--	--	--	--
	\$100,000-\$150,000	0.12	0.16	0.57	0.45	1.13	0.83-1.53
Previously Provided	>\$150,000	0.01	0.21	0.00	0.97	1.01	0.67-1.51
	Yes	2.91	0.31	87.38	<0.0001	18.36	9.98-33.80
MTM Services ^d	No	--	--	--	--	--	--
Believe Qualified to	Strongly Agree	--	--	--	--	--	--
	Agree	-0.02	0.17	0.02	0.90	0.98	0.70-1.36
Provide MTM Services ^d	Neutral or Disagree	-0.06	0.22	0.07	0.79	0.94	0.62-1.45
	Strongly Agree	--	--	--	--	--	--
Annual Medication	Agree	0.05	0.14	0.11	0.74	1.05	0.79-1.38
Review Benefits	Agree	--	--	--	--	--	--

Characteristics	Groups	Estimate	Standard Error	Chi-Square	P Value	Hazard Ratio (HR)	95% Confidence Limit for HR
Patient ^s ^a	Neutral or Disagree	-0.04	0.27	0.02	0.89	0.96	0.57-1.63
Interaction Terms	Compensation* Independent Pharmacy	-0.02	0.01	12.30	0.00	0.98	0.97-0.99
	Compensation*Having Provided MTM Services	-0.05	0.00	93.40	<.0001	0.95	0.95-0.96

^a $P < 0.05$