

Medication Therapy Management: Is it Worth Medicare's Time?

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I. Executive Summary

Problem:

Medication Therapy Management (MTM) is a service that a pharmacist can provide to any of their patients, but mostly to those who are either high risk patients for adverse events or those who are new to chronic medication therapy. As Medicare Part D has begun to cover MTM services, more and more pharmacists and other clinicians are becoming providers of MTM.

The intent of MTM is to decrease adverse events and healthcare costs to both the patient and the third party payer. In realizing the benefits of MTM, it is important to assess these outcomes to see if clinical, humanistic, and economic benefits are being realized. However, the available knowledge and studies on MTM outcomes are very limited in scope and most results are inconclusive. This study contributes to the limited knowledge on whether patients find MTM services to be worth an investment of their time.

Research Strategy:

This retrospective analysis was designed to evaluate a small sample of previously surveyed patients qualifying for MTM services at 8 pharmacies in Kentucky. The main point of interest is the effect of patient characteristics on a person's willingness to purchase MTM services.

Descriptive statistics were used to characterize the study group. Logistic regression was used for the prediction of the probability of the patient's willingness to pay for the MTM service. There is special interest on the findings associated with the differences in a patient's value of time between the Medicare Part D qualifying age group and the non-qualifying age group.

Major Findings:

There was a difference between the age groups when looking at the value of time variables. Those patients in the age group not qualifying for Medicare Part D who place more than \$5.00/hr value to their time decreases the probability that they will purchase the MTM service. This was not a significant finding in the Medicare Part D qualifying group.

Recommendations:

The results provide preliminary insight into whether investments in MTM services are worth public and private monetary resources when considering a patient's willingness to spend their time to receive the service. Healthcare policy makers should be cognizant of the targeted population and the standards to be achieved when making their decisions related to MTM services.

II. Problem Statement

The United States Medicare program provides many benefits to the country's elderly population. Among these benefits is the prescription drug provision, Medicare Part D (The Medicare Prescription Drug, Improvement, and Modernization Act, 2003). Under this provision and in combination with the possible addition of private supplemental coverage, Medicare beneficiaries are able to choose from numerous prescription drug plans depending on their specific needs. In general, most public policy analysts and officials find that Medicare is relieving the healthcare cost burden for senior citizens (those aged 65 and older) and a subpopulation of younger people with disability (Johnson, 2008). These opinions were of course made after several years of debate (which still continues) on Medicare's reform addressing several of its main problems including inadequacy, inefficiency, lack of equity among beneficiaries depending on their provider and regional differences, and difficult to understand application process (Reischauer, 2001). While these criticisms provide interesting areas for policy research, including their application to the newly added Part D drug benefit, the focus of this analysis is on the Medication Therapy Management (MTM) component of Part D (Beneficiary Protections for Qualified Prescription Drug Coverage, 2003; Center for Medicaid and Medicare Services, 2008). Approximately 65.4% of the Medicare Part D population who met the criteria for MTM services was actually participating in 2006, the first year of availability to beneficiaries. This same population grew to 77.9% in 2007 (Center for Medicaid and Medicare Services, 2008).

MTM is a service that a pharmacist can provide to any of their patients, but mostly to those who are either high risk patients for adverse events or those who are new to chronic medication therapy. MTM usually involves additional visits by the patient to receive counseling, general disease state and healthy lifestyle education, and answers to questions about their chronic maintenance medications. Since Medicare Part D has begun to cover MTM services, more and more pharmacists are becoming providers of MTM.

The intent of MTM is to decrease adverse events and healthcare costs to both the patient and the third party payer (i.e. in this case, third party payers include CMS as well as others providing reimbursement for MTM) (Center for Medicaid and Medicare Services, 2008). It is important to assess the outcomes of MTM to see if these benefits are being realized. If the individual patient does not see a personal, tangible benefit to using the services, then the programs will likely be underutilized and potential benefits such as humanistic (quality of life, patient satisfaction, adherence rates, etc.) and economic (costs to health care purchasers over time, medication costs to the patient, etc.) outcomes, may not be correctly represented in reports generated. Reasons for patient underutilization need to be assessed in addition to other quality indicators before future decisions are made about the provision of these extra services under insurance prescription drug programs (Center for Medicaid and Medicare Services, 2008; United States Congressional Senate, 2006).

By providing such data from both smaller analyses and other large randomized trials, we can assess the demand and outcomes for MTM services. If MTM

demonstrates clinical, humanistic, and economic outcomes, further analysis may be necessary to evaluate and propose new policies to standardize the care and/or outcome goals provided to all MTM patients (Machado Part I and II, 2007).

This study contributes to the limited knowledge on whether patients find MTM services to be worth an investment of their time. Over 200 responses from consumers at 8 different community pharmacies in KY were analyzed. On a local level, the results are being used to evaluate the desire to use the new MTM services at these pharmacies. In a larger context, the results may provide preliminary insight into whether investments in MTM services are worth public and private monetary resources and patients' time in order to provide a positive return on these investments.

III. Introduction/ Background (Literature Review)

The governmental health insurance, Medicare, was expanded in 2003 with the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) (The Medicare Prescription Drug, Improvement, and Modernization Act, 2003). This new plan allowed for many changes to be made in the delivery of healthcare by Medicare providers. There was the major implementation of the new prescription drug plan, Part D, and the choice of additional participating private drug coverage plans for beneficiaries to address their specific needs. Among other changes made was the addition of reimbursement for Medication Therapy Management (MTM) Programs for those beneficiaries who qualify (Center for Medicaid and Medicare Services, 2008).

The inclusion of MTM was considered in 2003 and revisited again in 2006 (when the MMA was under revision) only after officials involved with the new prescription drug plan saw how members of the healthcare team had the potential to increase the quality and effectiveness of a patient's health outcomes through numerous interactions and interventions. It was brought before the House Committee on Ways and Means Subcommittee on Health of the U.S. government by a Center for Medicaid and Medicare Services (CMS) administrator that CMS was willing to include this in their new prescription drug plan program as a part of the Pharmacy Quality Alliance (PQA). MTM would be considered a "demonstration project" and there would be provisions to require the collection of information that would indicate the impact that MTM services made (United States Congressional Senate, 2006). Currently, the

MTM provision is still being assessed systematically through exploratory research projects funded by CMS and whether the service will continue to be included as a benefit or not will largely depend on the various outcomes of these endeavors.

According to CMS's 2009 Active Project Reports, one such research project ended collection in July 2008 and results are forthcoming (Center for Medicaid and Medicare Services, 2009).

MTM is a service that a pharmacist or any qualified healthcare professional can provide to any of their patients, but mostly to those who are either high risk patients for adverse events or those who are new to chronic medication therapy. It usually involves additional visits by the patient to receive counseling, general disease state and healthy lifestyle education, and answers to questions about their chronic maintenance medications. Some visits can even include discussion about lab results, minor physical exams (i.e. diabetic foot exams, blood pressure readings, etc.) and the potential to be referred to other healthcare specialists. The intent of MTM is to improve the patient's health and decrease adverse events and healthcare costs to both the patient and provider (Machado Part I and II, 2007).

There are very few specific provisions in place to allow for guidance in developing an MTM service. The MMA differentiates who can be a Part D Sponsor for MTM services, who may qualify for the Part D MTM provision, and the expectations regarding the measurement of specific MTM outcomes, if any.

A Part D Sponsor is any entity that sponsors a health plan. This can be an employer, the employee organization, a union, or other entity that establishes or maintains an employee benefit plan. As of 2003, the MMA, under section 423.153(d),

requires that a Medicare Part D Sponsor must include the following in their MTM program:

- A plan to appropriately address Part D formulary drugs prescribed to targeted beneficiaries (see definition below) and to make sure that they are used to optimize therapeutic outcomes through improved medication use;
- A therapeutic plan that reduces the risk of adverse events, including adverse drug interactions, for targeted beneficiaries;
- A list of all cooperating licensed and practicing pharmacists and physicians or other qualified healthcare providers involved;
- A distinction between services in ambulatory and institutional settings;
- A description of the resources and time required to implement the program if using outside personnel and the establishment of the fees for pharmacists or others (which currently is at the Part D Sponsor's discretion and dependent on the other costs associated with the program). (Center for Medicaid and Medicare Services, 2008)

Targeted beneficiaries for the MTM program as described in section 423.153(d)(1) are enrollees in the Sponsor's Part D plan who meet all of the following criteria:

1. Have more than one chronic disease (i.e. asthma, hypertension, diabetes, etc);
2. Are taking more than one Part D drug;
3. Are likely to incur annual costs for covered Part D drugs that exceed a predetermined level as specified by the Secretary (initial cost threshold of

\$4,000 established) (The Medicare Prescription Drug, Improvement, and Modernization Act, 2003; Center for Medicaid and Medicare Services, 2008)

As with the initiation of any new government program, CMS wants to collect information from the various MTM demonstration projects. CMS has established very limited data that they would like to collect from practitioners delivering an MTM service, which include:

1. The eligibility criteria of the recipient/patient as discussed above
2. Method of enrollment whether the beneficiary actively choose to participate or was auto-enrolled in the MTM service
3. When new targeted beneficiaries were enrolled (monthly, quarterly, etc)
4. Who received the monetary benefit from providing the MTM service (beneficiary, provider, or both) and whether the intervention was communicated through e-mail, face-to-face, intervention letter, medication profile screenings, etc.
5. Provider of MTM services
6. Outcomes (non-specific expectations)

It is this movement in healthcare policy generated by CMS that has led many interest groups to consider the potential benefits of such a program and whether positive outcomes can be related back to the additional role of the healthcare professional. Should overall outcomes from MTM services prove to enhance clinical health outcomes (i.e. decrease in blood pressure and cholesterol) or economic and humanistic outcomes (i.e. quality of life and saving resources by a decrease in costs to third parties and healthcare

facilities), then healthcare professionals will be encouraged to move forward in their MTM efforts. This may ultimately lead to the possible expansion of the MTM program to other practice sites and other beneficiary groups may be considered (Center for Medicaid and Medicare Services, 2008).

There have been several individual studies such as the Asheville project in North Carolina and DiabetesCare at University of Kentucky as well as a few meta-analyses that have identified some of the potential outcomes from providing an MTM service (Cranor, 2003; DeName, 2008; Johnson, 2008; Machado Part I and II, 2007). Most studies identify the specific role the pharmacist (or other healthcare provider) had in the patient's health program. Additional education on the medications and leading a healthy lifestyle, addressing compliance issues with the patients or making medication therapy changes (resolving drug interactions, dosage adjustments, etc.) are mentioned as possible elements to include in a pharmacist provided MTM service.

There are a limited number of studies to date looking at these outcomes. Trial designs range from a few randomized controlled trials to several observational/descriptive trials concerning many chronic disease states including: diabetes, hyperlipidemia, hypertension, and asthma. Most studies are comparative between a pre-intervention period and post-intervention period. In all studies, several variables are measured including clinical, quality of life, and economic measures. Results suggest that pharmacists and other providers can have a positive impact on clinical outcomes such as a decrease in patient's hemoglobin A1c (HbA1c; a commonly used blood test to assess a patient's blood sugar control over 3 months), and a decrease in patient's blood pressure. However, meta-analyses suggest that most studies are poor in

design (i.e. small sample size, non-randomized, lack of control group). In aggregate, it is difficult to draw any firm conclusions about many of the outcomes, such as medication adherence, medication knowledge, cost vs. benefit of the program, value of time, and quality of life parameters (Machado Part I and II, 2007; Garrett, 2005).

The outcomes from MTM services are starting to become more important to third party payers, public officials, and healthcare professionals but what about the patient? Does the patient really perceive MTM sessions as a valuable tool in assisting them to better health? And therefore would the patient be willing to spend time with a pharmacist to help them accomplish their health goals?

MTM requires patients to give their time even if the service is “free” to them through insurance plans like Medicare Part D. In some cases, this time requirement can be a small investment on the patient’s part and in other cases it can be quite large. MTM sessions can range anywhere from 15 minutes per session to one hour per session. The sessions can be scheduled every month, every three months, or even every six months. This may be problematic for those still in the workforce because MTM services are not necessarily provided during “off-hours” (i.e. nights, weekends). So, a patient may have to take time away from work to partake in MTM sessions and depending on the patient’s employer, this time away from work may, or may not, be reimbursed. Also, even if MTM is offered at night, patients who have busy jobs and lives with a full schedule of other responsibilities during their “off-hours” may place a premium on their leisure time.

There has been some consideration of the value of an individual’s time in health economics literature. A person’s specific investment of time to improve their health was included in the health production function proposed by Michael Grossman, a health

economist (Grossman, 1972). A person's health (considered the output of the function), is influenced by several inputs such as a person's education, income, lifestyle, environment, race, gender, and time investment in health. Each of these variables can have a positive or negative effect (Gilleskie, 2006). For example, as the amount of a person's education increases, the more likely they are to allocate their resources to maintain good health and therefore have a positive impact on their health. Applying Grossman's ideas to the current study, it could be expected that those who had more time to spend (i.e. potentially those retired and on Medicare), and therefore a lower value of time, would be more willing to purchase MTM services than someone in the workforce.

The influence of the value of an individual's time on their willingness to purchase (or even partake of) MTM services is clearly underrepresented in the evidence. Understanding a patient's willingness to give their time could help support either the movement towards providing more MTM services or to revise current MTM practice and policies (Cranor, 2003; Garrett, 2003). If patients do not value MTM services at a sufficient level to overcome the costs (monetary or time) than it is unlikely the benefits of MTM (i.e. a decrease in morbidity and mortality, a decrease in healthcare costs, or an increase in quality of life) will be realized. Therefore, it is important to evaluate the patient's perception of MTM, and whether the patients value these services sufficiently to invest time in receiving them.

IV. Research Strategy and Methods

This analysis was designed to evaluate a small sample of previously surveyed patients (or consumers) qualifying for MTM services at 8 pharmacies in Kentucky. The main point of interest is the effect of patient characteristics on a person's willingness to purchase MTM services and which variables suggest a significant influence. Willingness to purchase MTM services is used as an indicator of the patient's perceived value of the MTM service. Findings from this analysis may provide an indication for what may need to be more closely and largely studied in future projects.

Sample

The populations of interest for this study were all patients with diabetes who filled prescriptions one of the eight pharmacies in Kentucky (Cooley's Apothecary in Prestonsburg, Medicine Shoppe in Frankfort, Grant Co. Drugs, Corner Drugstore in Winchester, Burlington Pharmacy in Burlington, Family Discount Drugs in Owingsville, ApotheCare in Elizabethtown, North Park Pharmacy in Owenton.

The pharmacists identified their type-2 diabetes patients who were age 18 or older and who had received a prescription for a type-2 diabetes medication in the past 6 months. Potential subjects randomly selected from the list and were contacted by phone. After confirming the diagnosis of diabetes they were asked if they would participate in a scientific study that involved an interview of approximately 15-20 minutes. Individuals who agreed to participate in the study were given a mutually convenient appointment time for the interview, which was carried out in the pharmacy. Subjects were first given a questionnaire with background questions to fill in. In all

experimental groups, a written description of the pharmacist-provided diabetes management program was then given to the subject. The interviewer read the program description to the subject while the subject read along on his/her own copy. The interviewer responded to any questions the subject had regarding the service. Next, the interviewer gave the subject a written copy of the survey. The interviewer read the valuation/purchase question to the subject and the subject marked his/her response on the survey form. All survey information was collected between May 1 and October, 2003 and pooled together to make up the sample of 222 subjects. The surveys given to all patients were the same except for the monetary options for “price willing to pay for MTM services” which varied by pharmacy site (Blomquist, forthcoming 2009; Blumenschein 2001, 2008).

The survey has been previously published and was considered valid in its design and free from survey bias (Blomquist, forthcoming 2009; Blumenschein 2001, 2008). All surveys were administered by one of two trained individuals. The study was approved by the University of Kentucky Institutional Review Board.

Measures

Data collected for each patient included several of the following characteristics:

- Severity of diabetes as subjectively rated by the individual as mild, moderate or severe;
- Perception of health as subjectively rated by the individual as poor, fair, good, very good, and excellent;

- Presence of co-morbidities seen with diabetes (eye problems, kidney disease, cardiovascular disease, or nerve problems);
- The travel time to pharmacy (in minutes);
- The distance from the pharmacy (in miles);
- The value of their time (the rate /hour or the monetary value the respondent places on his or her time);
- Average Income (in dollars);
- Other descriptive statistics: Gender, Age, Body Mass Index (BMI), HbA1c, ethnicity, smoking history, years of school;
- Renting or owning their residence;
- Previous diabetes management;
- Use of a support group;
- Price of MTM service offered to the patient at that specific pharmacy (\$15, 40, 60, 100, 150) and whether patient would accept that price;

See Appendix 1 for a more specific list of survey questions.

Design

As originally collected, the information desired was from a prospective, randomized intervention study assessing hypothetical bias in contingent valuation surveys. The current analysis makes use of this previously collected data; in this analysis, only the subjects who responded to hypothetical willing to pay questions are included. The purpose is to ascertain how patient characteristics such as knowledge of disease state,

presence of other co-morbidities, age, previous disease management, value of time, income, and price offered impact a patient's probability to pay for MTM services by the pharmacist. There is a special interest on the findings associated with a patient's value of time as research in this area is limited and may serve as a useful beginning for future analysis.

Procedures

Descriptive statistics were used to characterize the study group. Logistic regression was used for the prediction of the probability of the patient's willingness to pay (WTP) for the MTM service. Logistic regression is a generalized linear model used for binomial regression and is appropriate in this analysis since willingness to pay can take on only two values- yes, or no. The predictor variables may be either numerical or categorical.

The dependent variable, WTP, is a measure of the total contribution of the marginal impact of each independent variable on a person's probability to pay in the model. The following independent variables were considered numerical:

- Length of time with diabetes
- number of other chronic co-morbidities
- age
- BMI
- perception of health (considered numerical because it could take on at least five different values)
- years of school
- time it takes to get to the pharmacy

- average income
- price of MTM service offered

The following variables were considered categorical:

- history of receiving previous disease management
- patient's knowledge of HbA1c
- Patient's perceived severity of diabetes (considered categorical because it could take on only 3 values)
- family history of diabetes
- smoker or non-smoker
- gender
- whether the patient rents or owns their residence
- value of time is large (classified as greater than \$5.00/hr) or small

Dummy variables were created to account for those variables not well defined and/or those with several missing values. Since there were not very many patients from different ethnic groups, a dummy variable was created for African Americans or other ethnicity (the variable is turned on or off depending on whether it is a Caucasian patient or not). A dummy variable was created for those who did not respond with a value for their time (variable is turned on when a value for the patient's time is not given). For those that did respond to the value of time question, there was a large range of values given. A grouping of the values was done after looking at all of the responses given by patients for this question, if they answered. The values seemed to fit into one of two arbitrarily designated groups: either greater than \$5.00/hr or less than \$5.00/hr. A dummy variable was also created for gender (if the respondent

answers female, the variable is turned on) and the income variable was changed to represent values in increments of ten thousands. A multi-collinearity check was done in order to make sure there was no significant association or correlation among the variables. Several iterations of the logistic regression were run in order to find the significant variables that explained the dependent variable, a person's willingness to pay.

The first model was expressed as: WTP is a dummy variable, yes=1, no=0

$$\Pr (WTP=1)= f(\text{prev_dis_mgm}\beta_1 + \text{time_diab}\beta_2 + \text{know_a1c}\beta_3 + \text{severity}\beta_4 + \text{comorbid}\beta_5 + \text{fam_dm}\beta_6 + \text{smoke}\beta_7 + \text{age}\beta_8 + \text{female}\beta_9 + \text{bmi}\beta_{10} + \text{hl> th_low_good}\beta_{11} + \text{yrs_sch}\beta_{12} + \text{rent}\beta_{13} + \text{time_phar}\beta_{14} + \text{vt_gt5}\beta_{15} + \text{inc_0000}\beta_{16} + \text{price}\beta_{17} + \text{val_t_miss}\beta_{18} + \text{black}\beta_{19} + \text{other_eth}\beta_{20} + \beta_0 + \epsilon)$$

The final model used for explanation of the relevant results was expressed as:

$$\Pr (WTP=1)= f(\text{rent}\beta_{13} + \text{vt_gt5}\beta_{15} + \text{inc_0000}\beta_{16} + \text{price}\beta_{17} + \text{val_t_miss}\beta_{18} + \beta_0 + \epsilon)$$

See Appendix II for a table describing the variables and the corresponding regression name assigned.

V. Results

Data were collected from 8 community pharmacies, giving a sample of 222 respondents (See Appendix 1 for survey).

The descriptive statistics for the sample population are in Table 1 below.

Table 1 Sample Descriptive Statistics (N=222).

Variable:	Mean or Proportion:	Std. Deviation	N*
Previous Disease Management:	10%	-	218
Time with Diabetes (in yrs):	8.9	±7.6	220
Knowledge of HbA1c:	20%	-	220
Severity of Diabetes:	-	-	220
Mild	34.5%	-	76
Moderate	56.4%	-	124
Severe	9.1%	-	20
Number of Co-morbidities:	1.8	±0.97	220
Family diagnosis of diabetes:	53%	-	219
Age (in yrs):	60.1	±13.12	217
Smoker:	25%	-	220
Female:	68%	-	220
BMI:	33.1	±7.27	218
Perception of Health:	-	-	219
Excellent	1.4%	-	3
Very Good	12.3%	-	27
Good	38.4%	-	84
Fair	36.1%	-	79
Poor	11.9%	-	26
Years of School:	11.9	±3.35	219
Rent:	22%	-	219
Distance from pharmacy (in mi):	7.1	±6.57	213
Time to pharmacy (in min):	12.4	±8.45	219
Value of time (dollars/min):	10.3	±14.24	127
Income (in dollars):	\$31,410.19	±27,978.75	214

* Number of responses varies depending on whether patient answered or not.

As shown in Table 1, the average age of the sample population is 60 with approximately 68% being female. Most of the population completed at least a high school education with an average income of \$31,000.

A good look at the sample population's health characteristics indicates that the average patient could be classified as overweight according to an average BMI (m/kg^2) of 33. The average time a patient has had diabetes is nine years with almost two co-morbidities. The characteristics are similar to the average for characteristics for individuals with diabetes in Kentucky (Kentucky Diabetes Network, 2008). Almost a quarter of the population smokes which is also similar to Kentucky's average smoking population (Kentucky Cabinet for Health and Family Services, 2001).

The results from the final logistic regression with all identified variables are presented below in Table 2. The marginal impact of the variable as well as the standard error is displayed, indicating the effect of that variable on the probability of a patient's willingness to pay for pharmacy MTM services. Also included in the table are the respective z-values (which could be interpreted similar to a t-value in OLS regression) and confidence intervals for the variables.

Table 2. Results from Final Logistic Regression.

Variable	Marginal Impact	Standard Error	z- value	P> z	95% Confidence Interval
Rent	-0.26	0.076	-3.38	0.001	(-0.41, -0.11)
Value of Time is larger than \$5/hr	-0.1	0.09	-1.10	0.27	(-0.28, 0.08)
Income	0.02	0.014	1.32	0.187	(0.008, 0.044)
Price	-0.003	0.00099	-3.13	0.002	(-0.005, -0.001)
Value of Time unanswered	-0.21	0.085	-2.42	0.015	(-0.37, -0.04)

Rent, price, and leaving value of time unanswered were considered to play a role in decreasing the probability of a person's willingness to pay for MTM services due to the level of significance and negative marginal impact values. It can be inferred from the final results of the logistic regression that a person who rented (as a proxy for a sign of wealth) their house, did not state a value of their time, or were given a higher price for MTM services were less likely to pay for MTM services. Patients who owned their property or were offered a lower price were more likely to pay for MTM services. Therefore, a poorer person, who rents their house and does not make a large salary, would be less likely to pay for MTM services than a wealthy person.

A second analysis was done separating those who qualify to receive Medicare Part D services and those who do not. The results from the logistic regression controlling for this difference in age (as 65 is the cut-off age for Medicare Part D) are shown in Tables 3 and 4.

Table 3. Results from Logistic Regression controlling for those patients >64yrs old.

Variable	Marginal Impact	Standard Error	z- value	P > z	95% Confidence Interval
Rent	-0.31	0.11	-2.72	0.007	(-0.53, -0.087)
Value of Time is larger than \$5/hr	0.23	0.17	1.37	0.172	(-0.09, 0.56)
Income	-0.0003	0.03	-0.01	0.993	(-0.06, 0.06)
Price	-0.002	0.002	-1.09	0.274	(-0.005, 0.001)
Value of Time unanswered	-0.25	0.14	-1.77	0.077	(-0.52, 0.03)

Table 4. Results from Logistic Regression controlling for those patients <65yrs old.

Variable	Marginal Impact	Standard Error	z- value	P > z	95% Confidence Interval
Rent	-0.27	0.098	-2.7	0.007	(-0.46, -0.07)
Value of Time is larger than \$5/hr	-0.27	0.103	-2.66	0.008	(-0.48, -0.07)
Income	0.022	0.017	1.3	0.192	(-0.01, -0.05)
Price	-0.004	0.0013	-3.06	0.002	(-0.007, -0.001)
Value of Time unanswered	-0.18	0.11	-1.68	0.093	(-0.4, 0.031)

When comparing the outputs of these two regressions, the difference in the variables of price, value of time greater than \$5.00/hr, and value of time unanswered

are important to note. In those 65 and older, the price of the MTM service and indicating that their value of time is greater than \$5.00/hr makes less of a difference (or is not significant) than for those who are less than 65 years of age in the sample population. Although only approaching significance in the regression for those over age 65, the value of time unanswered variable indicates that someone in this age group would be 25% less likely to pay for services if they did not respond to this question. More or less, the price of the MTM service offered, placing greater than \$5.00/hr to their value of time, and whether a patient rents their house all have an influence on the probability of whether a patient less than 65 years old will pay for the MTM service.

VI. Discussion

The purpose of this project was to determine a patient's willingness to pay for pharmacy MTM services and how closely the value of a patient's time is related to willingness to pay based on responses to a previous survey. When looking at the entire population, the price of MTM service, whether the patient's rent or own their residence, and the value of time left unanswered were of most significance when determining a patient's willingness to pay. If a patient rented their property they were less likely to pay for MTM services; meaning they may have to allocate the money towards paying rent as opposed to someone who may no longer have mortgage payments and own their home. As the price for the MTM service rises, the patient is also less likely to take advantage of MTM services. This intuitively makes sense as in general, when prices increase; the quantity purchased decreases. Finally, if a

person did not place a value on their time, they were less likely to be willing to pay for MTM services. Not responding to the value of time question could be interpreted as a patient values their time so much that they can't even place a value on their time. Alternatively, they may be unsure of how to answer such a question. This would of course be something to look at more closely in future studies.

These economic indicators would be important when contemplating the price to charge for a MTM service (especially if patients are paying out-of-pocket for MTM services) but they do not provide much information related to the patient's value of time and if they would be willing to spend the time required to receive the service.

This led to looking at the differences in significance of the value of time variables between patients 65 years and older and patients under 65 years old. For those who are 65 and older, the value of time unanswered (considering that it is approaching significance) and whether the patient rented or owned their property played a significant role in determining the probability of whether or not they would be willing to pay for MTM services. A patient of supposedly "retired" age (making the assumption that most people over 65 are retired; however, this question was not specifically asked in the dataset under study) may not know how to place a value on their time as they are not worried about losing salary for leaving work. Or, perhaps they may not put a dollar value to their time as much as a working parent who has so many competing demands for their time. Renting their property also decreases the likelihood that they will pay for MTM services.

In patients less than 65 years old, renting status, rating their value of time greater than \$5.00/hr, and the price of MTM services all had a significant effect on the

probability of whether they were willing to purchase the MTM service. Of course, if the patient is allocating money to pay rent every month rather than owning their home (with no mortgage payments) then they may be less likely to use the money left over for MTM and may be using it for food, clothing, and regular doctor appointments. Also, the price offered played more of an effect for this age group. Therefore, if the cost of MTM services is very high or increases, they will be less likely to pay and if MTM prices decrease, they may be more likely to use the service. Finally, when looking at their value of time, a patient in this age group valuing their time more than \$5.00/hr would be 27% less likely to be willing to purchase the MTM services. This indicates that their time is worth more to them than maybe someone who is retired and does not have to leave work for their appointments or has other errands to run before they go pick-up the kids. Whether or not they value the time it takes to get to the pharmacy, receive the MTM service, and then return to their previous activity plays a more significant role in determining their willingness to purchase the service than someone over the age of 65 years old.

As stated previously, we would expect those qualifying for Medicare Part D (i.e. those ≥ 65 years old) to have potentially more time than those in the workforce, although even some retired folks can still have a high value for their own time. According to the findings here, there is an indication that those in the workforce are not willing to spend time (and money) to receive MTM services. Widespread expansion of these services into non-Medicare Part D populations may not be practical. Instead, it may make more sense to target select populations for these services. However, this study is the first look at whether individuals vary in their

willingness to give time to obtain MTM services. Future larger survey studies would need to be conducted to better capture the true relationship between value of time and willingness to receive MTM services.

In light of the results, it is important to note the various limitations in the project. One significant threat to external validity is that the sample size was relatively small and limited to those patients who qualify for diabetes MTM services in selected Kentucky pharmacies. Other MTM services directed to cardiovascular or mental health problems may produce differing results. MTM services delivered by other health providers were also not assessed. The survey did not specifically ask if a person was retired or not. In this analysis, the assumption was made that those in the age group ≥ 65 years old were retired and did not hold a job. Clearly, this may not be the case for everyone in this population; some may hold full or part time jobs. This would be an important variable to clarify in a larger survey so that these conclusions can be validated.

Finally, there were a limited number of people who responded to survey questions related to defining their value of time (this necessitating the dummy variable “value of time unanswered” in this analysis). This of course limits our conclusions. The small number of responses to this question could explain why the variables that were considered significantly different between the ≥ 65 and < 65 age groups were not complementary to each other. For example, for those in the less than 65 year old group, we saw that a value of time greater than \$5.00/hr was a significant variable and it was more likely to decrease the willingness to purchase. However, in the

greater than 65 year old group, we can't with certainty say that it didn't matter to this group because it did not reach significance.

Another limitation that might be of concern is that the income variable did not become significant in the analysis at any point which we would like to see as it can be a double check to see if the regression intuitively makes sense. It's widely understood that income is closely related to how people allocate their resources and one would intuitively think that as a person's income decreases, they would be less willing to pay for MTM. However, this is not the case in this analysis as it does not appear that income plays a significant role in determining a person's willingness to pay.

One important threat to internal validity that should be noted is that the willingness to purchase scenario was hypothetical. It is difficult to know if responses in "hypothetical" situations will match those in "real" situations when the patient is actually paying out of their own pocket and receiving the service.

Recommendations

There are policy implications and reasons for future study in this area. In determining if a pharmacist should offer a MTM service, or if a private or public insurance policy should include MTM services as part of their offered benefits, a larger survey study would help to clarify whether patients value the service and if people would be willing to give both their time and money to receive the service. This kind of research would be beneficial before rolling out new plans or expanding those MTM services in place now.

When deciding whether a person values a service, it is important to find out their perception of the quality of the service and if they believe they will benefit from giving their time to the service. Future survey studies involving more practice sites could be done looking at a patient's perceptions and knowledge of service's benefits. If a patient does not see the value of the service or the positive outcomes that can come of it, then they will not be willing to spend their time or money. It would also be important to accurately report these results to patients not yet knowledgeable of the service.

Further research may also lead to a different approach by third party payers. They may want to target the older population or those who have retired as they may be willing to invest more time in their health and consider it more worthy of spending their time to obtain MTM services. This would of course help companies in trying to evaluate programs and resources in which to efficiently allocate their money in order to improve their returns on investment and the health of their beneficiaries.

While completing the research, another point of interest was found in the structure of MTM services and the way practice is conducted. There are many policy implications for enforcing standardization among the different practice sites and the inclusion of the requirement for evidence based practices in MTM programs. If all programs are structured to realize the same outcomes and are seen as the norm in a patient's standard of care, then more patients may perceive it as a "valuable" service (i.e. worth their time) that they can utilize for continuing treatment in their chronic health conditions. As documented in the literature, no two MTM services are alike when comparing them across the board and this creates a confusing concept for

patients, who wonder “What is an MTM service?” Each pharmacist run program is different in nature when considering setting, material discussed or taught, what physical assessments are made, and whether there is a collaboration between the primary care provider and the pharmacist so that medications can be adjusted during the MTM visit (Machado Part I and II, 2007). Just as the FDA has a standard approval process for drugs that are proposed to go to market to ensure that the same dosage is in each pill and will provide similar effects in different people, there is perhaps a way to offer a more “standardized” MTM service (Federal Food Drug and Cosmetic Act, 2004).

Pharmacists and third party payers could follow an outline or policy guidance document in order to ensure everyone has care that is equal in quality no matter where they are receiving the service. It is the model that general medicine has been practicing for several years now, called Evidence Based Medicine. It essentially involves a basic five step process by the clinician in order to justify their decision in how to proceed in the care of a patient. The following provides the basic model steps in EBM:

1. Assess the problem
2. Ask the clinical question
3. Acquire the evidence
4. Appraise the evidence for validity and usefulness
5. Apply the evidence to the situation at hand

It is quite possible to formulate a sound MTM program based on this model where “hard” evidence would be used to provide the best outcomes for the patient. In other

words, if an intervention were to be made in a patient's diabetic therapy by the pharmacist, there would be documentation of using EBM to change and monitor therapy. In a sense, it would only be restrictive in the way the pharmacist is to conduct her service. It would not be a prescriptive policy (Haynes, 2002; Guyatt, 1992; Eardley, 2008; Sackett, 1996; Harbour, 2001, Morales Suarez-Varela, 1999).

By making these next steps in MTM practices, policies, and research, a service that will be more clearly defined for patients can be put in place and lead to the future consideration for inclusion into other private and public health insurance plans.

VII. Appendix 1. List of Items Recorded in Survey

1. Date and Time
2. Pharmacy Name
3. Any previous Disease Management?
4. Use of a support group?
5. Length of time with diabetes
6. Knowledge of current HbA1c
7. Perceived severity of disease: mild, moderate, severe?
8. Other co-morbidities: Renal disease, Cardiovascular Disease, Vision problems, Neuropathies?
9. Family History of diabetes?
10. Smoker?
11. Age and sex
12. Height and weight
13. Perceived state of health: poor, fair, good, very good, excellent?
14. Ethnicity
15. Years of School achieved
16. Do you rent or own your home?
17. How many miles do you live from the pharmacy?
18. How long does it take you to get here?
19. What is your value of time in rate/hour?
20. Average Income?
21. Price they were offered (\$15,40,60,100,150) and would they pay?

VIII. Appendix 2. Variables and their corresponding regression name assigned.

Variable:	Regression Name Assigned:
Previous disease management	prev_dis_mgm
Time with diabetes	time_diab
Knowledge of HbA1c	know_a1c
Severity of diabetes	severity
Number of comorbidities	comorbid
Family history of diabetes	fam_dm
Smoker	smoke
Age	age
Gender	female
BMI	bmi
Perception of health	hl> th_low_good
Years in school	yrs_sch
Rent house or apt.	rent
Time it takes to get to the pharmacy	time_phar
Value of time greater than \$5.00/hr	vt_gt5
Average income in increments of \$10,000	inc_0000
Price of MTM service offered	price
Value of time left unanswered	val_t_miss
African American	black
constant	β

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