

Analysis of Pharmacist-Provided Medication Therapy Management (MTM) Services in Community Pharmacies Over 7 Years

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ABSTRACT

BACKGROUND: Although community pharmacists have historically been paid primarily for drug distribution and dispensing services, medication therapy management (MTM) services evolved in the 1990s as a means for pharmacists and other providers to assist physicians and patients in managing clinical, service, and cost outcomes of drug therapy. The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA 2003) and the subsequent implementation of Medicare Part D in January 2006 for the more than 20 million Medicare beneficiaries enrolled in the Part D benefit formalized MTM services for a subset of high-cost patients. Although Medicare Part D has provided a new opportunity for defining the value of pharmacist-provided MTM services in the health care system, few publications exist which quantify changes in the provision of pharmacist-provided MTM services over time.

OBJECTIVES: To (a) describe the changes over a 7-year period in the primary types of MTM services provided by community pharmacies that have contracted with drug plan sponsors through an MTM administrative services company, and (b) quantify potential MTM-related cost savings based on pharmacists' self-assessments of the likely effects of their interventions on health care utilization.

METHODS: Medication therapy management claims from a multi-state MTM administrative services company were analyzed over the 7-year period from January 1, 2000, through December 31, 2006. Data extracted from each MTM claim included patient demographics (e.g., age and gender), the drug and type that triggered the intervention (e.g., drug therapeutic class and therapy type as either acute, intermittent, or chronic), and specific information about the service provided (e.g., Reason, Action, Result, and Estimated Cost Avoidance [ECA]). ECA values are derived from average national health care utilization costs, which are applied to pharmacist self-assessment of the "reasonable and foreseeable" outcome of the intervention. ECA values are updated annually for medical care inflation.

RESULTS: From a database of nearly 100,000 MTM claims, a convenience sample of 50 plan sponsors was selected. After exclusion of claims with missing or potentially duplicate data, there were 76,148 claims for 23,798 patients from community pharmacy MTM providers in 47 states. Over the 7-year period from January 1, 2000, through December 31, 2006, the mean ([SD] median) pharmacy reimbursement was \$8.44 (\$5.19] \$7.00) per MTM service, and the mean ([SD] median) ECA was \$93.78 (\$1,022.23] \$5.00). During the 7-year period, pharmacist-provided MTM interventions changed from primarily education and monitoring for new or changed prescription therapies to prescriber consultations regarding cost-efficacy management (Pearson chi-square $P < 0.001$). Services also shifted from claims involving acute medications (e.g. penicillin antibiotics, macrolide antibiotics, and narcotic analgesics) to services involving chronic medications (e.g., lipid lowering agents, angiotensin-converting enzyme [ACE] inhibitors, and beta-blockers; $P < 0.001$), resulting in significant changes in the therapeutic classes associated with MTM claims and an increase in the proportion of older patients served ($P < 0.001$). These trends resulted in higher pharmacy reimbursements and greater ECA per claim over time ($P < 0.001$).

CONCLUSION: MTM interventions over a 7-year period evolved from primarily the provision of patient education involving acute medications

towards consultation-type services for chronic medications. These changes were associated with increases in reimbursement amounts and pharmacist-estimated cost savings. It is uncertain if this shift in service type is a result of clinical need, documentation requirements, or reimbursement opportunities.

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What is already known about this subject

- Community pharmacists have historically been paid primarily for drug distribution and dispensing services.
- Medication Therapy Management (MTM) was officially recognized in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA 2003), including the objectives to increase patient adherence, prevent drug complications, and enhance patient understanding of their medication therapy.
- To date, pharmacist-provided MTM services have been shown to reduce patient out-of-pocket costs through interventions such as generic substitution and therapeutic interchange.

What this study adds

- MTM services provided by community pharmacists have changed significantly over a relatively short period of time. MTM interventions appear to be evolving from the provision of patient education regarding acute medications toward consultation-type services with prescribers regarding chronic medications.
- This evolution in pharmacist intervention-type was associated with higher pharmacy reimbursements for MTM services.
- Based on pharmacists' self-assessments of the expected effects of their interventions on health care utilization, estimated cost avoidance attributable to MTM has increased over time and exceeds the pharmacist reimbursement amount for the performance of these services.

Medication Therapy Management (MTM) was officially recognized by Congress in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA 2003).¹ Section 423.153(d) of MMA 2003 established the requirements that Medicare Part D plans must meet regarding quality and cost control, including the requirements for MTM

Programs “designed” to “optimize therapeutic outcomes through improved medication use” and “reduce the risk of adverse events, including adverse drug reactions.”² The Centers for Medicare and Medicaid Services (CMS) require each Medicare Part D plan to establish an MTM program for targeted beneficiaries as part of its benefit.³ CMS classifies targeted beneficiaries as Part D enrollees who have multiple chronic disease states (number and type determined by the plan sponsor), are taking multiple Part D covered drugs (number determined by the plan sponsor), and are likely to incur annual costs of at least \$4,000 for all Part D-covered drugs (2006 predetermined level specified by the Secretary).² Part D plans are required to offer an MTM benefit to those enrollees who meet these criteria but may also extend the benefit to all plan enrollees. Plans can choose to offer the MTM benefit as an opt-in or opt-out benefit.

Requirements of an MTM program as outlined by CMS are somewhat ambiguous; however, CMS does require that programs be designed to increase patient adherence to medication regimens, enhance patient understanding of their medication therapy, and prevent drug complications, conflicts, and drug interactions. Although several professional pharmacy associations have attempted to interpret CMS guidance and define specific requirements of MTM for the pharmacy profession, MTM services provided to Medicare beneficiaries continue to vary from sponsor to sponsor.⁴⁻⁸

Community pharmacists have historically been paid primarily for drug distribution and dispensing services provided to patients. By year-end 2008, most pharmacists have heard of MTM and many have begun providing MTM services in their practice setting. Some pharmacists have been providing MTM-like professional services for years by participating in programs such as Project Improve Persistence and Compliance with Therapy (ImPACT), the Asheville Project, or other employer- or commercially sponsored programs.⁹⁻¹⁰ However, the advent of Medicare Part D provides pharmacists with a larger opportunity to perform professional services and receive compensation for their medication expertise. Medicare Part D also creates a relatively new opportunity to better define the value of pharmacist-provided MTM services to the health care system, although assessment of the value of such pharmacist-provided MTM services is still in its infancy.¹¹

Outcomes Pharmaceutical Health Care is a pharmacist-owned and pharmacist-operated MTM administrative services company that began operation in 1999 to advance the delivery of face-to-face pharmacist-provided MTM services in community pharmacies. Fees are collected by the MTM administrative services company from health plans or other benefit providers, and pharmacies are in turn reimbursed by the administrative services company for MTM services provided to eligible enrollees.

Since 1999, this MTM administrative services company has built a comprehensive system enabling pharmacist-provided MTM services, which includes: a national pharmacy network,

pharmacist training modules, an Internet-based documentation and billing system, quality assurance procedures, claim payment processing, and data reporting. This MTM administrative services company has administered programs on behalf of self-insured employers, union health plans, a state Medicaid program, pharmaceutical manufacturers (e.g., compliance and persistence programs or community-based research projects), Medicare Part D plan sponsors (including both Prescription Drug Plans and Medicare Advantage Plans) and others.

An early innovation for this MTM administrative services company was the development and implementation of a proprietary Internet-based documentation and billing system in 2000, allowing the capture of claim information submitted by participating pharmacies.¹² The information collected during the provision of MTM services over 7 years through 2006 represents perhaps the most extensive MTM database available. Further, the database is particularly suited to quantify changes in pharmacist-provided MTM services over time because it includes detailed information about each intervention, patient-level demographics, and estimates of cost savings associated with pharmacist interventions.

Analyses of a convenience subsample of MTM plan sponsors in the database of this MTM administrative service company over a 7-year timeframe are presented here for the first time. Specific objectives of this study were to (a) identify trends associated with the provision of MTM services provided by pharmacists, and (b) quantify potential MTM-related cost savings derived from pharmacists' self-assessments of the likely impact of their interventions on health care utilization. Consent (P#0108) for this study was approved by the Touro University Institutional Review Board.

Methods

Database and Patients

The MTM administrative service company's database is comprised of MTM services collected from pharmacy-submitted claims for pharmacist-provided interventions. MTM program sponsors identify patients eligible for MTM services and provide the MTM administrative services company with prescription claims data for each eligible member. The prescription claims data are then used to refer patients to primary dispensing pharmacies through the Internet-based documentation and billing system. The pharmacist identifies when a patient needs an MTM service (“pull referral”) in addition to acting on targeted interventions sent by the MTM administrative services company (“push referral”) for specific patients. Payments to pharmacies are processed when claims are submitted through the proprietary Internet-based MTM documentation system. The Internet-based system captures information gathered during the pharmacist documentation process and includes detailed information about each intervention provided. Data are stored by client (plan sponsor) and can be queried through an Internet interface. Pharmacies become MTM providers in the network of this MTM administrative services

company by completing a network participation agreement, and each pharmacist that provides MTM services at the participating pharmacy must complete a "Personal Pharmacist" training program. The training program includes the details of billing and documentation for MTM services, such as selection of the most reasonable and foreseeable estimated cost avoidance (ECA) level for each intervention provided (e.g., routine education/monitoring not expected to result in cost savings vs. avoidance of inpatient hospitalization). The 7-year time period of this study was January 1, 2000, through December 31, 2006.

The network of pharmacies for this MTM administrative services company includes a diverse mix of independent, franchise, chain, health-system, and consultant pharmacy providers, located in 47 states during the time period of this study. Eligible patients for MTM services provided by community pharmacists are members of benefit plans that have contracted with the MTM administrative services company. Some MTM sponsors choose to offer the MTM benefit to a subset of enrollees (e.g., high prescription utilizers, targeted disease states), while others choose to offer the benefit to all enrollees. Benefit plans or insurance providers hire the MTM administrative services company to serve as a business partner in the administration of MTM services, including quality control. The MTM administrative services company functions as a stand-alone entity, enabling pharmacists access to a group of enrollees eligible for MTM services as well as providing an efficient mechanism with which to bill and receive payment for these services. Program fees collected by the MTM administrative services company from MTM sponsors are typically capitated fees (i.e., per member per month) and are used to reimburse pharmacies for MTM services provided to benefit enrollees and to cover program administrative costs.

Outcome Claims

The documentation of an MTM claim is a 5-step process. In the first 3 steps of claim documentation, the pharmacist selects a Reason, Action, and Result. The Reason can be thought of as the "Indication for Service," the Action the "Professional Service" provided, and the Result the "Outcome of Service" of the intervention.¹³ To facilitate the documentation process, Reason, Action, and Result fields are linked in a sequential manner, whereby the selection of a Reason governs possible choices for Action, and the selection of an Action governs possible choices for Result.

The fourth step in the MTM documentation process involves the pharmacist choosing the most reasonable and foreseeable ECA level, a severity rating of the MTM service provided. ECA is derived from average national health care utilization costs using a previously developed methodology.¹⁴⁻¹⁵ The pharmacist-derived assessments of "reasonable and foreseeable" outcomes from the intervention are linked to actual ECA dollar values (e.g., \$307 per avoided physician visit, \$605 per avoided emergency room visit, and \$17,706 per avoided hospital admission in 2006). ECA values are updated annually to reflect inflation. In the final step of

the documentation process, pharmacists are required to provide detailed notes pertaining to the intervention and substantiate the rationale for the ECA level selected. The required notes are input as free text.

A proprietary MTM claim worksheet, similar to a physician superbill, is made available for pharmacists to use at the point of service (Appendix). Pharmacist worksheet information is used to generate MTM claim information which is submitted via the online documentation and billing system. This Internet-mediated interface is formatted to be similar to the MTM claim worksheet to facilitate real time capture of information. The data fields in the MTM claim documentation are listed in Table 1. Professional service fees for the MTM services provided are tied to the Reason-Action-Result fields selected on the claim worksheet and defined by the fee schedule of the MTM administrative services company. Because the Reason, Action, and Result fields are linked, as described above, the choice of Reason (Indication for Service) in effect determines the MTM fee associated with the intervention. MTM fees are \$0 and \$2 for claims with a Result (Outcome of Service) of Patient or Prescriber Refusal, respectively.

To ensure a high level of quality and provide a feedback mechanism, an outside company verifies the integrity of each claim. The quality assurance team comprises clinical pharmacists, and each claim is reviewed before reimbursement to the pharmacy is processed. The quality assurance process includes verification that MTM claim documentation is in accordance with the MTM administrative services company's policies and procedures and that the ECA level selected is reasonable and foreseeable. Claims lacking sufficient documentation of the MTM service provided, as well as those with an inappropriate ECA level (e.g., ECA Level 6 [avoidance of a hospital admission] is inappropriately selected for a cost efficacy management [therapeutic substitution] intervention) are returned to the pharmacist for further review and resubmission or rejection. Claims rejected for insufficient documentation or inappropriate or unverifiable ECA level represent a small percentage (<3.0%) of total claims and were not included in this analysis.

Data Elements

Data extracted from each claim included patient demographic information (e.g., age and gender), specific information about the medication triggering the intervention (e.g., date of service, therapeutic class, and therapy type specified as acute, chronic or intermediate/other), and specific information about the service provided (e.g., Reason, Action, Result, ECA and associated ECA dollar amount). Acute therapy included medications used for a limited time period (e.g., antibiotic and one-time narcotic analgesic prescriptions), chronic therapy included medications prescribed for chronic conditions (e.g., lipid-lowering and anti-hypertensive medications), and intermediate/other medications included primarily seasonal allergy treatments. In addition, pharmacy payment information was extracted.

Analysis of Pharmacist-Provided Medication Therapy Management (MTM) Services in Community Pharmacies Over 7 Years

TABLE 1 Documentation of Interventions and Description of Levels of Estimated Cost Avoidance (ECA)^a

| I. Indication for MTM Service (REASON) | Description/Examples |
|---|---|
| 1.1 Complex drug therapy | Typically applies to the presentation of a patient taking multiple medications (e.g., a patient taking 4 or more chronic medications). A few plan sponsors have slightly different thresholds (e.g., 6 or more chronic medications). |
| 1.2 Cost-efficacy management | An order for a drug product where a more cost-effective therapeutic alternative is available (e.g., a patient is prescribed a tier-3 medication when a tier-1 medication is available and appropriate for the indication). |
| 1.3 New or changed therapy | An order to initiate new prescription therapy or change an existing prescription therapy (e.g., patient presents with a new prescription for an antibiotic). |
| 1.4 OTC therapy | Patient with an untreated indication for OTC therapy (e.g., male patient with an enlarged prostate seeks pharmacist's advice on avoiding cold medication containing an antihistamine). |
| Drug Therapy Problems Detected | |
| 1.5 Drug Therapy Indication | |
| 1.5a. Needs therapy | Patient with an untreated indication for prescription therapy (e.g., a patient is post-myocardial infarction and has not been prescribed a beta-blocker). |
| 1.5b. Unnecessary therapy | An order to initiate or continue drug therapy that is not indicated (e.g., patient continued on histamine-2 blocker or proton-pump inhibitor therapy after resolution of an acute gastrointestinal episode). |
| 1.6 Drug Therapy Efficacy | |
| 1.6a. Suboptimal drug selection | An order to initiate or continue a drug therapy with suboptimal efficacy (e.g., patient with systolic heart failure receives a new prescription for propranolol or other beta-blocker not shown to decrease mortality). |
| 1.6b. Insufficient dose or duration | An order to initiate or continue drug therapy at a dose or duration insufficient to be effective (e.g., a patient presents with uncontrolled blood sugar and is not on optimal dose of antidiabetic medication). |
| 1.7 Drug Therapy Safety | |
| 1.7a. Adverse drug reaction | A drug order with an adverse reaction risk significant enough to render the therapy unsafe, including side effects and allergic or idiosyncratic reactions (e.g., patient is on statin therapy and reports leg pain). |
| 1.7b. Drug interaction | A drug order with a drug interaction risk significant enough to render the therapy unsafe (e.g., patient is prescribed sildenafil and a nitrate by different prescribers). |
| 1.7c. Excessive dose or duration | An order to initiate or continue drug therapy at a dose or duration too excessive to be safe (e.g. antibiotic for a 6 year-old patient prescribed at an adult dosage). |
| 1.8 Drug Therapy Compliance | |
| 1.8a. Overuse | Patient has demonstrated overuse of a drug product and as a result is noncompliant (e.g., 30-day supply of medication lasts 15 days). |
| 1.8b. Underuse | Patient has demonstrated underuse of a drug product and as a result is noncompliant.(e.g., patient's asthma is not controlled due to underuse of long-acting inhaler and overuse of short-acting inhaler). |
| 1.8c. Administration technique | A patient who has demonstrated inappropriate administration/technique of a drug product and as a result is non-compliant (e.g. inappropriate inhaler technique). |
| 1.9 Other | A patient or physician intervention that results in a significant health care cost or quality improvement that does not correspond with other available billing codes. |
| 2. Professional Service (ACTION) | |
| 2.1. CMR | Comprehensive review of a patient's drug profile to identify any cost-efficacy issues or drug therapy problems. |
| 2.2 Prescriber consultation | Consulting a prescriber to recommend a drug order change due to either a cost-efficacy issue or drug therapy problem. |
| 2.3 Patient consultation | Consulting a patient to address a cost-efficacy issue or compliance-related drug therapy problem. |
| 2.4 Patient education and monitoring | Patient education and monitoring of a drug therapy. Minimum patient education includes information related to the name of the drug, therapeutic class, directions for use, side effects, warnings, storage requirements, missed dose actions, and appropriate written material. Minimum patient monitoring includes collecting information about change in patient-reportable symptoms, side effects, compliance, and additional patient questions. |
| 2.5 Patient compliance consultation | Consulting a patient to address medication overuse, underuse, or inappropriate administration technique. Pharmacist should provide follow-up monitoring to assess if compliance has been altered. |
| 2.6 Other | Professional service provided not covered in above (e.g., patient-specific special project). |
| 3. Outcome of Service (RESULT) | |
| 3.1 CMR with drug therapy problem(s) | Completion of a CMR that results in an additional intervention being conducted due to the identification of a cost-efficacy issue or a drug therapy problem. |
| 3.2 CMR without drug therapy problem(s) | Completion of a CMR that does not result in an additional intervention. |
| 3.3 Initiation of a cost-effective drug | Prescriber approval of a more cost-effective drug following a pharmacist recommendation to change a drug order due to a cost-efficacy issue. |
| 3.4 Therapeutic success | A monitoring situation in which the pharmacist has determined that a patient's condition(s) are resolved or stabilized as a result of drug therapy. |

TABLE 1 Documentation of Interventions and Description of Levels of Estimated Cost Avoidance (ECA)^a
(continued from previous page)

| | |
|--|--|
| 3.5 Therapeutic failure | Monitoring situation in which the pharmacist has determined that a patient's condition(s) are unresolved, unstable, or worsened as a result of drug therapy. |
| Drug Therapy Problems Resolved | |
| 3.6 Drug Therapy Indication | |
| 3.6a Initiated new therapy | Prescriber approval of a pharmacist recommendation to initiate a drug order for an untreated indication. |
| 3.6b Discontinued therapy | Prescriber approval of a pharmacist recommendation to discontinue a drug order that is not indicated. |
| 3.7 Drug Therapy Efficacy | |
| 3.7a Changed drug | Prescriber approval of a pharmacist recommendation to change a drug order that has suboptimal efficacy. |
| 3.7b Increased dose/duration | Prescriber approval of a pharmacist recommendation to change a drug order that has a dose or duration insufficient to be effective. |
| 3.8 Drug Therapy Safety | |
| 3.8a Altered regimen/changed drug | Prescriber approval of a pharmacist recommendation to change a drug order with an adverse reaction or drug interaction risk significant enough to render the therapy unsafe. |
| 3.8b Decreased dose/duration | Prescriber approval of a pharmacist recommendation to change a drug order that has a dose or duration too excessive to be safe. |
| 3.9 Drug Therapy Compliance | |
| 3.9a Altered compliance | Altering a patient's behavior to become compliant with a drug therapy that he or she had previously been overusing or underusing (e.g., patient's receipt of refill is within an appropriate interval, such as ±20% of the days supply dispensed). |
| 3.9b Altered administration/technique | Altering a patient's behavior to become compliant with a drug therapy that had previously been administered with inappropriate technique. |
| 3.10 Patient refusal | Patient refusal to (a) participate in a CMR, (b) receive Patient Education/Monitoring, (c) permit a physician consultation on cost-efficacy issues, or (d) alter compliance-related behavior. |
| 3.11 Prescriber refusal | Prescriber refusal of a pharmacist recommendation to change a drug order associated with a cost-efficacy issue or a drug therapy problem. |
| 3.12 Other | Patient or physician intervention that results in significant health care cost or quality improvement that does not correspond with other available billing codes. |
| 4. ECA Levels^a | |
| For each MTM claim, the pharmacist must select the most reasonable and foreseeable ECA from 1 of the 8 available levels below. | |
| 4.1 Level 1 – Improved quality of care | Completed patient education/monitoring whether therapeutic success or failure, all CMRs, and all other interventions that do not result in any reasonable and foreseeable cost avoidance. |
| 4.2 Level 2 – Reduced drug product cost | Cost-efficacy management in combination with prescriber consultations that result in changes in prescribed therapy. |
| 4.3 Level 3 – Avoided physician visit | Drug therapy problem identified and resolved by the pharmacist for which it is reasonable and foreseeable that the patient would have visited a physician if not addressed by the pharmacist. |
| 4.4 Level 4 – Avoided new prescription order | Drug therapy problem identified and resolved by the pharmacist for which it is reasonable and foreseeable that the patient would have obtained a new prescription order if not addressed by the pharmacist. |
| 4.5 Level 5 – Avoided emergency room visit | Drug therapy problem identified and resolved by the pharmacist for which it is reasonable and foreseeable that the patient would have needed to visit the ER if not addressed by the pharmacist. |
| 4.6 Level 6 – Avoided hospital admission | Drug therapy problem identified and resolved by the pharmacist for which it is reasonable and foreseeable that the patient would have been admitted to the hospital if not addressed by the pharmacist. |
| 4.7 Level 7 – Avoided life-threatening event | Drug therapy problem identified and resolved by the pharmacist for which it is reasonable and foreseeable that the patient would have faced a life-threatening situation if not addressed by the pharmacist. |
| 4.8 Prescriber or patient refusal of recommendation | Prescriber refuses drug therapy problem recommendation or patient refuses comprehensive medication review, education/monitoring, medication change, or compliance recommendation. |

^a For each MTM claim, the pharmacist must document an ECA level, a severity rating assigned to the MTM service among 8 ECA levels. "Reasonable and foreseeable" is the self-reported test for avoidance of an outcome associated with a problem identified and resolved by the pharmacist.

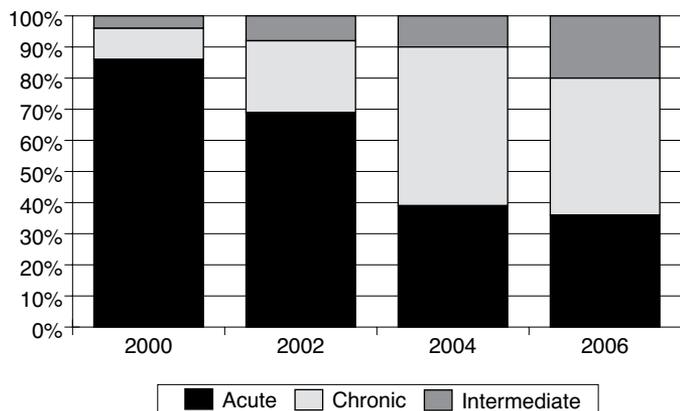
CMR = comprehensive medication review; ECA = estimated cost avoidance; ER = emergency room; MTM = medication therapy management; OTC = over-the-counter.

Study Sample

A convenience sample of 50 MTM programs covering a 7-year time period from January 1, 2000, through December 31, 2006 was selected for analysis. The 50 programs represented approximately 90% of the drug plan sponsors of the MTM administra-

tive services company. Some data were not available for analysis because of confidentiality agreements with some drug plan sponsors and a few drug plan sponsors that did not use the Internet-based system. In addition, several individualized disease management programs using the Internet-based system during

FIGURE 1 MTM Claims Over 7 Years by Drug Therapy Type



Acute is defined as one-time use medications such as penicillin antibiotics, macrolide antibiotics, and one-time narcotic analgesics. Chronic is defined as medications prescribed for chronic conditions such as lipid-lowering agents, angiotensin converting enzyme (ACE) inhibitors, and beta-blockers. Examples of intermediate/other category include medications for seasonal allergy.

MTM=medication therapy management.

the study timeframe were excluded from this analysis.

Over 82,000 claims for 25,143 unique beneficiaries from the 50 drug plan sponsors were originally eligible for analysis. Before analysis, 1,874 claims with missing drug or incomplete patient (age and gender) information were excluded. In addition, claims from the same pharmacy with the same drug and date of service for the same beneficiary (n=3,303) also were excluded because it was thought that these most likely represented duplicate claims. These exclusions left a final analytical cohort of 76,148 claims from 50 groups administered by the MTM administrative services company. These claims represent MTM interventions performed by 1,158 unique pharmacists at 1,054 unique pharmacies for 23,798 patients.

Analytic Strategy

Analyses were performed on the sample of 76,148 MTM claims. Distributions of the Reasons, Actions, Results, and ECA for pharmacist-generated MTM interventions were calculated, along with measures of central tendency and dispersion (mean, median, and SD) for pharmacy reimbursement per claim and ECA dollar amount. Descriptors of the unique patients comprising the study cohort also were generated. Trends occurring in MTM interventions over time were explored by comparing claims in years 2000, 2002, 2004, and 2006. These years represent time periods at the beginning, end, and 2 midpoints in the study time frame. Differences were tested for significance using Pearson chi-square tests for categorical variables and Analysis of Variance (ANOVA) for continuous variables. All analyses were conducted using SAS for Windows, Version 9.1 (SAS Institute, Cary, NC).

Results

Data analyses for a selected subsample of MTM claims from 2000 through 2006 showed 76,148 sampled pharmacist interventions. The average age of a patient receiving MTM services over the 7-year study period was 44 years, and 39% were male (Table 2). The mean ([SD] median) MTM interventions over the 7 years were 3.2 ([3.5] 2.0) per patient. Half of the MTM interventions (49.9%) were related to medication therapy classified as acute, while 37.9% were related to therapy classified as chronic, and 12.2% of the interventions involved “intermediate” or “other” medications. The most common drug categories were antimicrobial (e.g., penicillins, macrolides), cardiovascular (e.g., statin or other lipid-lowering), and central nervous system (e.g., narcotic analgesic) agents. The most common Reason for MTM intervention was new/changed therapy (85.6%); the most common Action was patient education/monitoring (86.7%); and the most common Result was therapeutic success (70.2%; self-determined by the pharmacist). The most common ECA level selected was Level 1—Improved Quality of Care (78.8%). Interventions resulted in a mean ([SD] median) \$8.44 ([\$5.19] \$7.00) in reimbursement per intervention to the pharmacy, with an ECA of \$93.78 ([\$1,022] \$5.00) per claim.

The characteristics of the patients who received MTM services changed from 2000 to 2006, including an increase in the average age from 30.4 years to 57.6 years ($P<0.001$) and a decrease in the percentage of males, from 39.6% to 35.4% ($P<0.001$; Table 3). However, no significant differences in the mean number of MTM interventions received per patient per year from 2000 to 2006 (from 2.0 to 1.8, $P=0.104$) were observed. The classification of medication therapy associated with the MTM services changed from 2000 to 2006, with a decrease in interventions for acute medications from 86.0% to 35.6% ($P<0.001$) and a corresponding increase in interventions for chronic medications from 10.2% to 43.7% ($P<0.001$; Figure 1). Changes were also observed in drug categories over time, with decreases in antimicrobials (from 35.5% to 8.7%, $P<0.001$) and increases in cardiovascular and central nervous system agents (from 8.2% to 21.6%, $P<0.001$ and 5.7% to 22.7%, $P<0.001$, respectively; Table 3). The most common agents associated with MTM services in 2000 were penicillins (11.1%) versus statins and other lipid lowering agents (12.5%) in 2006.

Corresponding shifts in the Reasons, Actions, and Results for MTM services over time also were observed. Notable changes in the Reason for pharmacist intervention included a decrease in new/changed drug therapy (from 87.1% to 40.0%, $P<0.001$) and an increase in cost-efficacy management (from 9.6% to 18.2%, $P<0.001$) from 2000 to 2006. The observed increase in cost-efficacy management claims was driven by pharmacist-initiated therapeutic substitution from a brand to a similarly effective, within-class generic product (e.g., escitalopram [Lexapro] to citalopram).

Analysis of Pharmacist-Provided Medication Therapy Management (MTM) Services in Community Pharmacies Over 7 Years

TABLE 2 Seven-Year Summary of MTM Encounter Data

| | Results | | Results |
|---|-------------------|---|-----------------------------|
| Patient Characteristics | n = 23,798 | Characteristics of MTM Claims | n = 76,148 |
| Mean [SD] age in years | 44.2 [26.5] | 2.2 Prescriber consultation | 8.7% (6,617) |
| % male | 38.9% | 2.3 Patient consultation | 2.6% (1,964) |
| Mean ([SD] median) claims per patient over 7-year study time period | 3.2 ([3.5] 2.0) | 2.4 Patient education and monitoring | 86.7% (66,048) |
| Characteristics of MTM Claims | n = 76,148 | 2.5 Patient compliance consultation | 0.1% (114) |
| Therapy Type: Intervention^a - % (n) | | 2.6 Other | 0.1% (89) |
| Acute | 49.9% (38,029) | Result of MTM Intervention - % (n) | |
| Chronic | 37.9% (28,829) | 3.1 CMR with drug therapy problem(s) | 0.9% (661) |
| Intermediate/Other | 12.2% (9,290) | 3.2 CMR without drug therapy problem(s) | 0.9% (655) |
| Most Common Drug Categories - % (n) | | 3.3 Initiation of a cost-effective drug | 4.2% (3,180) |
| Antimicrobial | 24.1% (18,383) | 3.4 Therapeutic success | 70.2% (53,474) |
| Cardiovascular system | 14.4% (10,994) | 3.5 Therapeutic failure | 5.3% (4,024) |
| Central nervous system | 10.6% (8,083) | 3.6 Drug Therapy Indication | |
| Most Common Drug Sub-Categories - % (n) | | 3.6a Initiated new therapy | 0.6% (430) |
| Penicillin antibiotics | 7.3% (5,543) | 3.6b Discontinued therapy | 0.6% (466) |
| Narcotic analgesics | 6.4% (4,858) | 3.7 Drug Therapy Efficacy | |
| Macrolide antibiotics | 5.1% (3,849) | 3.7a Changed drug | 0.6% (462) |
| Statins and other lipid lowering agents | 3.7% (2,808) | 3.7b Increased dose/duration | 0.4% (303) |
| Reasons for MTM Intervention - % (n) | | 3.8 Drug Therapy Safety | |
| 1.1 Complex drug therapy | 1.9% (1,430) | 3.8a Altered regimen/changed drug | 0.9% (651) |
| 1.2 Cost-efficacy management | 4.8% (3,656) | 3.8b Decreased dose/duration | 0.4% (323) |
| 1.3 New or changed drug therapy | 85.6% (65,199) | 3.9 Drug Therapy Compliance | |
| 1.4 OTC therapy | 1.1% (849) | 3.9a Altered compliance | 1.6% (1,233) |
| 1.5 Drug Therapy Indication | | 3.9b Altered administration/technique | 0.4% (282) |
| 1.5a. Needs therapy | 0.6% (468) | 3.10 Patient refusal | 11.7% (8,906) |
| 1.5b. Unnecessary therapy | 0.8% (625) | 3.11 Prescriber refusal | 1.0% (778) |
| 1.6 Drug Therapy Efficacy | | 3.12 Other | 0.4% (320) |
| 1.6a. Suboptimal drug selection | 0.7% (530) | Estimated Cost Avoidance Level^b - % (n) | |
| 1.6b. Insufficient dose or duration | 0.4% (331) | 4.1 Improved quality of care | 78.8% (60,032) |
| 1.7 Drug Therapy Safety | | 4.2 Reduced drug product cost | 4.7% (3,602) |
| 1.7a. Adverse drug reaction | 0.7% (511) | 4.3 Avoided physician visit | 2.4% (1,830) |
| 1.7b. Drug interaction | 0.5% (365) | 4.4 Avoided new prescription order | 0.6% (485) |
| 1.7c. Excessive dose or duration | 0.5% (353) | 4.5 Avoided emergency room visit | 0.4% (285) |
| 1.8 Drug therapy compliance | | 4.6 Avoided hospital admission | 0.3% (195) |
| 1.8a. Overuse | 0.2% (124) | 4.7 Avoided life-threatening event | 0.1% (92) |
| 1.8b. Underuse | 1.6% (1,185) | 4.8 Prescriber or patient refusal of recommendation | 12.6% (9,627) |
| 1.8c. Administration technique | 0.4% (293) | Mean [SD] MTM Claim Reimbursement and Estimated Cost | |
| 1.9 Other | 0.3% (229) | Mean [SD] median pharmacy reimbursement | \$8.44 [\$5.19] \$7.00 |
| Action or MTM Intervention - % (n) | | Mean [SD] median ECA | \$93.78 [\$1,022.23] \$5.00 |
| 2.1 CMR | 1.7% (1,316) | | |

^aAcute is defined as one-time use medications; examples include penicillin antibiotics, macrolide antibiotics, and one-time narcotic analgesics. Chronic is defined as medications prescribed for chronic conditions; examples include lipid lowering agents, ACE inhibitors, and beta-blockers. Examples of intermediate/other include medications such as seasonal allergy treatments.

^bSelf-assessed by the pharmacist when recording the intervention.

ACE = angiotensin-converting enzyme; CMR = comprehensive medication review; DTP = drug therapy problems (e.g., drug interactions, adverse drug reactions, insufficient dose/duration); MTM = medication therapy management; OTC = over-the-counter; Rx = prescription.

Specific subcategories related to drug therapy problems detected over the 7 years were also explored. Specific examples of pharmacist-identified drug therapy problems included patients

with systolic heart failure receiving a prescription for propranolol or other beta-blocker not shown to decrease mortality (Suboptimal Drug Selection); patients skipping maintenance antipsychotic or

Analysis of Pharmacist-Provided Medication Therapy Management (MTM) Services in Community Pharmacies Over 7 Years

TABLE 3 Changes in Characteristics of Patients and MTM Claims Over 7 Years

| | Year 2000 | Year 2002 | Year 2004 | Year 2006 | P Value (Overall Differences) ^a |
|---|--------------------|---------------------|---------------------|--------------------|--|
| Characteristics of Patients (n) | (2,070) | (5,427) | (4,216) | (1,995) | |
| Mean [SD] age | 30.4 [19.0] | 31.6 [19.6] | 41.8 [26.1] | 57.6 [24.8] | <0.001 ^a |
| % male | 39.6% | 41.5% | 40.4% | 35.4% | <0.001 |
| Average # [SD] claims per patient | 2.0 [1.8] | 2.3 [2.1] | 2.8 [3.2] | 1.8 [2.0] | 0.104 ^a |
| Characteristics of MTM claims | (n = 4,065) | (n = 12,338) | (n = 11,452) | (n = 3,525) | |
| Therapy Type Initiating Intervention^b - % (n) | | | | | |
| Acute | 86.0% (3,495) | 69.4% (8,559) | 39.2% (4,486) | 35.6% (1,255) | <0.001 |
| Chronic | 10.2% (414) | 22.8% (2,819) | 50.6% (5,793) | 43.7% (1,540) | <0.001 |
| Intermediate/other | 3.8% (156) | 7.8% (960) | 10.2% (1,173) | 20.7% (730) | <0.001 |
| Most Common Drug Categories - % (n) | | | | | |
| Antimicrobial | 35.5% (1,444) | 33.9% (4,186) | 15.8% (1,815) | 8.7% (305) | <0.001 |
| Cardiovascular system | 8.2% (332) | 6.3% (773) | 16.7% (1,907) | 21.6% (760) | <0.001 |
| Central nervous system | 5.7% (233) | 7.7% (945) | 14.5% (1,663) | 22.7% (802) | <0.001 |
| Most Common Drug Sub-Categories - % (n) | | | | | |
| Penicillin antibiotics | 11.1% (452) | 11.1% (1,375) | 4.8% (544) | 2.0% (70) | <0.001 |
| Narcotic analgesics | 5.3% (217) | 5.5% (682) | 8.2% (941) | 3.3% (116) | <0.001 |
| Macrolide antibiotics | 8.2% (332) | 7.8% (964) | 2.8% (321) | 1.5% (52) | <0.001 |
| Statins and other lipid-lowering agents | 2.3% (95) | 1.7% (215) | 3.6% (408) | 12.5% (441) | <0.001 |
| Primary Reason for MTM Intervention - % (n) | | | | | |
| 1.1 Complex drug therapy ^c | 0.0% (0) | 0.0% (0) | 1.2% (139) | 6.6% (231) | <0.001 |
| 1.2 Cost-efficacy management | 9.6% (390) | 3.6% (446) | 1.2% (134) | 18.2% (640) | <0.001 |
| 1.3 New or changed drug therapy | 87.1% (3,541) | 94.0% (11,602) | 88.1% (10,089) | 40.0% (1,409) | <0.001 |
| 1.4 OTC therapy | 0.0% (0) | 0.3% (32) | 0.6% (72) | 9.2% (323) | <0.001 |
| 1.5 Drug therapy indication | | | | | |
| 1.5a. Needs therapy | 0.5% (21) | 0.2% (30) | 0.9% (101) | 2.4% (79) | <0.001 |
| 1.5b. Unnecessary therapy | 0.1% (4) | 0.0% (5) | 1.6% (177) | 2.6% (92) | <0.001 |
| 1.6 Drug therapy efficacy | | | | | |
| 1.6a. Suboptimal drug selection | 0.2% (9) | 0.1% (16) | 0.6% (65) | 4.3% (142) | <0.001 |
| 1.6b. Insufficient dose or duration | 0.4% (18) | 0.2% (22) | 0.6% (69) | 0.7% (23) | <0.001 |
| 1.7 Drug therapy safety | | | | | |
| 1.7a. Adverse drug reaction | 0.5% (22) | 0.4% (48) | 0.9% (98) | 0.9% (31) | <0.001 |
| 1.7b. Drug interaction | 0.3% (12) | 0.2% (18) | 0.6% (70) | 0.5% (17) | <0.001 |
| 1.7c. Excessive dose or duration | 0.3% (12) | 0.2% (23) | 0.9% (100) | 0.5% (18) | <0.001 |
| 1.8 Drug therapy compliance | | | | | |
| 1.8a. Overuse | 0.1% (2) | 0.1% (12) | 0.2% (19) | 0.1% (5) | 0.226 |
| 1.8b. Underuse | 0.5% (19) | 0.5% (57) | 1.6% (182) | 11.8% (416) | <0.001 |
| 1.8c. Administration technique | 0.2% (7) | 0.1% (16) | 0.4% (42) | 0.9% (30) | <0.001 |
| 1.9 Other | 0.2% (8) | 0.1% (11) | 0.8% (95) | 2.0% (69) | <0.001 |
| Action or MTM Intervention - % (n) | | | | | |
| 2.1 CMR ^c | 0.0% (0) | 0.0% (0) | 1.2% (139) | 3.3% (117) | <0.001 |
| 2.2 Prescriber consultation | 12.1% (491) | 4.4% (539) | 7.0% (801) | 27.8% (980) | <0.001 |
| 2.3 Patient consultation | 0.8% (33) | 1.3% (165) | 2.3% (262) | 16.5% (582) | <0.001 |
| 2.4 Patient education or monitoring | 87.1% (3,541) | 94.3% (11,634) | 88.7% (10,161) | 49.1% (1,732) | <0.001 |
| 2.5 Patient compliance consultation ^c | 0.0% (0) | 0.0% (0) | 0.0% (0) | 3.2% (114) | <0.001 |
| 2.6 Other ^c | 0.0% (0) | 0.0% (0) | 0.8% (89) | 0.0% (0) | 0.063 |
| Result of MTM Intervention - % (n) | | | | | |
| 3.1 CMR with DTP(s) ^c | 0.0% (0) | 0.0% (0) | 0.7% (75) | 0.8% (30) | <0.001 |
| 3.2 CMR without DTP(s) ^c | 0.0% (0) | 0.0% (0) | 0.6% (64) | 2.4% (87) | <0.001 |
| 3.3 Initiation of cost-effective drug | 9.4% (382) | 2.8% (350) | 1.0% (114) | 13.2% (467) | <0.001 |

TABLE 3 Changes in Characteristics of Patients and MTM Claims Over 7 Years
(continued from previous page)

| | Year 2000 | Year 2002 | Year 2004 | Year 2006 | P Value (Overall Differences) ^a |
|---|--------------------|--------------------|-----------------------|-----------------------|--|
| 3.4 Therapeutic success | 75.2% (3,055) | 70.3% (8,677) | 77.6% (8,892) | 46.4% (1,634) | <0.001 |
| 3.5 Therapeutic failure | 8.1% (331) | 5.5% (673) | 5.5% (626) | 1.8% (63) | <0.001 |
| 3.6 Drug therapy indication | | | | | |
| 3.6a Initiated new therapy | 0.5% (21) | 0.3% (31) | 0.8% (88) | 2.0% (69) | <0.001 |
| 3.6b Discontinued therapy | 0.1% (4) | 0.0% (3) | 1.2% (137) | 2.3% (80) | <0.001 |
| 3.7 Drug therapy efficacy | | | | | |
| 3.7a Changed drug | 0.2% (9) | 0.1% (14) | 0.5% (54) | 3.1% (110) | <0.001 |
| 3.7b Increased dose/duration | 0.4% (17) | 0.2% (22) | 0.5% (59) | 0.6% (20) | <0.001 |
| 3.8 Drug therapy safety | | | | | |
| 3.8a Altered regimen/changed drug | 0.8% (34) | 0.4% (55) | 1.1% (128) | 1.1% (40) | <0.001 |
| 3.8b Decreased dose/duration | 0.3% (10) | 0.2% (19) | 0.7% (83) | 0.6% (21) | <0.001 |
| 3.9 Drug therapy compliance | | | | | |
| 3.9a Altered compliance | 0.5% (19) | 0.5% (64) | 1.7% (190) | 12.3% (434) | <0.001 |
| 3.9b Altered administration-technique | 0.2% (7) | 0.1% (11) | 0.3% (39) | 0.6% (23) | <0.001 |
| 3.10 Patient refusal | 3.9% (159) | 19.2% (2,372) | 5.9% (675) | 3.8% (133) | <0.001 |
| 3.11 Prescriber refusal | 0.3% (11) | 0.3% (38) | 1.2% (133) | 4.6% (162) | <0.001 |
| 3.12 Other | 0.1% (6) | 0.1% (9) | 0.8% (95) | 4.3% (152) | <0.001 |
| ECA Level - % (n) | | | | | |
| 4.1 Improved quality of care | 85.1% (3,461) | 76.0% (9,375) | 86.2% (9,871) | 66.1% (2,331) | <0.001 |
| 4.2 Reduced drug product cost | 9.6% (391) | 2.9% (361) | 2.1% (245) | 15.0% (528) | <0.001 |
| 4.3 Avoided physician visit | 2.0% (80) | 0.9% (113) | 2.6% (299) | 7.6% (267) | <0.001 |
| 4.4 Avoided new Rx order | 0.7% (27) | 0.4% (48) | 1.0% (113) | 0.4% (15) | 0.045 |
| 4.5 Avoided ER Visit | 0.2% (7) | 0.1% (18) | 0.5% (52) | 0.7% (24) | 0.061 |
| 4.6 Avoided hospital admission | 0.0% (1) | 0.1% (13) | 0.4% (43) | 1.7% (61) | <0.001 |
| 4.7 Avoided life-threatening event | 0.0% (0) | 0.1% (9) | 0.2% (19) | 0.1% (4) | 0.068 |
| 4.8 Prescriber or patient refusal | 2.4% (98) | 19.5% (2,401) | 7.1% (810) | 8.4% (295) | <0.001 |
| MTM claim reimbursement and cost avoidance | | | | | |
| Mean [SD] pharmacy reimbursement | \$7.65 [\$3.03] | \$5.97 [\$3.34] | \$9.25 [\$4.51] | \$12.28 [\$6.65] | <0.001 ^a |
| Mean [SD] ECA | \$24.18 [\$139.33] | \$37.47 [\$566.98] | \$114.39 [\$1,197.65] | \$429.39 [\$2,420.77] | <0.001 ^a |

^a All P values derived from Pearson chi-square except ANOVA where marked by this superscript.

^b Acute is defined as one-time use medications; examples include penicillin antibiotics, macrolide antibiotics, and one-time narcotic analgesics. Chronic is defined as medications prescribed for chronic conditions; examples include lipid lowering agents, ACE inhibitors, and beta-blockers. Examples of intermediate/other include medications such as seasonal allergy treatments.

^c Category not available during all years of study.

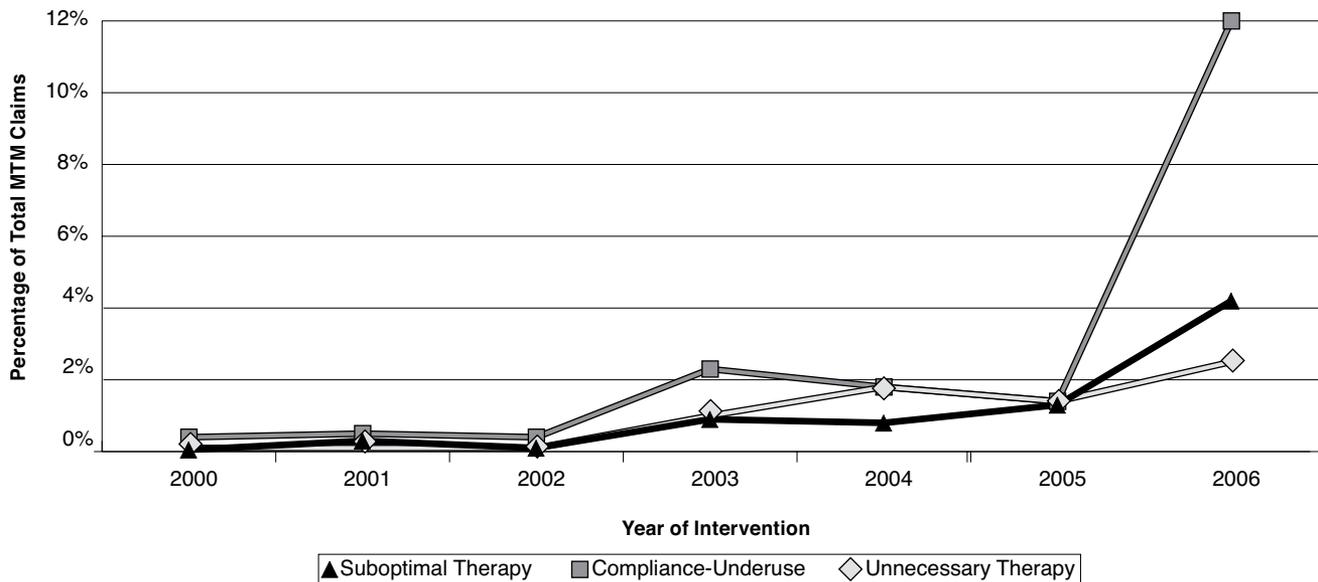
ACE=angiotensin-converting enzyme; ANOVA=Analysis of Variance; CMR=comprehensive medication review; DTP=drug therapy problems (e.g.,drug interactions, adverse drug reactions, insufficient dose/duration); ECA=estimated cost avoidance; ER=emergency room; MTM=medication therapy management; OTC=over-the-counter; Rx=prescription fill.

oral diabetic medications (Compliance-Underuse); and patients receiving continued histamine-2 blocker or proton-pump inhibitor therapy after resolution of an acute gastrointestinal episode (Unnecessary Therapy). (See Appendix worksheet for complete list of 10 specific subcategories of drug therapy problems from which the MTM pharmacist could choose). Subcategories showing the greatest relative increases from 2000 to 2006 (Figure 2) included: Suboptimal Drug Selection (from 0.2% to 4.3%, $P<0.001$), Unnecessary Therapy (from 0.1% to 2.6%, $P<0.001$);

and Compliance-Underuse (from 0.5% to 11.8%, $P<0.001$).

Notable changes in the “Action” of MTM interventions provided from 2000 to 2006 included a shift from patient education/monitoring (87.1% to 49.1%, $P<0.001$) to more prescriber consultations (12.1% to 27.8%, $P<0.001$). Changes in the “Result” associated with the MTM intervention included a shift from the outcome of therapeutic success (75.2% to 46.4%, $P<0.001$) to an alteration in medication compliance (0.5% to 12.3%, $P<0.001$). In addition, it should be noted that, although 11.7% of claims

FIGURE 2 Change in the Reasons for MTM Intervention Over 7 years for 3 Drug Therapy Subcategories With the Greatest Relative Increase



These are categories of drug therapy problems. An example of suboptimal therapy includes a patient with heart failure receiving a prescription for a beta-blocker not shown to decrease mortality; compliance-underuse includes a patient skipping a maintenance medication dose; and unnecessary therapy is continued proton-pump inhibitor therapy after resolution of an acute gastrointestinal episode. MTM=medication therapy management.

documented over the 7-year study period were patient refusals, the patient refusal rate steadily declined from a high of 19.2% in 2002 to 3.8% in 2006. This trend can be attributed to 2 possible factors—the claims date back to the early 2000’s, when MTM services were not as widely recognized and a change in the ability of both pharmacists and the MTM administrative services company to show the value of MTM services to patients. Somewhat surprisingly, prescriber refusal increased during a similar period, from less than 1% in 2000 to 4.6% in 2006. The increase in prescriber refusal is likely related to the marked increase in interventions involving prescriber consultations that occurred during this time period. Notable changes in the ECA level (Outcome of Service) from 2000 to 2006 included fewer claims submitted with improved quality of care (from 85.1% to 66.1%, $P<0.001$) and an increase in claims submitted with ECA related to reduction in drug costs (from 9.6% to 15.0%, $P<0.001$).

Finally, examination of changes in MTM reimbursement over time revealed a greater than 60% increase in the mean (SD) pharmacy payment from \$7.65 (\$3.03) in 2000 to \$12.28 (\$6.65) in 2006. The ECA mean (SD) dollar amount per claim increased from \$24.18 (\$139) to \$429 (\$2,421) from 2000 to 2006 ($P<0.001$). It should be noted that a relatively small number of high-impact claims led to significant changes in the ECA in the latter portion of the evaluated time period. Specifically, notable

increases in the percentage of total claims that were assigned ECA Level 4.6, avoidance of a hospital admission, occurred in both 2004 and 2006 relative to previous years.

Discussion

This MTM administrative services company has one of the largest databases of MTM service claims and includes a nationwide sample of claims submitted over more than 7 years. The present study represents the first analysis of the MTM claims in this database. The MTM administrative services company has adopted a cost avoidance model as a means to demonstrate the value that pharmacists add to the U.S. health care system, and this study includes the first report of pharmacist self-assessment of the ECA associated with MTM interventions. Examination of claims from 50 MTM programs over a 7-year period found that the types of pharmacist-provided MTM services have changed over time, associated with increases in mean MTM reimbursement to pharmacies and ECA.

Over the past several years, MTM interventions have evolved from the provision of patient education involving acute medications toward consultation-type services for chronic medications. These shifts suggest that the provision of MTM services will become increasingly vital as the population ages. Specific trends related to drug therapy problems included an increase in services related to suboptimal drug selection, unnecessary therapy,

and compliance-underuse. In addition, the MTM services evaluated in this study show an increase over time in the MTM-related ECA derived from pharmacists' self-assessments. This change suggests that pharmacists are well-suited and positioned to identify, resolve and prevent medication-related complications that result in substantial health care costs. However, it should be noted that since this study lacked a comparison group, other explanations for observed changes in MTM services cannot be fully dismissed. Other plausible explanations include changes in the number and demographics of the populations served, as well as possible changes in pharmacist documentation patterns related to MTM interventions.

In a landmark 1995 study, Johnson and Bootman projected the costs associated with drug therapy problems to be \$76.6 billion.¹⁴ In an update 6 years later, the projected costs associated with drug therapy problems had increased to \$177.4 billion.¹⁵ The authors also expressed that the high costs of drug-related morbidity and mortality should play a factor in health policy decisions and that pharmaceutical care, now termed Medication Therapy Management, could be a strategy to prevent drug therapy problems and reduce associated costs.¹⁴ A 2005 study by Stebbins et al. of pharmacist provided MTM type services found that pharmacists could significantly decrease patients' out-of-pocket expenses by enrolling patients in manufacturer-sponsored patient assistance programs, switching patients to appropriate generic or therapeutic alternatives, and employing other cost-saving measures such as tablet splitting.¹⁶ Pharmacists at the clinic were able to save the average patient over \$90 during the first year of the study and over \$60 during the second year of the study. Although the findings of the study by Stebbins et al. are encouraging, it should be noted that they were limited to elderly lower-income patients who used a single medical clinic, and that the cost-saving estimates were limited to savings in out-of-pocket prescription drug expenses.

The current study suggests that MTM services provided by community pharmacists may have favorable effects beyond educational benefits and out-of-pocket medication costs for patients and MTM program sponsors. Specifically, MTM services provided by community pharmacists may have a favorable effect on medical costs associated with avoidance of physician visits, emergency room visits, hospital admissions, etc. The proportion of MTM claims in which pharmacists self-rated their services as avoiding higher dollar medical cost events increased from 2000 to 2006. While the exact reason for these sharp increases is unknown, this trend is expected to continue as pharmacists are given more opportunities to provide MTM services and receive reimbursement for the identification and resolution of increasingly complex drug therapy problems. Further, this observation may reflect the expanding role of pharmacists in the avoidance of significant

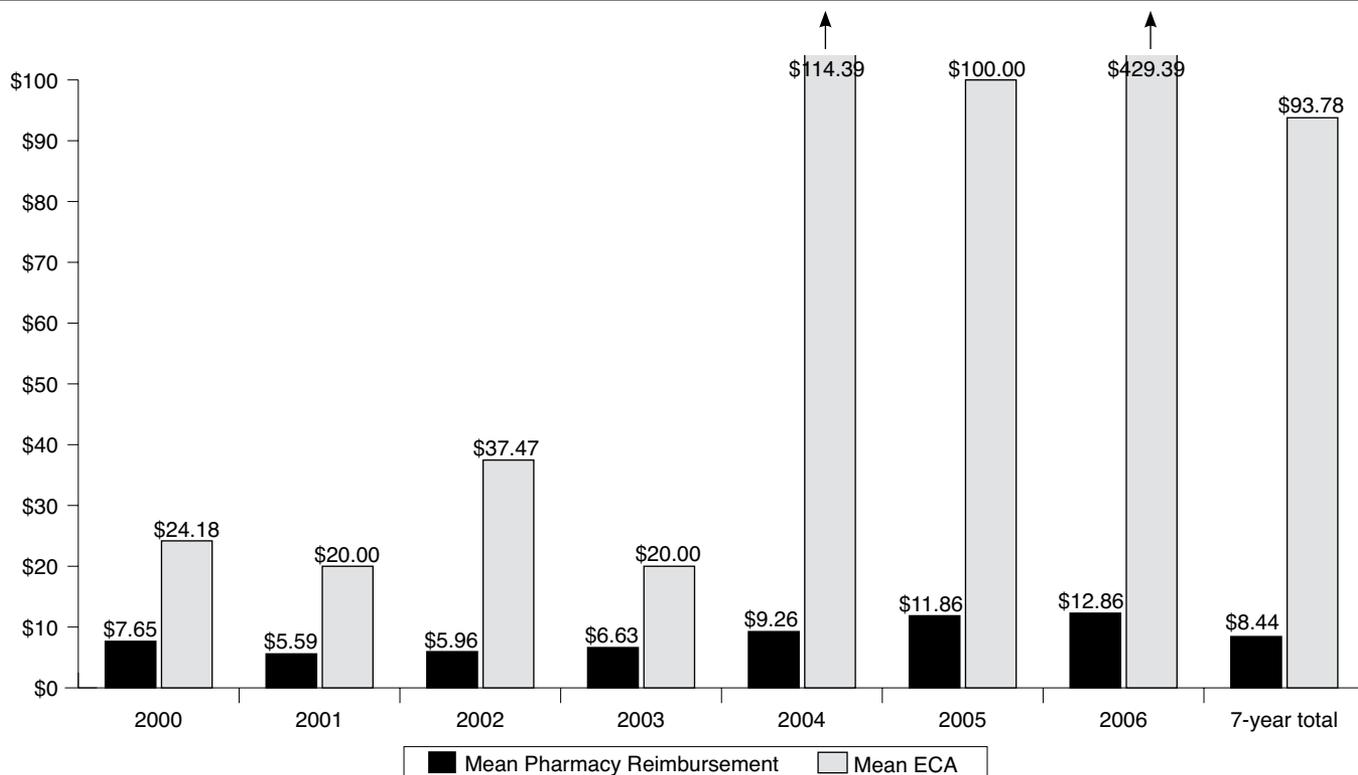
morbidity and mortality as MTM programs mature. Activities undertaken to avoid high-cost medical events included ensuring that patients were on appropriate guideline-recommended therapy, such as aspirin and beta-blocker use in patients following a myocardial infarction and use of ACE inhibitors in diabetic patients without a contraindication. Other specific examples of pharmacist interventions that were considered as preventing a hospitalization included patients taking multiple beta-blockers, patients prescribed multiple potassium products, patients reporting severe cramps or leg pains while on statin therapy, and mental health patients grossly noncompliant on chronic antipsychotic therapy.

Limitations

Foremost among the study limitations are the self-reported estimates of cost avoidance without follow-up assessment of the actual avoidance of health care utilization events, such as office visits and hospitalizations. In addition, a recent (2008) study of pharmacist interventions, conducted by Kroner et al., found that projected medication cost savings overstated actual cost savings by 14%.¹⁷ However the Kroner et al. study was limited to medication conversion savings and did not include cost-saving analyses of other resources, such as physician visits and hospitalizations, which were included in the present study. Second, the absence of a comparison group makes this a descriptive report without the ability to attribute outcomes to the pharmacist interventions; there is no way to determine if the billed MTM intervention would have been performed without the MTM administrative services company's network, either by another health care provider or by a patient representative.

Third, the study employed a sample of MTM claims from some but not all MTM programs in the database of the MTM administrative services company. For example, the company administers a number of comprehensive disease state management programs, and the claims for these programs were not included in this analysis because they use a different documentation and billing system. In addition, not all MTM programs were active throughout the entire study timeframe. While most original plans renewed their contract for services, some plans left and other plans were added; thus some observed trends may be attributable to changes in the eligibility cohort. In addition, data were presented for even calendar years, but many programs were administered in accordance with insurer fiscal year dates. Thus, the apparent relative decrease in the number of patients and claims in 2006 is misleading. Follow-up analyses from calendar year 2005 and early calendar year 2007 show an upward trend in the number of patients provided MTM services by this MTM administration company. In addition, it should be noted that the claims represent real-world pharmacist MTM interventions across a 7-year time period, from 2000-2006, and encompass 50 MTM programs which were administered nationally to a wide variety of patients.

FIGURE 3 Mean Pharmacy Payment for MTM Services and Mean ECA



ECA = estimated cost avoidance; MTM = medication therapy management.

Conclusions

MTM services appear to be evolving from patient education involving acute medications to more complex prescriber

consultation-type services for older patients receiving chronic medications. Further, these changes are associated with greater reimbursement amounts and greater estimated cost savings. While the causal factors underlying these changes remain to be fully explained, the changes appear to be directly linked to requirements outlined in Medicare Part D legislation. Opportunities beyond Medicare Part D are likely to expand as well, particularly for employers and other government-sponsored programs.

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APPENDIX MTM Encounter Worksheet



| PRESCRIPTION INFORMATION | | | | MONITORING | | | |
|---|-------------------|--------------------------|------------|-----------------|---|---------------------|--|
| Patient Info/Rx Info | | | | Attempts | | Appointment | |
| Patient ID Number | Gender | Date of Birth | | 1 | ___/___/___ at ___:___ a.m./p.m. | ___/___/___ | |
| | M F | YYYYMMDD | | 2 | ___/___/___ at ___:___ a.m./p.m. | ___:___ a.m. / p.m. | |
| | | | | 3 | ___/___/___ at ___:___ a.m./p.m. | () - | |
| Document Patient Refusal after 3 attempts | | | | Initial Rx Info | | | |
| Initial Rx Date | Initial Rx Number | N R | Metric Qty | Days Supply | Frequency of Therapy | | |
| YYYYMMDD | YYYYMMDD | | | | <input type="checkbox"/> Acute <input type="checkbox"/> Intermittent <input type="checkbox"/> Chronic | | |
| Initial Rx National Drug Code | | Initial Rx Prescriber ID | | | | | |
| Labeler | Product | Pkg | | | | | |

| ENCOUNTER DOCUMENTATION | | Date of Encounter | Claim Number |
|---------------------------------------|---|---|--|
| YYYYMMDD | | YYYYMMDD | |
| I. Indication For Service (Reason) | II. Professional Service (Action) | III. Outcome Of Service (Result) | |
| Complex Drug Therapy 100 | Comprehensive Med Review (CMR) 200 | CMR with Encounter 300 | CMR without Encounter 301 |
| Cost Efficacy Management 105 | Prescriber Consultation 205 | Initiation of Cost Effective Drug 305 | Prescriber Refusal 375 |
| Cost Efficacy Management 105 | Patient Consultation 215 | Patient Refusal 380 | |
| New/Changed Prescription Therapy 110 | Patient Education/Monitoring 210 | Therapeutic Success (Resolved/Stable) 310 | Therapeutic Failure (Unresolved/Worse) 320 |
| OTC Therapy 117 | Patient Education: | Patient Refusal 380 | |
| Drug Therapy Problem Detected: | <input type="checkbox"/> Name of Drug | Drug Therapy Problem Resolved: | |
| Indications | <input type="checkbox"/> Therapeutic Class | Indications | |
| Needs Therapy 120 | <input type="checkbox"/> Directions for Use | Initiated New Therapy 330 | |
| Unnecessary Therapy 125 | <input type="checkbox"/> Side Effects/Warnings | Discontinued Therapy 335 | |
| Efficacy | <input type="checkbox"/> Storage Requirements | Efficacy | |
| Suboptimal Drug Selection 130 | <input type="checkbox"/> Missed Dose Actions | Changed Drug 340 | |
| Insufficient Dose/Duration 135 | <input type="checkbox"/> Written Material | Increased Dose/Duration 345 | |
| Safety | <input type="checkbox"/> Set Monitoring Appointment | Safety | |
| Adverse Drug Reaction 140 | Monitoring: | Altered Regimen/Changed Drug 350 | |
| Drug Interaction 145 | <input type="checkbox"/> Monitor Symptoms | Decreased Dose/Duration 355 | |
| Excessive Dose/Duration 150 | <input type="checkbox"/> Monitor Side Effects | Prescriber Refusal 375 | |
| Compliance | <input type="checkbox"/> Monitor Compliance | Compliance | |
| Overuse 155 | <input type="checkbox"/> Patient Question & Answer | Altered Compliance 360 | |
| Underuse 160 | Prescriber Consultation 205 | Altered Admin/Technique 365 | |
| Administration/Technique 165 | Patient Compliance Consultation 215 | Patient Refusal 380 | |
| Other 170 | <input type="checkbox"/> Education | Other 370 | |
| | <input type="checkbox"/> Set Monitoring Appointment | | |
| Special Project 190 | Special Project 290 | Special Project 390 | |

| IV. Estimated Cost Avoidance | | |
|---|--|---|
| <input type="checkbox"/> Level 1 Improved Quality of Care | <input type="checkbox"/> Level 4 Additional Prescription Order | <input type="checkbox"/> Level 7 Life Threatening |
| <input type="checkbox"/> Level 2 Drug Product Costs | <input type="checkbox"/> Level 5 Emergency Room Visit | <input type="checkbox"/> Prescriber/Patient Refusal |
| <input type="checkbox"/> Level 3 Additional Physician Visit | <input type="checkbox"/> Level 6 Hospital Admission | <input type="checkbox"/> See Previous Claim # |

| V. Encounter Notes And Estimated Cost Avoidance Rationale | | |
|--|------------|--------------|
| <p>Monitoring Questions</p> <p>How have initial signs and symptoms changed? Have any new health problems developed? Explain how you have been using the medication. Have you missed any doses? Are you satisfied with your drug therapy? What other questions or concerns do you have?</p> | | |
| <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> | | |
| RPh ID Number | NCPDP/NABP | RPh Initials |
| _____ | _____ | _____ |