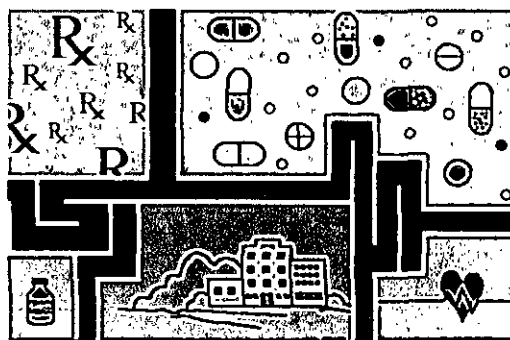# Final Report

Establishment of a Pharmacist Service for Planning Affordable Therapies: The Medication Assessment Program

Navigating the Medication Maze

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STATEMENT OF APPRECIATION

Table of Contents

EXECUTIVE SUMMARY

The project "Establishment of a Pharmacist Service for Planning Affordable Therapies" was developed via a partnership among Wayne State University, West Virginia University, practicing pharmacists, Huron-Clinton Metroparks, St. Clair County and St. Clair County Road Commission. The project was funded by the Community Pharmacy Foundation, the Michigan Pharmacy Foundation, the employers, and through in-kind contributions from the Eugene Applebaum College of Pharmacy and Health Sciences.

Project goals

The goals of the project were to:

- Improve the effectiveness and affordability of medication regimens and lower overall prescription medication expenditures and/or health expenditures for people taking multiple medications.

- Gather information about the feasibility and effectiveness of community-based pharmacists offering comprehensive medication assessments.

Project objectives

The project objectives included:

- Creation of a pharmacist network to provide comprehensive medication assessment and patient education
- Development of a comprehensive medication assessment program
- Establishment of a patient referral system
- Provision of recommendations to patients to improve the effectiveness and affordability of their regimens while maintaining or improving patient health status
- Collection and analysis of program outcomes

To meet these goals and objectives, the Medication Assessment Program (MAP) was created for users of multiple chronic medications. The program included a set package of services that included an initial medication assessment visit, therapy and health assessment by the pharmacist, a second visit that provided written, researched recommendations and patient education, a follow-up telephone call, and a final evaluation visit. The program was provided through a statewide network of pharmacists with administrative and clinical support offered by the colleges of pharmacy.

Results

- A network of 30 pharmacists throughout the Lower Peninsula of Michigan was established to offer the MAP program.

- A college-sponsored support system that provided centralized patient enrollment, a uniform data collection and analysis process, patient care forms, patient education materials, peer review and drug information services, and a centralized service billing process was developed.

- Sixty-seven patients completed the MAP program, with care being provided in community pharmacies, at worksites, and in patient homes.

Data Findings

Patient-related outcomes

- MAP patients had significant morbidity, reporting an average of 5.9 diagnoses and the use of 12.5 chronic medications. 17.5% reported having poor health at the time of enrollment.

- Pharmacists provided 662 recommendations related to medication and health concerns to MAP patients. Acceptance rates for recommendations related to medications, lifestyle changes, and the need for medical evaluations were 70.5%, 75.0% and 72.5% respectively.

- Pharmacist recommendations resulted in actions that improved drug therapy appropriateness and patient health, such as unnecessary medication discontinuation, improved disease and drug monitoring, drug side effect avoidance, and actions to avoid adverse health events.

- Program participation significantly increased patient self-reported knowledge of medications, health conditions, and healthy lifestyle practices.

- *Pharmacist assessments indicated that 44 (74.6%) of patients had improved disease control*

- Medication discontinuations, and decreases in emergency department visits and hospitalizations suggest program participation may be cost beneficial to employers and patients.

Program-related outcomes

- Fewer patients than expected were enrolled. Patient enrollment required significant advertising and face-to-face interactions with employees and retirees.

- Program implementation went smoothly with pharmacists and patients generally completing all program components and requirements.

- Pharmacists spent about 140 minutes of direct patient care time with each patient. Time spent with patients was not correlated with age, medication use or number of diagnoses reported.

- University-provided support services were widely used. Provision of such services required significantly more time than anticipated.

- Patients, employers, and pharmacists were generally enthusiastic about the program and its results.

Lessons Learned

Several lessons were learned that are valuable for future program endeavors. Specific findings and their implications are listed below.

- Program development and implementation required significant resource investment and personnel time. Individuals and organizations seeking to develop such programs should anticipate a development time of 6 months to one year with consistent administrative oversight required throughout the program.

- Additional research is needed to determine what messages and marketing and advertising methods could effectively encourage patient use of pharmacists' services. Project findings suggest considerable marketing requirements. Advertising messages should emphasize health improvement in addition to a reduction in medication-related problems.

- The comprehensive MAP approach emphasized the pharmacists' skills and was needed by many patients; however, a disease-specific intervention may have been more effective and efficient for some patients. Future programs should consider offering a combination of these services.

- Patients often lacked basic information about medication use, their diagnoses, diet and exercise that could have obtained at the time of prescription dispensing or through standard information sources. Teaching patients to become wiser users of community pharmacy services and publicly

available medication and health information sources may be useful in decreasing adverse events and improving therapy effectiveness.

- *While pharmacists were enthusiastic about the program, the program time requirements were daunting to some. Methods of increasing the efficiency of patient care programs are needed.*
- Pharmacists appreciated the clinical support system and relied on it extensively. Future programs should consider establishing drug information and clinical decision-making support systems for community-based pharmacists.

- Evaluation efforts were hampered by the lack of certain data. Future endeavors should incorporate the use of claims data, specific clinical parameters, and the inclusion of a comparison group, if possible. Standardized data collection tools may facilitate the development and evaluation of community-based pharmacists' services.

Project Translation into Practice

The MAP project was undertaken to test a model of care that, if successful, could serve to foster the *growth of community-based pharmacist services. The translation of project activities and findings into* practice has resulted in:

- The creation of a PowerPoint presentation on community-based pharmacist services and a CD of patient education materials for pharmacist use

- New research to explore the impact of MAP on pharmacists' practice

- A publication and local, state and national presentations that describe the MAP program and its outcomes

- The development of various pharmacist services for employer groups and/or the general public

Conclusions

The MAP project was successful in implementing a community-based pharmacist service that was acceptable to patients, employers and pharmacists. The MAP program was effective in improving the appropriateness of drug therapy and medication use among a population that typically included older individuals who took a high number of medications and had significant morbidity. The findings suggest that these changes may be useful in containing health care expenditures. Program processes were consistently implemented as planned. The program provided valuable information regarding the offering *of comprehensive medication assessments and their outcomes. The project is creating an array of useful* products for offering such services and has informed the development of a number of new patient care programs.

PROJECT BACKGROUND

The need for interventions to improve appropriate drug therapy prescribing and use is evident from reports of medication errors, patient misunderstanding of drug regimens, medication non-adherence rates, and prescriber lack of adherence to clinical guidelines. The Institute of Medicine (IOM) (IOM, 2006) estimates that 1.5 million preventable adverse drug events happen in the U.S. each year and cite costs of $887 million among Medicare enrollees aged 65 and older due to these events. Slow adoption of clinical guidelines, low medication adherence rates, the lack of adoption of healthy lifestyles, and low health literacy hinder positive treatment outcomes. (Nau DP and Kumar RN, 2002; Petrilla AA et al, 2005; Spiers M et al, 2004)

Efforts to improve the effectiveness, safety and use of medications have included a variety of interventions ranging from clinical guidelines and drug formularies to patient care management. (Norris SL et al, 2002) These efforts have enjoyed varied success, however, drug therapy problems continue to be prevalent. (Burkiewicz JS and Sweeney BL, 2006; IOM, 2006) Thus, additional methods to improve therapy are being sought.

Pharmacist-lead interventions that use the unique knowledge of practitioners trained in drug therapy assessment hold particular promise for improving medication-related outcomes. Pharmacists are uniquely qualified to address medication-related problems related to all health conditions and to the use of prescription, non-prescription and herbal products. This encompassing knowledge has been shown to be useful for individuals who take a multiple prescription or self-care medications. (Chumney ED and Robinson LC, 2006) For these individuals, pharmacists' education in drug therapy assessment, particularly interactions among medications, health conditions, and non-prescription and herbal products, is essential in improving medication prescribing and use. In these complex patients, drug issues can be challenging and thus, the literature research and assessment skills of pharmacists can be invaluable in determining appropriate actions.

Numerous studies have evaluated the impact of pharmacist-provided patient education and drug therapy monitoring on patient health. Positive outcomes have been reported for programs that focused on cardiovascular disease (McConnell KJ et al, 2006; Rothman RL et al, 2005, Snella KA, 2006), diabetes (Cho, HM et al, 2005; Garrett DG and Bluml BM, 2001, Jaber LA et al, 1996), dyslipidemia (Bluml BM et al, 2002; Cross LB and Franks AS, 2005), asthma (Bunting BA and Cranor CW, 2006; Cordina M et al, 2001); smoking cessation (Kennedy DT et al, 2002, McGhan WF and Smith MD, 1996; Zillich AJ et al, 2002), and the elderly (Shimp et al, 1985). These programs included patients recruited from ambulatory care practices, the general public, and/or employer groups. The Asheville Project in which employees and retirees received pharmacist care in addition to usual care has been shown to improve health outcomes related to diabetes as well as lower health expenditures and work absenteeism (Cranor CW at al, 2003). One study estimated that pharmacists' interventions could result in a cost savings of $2 for each $1 invested in the provision of care. (Strand L et al, 2004)

This project tested the provision of comprehensive medication assessments by a network of community-based pharmacist. The project included a university-sponsored support system to assist pharmacists with the administrative and clinical aspects of providing the service. It was thought that combining local pharmacist expertise and patient care skills with such a system would yield a program that met patient needs, offered consistent, high quality care, and was feasible for pharmacist participation.

PROJECT GOALS AND OBJECTIVES

This project, titled "Establishment of a Pharmacist Service for Planning Affordable Therapies", was designed through a partnership among Wayne State University Eugene Applebaum College of Pharmacy and Health Sciences (WSU), West Virginia University (WVU) Center for Drug and Health Information, practicing pharmacists, and three employers (Huron-Clinton Metroparks, St. Clair County and St. Clair County Road Commission). Each partner offered its unique expertise to the project. WSU brought community pharmacy and patient care experience while WVU provided expertise in drug information research and evaluation. The pharmacists brought a wealth of patient care experience and practical

4

programmatic knowledge. The employer Directors of Human Resources had significant expertise in employee and retiree relations and knowledge about health issues and prescription drug use among their covered lives.

Project Goal

The project goals were to:

- Improve the effectiveness and affordability of medication regimens and lower overall prescription medication expenditures and/or health expenditures for people taking multiple medications.

- *Gather information about the feasibility and effectiveness of community-based pharmacists offering comprehensive medication assessments.*

Project Objectives

The objectives of the demonstration project were to:

- Create a network of Michigan pharmacists who provide individualized comprehensive medication assessments and patient education

- Develop a comprehensive medication assessment program for people taking multiple medications

- Establish a system for referring program-eligible Huron-Clinton Metroparks and St. Clair County employees, retirees and their dependents to network pharmacists.

- Provide recommendations to patients on ways to improve the effectiveness and affordability of medication regimens while maintaining or improving patient health status.

- Collect, analyze and report data on program utilization, recommendations, recommendation *adherence, and changes in prescription and health care expenditures for the plan and patients.*

PROGRAM DEVELOPMENT

The Medication Assessment Program (MAP) was created to meet the demonstration project goals and objectives. The program provided comprehensive medication assessments and medication and health education to individuals taking four or more chronic medications. The program name was carefully chosen to reflect the major service provided. The acronym, MAP, was used to represent the confusion that can exist when many medications are prescribed and the service's ability to lead individuals to better health through improved therapy and education.

The primary goals of the MAP were to improve health and contain health care costs by:

- Decreased medication-related problems
- Enhanced patient understanding of their medications and health conditions
- Increased patient involvement in disease self-monitoring
- Increased patient involvement in health promotion activities such as healthy meal planning, and routine exercise

Program Principles

Several principles guided program planning and were used to communicate key programmatic goals and design features to employers and pharmacists. The principles are listed below with a discussion of how they were incorporated into program design.

- Pharmacists' services should highlight their expertise in drug therapy assessment.
- Medication assessment and counseling is a distinct service from prescription dispensing.
- The service providers should be pharmacists, not pharmacies.
- *Community-based pharmacists need specific support services in order to provide in-depth patient care services.*
- The program must include quality improvement processes.
- Program services and costs should be predictable to employers.

The MAP focus on individuals taking multiple medications highlighted the unique knowledge and skills of pharmacists. Pharmacists' ability to assess such regimens for appropriateness and safety is an important contribution that is widely recognized by the health care system and the public. Focusing on the assessment of individuals receiving multiple medications, therefore, is a service uniquely suitable for pharmacists to offer and one that is additive, not duplicative, to the efforts of other health care professionals.

The program offered medication assessment and patient education as a service distinct from prescription dispensing. This separation signaled to patients and employers that the program was a unique package of care unlike the counseling services received at the point of prescription dispensing. Since the MAP pharmacist was not required to be the patient's dispensing pharmacist, the program created the opportunity for a complimentary, but stand alone service. It also allowed the service to be provided in locations other than pharmacies, including worksites and patient homes.

A professional network composed of pharmacists, not pharmacies, was established. An established, *stable network of skilled individuals who were familiar with the program was important for patient care and* program efficacy. Basing the network membership on pharmacists narrowed service provision to only pharmacists who truly met network participation criteria and allowed stability in network membership even when pharmacists changed practice sites.

Time commitment concerns and uncertainty about patient care skills can hinder the provision of patient care services by pharmacists. Thus, administrative and clinical support services were offered to lower time demands on pharmacists and assist in supporting clinical decision-making. Program efficiencies were also created through centralized responsibility for advertising, enrollment and billing functions.

Continuous quality improvement is rapidly becoming a necessary component of health care service delivery. Employers and other service purchasers, patients and health professionals need assurance that services are appropriate and that systems are in place to improve quality and prevent untoward events. The MAP promoted quality care through the pharmacist selection process and by the use of standardized forms and assessment guidelines. A peer review process assured pharmacists that their assessments and recommendations were appropriate and complete. The availability of drug information services encouraged pharmacists to seek evidence-based answers to drug therapy dilemmas. Continuing education programs for MAP pharmacists raised their awareness and understanding of current treatments and practice guidelines.

For the MAP, employers paid the total professional fee on a per patient basis for MAP services. This *approach provided predictability to the employer regarding the services to be provided and their cost. This* payment method also streamlined the billing process. The professional fee amount was chosen based on fees associated with similar pharmacist services and reflected the 2003 generally accepted value of $1 per minute of pharmacist time. Since this method risks underpayment if time and resource contributions exceed predictions, care was taken before and during the program to create an efficient pharmacist service delivery process.

Pharmacist Network

Recruitment .

To serve the needs of the employer groups, a statewide network of pharmacists was established. The employers provided information on the geographical location of employees and retirees at either the city

or zip code level. The information allowed the mapping of the presence and density of covered individuals throughout the State of Michigan and beyond so that pharmacists practicing in these areas could be recruited into the network.

Criteria for pharmacist selection for the network were established. To be eligible for the program, pharmacists had to meet the following criteria:

- Practice or live in an geographical area in which active employees or retirees of the employer groups lived
- Have a strong interest in patient care
- Be involved in patient counseling
- Be able to designate a specific place and times for patient visits
- Have internet access and a personal e-mail address
- Be willing to follow the study protocol
- Attend study-related meetings as required

A variety of means were used to recruit network pharmacists. In areas in which a high number of employees and retirees lived, project staff visited local community pharmacies to provide pharmacists with information about the MAP. To assure that retirees who lived throughout the state had access to MAP services, visits were made to pharmacies in cities that served as shopping hubs for selected rural communities. Notices about the MAP network formation were placed in the state pharmacy association electronic newsletter and WSU announcements. Specific invitations were sent to pharmacists participating in a state pharmacy association physician counter-detailing program and to pharmacists known by the project managers. Invitational recruitment meetings were held at WSU to discuss the project with interested pharmacists.

Pharmacists were required to submit an application listing their educational and professional experience and indicating their rationale for applying to be a network member. The pharmacists also had to indicate the location they would use for service provision. If services were to be provided within a pharmacy or any location other than the patient's home, an approval letter for space use was required.

Thirty-three pharmacists applied for the network and 30 were selected. The pharmacists practiced in community pharmacy, long-term care, ambulatory care or academia. The number of years of practice experience varied widely among pharmacists; some had practiced only 1 to 2 years while others had more than 30 years of experience. Nine pharmacists had doctorate of pharmacy degrees and three had completed residency programs. The pharmacists who applied for network participation did so mainly for the opportunity to provide comprehensive care to patients. None of the pharmacists mentioned the attainment of additional income as a motivating factor. Many, however, viewed service compensation by the employers as a positive step for community pharmacy practice.

Pharmacist training

All selected pharmacists attended an 8-hour Accreditation Council for Pharmaceutical Education (ACPE) approved continuing education program. The program titled "Providing Medication Assessment Services for Individuals on Multiple Medications" reviewed medication history taking, drug therapy assessment, patient counseling, MAP program requirements and data collection processes, and program resources. Program content was provided via lectures and discussions, with pharmacists role-playing all aspects of the program. A resource manual was created to support the training. The program was offered in Port Huron, Detroit and Grayling in September, October, and December 2004, respectively.

Quarterly meetings were held to update pharmacists on program issues and provide continuing education. A continuing education program on "Secondary Prevention of Cardiovascular Disease" was offered in Port Huron, Farmington Hills and Grayling in March and April 2005. Another program "Evaluating Medication Use in the Elderly" was offered in Rochester Hills in June 2006. Informal meetings

7

for program updates and pharmacist input were held in October 2005 in Port Huron and Farmington and in February 2006 during the Michigan Pharmacists Association Annual Meeting in Dearborn.

Network Support System

Administrative and clinical support services were developed for the network. Administrative support was offered since many pharmacists did not have established means for advertising patient services or setting appointment times. Clinical support was offered since pharmacists were likely to encounter complex therapeutic and patient issues requiring proficiency in across a wide range of current diagnostic practices, treatment guidelines and necessitating research into specific patient issues. The support system proved to be useful in recruiting pharmacists who otherwise would have been reluctant to join the project.

Administrative Support System

The administrative support system centralized activities such as patient enrollment, appointment scheduling, data analysis, and billing. A centralized enrollment system allowed patients to call a single telephone number to get program information and enroll into the program. Since pharmacists' schedules vary from day to day, this service ensured that patients could reach someone who was knowledgeable about the program during business hours every day. A toll-free program number was established so that calling costs would not hinder enrollment. Centralized enrollment also shifted the responsibility for scheduling initial visits and sending out enrollment packets from the pharmacists to project staff. Once pharmacists and patients had met for the initial visit, the pharmacists scheduled all other meetings directly with their patients.

Standardized forms to support data collection were developed for pharmacists' use. The forms included a patient enrollment packet, a medication and health history form, a medication assessment guide, and forms to record interventions occurring during patient visits. The forms ensured that services were provided in a similar fashion to all patients and led to the development of a program database that facilitated program evaluation. Pharmacists preferred to record data in writing rather than using direct computer entry. Therefore, all completed forms were de-identified and faxed to WSU for review and data entry.

Project staff also coordinated the development and distribution of advertising materials to increase employee and retiree awareness about the program and promote enrollment. Patient letters, brochures, posters, bookmarks, and magnets provided basic program and enrollment information. Mailed letters describing the benefits of the service, the service components, and the enrollment process were mailed to employees and retirees directly from the employer (St. Clair County and St. Clair Road Commission) or from the College (Huron-Clinton Metroparks) using employer-generated address labels. Letters sent by the employer were mailed as separate letters, included within paycheck envelopes, or included as a supplement to a retiree newsletter. Letters were sent to employees and retirees in January 2005, March 2005, January 2006 and May 2006.

Mailings were viewed as an efficient means of reaching people and, indeed, with each mailing an increasing number of individuals called for program enrollment information. However, conversations with employees and retirees indicated that letters were not always received or their content was misunderstood. Therefore, additional advertising methods were initiated. These methods included:

- Presentations at retiree luncheons
- A presentation to department administrators
- Program displays at worksites and employee health fairs
- An interview for a Port Huron radio station
- Advertisement in a Port Huron newspaper health circular
- Advertisement on a Port Huron cable TV station

In addition, pharmacists who practiced in community pharmacies displayed posters, flyers and magnets about the MAP program at their practice sites. Some used the bookmarks as bag stuffers and handed

them out with each prescription. One pharmacist visited local medical offices to discuss the program with doctors and nursing staff and another pharmacist included information about the program in community health presentations.

Service billing was also done centrally. One employer pre-paid for a given number of patients, while the other employer paid as patients completed the program. The pharmacist compensation process was triggered by the College's receipt of a completed final program evaluation form. This ensured that the patient had received all services and that the final evaluation data was available for analysis.

<u>Clinical Support System</u>

The second component included clinical support services to assist pharmacists in assessing drug therapy and clinical decision-making. Since MAP pharmacists assessed medication regimens that treated a wide range of illnesses, providing continuing education on all potential therapies that they may encounter was not feasible. Therefore, web-based resources were created to assist pharmacists in performing assessments. These resources focused on 20 common diagnoses and included PDF files of continuing education articles, Internet links to national practice guidelines, and disease-specific interview guides. A listing of websites that provided accurate information related to subjects such as herbal medications and laboratory test analysis was also available. Throughout the duration of the project, pharmacists were e-mailed additional information about new therapeutic findings and clinical resources.

Drug information services were offered by the West Virginia University (WVU) Center for Drug and Health Information. The Center offered pharmacist support in researching complex therapeutic issues, thus sparing pharmacists from doing extensive literature searches and allowing answers to be formulated and referenced by drug information specialists.

A peer review process was established that engaged a second pharmacist in the review of the collected information and MAP pharmacist's recommendations. Three peer review pharmacists with experience in direct patient care and drug therapy assessments served the network.

The support system also included the identification of patient education materials that could be used to inform the patient about their medications, illness, strategies for self-monitoring of disease and healthy lifestyle practices (e.g., meal planning, exercise). Publicly available materials from governmental agencies, non-profit organizations or pharmaceutical manufacturers were used along with educational information handouts designed by WSU project staff and students.

DESCRIPTION OF MAP INTERVENTIONS

Program Population

The MAP program was offered to individuals 18 years of age or older who met one of the following criteria:

- Takes 4 or more medications on a routine basis (three or more times per week)
- Has been recently hospitalized and takes any number of medications

The four medications could be prescription medications, non-prescription medications or herbal products. This definition recognized the adverse reactions and drug interactions associated with the use of non-prescription and herbal products.

The program was offered to employees, retirees and adult dependents associated with St. Clair County, St. Clair County Road Commission, and Huron-Clinton Metroparks. For two employers (St. Clair County and St. Clair County Road Commission), parents of employees and retirees were also eligible for the program. Parents were included in the program since it was recognized that employees and retirees often served as care givers for elderly parents. It was thought that improving the health of the parents would decrease the care burden experienced by their children and thus, improve their work productivity.

9

The employers offer health benefits to about 3,500 people. St. Clair County and Road Commission employees live in and around the Port Huron, Michigan area. Employees for Huron-Clinton Metroparks live near the locations of the 13 parks located within five Southeastern Michigan counties. Retirees for both employers live throughout the State of Michigan and beyond with the majority of retires residing within the Port Huron and Southeastern Michigan regions.

Enrollment Process

Patients enrolled into the MAP program by calling a central telephone number. Callers were screened to determine whether they met program criteria and their affiliation with a participating employer group. The program was explained and, if interested, the person was assigned to a pharmacist and mailed an enrollment packet.

The enrollment packet included a cover letter that explained the program, a patient consent form, a Health Insurance Portability and Accountability Authorization Act (HIPAA) form, and a medication and health history form. This latter form asked for general information about the patient's diagnoses, medications and their primary health and medication concerns. It also requested information on recent blood pressure readings, laboratory tests results and any other medical record information that the patient thought would be helpful to the pharmacist. The patient completed the form and mailed it in a pre-addressed envelope to the assigned pharmacist prior to the initial visit. This information allowed the pharmacist to review the patients' medical conditions and medication list prior to the first visit.

MAP pharmacist assignment was based on several factors. Whenever possible, patients were assigned to the pharmacist whose practice location was most convenient for them. If a patient desired a home visit, then a pharmacist who had agreed to offer such a service was assigned. Some MAP pharmacists recruited patients to the program and these patients were automatically assigned to the referring pharmacist. First visit dates and times were verified with pharmacists prior to patient notification. Pharmacists telephoned their patients the day before their initial visit to introduce themselves to the patients and to remind patients of the date, time and location of the visit.

Program Services

Initial Assessment Visit

The goal of the initial assessment visit was to gather information about patient health and medication knowledge, medication use, and health-related concerns. The pharmacist obtained written patient consent to share information with the patient's physician and/or family members. The mailed medical and medication history form was reviewed and the pharmacist did an extensive assessment of the patient's prescription, non-prescription and herbal product use. The patient's exercise and dietary habits and other factors that may influence their health were also discussed.

Pharmacist Therapy Assessment

After the initial visit, the pharmacist reviewed the information gathered to identify patient-specific medication and health-related problems and educational needs. Based on the analysis, the pharmacist developed drug therapy and health recommendations. If a medication or health concern required research, patient background information and questions were forwarded to the WVU Drug and Health Information Center. The Center would research the questions and provide a referenced response within about one to three days depending on the complexity of the question.

All data collected, the problem list and recommendations were faxed to WSU and assigned for review to one of the three peer review pharmacists. The peer review pharmacist and MAP pharmacist discussed the patient case and recommendations to ensure that all recommendations were pertinent and evidence-based. Peer review pharmacist assistance varied from being a sounding board for specific issues to

providing literature references for key drug therapy recommendations to identifying additional drug therapy-related problems.

Depending upon the pharmacist's preference, the peer review pharmacist would also assist in writing the formal recommendation letter. Since this can be a difficult and time-consuming task, many MAP pharmacists opted for this service. Formal letters of recommendations were prepared using a standard format. The letter began with a statement that all recommendations were based on patient report and that no changes in therapy should be made without a physician's consultation. The letter listed the patient's medications and illnesses and the patient's expressed concerns. For each drug therapy or health-related problem found, remediate steps were described and patients were advised as to whether they could take actions on their own or first needed to consult with their physician. Examples of actions that patients could take on their own included changing the times medications were taken to prevent side effects or drug interactions, or trying a non-prescription medicine for symptomatic relief. In all cases, patients were instructed to discuss any changes in medications or their health status with their physician.

With pharmacist's input, WSU project staff or peer review pharmacists selected educational materials to support patient educational needs. These materials were placed into a binder for presentation to the patient. The binder contained 5 sections: the pharmacist's recommendations, medication-related information, disease information, monitoring forms related to the patient's medications and diagnoses (e.g. a chart for recording blood pressure readings) and information that promoted healthy dietary practices, routine exercise or other healthy behaviors. The binder materials supported the pharmacist's oral counseling, served as a permanent reference source for the patient, and gave the patient a tangible program product.

<u>Second, Educational Visit and Follow-Up Telephone Call</u>

A second pharmacist-patient visit was held to discuss the pharmacist's recommendations and selected patient education materials. During this visit, the pharmacist reviewed the recommendation letter and/or a summary of the recommendations and key educational materials. About 10 to 14 days following these visits, the pharmacist telephoned the patient to determine if he/she had any additional questions about the recommendations, the educational materials given and if additional information was desired.

Recommendations were provided to patients who decided whether the recommendations would be shared with their physician. Pharmacists were not required to contact physicians when drug therapy changes were recommended. The program focused on empowering patients to take control of their health and treatment with the recommendations serving as catalysts for improved physician-patient communication. This approach honored patient confidentiality, gave patients control over recommendation implementation, and avoided requiring pharmacists to spend significant time trying to contact physicians.

<u>Final Evaluation Visit</u>

The pharmacist and patient had a final visit to determine whether the pharmacist's recommendations had been accepted. This visit typically occurred after the patients had a doctor's visit so that drug therapy changes or medical evaluations could be completed as recommended. For each recommendation given, the pharmacist would determine whether the recommendation had been accepted, rejected or if an action had been taken to remediate the problem but it differed from that suggested by the pharmacist. During the final visit, information was again collected on health care utilization, and medication, diagnosis and healthy lifestyle knowledge. The pharmacist also reported their assessment of program effects on drug therapy and patient health.

PROJECT RESULTS

Data were analyzed using the Statistical Analysis System (SAS). Descriptive statistics were reported as means and standard deviations (SD) for continuous variables and as proportions for categorical variables.

11

For statistical analyses, continuous variables were analyzed by using Student's t-test, and comparisons of pre- and post intervention results were analyzed by using the paired t-test.

Enrollment and Patient Characteristics

Sixty-nine people enrolled into the MAP program between October 2004 and September 2006. Sixty-seven patients completed the initial assessment and educational visits. Two patients enrolled into the program, but did not receive any services, one due to a family death and another due to undetermined reasons. Ten patients were unable to be reached for the follow-up telephone call. Only one patient was lost to follow-up and did not have a final evaluation visit.

Analysis of patients who participated in the MAP found that:

- Over half (59.7%) of patients were female.

- The mean age was 68.7 years ($\pm$13.9) with a range from 22 years to 89 years.

- Forty (59.7%) of patients were 65 years of age or older. Nearly one third of patients were at least 80 years old.

- Almost all patients (91%) were Caucasian; three (4.5%) were African American and three (4.5%) were Native American.

- For those people associated with the project employer groups, 15 (28.3%) people were active employees; 19 (35.9%) people were retirees and 15 (28.3%) were dependents of active employees or retirees.

- All participants lived within Southeastern Michigan or the Thumb Area of Michigan.

While program eligibility required that a person take a minimum of four or more chronic medications, the typical MAP patient took many more. Table 1 summarizes medication use as reported by MAP patients and verified by the pharmacists. Most patients took more prescription medications than non-prescription or herbal products. However, non-prescription and herbal product use was significant among a subset of patients.

Table 1: Number of chronic medications taken by MAP patients

Medication category	Mean ($\pm$SD)	Range
Prescription	8.4 ($\pm$4.0)	2 - 20
Non-prescription medications or herbal products	4.1 ($\pm$2.4)	0 - 12
Total medications	12.5 ($\pm$4.5)	2 - 25

Patients 65 years of age and older were more likely to take a higher number of prescription medications than younger patients (9.5 $\pm$3.9 versus 6.8 $\pm$3.6, p<0.01). However, there was no difference in the total number of medications taken or the number of non-prescription and herbal products taken between the two age groups. Higher medication use was also found to be correlated with poorer patient related health status.

MAP patients had multiple illnesses with an average of 5.9 $\pm$2.3 reported diagnoses per patient with a range of 2 to 12 diagnoses. Those who were 65 years of age and older also had a higher number of diagnoses than younger patients (5.1 $\pm$1.9 versus 6.4 $\pm$2.5, p<0.05). The most common diagnoses are presented in Table 2. While many patients had multiple health conditions, pharmacists reported that patients often had one or two health conditions that were of primary concern. These health conditions tended to be associated with symptoms that were not well controlled with current therapy, were

progressing in severity, and/or were associated with a recently diagnosed condition. Pharmacist-patient interactions tended to focus on these conditions.

Table 2: Common diagnoses reported by MAP patients

Diagnosis	# of patients reporting condition (n=67)	% of patients reporting condition
Hypertension	50	74.6
High cholesterol	41	61.2
Coronary heart disease	31	46.3
Diabetes	29	43.3
Gastrointestinal esophageal reflux disease (GERD)	21	31.3
Osteoarthritis	19	28.4
Chronic pain	19	28.4
Osteoporosis	17	25.4
Asthma	14	20.9
Heart failure	14	20.9
Anxiety	13	19.4
Depression	12	17.9
Rheumatoid arthritis	10	14.9
Hypothyroidism	10	14.9

Given the prevalence of cardiovascular diseases among the general population, the mention of diseases such as hypertension, high cholesterol and coronary heart disease are expected. Comparisons of MAP data to 2005 Behavioral Risk Factor Survey (BRFS) data of Michigan residents 18 years of age or older indicates that MAP patients reported some conditions more frequently. For example BRFS data report percentages of 27.8% for high blood pressure, 38.9% for high cholesterol, 9.0% for asthma and 8.1% for diabetes. Since MAP patients used a high number of medications and tended to be older, this may account for the variation between disease prevalence in MAP patients and state residents.

In the 12 months before the initial assessment visit, all patients had at least one physician visit, with 25 (37.3%) individuals having more than six visits, Twenty- four (35.7%) patients had at least one hospitalization and 24 (35.7%) had at least one emergency department visit. Michigan Department of Community Health reports 2004 hospitalization rates of 854.5 per 10,000 for Michigan residents 18 to 44 years of age, 1,268.9 per 10,000 residents for those 45-64 years of age, and 3783.2 per 10,000 for residents 65 years of age or older. Thus, MAP patients appeared to have a similar rate of hospitalization compared to Michigan residents overall.

Services Provided

Fourteen of the 30 MAP pharmacists saw program patients. The number of patients seen by a MAP pharmacist ranged from one to 14. Six pharmacists saw 6 or more patients and seven pharmacists saw only one or two patients. Four pharmacists received multiple referrals because of their willingness to do home visits. (Twenty-four patients (36%) requested home visits.) Pharmacists practicing in the Port Huron or Thumb Area of Michigan saw the most patients.

Initial Assessment Visit

The initial assessment visit was designed to primarily collect data, however, pharmacists provided an array of counseling services during this visit (Table 3). As pharmacists identified medication use problems, they addressed those that they felt needed immediate attention or those that could be remedied by simple counseling. More complex issues were discussed during the second educational visit

13

·after the pharmacist had researched the literature or received assistance from the drug information center or peer review pharmacist.

Table 3: Services provided at initial assessment visit as reported by pharmacists

Service provided	# of patients receiving this service (n=67)	% of patients receiving this service
Medication counseling	48	87.3
Diagnosis/symptom-related counseling	47	85.5
Self-monitoring practices counseling	39	70.9
Adherence strategies discussed	26	47.3
Medication administration techniques discussed	30	54.6
Written patient education materials provided	5	9.1

Second, Educational Visit

During the second visit, pharmacists provided patients with written recommendations to improve their drug therapy, self-monitoring practices, and overall health during the second visit. For analysis purposes, the recommendations were categorized according to type based on a modified scheme originally designed by Tomechko and colleagues (Tomechko MA et al, 1995). A standard approach to recommendation categorization was developed with each recommendation reviewed and coded by two pharmacists. Coding discrepancies were discussed to ensure uniformed categorization.

Overall, pharmacists provided 662 medication and health-related recommendations. Of these, 463 (69.9%) recommendations related to needed changes in medication selection, dosage, administration or adherence. One hundred and forty-two (21.5%) recommendations advised changes in health practices or lifestyle choices such as meal planning or exercise. Fifty-seven recommendations (8.6%) were for a medical evaluation for untreated or uncontrolled health problems. Sixty-five percent of all recommendations related to actions that patients could undertake without prior physician approval including more intense self-monitoring (e.g. self-blood glucose monitoring, daily weight checks for congestive heart failure patients) and taking actions to avoid adverse drug reactions (e.g. taking medication with food, spacing out medication doses) and improving medication adherence. The most common recommendations given are listed in Table 4.

Table 4: Types and frequency of pharmacist recommendations ·

Recommendations	# of times recommendation given	% of total recommendations
Additional drug therapy monitoring needed	193	29.2
Lifestyle change needed	104	15.7
Actions needed to avoid adverse event	84	12.7
Additional drug therapy needed	58	8.8
Medical evaluation needed	57	8.6
Actions needed to improve medication adherence	51	7.7
Medication change needed due to wrong drug prescribed	35	5.3
Actions needed to eliminate adverse medication event	29	4.4
Dosage needed to be increased	21	3.2
Unnecessary drug therapy	20	3.0
Dosage needed to be decreased	10	1.5

The need for recommendations related to drug dose timing and the prevention of drug interactions or adverse events suggests that patients had not received or understood basic information that would help

them to better manage their drug therapies. It also implies that complete medication reviews for continued drug necessity, appropriateness of dose, and adverse events and drug interactions may not be routinely done during physician visits. Referrals for medical evaluations may mean that patients were not discussing all of their health concerns with their physicians.

Medication non-adherence included missed doses and wrong dosage timing and administration. Pharmacists reported that patients used multiple systems for remembering medications including pillboxes, medication calendars and spousal/family member supervision. The major reasons given for missing doses were: simply forgot (14.1% of patients), have problems taking medicines at specific times (9.5%), busy with other things (9.4%), away from home at dosing time (6.4%), forgot due to a change in daily routine (6.3%) and fell sleep or slept through dosing time (6.3%).

Pharmacists reported activities during the second visit are listed in Table 5. The low frequency of visits during which medication adherence counseling occurred compared to the frequency of adherence-related recommendations indicates that some people had adherence problems with multiple medications while others were found to be adherent with all their therapies.

Table 5: Activities completed during second, educational visit (n=67)

Activity	# of visits that included this activity	% of visits that included this activity*
Recommendation letter discussed	64	98.5
Symptoms and/or health status discussed	59	90.8
Medication-specific information reviewed	55	84.6
Discussed self-monitoring practices	54	83.1
Reviewed disease-specific information	51	78.5
Reviewed health promotion strategies	45	69.2
Medication list updated	34	52.3
Discussed adherence strategies	27	41.5

*Percentage based on number of visits for which data were reported

Telephone Follow-up

Pharmacists reported information related to the follow-up telephone call intervention for 57 (85.1%) patients. Data reporting for this portion of the program was the lowest of all program areas due to difficulties in contacting patients by telephone. By the time of the follow-up call 53 (93%) of patients contacted had reviewed the recommendation letter with 5 (8.8%) having questions about the recommendations. The majority of patients had also reviewed the written medication, diagnosis and healthy lifestyle information. Eight (14%) patients requested additional information at the time of the telephone call.

Final Evaluation Visit

At the final evaluation visit, pharmacists determined whether the recommendations provided at the second educational visit had been accepted. All reported outcomes were reviewed and coded by two pharmacists with differences in coding resolved through discussion.

Pharmacists' recommendations were accepted with rates of 70.5%, 75.0% and 72.5% for medication-related recommendations, lifestyle-related recommendations and the need for medical evaluations, respectively. Table 6 shows the acceptance rates for various subgroups of recommendations. Interpretation of the findings is limited since the pharmacists did not record outcomes related to all recommendations. In addition, some recommendation-related actions were recorded as neither accepted nor rejected. For example, sometimes when pharmacists recommended that patients discuss certain

15

symptoms with their physician, the patients reported that the problem dissipated before their physician visit so the problem was never discussed with their physician.

Table 6: Acceptance rates for pharmacist recommendations

Recommendation	# of times recommendation accepted	% of recommendations reported as accepted*
Actions needed to prevent adverse event	53	84.1
Unnecessary drug therapy	16	80.0
Actions needed to improve medication adherence	35	76.1
Actions to avoid adverse drug reaction	19	76.0
Medication change needed due to wrong drug prescribed	23	74.2
Lifestyle change needed	57	74.0
Medical evaluation needed	29	72.5
Additional drug therapy needed	35	71.4
Dosage needs to be increased	13	65.0
Improved drug therapy monitoring needed	96	63.2
Dosage needs to be decreased	4	50.0

* This rate excludes recommendations with missing outcomes data.

While pharmacists' recommendations appeared to be well received, patients and physicians accepted certain types of recommendations to a greater degree than others. Recommendations related to safety, such as stopping the use of unnecessary medications or the prevention of adverse events, were accepted in the majority of cases. Recommendations that required patients to make changes in their own health behaviors (i.e., enhanced self-monitoring, improved meal planning and increased routine exercise) were accepted to a lesser degree, yet still enjoyed acceptance by most patients.

Studies in which pharmacists have interacted directly with physicians report recommendation acceptance rates ranging from 61% to 80% (Strand et al, 2004, Shimp et al, 1985, Shimp et al, 1986, Kaplan et al, 1994). In the MAP, changes in prescription drug therapy required patients to relay pharmacists' recommendations to their physicians. In many cases, patients reported taking the written pharmacists' recommendations to their physician visit for review by the physician. Patients reported that physician reaction to the recommendations, and the program overall, was very positive. In some cases, pharmacists spoke to physicians directly about their recommendations. Whether mandating direct pharmacist and physician communication within the program would have increased recommendation acceptance is unknown.

Pharmacist-patient relationships may have influenced the impact of the recommendations. Some pharmacists had an established relationship with the patient; some did not. The program required only four contacts with each patient, however, pharmacists and patients spent considerable face-to-face contact time during the initial assessment visit and the second educational visit. Whether more visits and/or contact over a longer period of time may have been useful in enhancing the acceptance of some recommendations such as those related to self-monitoring behaviors and lifestyle changes is not known.

Table 7 lists the most common actions that resulted from the MAP pharmacists' recommendations based on pharmacist report. Actions taken based on a pharmacist's recommendations differed from the type of recommendation given. For example, increased drug therapy monitoring recommendations may have been aimed at patient self-monitoring or the need for physician-ordered laboratory testing. In some cases, the action suggested differed from the action taken. For example, a pharmacist may have recommended that a medication be discontinued and the dosage was decreased instead.

16

Table 7: Actions taken pursuant to pharmacists' recommendations

Action taken by patient and/or physician	# of times action taken
Patient self-monitoring of drug/disease improved	34
Patient actions taken to prevent injuries/disease progression	28
Increase in routine exercise	27
Physician medication review received	26
Symptoms discussed with physician	26
New non-prescription product used	24
Dosage/regimen change in non-prescription product use	24
Drug interaction eliminated	22
Improvement in meal planning	22
Medication adherence increased	21
Dosage/regimen change in prescription medication	20
Patient actions taken to prevent medication adverse effects	19
Laboratory/disease monitoring tests ordered	18
Prescription medication discontinued	17
Non-prescription medication discontinued	13
Herbal product discontinued	8

During the final visit, patients were asked their opinion about whether their health had improved, remained the same or had worsened since the MAP assessment visit. Of the sixty five patients answering this question, 38 (58.5%) indicated their health had improved, 24 (36.9%) said their health was the same and 3 (4.6%) reported worse health.

Pharmacists also gave a global assessment of patient outcomes about the impact of the program by reviewing a list of possible outcomes and checking those that applied (Table 8). For the majority of patients, pharmacists indicated the program had a positive effect on disease control, drug therapy safety and patient self-monitoring skills. Pharmacist opinions gave additional insight into the cost impact of the program since they were aware of medication regimen changes and are knowledgeable about drug product costs. For about half of patients, the pharmacists' believed the program had resulted in decreased drug costs while these costs were reported as increased for 5.1% of patients. Nearly half of patients had no change in drug therapy costs.

Table 8: Pharmacist-reported outcomes related to MAP program (n=59)

Outcomes	# of patients reported to have this result (n=67)	% of patients reported to have this result
Disease control improved	44	74.6
Patient self-monitoring skills improved	39	66.1
Side effects decreased or avoided	39	66.1
Medication adherence improved	33	55.9
Drug costs decreased	29	49.2
Drug interactions avoided	26	44.1
Drug costs increased	3	5.1

The global assessments tended to be more positive than those reported based on patient responses recorded for each recommendation. This may indicate that the global assessments considered information beyond that captured by individual responses to recommendations or that pharmacists were generally more optimistic about patient outcomes.

ADDITIONAL PROGRAM OUTCOMES

Changes in Medication and Health-related Knowledge

At the final evaluation visit, patients rated their knowledge of the effects and use of their medications, their diagnoses, and ways to stay healthy on a Likert scale of 1 through 4 where 1 was not informed at all, 2 was somewhat informed, 3 was informed, and 4 was very informed (Table 9). Paired T-test scores indicated that knowledge significantly increased after program participation. The changes in perceived knowledge are consistent with the program's emphasis on providing oral and written medication and health information and improvements in self-monitoring, dietary and exercise practices.

Table 9: Number (%) of patients reporting that they are informed or very informed about the medications, diagnoses, and healthy lifestyle choices (n=67)

Knowledge item	Initial visit	Final visit	Significance
Medications	33 (51.4%)	62 (96.9%)	p<0.001
Diagnoses	42 (63.6%)	64 (98.5%)	p<0.001
Healthy lifestyle choices	48 (72.7%)	63 (98.4)	p<0.001

Changes in Health Care Utilization

Health care utilization for three months before the initial visit and between the initial visit and the final visit was measured through patient report. A three-month comparison time was chosen since it was anticipated that the average time between the initial and final visit would be about three months. Analysis of visit dates found that the average length of time between the initial and final visit was 99.8 ($\pm$36.5) days. Only 6 (9.4%) of patients had an evaluation visit that occurred less then two months following the initial visit, while 14 (21.9%) of patients had a visit more than three months following the initial visit. Therefore, the time span reflected in the final evaluation was similar or longer than the three month pre-intervention time period. Thus, patients had a slightly greater time period to use health care during the post-visit than the pre-visit time. Table 10 shows health care utilization before and during the MAP.

Table 10: Health care utilization reported by patients before and after initial MAP visit

Health service	# of people reporting having specified number of visits or hospitalizations (n=67)					
	0	1	2	3	4	4+
Physician visits						
Pre-visit*	7	18	9	0	1	10
Post-visit**	11	21	11	10	5	5
ED visits						
Pre-visit*	54	4	0	1	0	0
Post-visit**	59	3	1	0	0	0
Hospitalizations						
Pre-visit*	52	8	0	1	0	1
Post-visit**	55	6	2	0	0	0

*The pre-visit time frame is the 3 months before the initial visit
** The post-visit time frame is the time between the initial assessment visit and the final evaluation visit (mean = 99.8 days)

The data suggest that the MAP may have influenced health care expenditures through the medication discontinuations and the lower incidence or emergency department visits and hospitalizations. Additional analysis found that patients who discontinued a prescription, non-prescription or herbal product did not begin new therapy, hence discontinuations reflected true costs savings to the employer and/or patient. Recommendations for testing and medical evaluations may have increased costs as reflected in an increase in physician visits after the initial visit. Decreases in hospitalizations and emergency department visits cannot be directly linked to MAP participation, but do suggest an overall improvement in health status and disease control.

DISCUSSION

The Medication Assessment Program was a unique program that offered medication assessment and patient education services through a community-based pharmacist network that had on-going university-based administrative and clinical support. The program met its objectives in that medication-related problems decreased, patient understanding of medications and diseases improved, and patient involvement in disease self-monitoring, appropriate diets, and routine exercise increased. Changes in drug therapy and emergency department and hospital utilization suggested that the service also contained health care costs. The successful implementation of the project and its favorable reception by patients, employers and patients indicate that the model of care was acceptable. An examination of the program experiences will serve to inform future programs that offer community-based pharmacist services. A discussion of several key issues follows.

Patient Enrollment

Maximizing patient enrollment was a key concern of project staff, MAP pharmacists, and the employers. Pharmacist medication assessment and education services are still a relatively unknown phenomena in Michigan, thus significant effort was needed to raise awareness about the value of these services and to get individuals to enroll in the program. Although the program was marketed to all employees and retirees irrespective of their geographical location, no individuals outside of the Southeastern Michigan and Thumb area enrolled into the program. Only a few patients outside of these regions even inquired about the program with none of them deciding to enroll. The degree to which the program was effective in reaching all those who could have benefited from the program is unknown. Baseline data on prescription utilization for one employer group suggested that 20% to 30% of patients eligible for the program enrolled.

Enrollment appears to be influenced by several factors. Although materials about the program were present at employee sites and within pharmacies, spikes in enrollment tended to occur following mailings to employees and retirees indicating that personal receipt of program information was a motivating factor. Family support had a positive influence on participation. Many individuals attended the visits with their spouse or another family member, some husbands and wives enrolled their spouse. For others, personal contact with a MAP pharmacist or project staff was a positive influence in program enrollment. When a newspaper article about the MAP included a quote by a local MAP pharmacist, it resulted in a number of inquires about receiving services from that particular pharmacist. Word of mouth recommendations played some role in enrollment as indicated by enrollment of several employees who worked within the same department.

Certain patient characteristics may be predictive of pharmacist service use. People who enrolled tended to be older individuals who took a high number of medications and had multiple disease states. A separate analysis indicated that the number of medications taken negatively influenced health status. The high number of diseases reported and the low health status of participants suggest that patients may have been attracted to participate in the program due to their overall morbidity and health status rather than simply because of the number of medications they took on a routine basis. Perceived knowledge about medications may have also been an influential factor since, at their initial visit, nearly half of patients reported being somewhat uninformed or not informed at all about their medications. Self-pay patients tended to be female and older (77.7 vs. 66.2, p=0.005), than those who received the service without charge. They also tended to report more diagnoses (7.1 vs. 5.6, p=0.02) but did not differ in the

19

number of prescription, non-prescription or total number of medications taken. Thus, the potential to lower their drug expenditures and improve their health may have been motivating factors for these patients.

There were also factors that hindered enrollment. The ability to reach retirees on a personal basis was only available through two employers (St. Clair County and St. Clair County Road Commission), while the other employer had little contact with their retirees. The geographical disbursement of the Huron-Clinton Metroparks employees made it difficult to personally inform people about the program.

The employer populations constituted only a small percentage of the patients pharmacists saw during the usual course of their practice. Therefore, most pharmacists believed that it most efficient to have recruitment efforts originate from the employer and did not consistently promote the program at their practice sites. While other patients could have accessed the program by paying a fee, many MAP pharmacists were did not want to discuss fees with patients and, thus, were reluctant to recruit.

The lack of program participation incentives may have hindered program enrollment. The program was provided at no cost to employees, retirees and their dependents to prevent financial barriers to the services. However, no monetary incentives, such as waived prescription co-payments, were provided to encourage employees or retirees to enroll into the program. Two reasons for not waiving co-payments were that most plans were developed through labor negotiations and there was a reluctance to make changes that were not created under these processes. Secondly, the pharmacists providing the service were not the pharmacists who dispensed the patients' prescriptions. Therefore, the loss of a co-payment would have had a slight, but real, negative effect on cash flow within pharmacies. For most employees and retirees, lowering prescription costs was not a motivation for program enrollment since their prescription benefit plans had low co-payments and no formulary or prior authorization restrictions. MAP patients who self-paid for the program services, however, often indicated that medication costs were a concern.

Informal discussions with individuals indicated other possible reasons that people hesitated to enroll. These included confidentiality concerns about participating in an employer-sponsored health program, uncertainty about the value of the program, and the time commitment required by the program. Some falsely believed that the service was only available in the Detroit area since it was associated with Wayne State University and others simply did not receive or remember receiving information about the program.

These findings indicate that for a comprehensive medication assessment program to be widely adopted, marketing and advertising efforts need to be intensive. They also suggest that there is a need to better identify patient needs, marketing strategies, advertising messages and, perhaps, service delivery models that could increase service participation.

Pharmacist Participation

The program provided interesting insights into the implementation of patient care services by community-based pharmacists. The method by which pharmacists incorporated the MAP into their current professional practice differed. Some pharmacists worked only part-time and provided the services in addition to their usual practice. Others coordinated their work schedule with pharmacist partners and staff in order to set aside time within their workday to provide the services. Some provided the service at their practice site, but provided care during nonscheduled working time. For those pharmacists who provided care as part of their scheduled working time, reimbursement for services was sent to the pharmacy. Other pharmacists received the reimbursement themselves.

The majority of pharmacists who were accepted into the network remained within the network for the full project duration. Even pharmacists who did not have patients referred to them, continued to attend update meetings and CE programs. Retaining the participation and interest of all of the out-state pharmacists was a challenge since the program was unable to recruit patients in out-state areas.

The ease with which pharmacists could schedule time for service provision depended on multiple factors. In general, those pharmacists who had direct control of their time routinely accepted patients and could

readily schedule patient visits. Pharmacists who depended on another pharmacist to cover their dispensing activities during patient visits often had a difficult time scheduling visits. This difficulty reflected a general lack of pharmacist staffing availability and, perhaps, management's hesitancy to provide personnel support for this activity. However, once a patient was seen pharmacists often went beyond the provision of required services to answer patient questions, provide patients with additional information or health resources. For example, pharmacists taught patients how to check their blood glucose or blood pressure at home, or provided relaxation tapes. Even when patient cases were complex and time-consuming, pharmacists continued to take the necessary time to fully evaluate medication regimens and counsel patients.

During program development there had been a concern that pharmacists may not have adequate information upon which to make clinical recommendations. However, most MAP pharmacists felt that the process provided sufficient information to make appropriate medication and health recommendations. Many patients reported laboratory results on their medication history forms or brought laboratory results, diagnostic test results or even medical record data with them to their initial assessment visit.

Pharmacist enthusiasm for this new model of care may have been a motivating factor for the high rate of pharmacist adherence to program data collection and reporting requirements. The only form that commonly lacked completion was the final evaluation form. Despite requests for complete data, pharmacists tended to focus on gathering information about patient responses to key recommendations rather than all recommendations.

Pharmacists uniformly reported that participation in the MAP project was rewarding. They felt the care they provided addressed an unmet need and improved patient health. Many remarked on how grateful patients were for the service. A number of pharmacists commented that focusing on patients with multiple medications highlighted the unique knowledge and skills of pharmacists.

Implementation Issues

While the basic structure and processes for the program were designed by the WSU project staff, input into the design was received from the employer groups and MAP pharmacists both at the program's onset and throughout its duration. Tailoring the program to meet employer and pharmacist needs was important for program success and was believed to play a significant role in retaining their on-going support.

Employer groups were active in defining who would be eligible for the program with two employers extending the program to parents of employees and retirees and another employer opting to exclude seasonal workers. Employers were also emphatic that the program include information about diet and exercise since they believe these factors contribute to the long-term health status of their employees and retirees. Both employers gave significant input into the advertising strategies and processes used. It was important that the employees and retirees viewed this program as a partnership among the universities and employers; thus, mailings and advertising materials contained all parties' names. The employers met with university staff on an on-going basis to discuss program process and to help frame the program evaluation.

Pharmacist input into the project processes at the initial training session, update meetings, telephone calls and e-mails was critical to program success. Pharmacists' comments were instrumental in revising patient assessment forms, recommendation letter formats, and enrollment processes. Service provisions changes that were made based on pharmacists comments included having pharmacists do introductory telephone calls to patients prior to the initial visit and allowing the final evaluation visit to be conducted via telephone in order to increase patient convenience.

MAP pharmacists frequently used university-provided support services. Discussions at MAP update meetings revealed that pharmacists appreciated the drug information and peer review services and felt that centralized patient enrollment, advertising, and billing services were essential program components. Patient enrollment services were particularly valued since pharmacists stated that their usual practice

21

activities prevented them from having the necessary time to promote the program, handle patient questions about the program or the enrollment process. Pharmacists also preferred not to discuss program fee requirements with persons not affiliated with the employer groups. Centralizing enrollment, however, meant that patients had one additional step to take before being enrolled into the program. The extent to which centralized enrollment helped or hindered enrollment compared to pharmacy or worksite-based enrollment is not known.

Pharmacists reported using the project website site to prepare for patient visits as well as to research patient care issues that were identified during the patient assessment visit. Eleven out of the 14 pharmacists who provided patient care used the web-based disease-specific questionnaires at least once. These questionnaires were used during 37 (56%) of patient assessments. Several pharmacists requested the development of additional questionnaires for specific conditions (e.g., Alzheimer's Disease, post-myocardial infarction, Parkinson's Disease) to allow them to prepare for their initial patient visits.

While pharmacists reported spending time reviewing therapeutic information to prepare for patient visits and develop recommendations, complex patient questions necessitating the assistance of WVU services arose with15 patients (22.4%). WVU reported that over half of the submitted questions required a primary literature search in order to be adequately addressed. The average research time spent per question was 120 minutes indicating that questions submitted to the Center required sophisticated drug information resources in order to be answered.

Every pharmacist was required to use the peer review pharmacist services for their patient cases. For most patient cases, the peer review pharmacists researched drug information questions and assisted with the writing of the recommendation letter. At MAP update meetings, pharmacists indicated that they appreciated having another pharmacist review their recommendations to make sure they were not overlooking a drug therapy or health issue that needed attention. None of the pharmacists reported concerns related to the comments of the peer review pharmacists.

Since pharmacist time is the major expenditure for patient care services, an accurate determination of time spent provides insight into appropriate compensation for this service. In order to measure patient care time, pharmacists recorded the intervention start and finish times for each visit and telephone call. Table 11 shows the reported times for each interaction. Significant variation is seen in the duration of the visits. Variations seen for the final evaluation visit are influenced by whether the interaction occurred in person or over the telephone. Pharmacists had requested the telephone call option for this visit since they believed it would save patients' time in traveling to pharmacies and, thus, be more convenient for them.

Analysis was done to determine if certain patient characteristics affected the length of the visits or telephone calls. The identification of such variables would be useful for developing fee structures for similar patient care services. However, no relationship was found between the total time spent with patients and their number of prescriptions, total medicines (prescription, OTC and herbal products) or diagnoses. In addition, patient age was not related to the total amount of time spent with patients. It may be that variations in time spent with patients were influenced by other, unmeasured, patient characteristics or pharmacist characteristics. Visits conducted within the pharmacists' practice site were slightly longer in duration than home or worksite visits (158.5 minutes versus 122.0, p=0.01). The reason for this difference is not known.

Table 11: Time spent (in minutes) for each patient interaction

Interaction	Mean time (+SD) in minutes	Range in minutes
Initial assessment visit	77.7 (+31.8)	30.0 – 225.0
Second educational visit	46.8 (+19.1)	14.0 – 96.0
Telephone call follow-up	8.8 (+4.9)	2.0 – 30.0
Final evaluation visit	27.5 (+13.7)	5.0 – 60.0
Total patient care time	143.8 (+59.1)	20-330

It should noted that the above times do not include time spent enrolling patients, preparing for patient visits, assessing patient data, developing patient recommendations, writing recommendation letters, selecting written patient education materials or travel time to home visits. These activities required significant time contributions by the MAP pharmacists, peer review pharmacists, and project staff. It was estimated that approximately 8 to 10 additional hours per patient was spent on activities that occurred beyond the time spent in direct patient contact. Exact time spent in these activities was not measured, however, it was found that as pharmacists gained experience in medication assessment and recommendation letter writing, the time expended in these activities decreased dramatically.

Program Limitations

Measuring the effectiveness of a program that includes patients with a broad range of health conditions and medications is challenging. Given the size and diversity of the MAP participant population it would have been difficult to characterize the program's impact through the capture and collation of changes in specific clinical endpoints. Thus, broad measures of recommendation acceptance, actions taken pursuant to recommendations, and changes in health knowledge and health status were used as program endpoints. The study time frame did not allow a determination of whether actions were maintained over a long period of time. However, the changes noted in patient knowledge after program participation and the actions taken pursuant to the pharmacists' recommendations indicate that the program was of sufficient intensity to meet its stated objectives.

As with many demonstration projects, the lack of a control group hindered the ability to discern program effects. The analysis characterizes changes in program participants before and after the program, but it cannot control for other external factors that may have influenced patient knowledge and behaviors or drug therapy changes. While news stories, new medical publications, and other information sources and events could have influenced the results by changing patient and/or physician behaviors, the wide range of health conditions and medications dealt with through the program tends to support a program effect.

A limitation of the program analysis was the lack of availability of claims data to track patient medical and prescription drug use and costs over time. Given the small sample size of this demonstration project, the employers were hesitant to provide claims data given concerns over patient confidentiality. While patient report provided some insight into the program's effect on health utilization, the lack of corroboration by actual claims data hindered the evaluation.

LESSONS LEARNED

The MAP project provided valuable insight into the offering of comprehensive medication assessments by a pharmacist network. Lessons learned that are valuable for future program endeavors are listed below.

- Program development and implementation required significant resource investment and personnel time. Individuals and organizations seeking to develop such programs should anticipate a development time of 6 months to one year with consistent administrative oversight required throughout the program.

- Additional research is needed to determine what messages and marketing and advertising methods could effectively encourage patient use of pharmacists' services. Project findings suggest considerable marketing requirements. Advertising messages should emphasize health improvement in addition to a reduction in medication-related problems.

- The comprehensive MAP approach emphasized the pharmacists' skills and was needed by many patients; however, a disease-specific intervention may have been more effective and efficient for some patients. Future programs should consider offering a combination of these services.

- Patients often lacked basic information about medication use, their diagnoses, diet and exercise that could have obtained at the time of prescription dispensing or through standard information sources. Teaching patients to become wiser users of community pharmacy services and publicly

23

available medication and health information sources may be useful in decreasing adverse events and improving therapy effectiveness.

- *While pharmacists were enthusiastic about the program, the program time requirements were daunting to some. Methods of increasing the efficiency of patient care programs are needed.*
- Pharmacists appreciated the clinical support system and relied on it extensively. Future programs should consider establishing drug information and clinical decision-making support systems for community-based pharmacists.

- Evaluation efforts were hampered by the lack of certain data. Future endeavors should incorporate the use of claims data, specific clinical parameters, and the inclusion of a comparison group, if possible.

PROJECT TRANSLATION INTO PRACTICE

The MAP project was undertaken with the goal of testing a model of care that, if successful, could serve to foster the growth of community-based pharmacist services in Michigan and beyond. As discussed below, the project has already achieved this goal to a limited degree. This goal may be further met as project products are completed and disseminated. It is hoped that these tools will be useful resources to motivate pharmacists to provide services and encourage employers and others to purchase such services.

A key factor in the growth of pharmacists' patient care services is the ability to financially support the development and offering of such services. The MAP was successful in obtaining employer support for pharmacist service compensation. Such support adds to the growing experience that compensation for patient care services can be obtained and should be an expectation rather than an exception. The MAP also provided useful data regarding program costs by systematically measuring pharmacist direct patient care time and determining if this time was influenced by patient characteristics.

Translation of the MAP into usual practice would, however, requires different funding sources and amounts than those received for this pilot project. Significant initial investment was required to implement this model of care. The financial support of the Community Pharmacy Foundation, the Michigan Pharmacy Foundation, and WSU was essential. In the private sector, these costs would have required investment from the pharmacists, pharmacies, financial institutions and/or private investors. Implementation and on-going infrastructure costs were also high in the MAP. To be sustainable over time, MAP services would have to be offered at a much higher fee, service provision would need to be streamlined and/or services would need to be offered within a package of care that allows profits from other services to support the provision of comprehensive medication assessments. Procuring such funding will undoubtedly require a detailed cost analysis to determine if cost savings offset program costs.

Pharmacist Resources Resulting from the MAP

To meet the goal of assisting other pharmacists in developing patient care programs, a number of products are being developed based on the MAP experience. These products will be provided to MAP pharmacists to foster their on-going participation in patient care services and to other pharmacists upon request.

- Through a grant from the Michigan Pharmacy Foundation, a PowerPoint presentation describing community-based pharmacist services and the MAP project will be developed. The presentation will be suitable for health care provider, employer, and health professional audiences. The presentation will assist pharmacists in explaining the value of community-based pharmacist services and promote discussion about the further adoption of such services. The presentation will be disseminated to the Michigan Pharmacists Association and to all pharmacists who participated in the MAP network. The presentation will be available in October 2007.

24

- An extensive listing of patient education materials and websites was compiled during the course of the MAP project. This listing is currently being updated and expanded. The listing includes PDF files of brochures available for general or one-time patient use and links to websites that are *reliable sources of patient information. All information will be categorized by disease state or symptom.* The CD will be distributed to MAP pharmacists and made available for patient use on the West Virginia Center for Drug and Health Information website, "For Your Health - Tailored Information for Patients (HTip)" at www.Htip.org. The listing should be available by October 2007.

- A survey of MAP network pharmacists that collects data on their perceptions of the program and the impact program participation had on their perceptions towards patient care and patient care practices is planned. The survey is being done as a University of Michigan PharmD student investigations project with results being available in Spring 2009.

MAP Project Presentations and Publications

Sharing information about the program design, experiences, and outcomes is an important component of this project. Presentations about the program have been given in Michigan and Delaware. One article has been published in a state journal and one poster presentation for a national meeting has been accepted. Additional publications are planned.

- Chung-Hsuen Wu, Caroline A. Gaither, Nancy JW. Lewis, Carol Bugdalski-Stutrud, and Marie A. Abate. Characteristics of patients who choose to participate in a comprehensive medication review (CMR) program: Implications for program structure and processes. Poster presentation at *the American Public Health Association, Washington DC, November 2007.*

- Bugdalski-Stutrud C, Lewis NJW. Creating a new package of care: the Medication Assessment Program. Delaware Pharmacists Society Annual Meeting, Rehoboth, DE, May 2006.

- Lewis NJW, Bugdalski-Stutrud C, Berry Z, Abate MA. Medication assessment program: A new package of care for Michigan pharmacists. *Mich Pharm* 2005; 43:52-3, 59.

- Lewis NJW. Developing a new package of care: the Medication Assessment Program. The University of Michigan College of Pharmacy Research Seminar, January 2005.

- The MAP program concept is incorporated into the instruction of the Community Advanced Practice Program at the Eugene Applebaum College of Pharmacy and Health Sciences.

New Programs Fostered by the MAP Project

This program was designed to serve as a model for the delivery of pharmacist services for people who take multiple medications. To date, there is initial evidence that the project is meeting this goal.

- St. Clair County is contracting with the University of Michigan College of Pharmacy Center for Medication Use, Policy & Economics to offer a program for its employees, retirees and their dependents that includes comprehensive medication assessments plus a range of direct patient care and web-based drug therapy management and information services.

- The MHealthy: Focus on Medicines program offered by the University of Michigan College of Pharmacy Center for Medication Use, Policy & Economics incorporates the MAP model of care for individuals taking 9 or more medications.

- One MAP pharmacist provides focused medication reviews for patients. These reviews followed the general format of the MAP but provide services through one visit with telephone contact thereafter.

- Another MAP pharmacist has begun a service that offers medication reviews that seek to improve care and reduce patient out-of-pocket prescription drug expenditures. Initial program results have shown significant cost savings to patients.

- Two other MAP pharmacists are exploring the potential to offer patient care programs; one pharmacist has discussed the program with organized labor, another has worked with her healthcare system to develop a patient care service proposal.

- The MAP program processes and resources served as a foundation for the implementation of a pharmacist-provided care management program within a Detroit Federally Qualified Health Center.

CONCLUSION

The MAP project was successful in implementing a community-based pharmacist service that was acceptable to patients, employers and pharmacists. The MAP program was effective in improving the appropriateness of drug therapy and medication use among a population that typically included older individuals who took a high number of medications and had significant morbidity. The findings suggest that these changes may be useful in containing health care expenditures. Program processes were consistently implemented as planned. The program provided valuable information regarding the offering of comprehensive medication assessments and their outcomes. The project is creating an array of useful products for offering such services and has informed the development of a number of new patient care projects.

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