Northwest Region

Achieving Positive Outcomes through Collaborative Pharmaceutical Care: The KPNW Medication Management Program

Background

A major challenge in health care today is to provide high-quality, cost-effective pharmaceutical care in a climate of skyrocketing prices (nationwide, spending for medications increased 84% from 1993 through 1998). To help meet this challenge, Kaiser Permanente Northwest (KPNW) in 1996 developed a quality improvement project known as the Clinical Pharmacy Services Restructure, which in 1998 became the Medication Management Program (MMP)—a centrally managed model for population-based clinical pharmacy services that are integrated into the delivery system. Onsite pharmacy staff and local health care teams collaborate to implement clinical

Table 1. Team members

Pharmacy Department: Rob Ashley, RPh, Pharmacist, MMP & Fisher's Landing MOB; Gene Boschee, RPh, Pharmacist, MMP & Beaverton MOB; Anne Bracy, Analyst; Donna Caldwell, MS, RPh, Pharmacist, Drug Information (DI); Jeanette Chardon, Education & Publications Specialist; Karen Carter, RPh, Pharmacy Improvement Program Team; Renee Christiansen, Pharmacy Technician, MMP; Sharon Cunningham, RPh, Pharmacist, Mt. Scott MOB; Marge Diment, RPh, Pharmacist-in-Charge, Vancouver Pharmacy; Diane Ditmer, PharmD, Pharmacist-in-Charge, DI; Jim Dunscomb, RPh, Supervisor, Sunnyside Pharmacy; Mike Eldredge, MS, RPh, Pharmacist, Optimal Renal; Suzanne Gauen, RPh, Pharmacist, Drug Information; Larry Gayton, RPh, Pharmacist, MMP & Vancouver MOB; Cheryl Geisler, RPh, Pharmacist, MMP & Cascade Park MOB; Marie Grant, RPh, Pharmacist, MMP & Longview Kelso MOB; Michelle Hall, RPh, Pharmacist, MMP & Rockwood MOB; Ken Hansel, RPh, MMP & Salmon Creek MOB; Anita Hampton, RPh, Supervisor, North Lancaster Pharmacy; Mike Harding, RPh, Supervisor, Longview Kelso Pharmacy; Dave Heffner, RPh, Supervisor, Skyline Pharmacy; Kent Higginbotham, RPh, Supervisor, Division Pharmacy; Val Johnson, Pharmacy Benefits & KP Online; Tricia Kahut, Communications & Database Specialist; Larry Klika, RPh, Pharmacist, MMP & Rockwood MOB; Dean Klopfenstein, RPh, CDE, Pharmacist-in-Charge, MMP; Mike Kinard, MS, RPh, Regional Pharmacy Manager; Evie Kralman, Pharmacy Secretary; Stacy Landes, Pharmacy Benefits, Pharmacy Alert Services & KP Online; Jackie Larson, RPh, Pharmacy Improvement Program Team; Sally Logan, RPh, Pharmacist, MMP, & EpicCare (CIS) Liaison; Steve Logan, RPh, East Central Service Area Manager; Carolyn Luettgerodt, RPh, Pharmacy Improvement Program Team; Norm Muilenburg, RPh, Pharmacist, Drug Information; Lisa Nakashimada, RPh, Pharmacist, MMP & Sunset MOB; Gary Nelson, RPh, Pharmacist, Division MOB; Terry Parsons, RPh, Pharmacist, Skyline MOB; Pat Perry, RPh, Pharmacist, MMP, and East Interstate MOB; Fred Powers, RPh, Acting Supervisor, Sunset Pharmacy; Judy Ramage, Pharmacy Technician, MMP; Chris Ramsey, PharmD, Pharmacist, Longview Kelso MOB; Tanya Ramsey, PharmD, Pharmacist, MMP, & Longview Kelso MOB; Mike Regner, MS, RPh, Pharmacist, Drug Information; Kathryn Ring, RPh, Pharmacist, MMP, Sunset MOB & KP Online; Kati Rowe, RPh, Pharmacist, MMP & Sunnyside MOB; Cathy Sbur, PharmD, Supervisor, Salmon Creek Pharmacy; Cindy Sieck, PharmD, Pharmacist, MMP & Salmon Creek MOB; Sandra Teeny, RPh, Supervisor, Automated Refill Center; Theresa Terry, PharmD, Pharmacist, Rockwood MOB; LouAnn Thorsness, RPh, Pharmacist, MMP, & Pharmacy Alert Services; Don Tsukamaki, RPh, Pharmacist, MMP & Beaverton MOB; Bernie Walker, PharmD, Pharmacist, MMP, Rockwood MOB, & EpicCare (CIS) Liaison; Bob White, RPh, Pharmacist, MMP & Vancouver MOB; Ginny Wilborn, RPh, Westside and Salem Service Area Manager; Lisa Wilson, RPh, Supervisor, Rockwood Pharmacy; Tami Wilson, RPh, Supervisor, Cascade Park Pharmacy; Donna Wolfer, RPh, Pharmacist, MMP & Mt Scott MOB; Gary Woodson, RPh, Pharmacist, DI (retired); Tom Wright, RPh, Supervisor, MMP; Colette Yamaguchi, RPh, Clark & Longview Kelso Service Area Manager
Contact Person: Nancy Louie Lee, MS, RPh, Clinical Pharmacy Services Manager

Northwest Permanente Medical Group: John Chen, MD, Service Area Director, Central PCSA, Member, Diabetes Steering Committee; Richard Dykstra, MD, Co-Chair, Senior & Disabled Care Committee; Harry Glauber, MD, Endocrinology, Member, Diabetes Steering Committee; Michael Herson, MD, Endocrinology, Member, Diabetes Steering Committee; Robin Lake, MD, Cardiology, Member, Cardiovascular Steering Committee; Jim Norris, MD, Chairman, Regional Formulary & Therapeutics Committee; Paul Wallace, MD, Chairman, Clinical Strategies Integration Group; Rick Wise, MD, Co-Chair, Cardiovascular Steering Committee; Maureen Wright, MD, Former Co-chair, Cardiovascular Steering Committee

KNPW Health Plan Operations: Sue Caulfield, RN, KSMC Director of Patient/Family Education, Member, Diabetes Steering Committee; John Crawford, Regional Health Education; Donna Forsberg, RN, Clinic Coordinator, Care Manager Strategy, Manager, Westside PCSA; Bill Hurst, Regional Call Center; Carla Johnson, MS, RN, Westside PCSA Manager, Co-chair, Cardiovascular Steering Committee; Connie Keyes, RN, MSN, Regional Nursing Consultant; Peggy McClure, MS, MBA, Manager, Health Systems & Call Center, Co-chair, Diabetes Steering Committee; Ray Robertson, Director, Shared Services; Kate Scott, Regional Call Center; Kimberly Smith, Formerly: Analyst, Consulting & Analytical Services; Kati Traunweiser, Clinical Implementation Specialist; Jan Weerts, RN, Implementation Specialist, Health Systems; Shirley Welch, PhD, Director of Chemistry, Regional Lab

Center for Health Research: Jonathan Brown, PhD, Co-chair, Diabetes Steering Committee; Lucy Nonnenkamp, MS, Co-chair, Senior & Disabled Care Committee

practice guidelines and best practices to ensure quality of care while minimizing the financial and social costs of drug therapy. The MMP was nominated for the James A. Vohs Award for 2000 as: *Achieving Positive Outcomes through Collaborative Pharmaceutical Care—the Kaiser Permanente Northwest (KPNW) Medication Management Program.* Table 1 recognizes team members and contact person for the MMP.

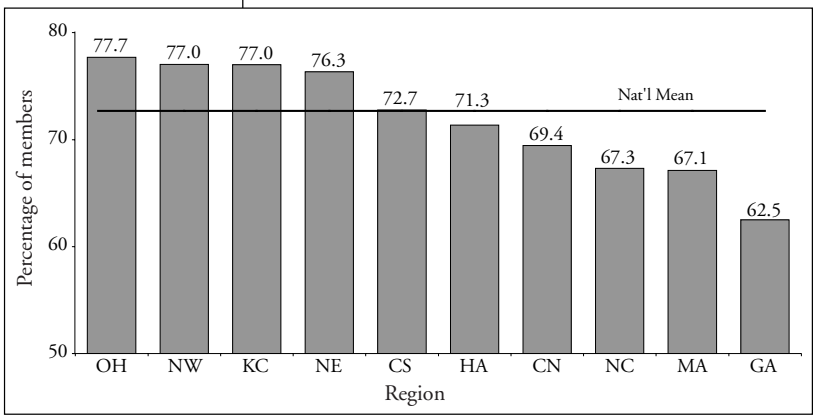

Figure 1. HEDIS 1998 Lipid Measurement for KP Regions. Lipid measurement was a HEDIS measure in 1998. This figure illustrates the percent of commercial members with coronary or peripheral disease who had LDL level measured within the last two years. KPNW 1998 target was 70%. KPNW ended 1998 with 77.0% measured which placed KPNW third highest for KP Regions.

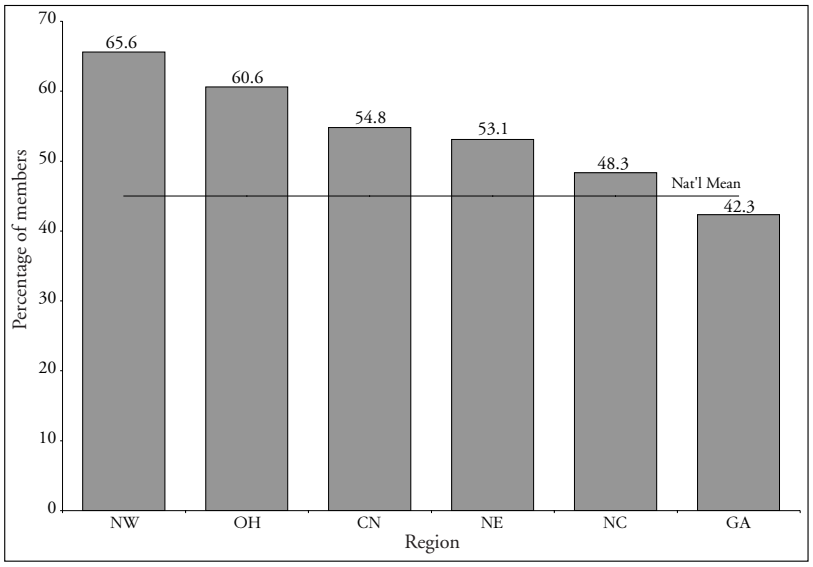

Figure 2. HEDIS 1998 Lipid Management for KP Regions: LDL ≤ 130 mg/dL. Lipid management defined by LDL ≤ 130 mg/dL was a HEDIS test measure in 1998. For Regions reporting, this figure defines the percentage of commercial members with coronary or peripheral disease, age 75 years and under, who had LDL result of ≤ 130 mg/dL in the last two years. As of 1998, KPNW is in the leading position with 65.6% of high-risk patients having LDL ≤ 130 mg/dL.

Implementing the MMP required not only pharmacy department and delivery system modifications but a considerable culture change—change that KPNW planned for by designing a staged implementation strategy, focusing first on the single quality target and disease state of lipid management. In its first seven months of operation, MMP gains put KPNW in second position of all reporting KP Regions for lipid measurement (77%) and, more important, in the lead position of reporting KP Regions for lipid management (65.6%, 1998 HEDIS) (Figures 1 and 2). MMP also significantly improved drug utilization and reduced drug costs while improving quality.

Objectives

The KPNW MMP aspired to meet the following objectives:

- Provide evidence-based care that results in consistent achievement of patient satisfaction and health outcomes;
- Improve consistency and reduce variability in the delivery of clinical pharmacy services;
- Establish effective integration of clinical pharmacy services across the continuum of care;
- Align clinical pharmacy priorities with KP national Programwide health care priorities, KP Interregional President's Quality Improvement Best Practices,[1] KP Interregional Pharmacy Committee, KPNW Region, and KPNW Pharmacy Department priorities and initiatives;
- Enable and support staff to work with more patients in a cost-effective manner within an integrated system;
- Improve the quality and affordability of health care; and
- Consistently document improvement in health care outcomes.

KPNW hypothesized that standardized, centrally managed, population-based clinical pharmacy services, integrated into local health care teams and the delivery system, would improve quality of care, health outcomes, and reduce cost of drug therapies compared with drug therapies provided under the previous model.

The Process

In the early 1990s, HEDIS emerged as the leading comparative quality indicator. The KP Interregional Pharmacy Committee established national quality targets and drug cost initiatives, to which KPNW

committed. When the pressure to document the value of clinical pharmacy services increased, the old model (where individual pharmacists set patient care priorities based on daily requests for service) was not sufficient. KPNW's historical model of providing clinical pharmacy services was no longer viable. A new model of pharmaceutical care delivery was needed—an integrated, population-based model that would support KPNW's health outcome goals, HEDIS and other quality goals, achieve drug cost initiatives, and provide data to demonstrate the effectiveness and value of clinical pharmacy services. The process to develop integrated, cost-effective clinical pharmacy services was driven by a shared vision to support physicians and health care teams to improve health care outcomes.

In 1996, the KPNW Regional Pharmacy Department initiated a quality improvement project to: 1) evaluate clinical pharmacy service delivery models inside and outside of KP, 2) evaluate the strengths and weaknesses of the current 'reactive' process of providing clinical pharmacy services, and 3) identify quality attributes and service features critical to a new model for the delivery of pharmaceutical care. Although no single best model emerged, the Pharmacy Department, in collaboration with Northwest Permanente physicians, Health Plan, and KPNW clinical committees, used the identified best practices to design the population-based MMP model. The Northwest Permanente physicians involved in the process were instrumental in soliciting support from fellow physicians, without whom MMP would not have been a success. Cardiovascular Steering Committee leaders helped to hone the focus for the initial stage of the implementation plan to an emphasis on high-risk, secondary-prevention patients. Other KPNW clinical committees continue to help focus priorities and shape the MMP program in vital, ongoing ways.

Eight key best practices emerged for the new MMP model:

The process to develop integrated, cost-effective clinical pharmacy services was driven by a shared vision to support physicians and health care teams to improve health care outcomes.

Table 2. 1998-1999 Pharmacy MMP Cumulative Priorities

Initiated	Priorities	Responsibility shared by
2Q98	Quality: Lipid Measurement and Management	Regional Formulary & Therapeutics Committee (RFTC), Cardiovascular Steering Committee (CVSC), Clinical Strategies Integration Group (CSIG), HEDIS
4Q98	Gastrointestinal Drug Therapy	RFTC, Interregional Pharmacy (IRP)
4Q98	Lipid Drug Therapy	RFTC, IRP, CVSC
4Q98	Anticoagulation Conversion	RFTC, IRP
4Q98	Pilot Glycemic Control	RFTC, Diabetes Mellitus Steering Committee (DMSC)
4Q98	Pilot Eldercare High-Risk Drug Therapy	Senior & Disabled Care Committee, CSIG
1Q99	Aspirin Documentation	RFTC, CVSC
1Q99	Allergy Drug Therapy	RFTC, IRP
1Q99	Plan Multidisciplinary Model	Westside Leadership
1Q99	ACE-Inhibitor Drug Therapy	RFTC, IRP, CVSC
3Q99	Aspirin Initiation	RFTC, CVSC
3Q99	Quality: Glycemic Control	RFTC, DMSC
3Q99	Implementation of Multidisciplinary Model	Westside Leadership
3Q99	Plan for expansion of Multidisciplinary Model	Clark County Leadership
3Q99	Plan Asthma & Depression Drug Therapy	RFTC, Asthma Steering Committee, Depression Steering Committee

- Integrate clinical pharmacy services into health system priorities;
- Focus clinical pharmacy resources on highest clinical and cost priorities;
- Use a comprehensive, integrated approach to population-based drug therapy management with consistent care, intervention, documentation, and follow-up across disease states;
- Implement collaborative drug therapy management based on evidence-based principles and clinical practice guidelines;
- Maximize the use of pharmacy support personnel;
- Create a centralized office to coordinate daily workload and serve as an educational clearinghouse and training site;
- Use Clinical Information Systems to standardize patient information, health record documentation, and team communication;
- Create worksites within medical offices that are appropriate to level of service and site of care, facilitate health care team integration, and support efficient service.

By yearend 1997, the new model was endorsed by the KPNW Operations Group and supported by pharmacists, medical staff, nurses, pharmacy managers, and other KPNW administrators. MMP began providing care in Spring 1998.

MMP work contributes directly to the results of two KPNW-designated highest-priority clinical quality targets: lipid management and diabetic glucose control ...

	MMP	Non-MMP
N	458	398
Age (years)	65.0	67.1
Sex (% Male)	65.9	64.1
Base LDL (mg/dL)	127.4	124.9
Last LDL (mg/dL)	106.3	110.0
Change in LDL (mg/dL)	-21.0	-14.9
% Change in LDL	-15.1	-10.7

Figure 3. Demographics, baseline, last, and change in LDL for MMP patients and for non-MMP patients. Criteria for inclusion were: all secondary-prevention members who received lipid drugs in the three months between 6/1/98 and 8/31/98; a baseline LDL measured at least 60 days prior to the date of dispense, a last LDL measurement 10-12 months after the baseline; and current members alive as of 6/30/99. Both groups had similar populations and demographics: total patients included in analysis (MMP = 458 vs non-MMP = 398), mean age (64.9 vs 67.1), sex (65.9 % male vs 64.1% male), and baseline LDL (127.4 mg/dL vs 124.9 mg/dL). Mean time between LDL measurements was ten months for both groups. A one-tailed t test performed on change in LDL demonstrated a significant difference: MMP patients made more improvement in LDL than non-MMP patients (MMP = -21.0 mg/dL vs non-MMP -14.9 mg/dL, $Z = 2.33$, $p < 0.0006$).

MMP work contributes directly to the results of two KPNW-designated highest-priority clinical quality targets: lipid management and diabetic glucose control as well as to KPNW's drug cost initiatives. The MMP began with lipid management as the initial quality target. MMP measured and managed lipids for 31% of KPNW's members at highest risk for cardiovascular (CV) problems and by 1999 was managing 38% of highest-risk lipid patients. In Fall 1998, the MMP added responsibility for drug cost initiatives and for a second Regional quality target, management of glycemic control in patients not responding to newer oral drug therapies for diabetes mellitus. KPNW has an established record of improving glycemic control in the diabetes mellitus population, but more than 50% of diabetes patients who were prescribed newer oral agents were not achieving the benefits of good glycemic control. The MMP added this population that was failing to respond as a high priority when responsibilities expanded to diabetes drug therapy management. The MMP also began work with eldercare high-risk drug therapies and additional drug cost initiatives, developed a multidisciplinary model with nursing, and added initiation of aspirin therapy by protocol as one of the most important therapies to reduce cardiovascular risk (Table 2). Competency-based training assured that pharmacists and nurse care managers initiated aspirin therapy according to established protocols.

Methodology

To initiate MMP, Pharmacy Department leadership selected pharmacists and support personnel through an educational interview process. Selected staff were trained and then were required to demonstrate therapeutic and process competency before providing care to patients. Most staff worked part-time for the MMP and part-time on care related to drug dispensing in the medical office pharmacies. This practice maintained cohesiveness and communication with other staff in the Pharmacy Department. Biweekly MMP staff meetings provided a forum to define and discuss priorities, introduce communication tools, receive further clinical practice training, report progress on clinical and cost targets, share new ideas for innovation and improvement, and recognize and celebrate achievements.

Under the old model, a majority of clinical pharmacy resources was allocated to low-risk primary patients. To improve the health outcomes of our

population, MMP needed to increase the percentage of high-risk CV members managed. In early 1998, the MMP initiated population-based care with outreach to the highest-risk CV population. High-risk patients were either referred to the MMP by physicians or harvested from one of two sources—a newly defined hospital discharge list or the newly developed disease state "high-risk" list. Standardized processes were developed by MMP personnel to improve patient care efficiency, documentation, and communications. Each patient's history is assessed, and an individualized care plan is developed according to established clinical practice guidelines. Pharmacists initiate therapy, monitor patients, and help patients to achieve their goal. Once patients reach a goal, they are categorized for maintenance monitoring. In an integrated multidisciplinary model recently added to MMP pharmacy care, nurse care managers work collaboratively to assist patients with paneling, conduct smoking assessments, and suggest educational opportunities.

The MMP launched each priority quality and cost initiative through electronic communications from clinician leadership and inservice presentations with clinicians and location pharmacy staff. Presentations included over 200 clinician and health care team meetings (which reached approximately 500 clinicians, 200 nurses, 90 managers, and 250 other health care team personnel), and 90 pharmacy inservice sessions, which reached 400 pharmacy staff. MMP pharmacists also made more than 1000 one-to-one clinician-pharmacist contacts to provide academic detailing on the top three drug cost initiatives.

Pharmacists, support personnel, and nurse care managers working with the MMP focus on the health of the entire population as they serve the individual. Through the MMP, the KPNW Regional Pharmacy Department broke new ground in partnering with physicians, local health care teams, and patients to find better ways to manage drug therapies and thus improve health outcomes. High-quality people and a positive team environment of continuous quality improvement are credited for improved patient care outcomes and improved workload and cost efficiencies.

Results

KPNW evaluation of the MMP included assessment of quality and cost for MMP patients compared with non-MMP patients. Assessment included relevant HEDIS measures, biomathematical modeling of health outcomes, surveys, comparison of clinical improvements, and utilization. All of these evaluations demonstrated a consistently higher quality of care and significant cost savings from the MMP.

Quality/Member Impact

To rule out the possibility that the MMP managed a healthier population, evaluation of secondary lipid management included a retrospective, cross-sectional evaluation of MMP and non-MMP patients. The initial population was defined as any current member alive as of 6/30/1999 who was diagnosed at secondary cardiovascular risk as defined by the Cardiovascular Steering Committee, received lipid drug therapy between 6/1/1998 and 8/31/1998, had baseline LDL measured at least 60 days before the date medication was dispensed, and a last LDL measurement taken 10 to 12 months after baseline measurement. Data were systematically extracted from established KPNW systems that monitor disease populations. Baseline LDL level, last LDL, and change in LDL were defined for each patient. Evaluation results showed no statistically significant difference in MMP compared with size of non-MMP patient evaluation groups, age, sex, or baseline LDL (Figure 3).

All of these evaluations demonstrated a consistently higher quality of care and significant cost savings from the MMP.

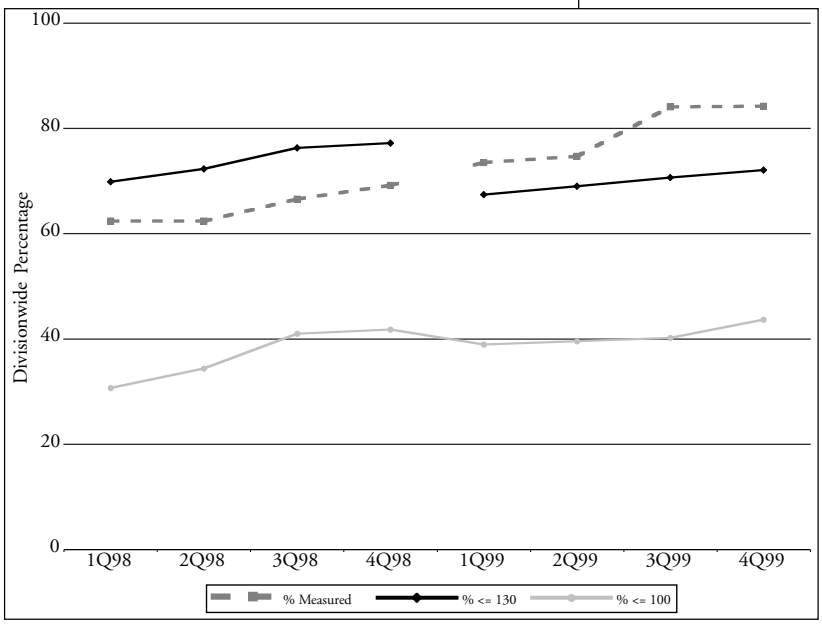

Figure 4. Management of LDL (LDL ≤ 130 mg/dL) was a KPNW test measure in 1998, while in 1999, it is a clinical priority. The three lines illustrate corresponding quarterly KPNW improvement in LDL measurement and LDL management (defined as LDL ≤ 130 mg/dL and LDL ≤ 100 mg/dL). For the year 1998, % measured and % management with LDL ≤ 130 mg/dL included patients of all ages. To more closely match the HEDIS measure, in 1999, % management with LDL ≤ 130 mg/dL only includes patients aged 75 years and under.

LDL measurement improved from 61.4% in the first quarter of 1998 to 69.2% in the fourth quarter of 1998. In 1999, the population at CV risk was defined to more closely align with the HEDIS measures.

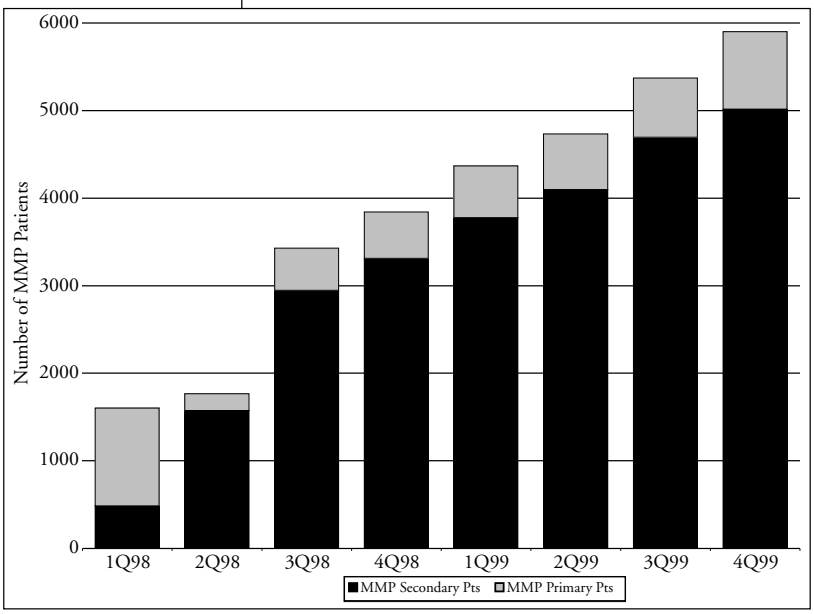

Figure 5. Growth of the MMP Program 1998 – 1999 and MMP's shift in priority from low-risk primary patients to highest-risk secondary patients.

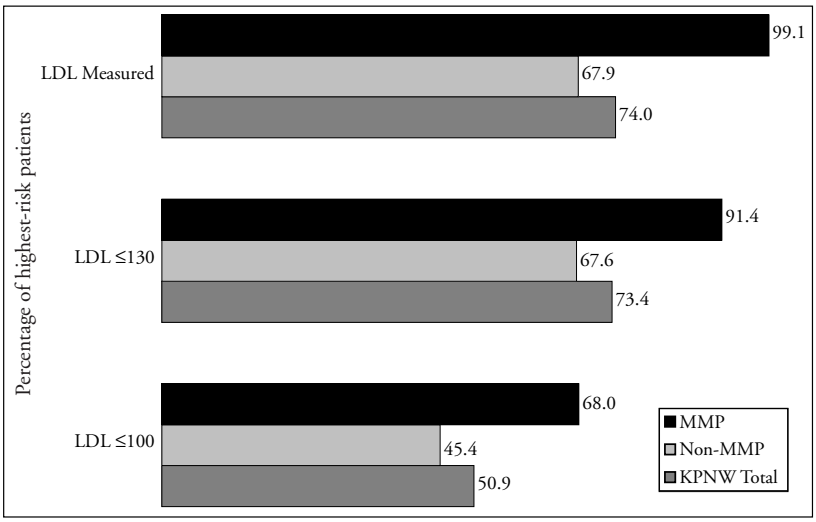

Figure 6. Highest-Risk Patients as of 6/30/99: MMP vs non-MMP. Figure 6 illustrates % LDL measured and % LDL managed to ≤ 130 mg/dL and ≤ 100 mg/dL for highest-risk patients categorized by MMP patients, non-MMP patients, and total KPNW patients. For LDL measurement, and in each case of LDL management, a higher percentage of MMP patients achieved goal compared to non-MMP patients therapy (% measured 99.1% vs 67.9%, % LDL ≤ 130 mg/dL 91.4% vs 67.6% and % LDL ≤ 100 mg/dL 68.0% vs 45.4%). These higher improvements in LDL measurement and management by the MMP account for KPNW's leading quality position in lipid management.

This reclassification resulted in reducing the size of the population to include patients aged 75 years and under. With this new population, LDL measurement was 73.5% in the first quarter of 1999 and increased to 84.2% by the fourth quarter of 1999. LDL management to ≤ 130 mg/dL improved in 1999: from 67.4% in the first quarter of 1999 to 72.1% by the fourth quarter of 1999. In addition, LDL management to ≤ 100 mg/dL improved: from 39.3% in the first quarter of 1999 to 43.7% by the fourth quarter of 1999 (Figure 4).

Regional compliance with clinical practice guidelines improved with a shift of MMP resources focused on high-risk secondary-prevention patients. In 1997 and early 1998, clinical pharmacy resources with work prioritized in response to the daily demand from physicians seeing patients coming into the medical office had focused primarily on low-risk primary-prevention patients. A change to population-based care with the MMP improved the priorities of clinical pharmacy services from 31% high-risk secondary-prevention patients and 69% low-risk primary-prevention patients to 87% secondary-prevention patients and 13% primary-prevention. Implementation of staff-identified improved efficiencies allowed the MMP to systematically triple the number of high-risk patients managed from fewer than 2000 in early 1998 to nearly 6000 by yearend 1999 (Figure 5).

A comparison of Northwest Region high-risk patients managed by MMP compared with non-MMP (those not managed by MMP) evaluated LDL measurement, LDL management, biomathematical estimates of ten-year myocardial infarction rates, and increase in life-years. Of secondary-prevention patients managed by the MMP, 99.1% had LDL measured as of 6/30/99, when the evaluation was conducted. Of secondary-prevention patients managed by the MMP, 91% achieved LDL of < 130 mg/dL compared with 67.6% in those not managed by the MMP. In the same patients, 68% managed by MMP achieved LDL of < 100 mg/dL compared with 45.4% in those not managed by the MMP (Figure 6). Biomathematical modeling of MMP lipid management care compared with the traditional model (non-MMP) estimates a decrease in myocardial infarction (MI) (92 ± 50) and an increase in life-years (90 ± 50) in ten years as a direct result of MMP management (Figure 7). The model also shows that improvement in these health care outcomes becomes evident as early as two years after management by MMP.

During the third quarter of 1999, glycemic control became the second quality priority added to MMP

responsibilities. The MMP focused on patients prescribed newer oral therapies who had failed to respond. A preliminary evaluation, when number of patients included was still quite small (MMP-managed = 4% and non-MMP-managed = 96% of general diabetes mellitus patients), suggested greater improvement in MMP-managed vs non-MMP-managed patients. Patients who had previously failed to respond to newer agents for glycemic control who were later managed by the MMP showed 18% greater improvement than the non-MMP-managed general diabetes mellitus population. Eighty-four percent of MMP patients achieved goal of $HBA_{1c} \leq 8$ mg/dL vs 63% of non-MMP-managed patients (Figure 8). Mean improvement in HBA_{1c} was also higher for MMP patients than for non-MMP patients (decrease of 0.84 mg/dL vs decrease of 0.63 mg/dL).

Results of mailed patient satisfaction surveys returned from 309 (40%) of 774 of members who achieved LDL goal in the first nine months of 1999 indicated that 96% were extremely satisfied or very satisfied with the care provided by MMP. In addition, as current KPNW members, 97% indicated they would definitely or probably recommend the MMP program to family members or friends (Figure 9). Responding members consistently expressed appreciation for KPNW's caring attitude and proactive outreach.

Results of satisfaction surveys returned from 161 of 202 (79.7%) clinicians surveyed indicated that: 96% agree or strongly agree that MMP pharmacists are an important part of the local health care team; 97% agree or strongly agree that MMP pharmacists play an important role in achieving clinical targets; 100% believe the MMP provides excellent or good quality of care; and 95.7% agree or strongly agree that patients are satisfied with the care provided by MMP (Figure 10). Clinicians appreciated the time savings, consistent processes, and high quality of care that the MMP provides.

Cost Impact

KPNW utilization of omeprazole, a treatment for acid-peptic disorders, is the highest for all KP Regions Programwide. Since the beginning of 1999, the MMP has improved appropriateness and reduced the omeprazole utilization growth rate by 14% in omeprazole patients managed by the MMP. Drug cost

... clinicians surveyed indicated that: 96% agree or strongly agree that MMP pharmacists are an important part of the local health care team; 97% agree or strongly agree that MMP pharmacists play an important role in achieving clinical targets ...

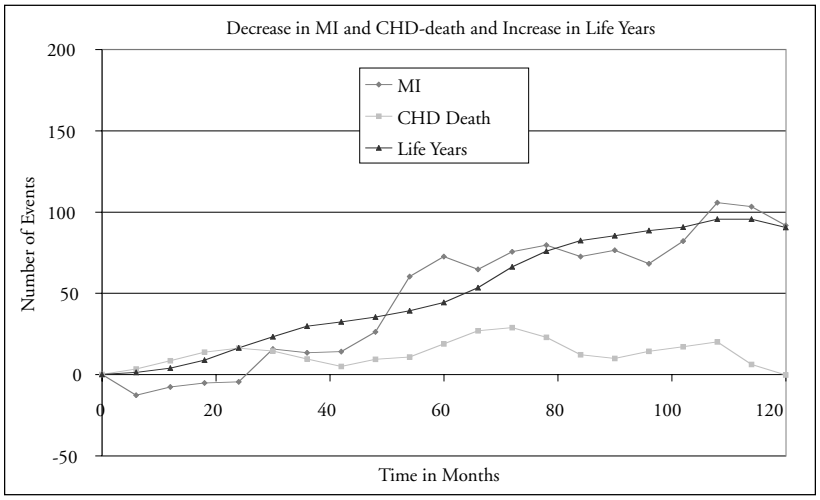

Figure 7. Biomathematical predictive model of health outcomes using the actual difference in LDL measured and LDL managed to ≤ 130 for KPNW MMP and non-MMP patients. Figure illustrates the difference in health outcomes comparing 5000 secondary-prevention patients treated by the MMP vs 5000 similar non-MMP patients. According to the calculations in this biomathematical model, improvement in MI and life years becomes evident in about two years (24 months). With large statistical fluctuations, these improvements continue to grow as time passes. The model predicts that over a ten-year period (120 months), the MMP program (as compared to the non-MMP) will decrease the number of MIs by about 92 (± 50) and increase the number of life years by about 90 (± 50). There was no defined difference in death at ten years, but the decrease is within statistical fluctuations.

Biomathematical Modeling by: Leonard Schlessinger, Manager of Biomathematical Analysis, CMI

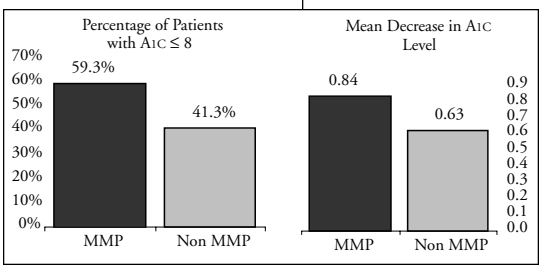

Figure 8. Glycemic control in MMP failing–to-respond DM population vs KPNW DM total population (non-MMP). The MMP initiated care to improve glycemic control in patients on priority drug therapies in 1998. A six-month sample (6/1/98 – 12/31/98) of all MMP diabetes patients and of non-MMP patients who were on the diabetes registry but not managed by MMP were identified (MMP = 4%, non-MMP = 96%). Baseline A_{1c} (A_{1c} obtained up to 60 days prior to 6/1/98) was compared to last A_{1c} (A_{1c} obtained up to 14 months after baseline). Where the last A_{1c} was not available, last A_{1c} was considered to have not changed from baseline A_{1c}. More MMP patients achieved goal of $A_{1c} \leq 8$ mg/dL than non-MMP patients (59.3% for MMP and 41.3% for non-MMP patients). The mean improvement in A_{1c} was higher for MMP patients than non-MMP (decrease 0.84 vs 0.63 in non-MMP).

initiatives conducted in collaboration with the Pharmacy Department involving gastrointestinal drug therapies, anticoagulation, lipid drug therapy, ACE-inhibitors and antihistamines resulted in over $1,500,000 in cost savings/avoidance in 1999.

The cost of drug therapies to lower cardiovascular morbidity and mortality has increased as a result of the MMP focus to improve clinical quality. This cost investment is balanced with biomathematical modeling that predicts improved health outcomes for MMP patients compared with non-MMP patients. These improvements would become evident within two years and include estimates of a decrease in MI of 92 (± 50) and an increase in life-years of 90 (± 50) in ten years as a direct result of MMP management of lipids to improve clinical quality (Figure 7).

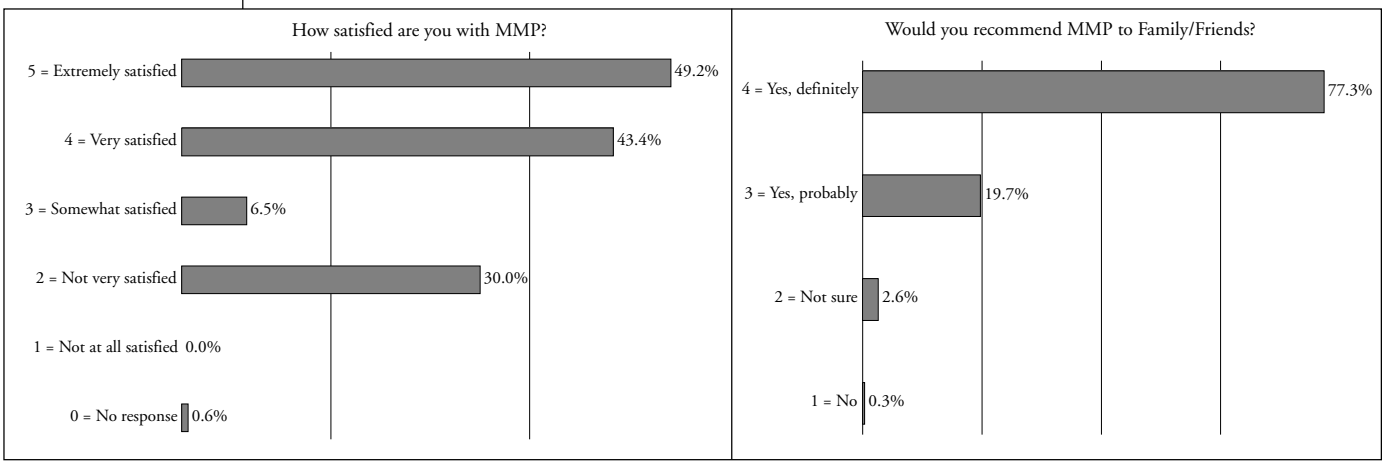

Figure 9. Member Satisfaction Survey results: Total surveys mailed - 774; total responses - 309; response rate - 40%.

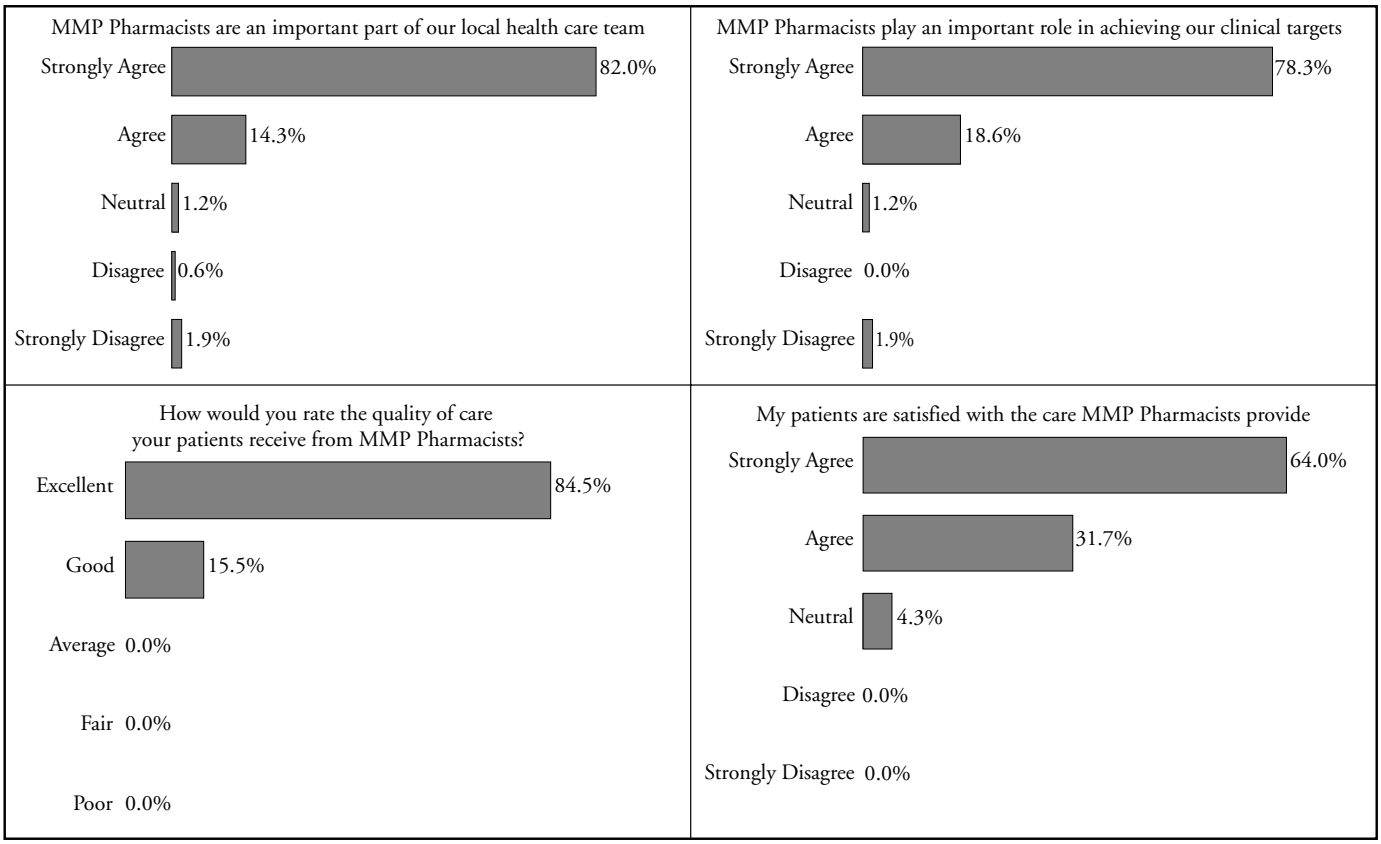

Figure 10. Clinician Satisfaction Survey results: Total surveys mailed - 202; total responses - 161; response rate - 79.7%.

In today's health care environment, it is often a challenge to invest scarce resources in improvements which do not have short-term returns. The MMP balanced priorities between improved utilization, which had short-term drug cost reductions, and improvement in clinical quality, which will provide longer-term returns with improved health outcomes.

Direct Patient Care Impact

The development of the MMP was a major change in philosophy of practice for pharmacists and pharmacy technicians and brought a major relationship change for pharmacy managers, physicians, and staff. MMP has broken new ground by partnering within the organization to better manage drug therapies to achieve the outcomes intended while making improvements to keep health care affordable for entire patient populations. The new focus required multiple changes in the old care delivery model and changes in the type of health system support needed. This support for change required close collaboration with physicians and leadership throughout the health system.

The MMP model resulted in staff and process changes to apportion resources to the highest-risk population by:

- Bringing pharmacists together as a team, pooling resources to focus on populations and facilitate cross coverage;
- Developing tools to help identify priority populations;
- Establishing designated time during the workweek for MMP staff to provide care;

In today's health care environment, it is often a challenge to invest scarce resources in improvements which do not have short-term returns.

Table 3. Pharmacy personnel on KPNW and Programwide clinical leadership committees

KPNW Committee	Pharmacy Member
Regional Formulary & Therapeutics Committee	Donna Caldwell, MS, RPh; Diane Ditmer, PharmD; Nancy Louie Lee, MS, RPh
Clinical Strategies Integration Group	Suzanne Gauen, RPh; Nancy Louie Lee, MS, RPh; Mike Regner, MS, RPh
Asthma/COPD Steering Committee	Suzanne Gauen, RPh, Co-Chair
Cardiovascular Steering Committee	Diane Ditmer, PharmD; Nancy Louie Lee, MS, RPh
Depression Steering Committee	Norm Muilenburg, RPh
Diabetes Mellitus Steering Committee	Donna Caldwell, MS, RPh; Dean Klopfenstein, RPh
Senior and Disabled Care Steering Committee	Nancy Louie Lee, MS, RPh
Prevention Steering Committee	Donna Caldwell, MS, RPh, Liaison
Immunization Practices Work Group	Mike Regner, MS, RPh, Co-Chair
KPNW Pain Board	LouAnn Thorsness, RPh
Clark, Central & Longview Kelso PCSA Quality Committees	Bob White, RPh; Pat Perry, RPh; Tanya Ramsey, PharmD
Interregional Pharmacy Managers	Mike Kinard, MS, RPh
Interregional Clinical Pharmacy Subcommittee	Nancy Louie Lee, MS, RPh
CMI Diabetes Guideline	Dean Klopfenstein, RPh
CMI Coronary Artery Disease Guideline	Gary Woodson, RPh
CMI Depression Guideline	Norm Muilenburg, RPh
CMI Asthma Guideline and Asthma Workgroup	Suzanne Gauen, RPh
CMI Eldercare Model of Care Committee	Nancy Louie Lee, RPh

- Defining patient-specific criteria to accept referrals into the program;
- Developing one centralized and multiple medical office worksites to support delivery of appropriate levels of care;
- Standardizing patient care and documentation processes to support personnel efficiency and utilize the Clinical Information System in providing care;
- Creating a positive team environment of continuous quality improvement.

In addition, the MMP enhanced the services provided to patients by:

- Developing a cardiovascular risk list with the Cardiovascular Steering Committee;
- Working with clinical leadership committees to define priorities for MMP;
- Collaborating with the Regional Laboratory to streamline ordering of directly measured LDL tests;
- Working with the Regional Call Center to schedule group appointments;
- Collaborating with Regional Health Education and using lifestyle modification programs and materials;
- Integrating pharmacist chronic disease medication management with chronic disease nurse care managers.

Patients are highly satisfied with the proactive communication and ongoing availability of MMP staff to answer questions via local and toll-free telephone numbers. Patients understand that a team of experts manages their care, individualized to their specific drug therapy needs, in collaboration with their clinicians. Patients appreciate the positive recognition they receive when they achieve their therapeutic goals and are comforted that the MMP continues to stay in contact through maintenance follow-up (Figure 9).

The key to successful implementation of centrally managed clinical pharmacy services is integration across the continuum of care within a health care system ...

Innovation/Leadership

The key to successful implementation of centrally managed clinical pharmacy services is integration across the continuum of care within a health care system; this includes integration with local health care teams and participation in decisions about the clinical care of the populations. Local integration builds and maintains relationships between pharmacy staff and medical office health care team members. KPNW established MMP worksites in each medical office, where MMP staff provide care as part of the local health care team. MMP staff may work in the central MMP office and rotate shifts for telephone follow-up and member calls. Pharmacy Department and MMP staff take an active role in leadership roles on committees and at department meetings (Table 3) and provide updates and education, participate in development of clinical practice guidelines, and lead health care team discussions on defining clinical targets. This relationship facilitates integration of MMP work priorities with KP national, Regional, and departmental priorities (Table 2) and is essential to alignment of MMP priorities within the KPNW Region and the national KP Program.

In the new model, MMP personnel take an active role in communicating with internal and external customers. Communication tools to define MMP services and changes are centrally developed. MMP pharmacists use the tools at local health care team meetings to facilitate discussion about the clinical targets or drug initiatives. In addition, the MMP uses satisfaction surveys to obtain ongoing feedback regarding MMP services, quality of care, and opportunities for improvement.

Another innovation in the MMP model is designing processes to address varying needs of individual patients as their health care needs evolve. MMP population-based processes and resource allocation are designed to individualize care to meet the continuum of needs of the individual. Resources are increased or decreased depending on patient need. This flexibility supports most efficient use of resources. The individualized care for a patient not at goal is different from the level of care for a patient who has achieved goal and is in maintenance. The care for a patient who may be experiencing an adverse drug event is different than the level of care for a patient who tolerates the same medication without adverse effects. In addition, the most appropriate type of patient interaction is also considered, ie, reminder letter, personal phone call, group appointment, or other appropriate interaction. Appropriate level of care is routinely considered in deciding on the best-qualified and least-costly process or personnel to employ. The MMP makes ongoing improvements; this work environment requires that all personnel participate and function comfortably in an environment of continuous change and improvement.

Summary and Conclusions

As the MMP enters its 22nd month of existence, quality and cost savings continue to improve. LDL levels less than or equal to 130 mg/dL increased to

72% at yearend 1999, up from the 66%, which had already placed KPNW in the lead position of HEDIS-reporting KP Regions in 1998. Glycemic control among MMP-managed therapy failure patients is higher than general diabetes mellitus patients not managed by the MMP: 59.3% vs 41.3%. Patient satisfaction survey results show that 96% of MMP patients are extremely or very satisfied with their care. Clinician satisfaction survey results reveal that 96% believe the MMP supports the health care team and helps them to achieve clinical targets, and 100% say that the MMP provides excellent or good quality of care. The MMP has helped KPNW achieve over $1,500,000 in drug cost savings. All of this has been accomplished in less than two years—including tripling the number of patients managed (Figure 5)—without hiring additional staff.

The MMP process is shaping state and national pharmaceutical care delivery models. KPNW has been asked to discuss the MMP at:

- CMI Network Interregional Teleconference;
- American Society of Health System Pharmacists Meeting;[2]
- Interregional Clinical Pharmacy Meeting;
- CMI Interregional Diabetes Models of Care Teleconference;
- Oregon Society of Health System Pharmacists Meeting;[3,4]
- CMI Interregional Eldercare Teleconference.

Now that the KPNW culture has changed, the MMP will move forward by continuing to extend its scope of care beyond lipid management, glycemic control in selected diabetes mellitus therapies, and aspirin therapy. Focus will expand to improving outcomes and reducing costs of other drug therapies. The infrastructure is in place to continuously improve processes and further expand collaboration with clinicians, staff, and administrators to meet changing clinical and cost priorities. KPNW's experience shows that the MMP is a transferable model that can assist other integrated health systems in providing high-quality, cost-effective clinical pharmacy services to a large population. ❖

Glycemic control among MMP-managed therapy failure patients is higher than general diabetes mellitus patients not managed by the MMP: 59.3% vs 41.3%.

References
1. Kaiser Permanente Interregional President's Quality Improvement Best Practices Recommendations for Clinical Pharmacy Services, 1997.
2. Lee NL. Implementing Challenges from the ASHP Conference "Pharmacy in Managed Care: Vision for the Future": Prioritization and Implementation of Challenges; Pharmaceutical Care in Managed Care Pharmacy. Special Session of American Society of Health System Pharmacists Meeting, Las Vegas, NV, December, 1998.
3. Wright TL. Population-based medication management of CV risk: Dyslipidemias, Oregon Society of Health System Pharmacists Annual Meeting, Skamania, Washington, May, 1999.
4. Ashley R, Boschee G, Grant M, Johnson V, Perry P, Ramage J, et al. Improving the health of populations: An integrated Medication Management Program, Oregon Society of Health System Pharmacists Annual Meeting, Skamania, Washington, May, 1999.

Belief

Perhaps the only limits to the human mind
are those we believe in.
Willis Harman, "Global Mind"