

Implementation of a drug therapy monitoring clinic in a primary-care setting

JILLMARIE K. YANCHICK

Many national organizations have identified the optimal management of chronic disease states through education and appropriate pharmacotherapy as a major public health issue. Published guidelines for the treatment of hyperlipidemia, diabetes mellitus, asthma, and hypertension are rapidly becoming the standard of care in ambulatory medicine.¹⁻⁴ At the same time, pharmacists have clearly established their role as facilitators of rational drug therapy and providers of pharmaceutical care.⁵

Pharmacists have been shown to have a positive impact on patient-care outcomes by monitoring treatment plans, educating patients and providers, and promoting cost-effective therapy.⁶ To tap into that potential, Reynolds Army Community Hospital in Ft. Sill, Oklahoma, instituted a pharmacist-managed drug therapy monitoring clinic in its primary-care department. The clinic, staffed with one clinical pharmacy specialist, began in 1995 after six months of preparation. As of August 1999, its staff had grown to two clinical specialists, a clinical pharmacist, an ASHP-accredited primary-

Abstract: The development and implementation of a drug therapy monitoring clinic in the primary-care clinics of a military hospital are described.

To improve patient care and decrease costs associated with treating chronic diseases, in August 1995 the pharmacy department established a drug therapy monitoring clinic. The clinic was responsible for initiating and monitoring treatment plans for patients with chronic diseases, implementing clinical guidelines, providing educational programs, collecting and analyzing outcome data, and handling requests for medication extensions. Treatment followed existing national standards and Department of Defense guidelines modified for the institution. The clinic began with one clinical pharmacy specialist, and within a year it added another clinical pharmacist and a technician. The clinic first obtained patients via consultations from providers in primary care; this was soon extended to all departments. In addition, the pharmacist was available to see walk-in patients needing medication extensions. Later, referrals came for inpatients and patients seen in the emergency room for asthma or diabetes mellitus, as well as for inpatients receiving oral anticoagulation therapy.

For fiscal year 1999, the clinic saw 104 (± 44.3) patients per month seeking medication extensions. It also handled 24,873 clinical interventions that year, resulting in projected annual savings of \$1,085,560. Chart review indicated that compliance with national standards improved dramatically for patients with diabetes mellitus or asthma followed by pharmacists compared with physician monitoring during the same period and before the clinic began. The wait time for reviewing laboratory results and for patients receiving anticoagulation therapy was eliminated, and doses were changed immediately, if needed.

A comprehensive pharmacist-managed drug therapy monitoring clinic for outpatients with chronic diseases can result in positive patient outcomes and more cost-effective care.

Index terms: Ambulatory care; Asthma; Clinical pharmacists; Compliance; Diabetes mellitus; Economics; Interventions; Patient education; Personnel, pharmacy; Pharmaceutical services; Pharmacy, institutional, hospital; Prescriptions; Primary care; Protocols; Standards

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care resident, a pharmacy student, a clinical technician, and a part-time registered dietitian. This

article describes the development, implementation, and evolution of the program.

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Background

Reynolds Army Community Hospital is a 120-bed hospital that provides both inpatient and ambulatory services. It serves active duty personnel, dependents, and retirees in the military health system. The hospital has 400,000 ambulatory visits annually and is part of the Medicare Subvention Project, which enables patients over age 65 to be enrolled for care at a military hospital.

In January 1994, the pharmacy department decided to convert from a product-distribution orientation to a patient orientation focused on positive therapeutic outcomes. The chief of pharmacy and the Department of Defense (DOD) Pharmacoeconomic Center teamed up to hire an ambulatory care pharmacy specialist who would be responsible for re-engineering pharmacy practice at the hospital. In August 1994, I was hired to fill this position.

Later that year, in an effort to improve patient care and minimize inappropriate cost expenditures, the hospital initiated an internal review of the impact of chronic disease states, and I got involved in that review. The primary-care department accounted for the highest pharmaceutical expenditures within the institution; within that, the respiratory category was the most expensive. We found that many patients did not receive appropriate drug treatment, education, and home management plans for asthma. The review also revealed that diabetes mellitus was one of the top chief complaints in the primary-care department, and medications and supplies used to treat it constituted the fifth highest expenditure category. Many patients did not receive appropriate education or drug treatment, and their treatment did not meet American Diabetes Association (ADA) standards of care.²

Speedy access to care was a problem, along with inadequate time for practitioners to spend with patients

at appointments. Preliminary chart reviews revealed that patients were on duplicate medications, standards of care for chronic disease states did not match national guidelines, and our emergency room was being used for routine care instead of acute care. Asthma and uncontrolled hypertension were two of the top chief complaints in the emergency room, as well as the primary reasons for repeat emergency room visits among our beneficiary population. Preventable hospitalizations for uncontrolled diabetes mellitus were also a concern.

The department of primary care and the department of pharmacy worked together to develop a plan for solving these problems related to the treatment of chronic diseases. We decided that DOD guidelines, along with national treatment guidelines, would be used when possible as the primary reference documents in developing baseline assessments and care plans for patients.⁷⁻⁹ Both departments wanted to institute the guidelines in such a way that would best maximize provider and patient participation, improve patient care, decrease waiting times for appointments, and decrease the cost of treating chronic disease states. Possible options included basic provider education classes, academic detailing, and a multifunctional pharmacy clinic.

Using total quality management methods to identify the strengths and weaknesses of each approach, the two departments decided that a pharmacist-managed drug therapy monitoring clinic fit well with the pharmacy department's new focus on patient outcomes, and it offered advantages over simply offering educational programs for providers. This clinic would be responsible for providing direct patient care by initiating and monitoring treatment plans for patients with chronic disease states; implementing clinical guidelines; providing educational programs for staff, providers, pa-

tients, pharmacy residents, and students; collecting and analyzing outcome data; and handling patient requests for medication extensions (refills).

Implementing the program

The first step in implementing the program involved deciding which clinical practice guidelines we would use. There were three available choices. Guidelines could be written *de novo*, existing national or DOD guidelines could be incorporated in total, or existing guidelines could be modified on the basis of specific situations unique to our facility. We chose to modify existing guidelines to fit our facility. Preference was always given to the DOD Pharmacoeconomic Center guidelines because they rely heavily on national guidelines; they were also modeled to yield specific recommendations that would enhance the economic efficiency in DOD medical facilities.⁷⁻⁹

The next step was to collect baseline data about a few disease states in the beneficiary population, including the number of patients, disease severity, and current treatment practices. Patients were identified via computer data on admissions, emergency room visits, ICD-9 diagnosis codes, pharmacy prescription records, consultations, and chart review.

Initially, the clinic obtained patients via consultations from health care providers in primary care only. In addition, the clinic's schedule was planned so that the pharmacist was available to see walk-in patients needing medication refills from one clinic. After three months, consultations were extended to all departments.

Developing a system for monitoring patient-care and economic outcomes was also part of the implementation plan. From the start, we used the Clinitrend computer program to document interventions and cost avoidance.

I spent a lot of time before the

clinic opened establishing a one-on-one rapport with providers in the primary-care department, teaching them how a clinical pharmacy specialist could function and facilitate their practice. The physical location of the drug therapy monitoring clinic next to the providers helped establish this relationship as well. Rapport-building and training continue to be an ongoing process when new providers come to our institution each year.

Evolution of the program

The pharmacist-managed drug therapy monitoring clinic saw its first patient in August 1995 with one practitioner. It operated four days a week. As mentioned previously, it served walk-in patients who needed medication extensions and provided consultations for patients in the primary-care department. Patients needing medication extensions were screened for medication duplications, therapeutic appropriateness and effectiveness, laboratory monitoring, and timely follow-up by their primary-care manager before being counseled on their medications. If the pharmacy specialist identified a problem, it was addressed and modified during the visit, and the patient received follow-up care through the drug therapy monitoring clinic.

Because of the overwhelming response to the clinic, a pharmacy technician was assigned to the clinic in October 1995 to help with data collection, patient check-in, and appointment booking. In March 1996, a second pharmacist was added to help with the expanding service. Pharmacy students from the Oklahoma University College of Pharmacy began clinical rotations in spring 1997, and an ASHP-accredited primary-care residency program was initiated in July of that year. In July 1999, the clinic added another clinical specialist.

The drug therapy monitoring

clinic's track record prompted a multidisciplinary hospital committee to ask us in October 1996 to begin an asthma education clinic. Our clinic had demonstrated in the past that it was an effective and efficient resource for patient care and cost-effective outcomes. The pharmacists also demonstrated the ability to serve as educators, health care providers, and researchers.

To improve continuity of care from the inpatient arena to the ambulatory setting, beginning in April 1997 the clinic began accepting consultation requests for inpatients with diabetes mellitus or asthma. Eventually, a system was developed whereby all patients seen in the emergency room for asthma or diabetes mellitus were automatically referred to the service.

Again in January 1998, the clinic was called upon to start a new service, this time an oral anticoagulation service. The department of primary care requested the service in response to several preventable hospitalizations caused by inappropriate monitoring practices.

Experience with the program

A key element of our program is ongoing monitoring of indicators and analysis of results, all of which indicate that our program is successful.

For fiscal year (FY) 1999, which began in October 1998, the clinic had 104 (± 44.3) walk-in visits per month by patients seeking medication extensions. Before the clinic started, more than three times that number of patients requested pre-

scription renewals from primary-care physicians each month. The drug therapy monitoring clinic decreased the number of requests by discontinuing duplicate prescriptions and freeing physician time, thereby enabling them to have more time for patient visits. The clinic also decreased the number of refill requests by checking patients' eligibility for care at our hospital and releasing those who were ineligible. Before, 25% of the medication refill requests by primary-care providers were for ineligible patients. In addition, the clinic did not fill requests for "ghost patients"; previously 32% of the patients had not seen a physician for routine care for over two years.

Before the drug therapy monitoring clinic began, on average patients had to wait 72 hours for a medication-extension request to be filled. That wait time has been eliminated.

During the first quarter of FY 2000, the clinic handled 494.3 (± 159.8) follow-up appointments and 62.7 (± 31.5) new consultations per month (Table 1), compared with 262.0 (± 61.3) and 68.0 (± 14.0), respectively, from the same period just a year earlier. Overall, the clinic completed 83.5 (± 17.0) new consultations per month in FY 1999. Table 2 shows the breakdown of the clinical interventions for FY 1999 by disease state.

As shown in Table 3, for FY 1999 the clinic handled a total of 24,873 clinical interventions, resulting in projected annual cost avoidance of \$1,085,560. The drug monitoring program has had an impact on the

Table 1.
Workload for the Drug Therapy Monitoring Clinic

| Time Period ^a | Number of Appointments/Month (Mean \pm S.D.) | | |
|--------------------------|--|--------------------|-------------------|
| | Medication Extensions | Routine Follow-ups | New Consultations |
| FY 1999 Q1 | 164.3 \pm 23.9 | 262.0 \pm 61.3 | 68.0 \pm 14.0 |
| FY 1999 Q2 | 108.7 \pm 33.0 | 305.0 \pm 112.2 | 79.7 \pm 10.4 |
| FY 1999 Q3 | 78.0 \pm 5.1 | 419.0 \pm 29.7 | 102.3 \pm 13.0 |
| FY 1999 Q4 | 66.3 \pm 20.0 | 395.3 \pm 98.1 | 84.0 \pm 7.7 |
| FY 2000 Q1 | 80.3 \pm 24.5 | 494.3 \pm 159.8 | 62.7 \pm 31.5 |

^aFiscal year (FY) runs from October of the previous year through September. Q = quarter.

Table 2.

Distribution of Clinical Interventions for Fiscal Year 1999 by Disease State

| Disease State | % (n = 24,873) |
|--|-------------------|
| Diabetes mellitus | 26 |
| Anticoagulation | 17 |
| Asthma or allergic rhinitis | 16 |
| Hyperlipidemia | 13 |
| Hypertension | 11 |
| Preventive services for women ^a | 5 |
| Thyroid disorders | 3 |
| Degenerative joint disease and gout | 3 |
| Gastroesophageal reflux disease | 3 |
| Chronic obstructive pulmonary disease | 2 |
| Other | 1 |

^aIncludes osteoporosis prevention and family planning.

pharmacy budget; it decreased from \$6.8 million in FY 1995 to \$5.2 million in FY 1999.

Patient outcomes

Outcomes related to the pharmacist-managed drug therapy monitoring clinic go beyond cost savings. We also evaluated the patient-care outcomes related to several specific chronic diseases.

Asthma. In a cohort of 300 patients who received intensive asthma management in FY 1999, the number of emergency room visits for asthma-related conditions decreased by 88% compared with the previous year when these same patients were monitored by physicians. Similarly, the number of hospital admissions for asthma exacerbations decreased by 92%.

Upon further review, we found that only 25% of patients in this cohort were on appropriate pharmacotherapy as recommended by National Heart, Lung, and Blood Institute guidelines³ when they came to the pharmacist-managed clinic (Table 4). The majority of patients received large doses of β -adrenergic agonist inhalers and only intermittent or no inhaled corticosteroid anti-in-

Table 3.

Number of Interventions and Estimated Cost Avoidance per Year

| Fiscal Year | No. Interventions | Estimated Annual Savings (\$) |
|-------------|-------------------|-------------------------------|
| 1995 | 1,439 | 39,541 |
| 1996 | 11,159 | 231,009 |
| 1997 | 11,951 | 399,002 |
| 1998 | 15,705 | 552,780 |
| 1999 | 24,873 | 1,085,560 |

flammatory drugs.

After regimens were adjusted to include routine inhaled corticosteroid therapy, the mean number of albuterol inhaler canisters used per month per person decreased from 2.6 to 0.25 in this patient cohort. No adverse drug reactions related to asthma pharmacotherapy were seen; rather, 95% of the patients with asthma reported having all symptom-free days, compared with only 11% at baseline. As a result of the pharmacist's monitoring and educational efforts, patients were better able to manage their disease through the use of spacers, peak-flow meters, and action plans.

Diabetes mellitus. Table 5 shows outcomes for patients with diabetes mellitus followed by pharmacists in the drug therapy monitoring program compared with those treated in the conventional way by physicians both before the program began and during FY 1999. Overall, 99% of our patients met ADA standards of care compared with 45% in the physician-monitoring group in FY 1999. That year, the mean glycosylated hemoglobin (HbA_{1c}) value for patients followed by a pharmacist for 12 months was 7.6% compared with 9.05% for patients followed by physicians; values less than or equal to 8% are associated with decreased morbidity and mortality. Overall, the number of hospitalizations for patients with diabetes mellitus decreased 90% from FY 1996 to FY 1999.

Patient participation in educational programs also improved. Ninety-four percent of our patients took a four-hour class on diabetes mellitus

or had several one-on-one appointments with a pharmacist that were devoted strictly to providing information and answering questions. This compared with 60% for patients with diabetes mellitus followed by family practitioners and internists.

Patients seemed to appreciate the positive effects of the pharmacist-managed clinic. According to a survey conducted in summer 1999, 96% of the patients with diabetes mellitus reported being more satisfied with their care since being enrolled in the drug therapy monitoring clinic. The remaining 4% were equally satisfied with their care.

Hypertension. In a hypertension project, 543 patients were switched from extended-release nifedipine tablets to amlodipine besylate tablets with no change in the adverse-event profile. Blood pressure control before and after the conversion was similar. The annual cost savings resulting from the change was \$49,578.

Oral anticoagulation therapy. In January 1998, we did a baseline assessment of all outpatients at the institution who received warfarin sodium during the previous year. Of the 359 patients identified, 207 did not have an International Normalized Ratio (INR) documented. Of the 152 patients who did have documented INRs, 33 adverse outcomes were documented. A goal INR was listed for only 45% of these patients. The average time to change a dose after a patient's INR was found to be out of range was 2.4 weeks, and numerous patients were subtherapeutic for months.

Since the drug therapy monitoring clinic initiated monitoring of

Table 4.
Compliance with National Guidelines for Treatment of Asthma³

| Outcome | % of Patients ^a | |
|---|---|--|
| | Physician Monitoring FY 1998 (n = 300) | Pharmacist Monitoring FY 1999 (n = 300) |
| Had regimen that followed NHLBI ^b guidelines | 25 | 100 |
| Reported symptom-free days | 11 | 95 |
| Avoided trigger(s) | 12 | 82 |
| Used spacer for inhaler(s) | 25 | 98 |
| Used peak-flow meter regularly | 12 | 88 |
| Had an action plan | 0 | 98 |

^aCharts of the same group of 300 patients were reviewed for both periods. FY = fiscal year.
^bNHLBI = National Heart, Lung, and Blood Institute.

Table 5.
Compliance with National Guidelines for Treatment of Diabetes Mellitus²

| ADA Standard | % Patients | | |
|--|--|--|---|
| | Physician Monitoring FY 1995 (n = 150) | Physician Monitoring FY 1999 (n = 185) | Pharmacist Monitoring FY 1999 (n = 190) |
| HbA _{1c} determined | 45 | 21 | 97 |
| Foot exam done | 10 | 30 | 100 |
| Eye exam done | 60 | 63 | 100 |
| Thyroid tests done | 50 | 68 | 100 |
| Lipid levels determined | 66 | 45 | 100 |
| Lipid levels at NCEP ^a goal | N.D. ^b | 54 | 87 |
| Blood pressure < 130/85 | N.D. ^b | 46 | 53 |
| Blood pressure < 140/90 | N.D. ^b | 69 | 96 |
| Overall met ADA standards ^c | N.D. ^b | 45 | 99 |

^aNCEP = National Cholesterol Education Program.
^bNo data.

^cLaboratory tests and exams were completed as described in the standards, but no determination was made that the results were within goal range.

anticoagulation therapy in the hospital and clinics in January 1998, there have been no adverse events and only five missed appointments. As of February 2000, 104 patients receiving warfarin were actively enrolled in the drug therapy monitoring clinic, and 89% of the 1867 INRs documented in their charts since the program began were within goal range. Drug interaction, medical procedure, diet, disease state, and adjustment by nonclinic provider accounted for the remaining 11% (5%, 2%, 2%, 1%, and 1%, respectively). Because patients are seen by

a pharmacist when laboratory tests are done, doses are changed immediately, if necessary.

Discussion

Our results show that pharmacists have an impact on outcomes for patients with chronic disease states because of their ability to optimize and monitor treatment plans, educate patients and providers, and promote cost-effective treatment. Substantial improvements have been seen in the number of patients meeting national standards for several chronic dis-

ease states since the drug therapy monitoring clinic opened at our institution. The clinic is well used and accepted by providers, which reflects the extensive educational programs we provided for physicians, feedback from patients, and documented outcomes.

Conclusion

Our experience indicates that a comprehensive pharmacist-managed drug therapy monitoring clinic for outpatients with chronic diseases can result in positive patient outcomes and more cost-effective care.

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