

Disease Management Practices of Health Plans

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Objective: To investigate how health plans manage chronic diseases.

Study Design: Health plan medical directors were surveyed regarding the disease management (DM) practices of their plans.

Methods: We took a stratified random sample of 65 plans, all members of the American Association of Health Plans. Forty-five plans responded. Results were weighted to be representative of the industry (including nonmember plans). Medical directors were asked to consider that they had a DM program only if 2 things were true: (1) A majority of a plan's enrollees could not be ineligible for a DM program for non-clinical reasons (eg, geographic location); and (2) a DM program had to have at least 6 of the 8 components of a DM program as defined by the Disease Management Association of America.

Results: The 3 diseases most likely to be the focus of DM programs were diabetes, asthma, and congestive heart failure. For each of these diseases, at least one quarter of Americans were enrolled in plans offering a DM program. Medical directors perceived their DM programs to be highly effective in reducing mortality and morbidity and in improving the functional status of patients, and perceived them to be effective in lowering cost. The greatest challenge in implementing DM programs involves information technology. These results yield insights into the future of treatment of chronic disease in the United States.

Conclusion: Health plans have made a significant investment in programs to improve care for chronic illness. The almost universality of DM programs highlight the need for scholarly evaluations of their effectiveness and cost effectiveness.

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sary to follow patients in a rigorous, formal manner over time.

The actual process of care often differs dramatically from processes documented in the medical literature to produce better outcomes. For instance, among Medicare fee-for-service beneficiaries, 30% of heart failure patients were not given the recommended prescription for an angiotensin-converting enzyme (ACE) inhibitor in 1993-1994, and 84% of diabetic patients did not receive the recommended hemoglobin A_{1C} test in 1990-1991.^{1,2}

In the 1960s, health plans began to develop programs to address specific disease entities. By the mid-1990s, these programs—as well as those developed by pharmaceutical firms—had evolved into programs for chronic disease management (DM),³ which supplements the routine processes of care in several ways. For instance, health plans and participating physicians are more proactive in identifying patients who need regular follow-up and have developed reminder programs to increase compliance. The health plan helps physicians manage their entire patient population with the disease of interest, not just those patients seen regularly. Patients are encouraged to play a more active role in taking care of themselves (patient empowerment), which requires more patient education.⁴⁻⁶

Despite the many analyses that underpin evidence-based guidelines for chronic diseases and despite tentative evidence that DM programs can

The US healthcare system is often criticized for its treatment of chronic diseases. Most treatment is focused on acute illness, and there is little of the infrastructure necessary to support a systematic approach to managing chronic disease effectively. Physicians are used to treating the patient “in front of them” and rarely have the systems neces-

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implement these interventions,⁷⁻¹⁰ little is known about the prevalence of DM programs. (As evidence of the increasing role of DM programs, the National Committee on Quality Assurance plans to accredit DM vendors as well as DM programs within plans.) Therefore, we fielded a survey of DM programs in health maintenance organizations (HMOs). From our enrollment-weighted results, it is possible to calculate a lower bound for the role that DM programs play in the US healthcare system.

HMOs' experience with DM may diffuse to other organized systems of care such as preferred provider organizations, which have a larger enrollment than HMOs. (Although institutional frameworks may differ, most developed nations are wrestling with the treatment of chronic diseases. See, for instance, Greenhalgh et al.¹¹) Hence, this article offers insights into the future of chronic disease treatment in this country and possibly abroad.

... METHODS ...

Sampling Methodology

This survey was designed to capture observations about the DM programs available to the typical enrollee, as distinct from the DM programs offered by the typical HMO (subsequently referred to as "a health plan"). Therefore, results in all tables (except the first) and figures are weighted by enrollment.

We took a stratified random sample of 65 plans, which, in the interest of a high response rate, were all members of the American Association of Health Plans (AAHP). Association members are broadly representative of the industry, particularly in terms of predominant model type and region. Small plans (ie, those with enrollments less than 100,000) are somewhat underrepresented; however, because small plans are numerous in the industry, there are still many small plans in our sampling frame.

Table 1. Distribution of Enrollment by Plan Characteristics: Industry vs Disease Management Survey Respondents*

Plan Characteristic	Industry [†]		Sample Plans	Survey Respondents		
	Plans	Enrollment (%)		Plans	Enrollment (%)	Weight (%)
Enrollment size						
>1,000,000	9	20	5	4	50	20
250,001-1,000,000	79	38	20	16	36	38
100,000-250,000	142	24	20	14	11	24
<100,000	457	19	20	11	3	19
Total	687	100	65	45	100	100
Predominant model type						
Group/staff	86	21	9	8	45	27
Network	166	22	18	6	10	14
IPA	435	57	38	31	45	59
Total	687	100	65	45	100	100
Region						
New England	34	8	5	3	7	7
Mid-Atlantic	80	15	9	7	11	13
South Atlantic	123	16	9	7	12	15
South Central	131	12	11	7	4	12
East North Central	124	12	10	8	11	16
West North Central	62	7	3	3	6	6
Mountain	58	6	7	2	1	4
Pacific	75	24	11	8	48	27
Total	687	100	65	45	100	100

IPA = independent practice association.

*"Enrollment" refers to pure health maintenance organization and point-of-service products, and commercial, Medicare, and Medicaid products. Percentages may not sum to 100 due to rounding.

[†]"Industry" includes plans that are not members of the American Association of Health Plans.

Adapted from reference 13.

Four enrollment-size categories were defined (Table 1), showing that plan size varies widely. The 9 largest plans and the 457 smallest plans each comprised one fifth of industry-wide enrollment. By design, each very large plan (enrollment more than 1 million) had a much higher probability of being selected for the survey than each small plan. The sample consisted of 5 very large plans, 20 large plans, 20 medium-sized plans, and 20 small plans. (By design, no plans with fewer than 25,000 members were sampled, but their enrollment was used to compute weights below.)

After being pilot-tested with 5 plans, in the summer of 2000 the survey instrument was sent to medical directors, who are very knowledgeable about key aspects of plans. Forty-five of 65 medical directors responded, yielding a response rate of 69%.

We weighted the responses so that the responding plans (as a whole) had the same distribution of sizes as the industry. For instance, although the 4 very large respondents had 50% of the enrollment of all respondents, they received 20% of the weights, replicating the 20% of enrollment represented by very large plans in the industry. Similarly, although the 11 small respondents had only 3% of the enrollment of all respondents, they received 19% of the weights.

Ideally, these weights would replicate the distribution of enrollment not only by size but also by other characteristics, such as predominant model type and region. However, as Table 1 shows, the weights somewhat overstate the impact of group/staff and independent practice association model plans and understate the impact of network model plans. In terms of region, the distribution more closely parallels that of the industry.

When these results were presented in seminars, participants requested plan-weighted results, too. To that end, we devised another set of weights such that the responding plans represented the typical plan, except for plans with enrollments less than 25,000. (Had we taken a census, each plan would have had the same weight.)

Definition of Disease Management Program

To increase the precision of responses, we asked health plans to consider that they had

a DM program only when 2 things were true. First, if a majority of a plan's enrollees were ineligible for a DM program because of nonclinical reasons (eg, geographic location, benefit design, medical group participation), the plan was not considered to have a DM program.

Second, we used the Disease Management Association of America's (DMAA) definition of DM programs.¹² A program had to have 6 of the 8 components in the DMAA's definition (Table 2). This definition is more operational, has more components, and may be more comprehensive than some other definitions.^{4,14} Therefore, our methodology yields conservative estimates of the prevalence of DM programs in plans.

... RESULTS AND DISCUSSION ...

Components of Disease Management Programs

Table 2 lists the components of DM programs. Consideration of whether to implement a DM program starts with a comparison between the way care is delivered and how it should be delivered, usually as articulated in evidence-based guidelines. If the discrepancy is large enough, the health plan may implement a program. Its first operational step is to identify the enrollees with the disease in question, ie, the patient population whose condition might be improved by application of the guideline. In a similar activity, a plan may stratify this population by risk to match the medical intervention with need.

Table 2. Prevalence of Disease Management Program Components, 2000

Disease Management Program Component*	Prevalence (%)
Evidence-based guidelines	100
Patient population identification process	100
Patient risk identification and matching of interventions with need	96
Collaborative practice model to include physician and support-service providers	86
Patient self-management education	100
Routine reporting/feedback	88
Appropriate use of information technology	76
Process and outcome measurement, evaluation, and management	97
All 8 components	64

*The Disease Management Association of America defines disease management as a multi-disciplinary, continuum-based approach to healthcare that includes the above 8 compo-

The successful management of chronic disease requires a systematic approach, regular evaluation of function, and active patient participation. Recognizing that most physicians practice alone or in small, single-specialty groups without an infrastructure or team to support the systematic management of patients with chronic disease, DM programs use a collaborative practice model. This involves the plan complementing the services of the treating physician with those of nurse case managers, educators, pharmacists, and other healthcare professionals. Because of the need for daily monitoring of measures of health or adequacy of medication (eg, blood sugar in patients with diabetes, body weight in patients with congestive heart failure [CHF]), patients with chronic illness need to be active partners with their physicians in the management of their disease. Disease management programs encourage patients to play a more active role than they traditionally have, which is called self-management. To facilitate self-management, DM programs have extensive outreach components to educate patients and their families.

Disease management programs provide physicians with more feedback than the fee-for-service sector. They accomplish this task by developing registries of patients with a specific disease and tracking measures of clinically significant function or outcome such as peak flow for asthmatic

patients, hemoglobin A_{1c} for diabetic patients, and cardiac status. Patient care and interventions are facilitated by information technology, which includes software for a range of activities such as risk stratification and patient reminder systems. Most DM programs identify patients from a variety of sources and stratify interventions based on the patient's risk or severity of illness. Finally, once a DM program has been up and running for a while, it is evaluated in terms of both process and outcomes.

The survey found that in two thirds of plans, DM programs typically included all 8 of the DM components listed in Table 2. (A DM program did not need to have at least 6 components for the purposes of this question.) Virtually all DM programs

- use evidence-based guidelines,
- identify the population with a disease,
- stratify that population by risk and match the intervention with the need,
- educate patients in self-management, and
- evaluate the DM program in terms of process and outcome.

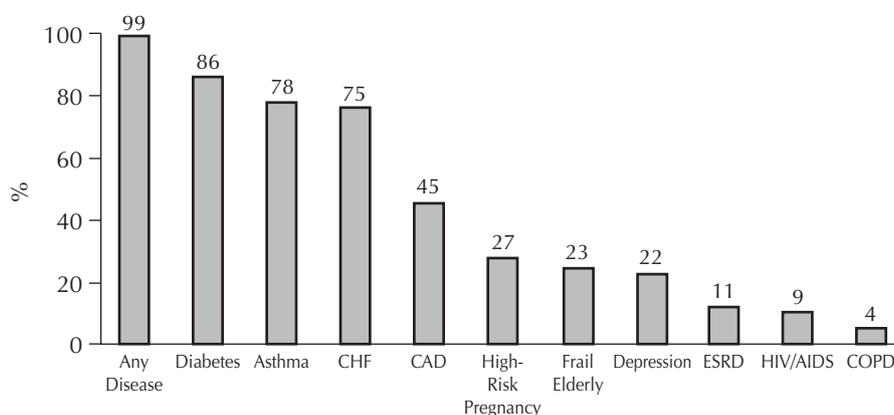
The other 3 components were present in the DM programs of most but not all plans. Eighty-six percent of plans used a collaborative practice model. Relative to other components, the presence of a collaborative practice model may vary more across plan model type. Eighty-eight percent of plans had routine reporting or feedback to patients and physicians.

The most challenging component was the appropriate use of information technology, but even here prevalence exceeded three quarters of the plans.

Prevalence of Implemented Programs

Virtually all plans had at least 1 DM program that had at least 6 of the 8 required components, and plans had an average of almost 4 such programs (Figure 1). The "big 3" DM programs pertained to diabetes, asthma, and CHF, each of which was found in three quarters or more of plans. Because about one third of Americans are

Figure 1. Prevalence of Disease Management Programs, Ordered by Prevalence, 2000



A disease management program was excluded if it had fewer than 6 of the 8 Disease Management Association of America-recognized components or if a majority of a plan's members were ineligible by virtue of geographic location, benefit design, or medical group participation.

CAD = coronary artery disease; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; ESRD = end-stage renal disease; HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome.

enrolled in HMOs for each of the 3 diseases, at least one quarter of Americans ($\frac{1}{3} \times 75\%$) are in plans with a DM program. (One quarter of Americans may be an underestimate, because some people who are not enrolled in plans participate in DM programs such as those run by large medical groups.¹⁵)

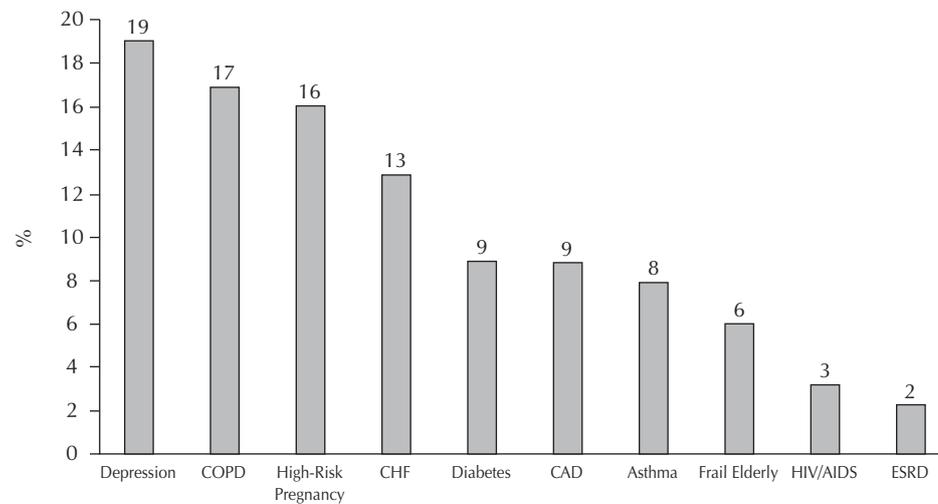
Almost half of plans had a program for coronary artery disease. Prevalence rates were lower for other DM programs, with high-risk pregnancy programs having a prevalence of one quarter, followed by programs for depression and the frail elderly. (Plan-weighted prevalence rates were quite similar to enrollment-weighted rates, except that 2 diseases had a lower plan-weighted rate [56% vs 75% for CHF and 10% vs 22% for depression].)

The low prevalence rates of DM programs for cancer and human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) highlight that certain diseases typically are not managed under the rubric of DM. Cancer care may be facilitated through case management programs, which involve a nurse or other case manager who coordinates healthcare services. HIV/AIDS, a less heterogeneous disease, may be managed through centers of excellence as well as case management.

The prevalence of DM programs appears to have increased considerably between 1996 and 2000. Plan-weighted rates increased from 45% in 1996 to 83% in 2000 for diabetes, from 50% to 77% for asthma, and from 14% to 57% for CHF. These figures underestimate the growth rate.*

*We used InterStudy rates for 1996¹⁶ and our rates for 2000. Although the InterStudy methodology is difficult to discern, there apparently was no requirement that a DM program have most of the 8 components discussed above or that a majority of enrollees not be ineligible for nonclinical reasons. Thus, if our methodology were used, the InterStudy figures for 1996 would presumably be lower and the growth rate higher.

Figure 2. Priority Disease Management Programs for Future Implementation, Ordered by Prevalence, 2000



Respondents were asked which 2 disease management programs had the highest priority for future implementation.

CAD = coronary artery disease; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; ESRD = end-stage renal disease; HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome.

Priority Disease Management Programs for Future Implementation

We asked plan medical directors which 2 DM programs were the highest priorities for future implementation, even though responses to such a question are necessarily subjective. As shown in **Figure 2**, the 3 most common responses were depression, chronic obstructive pulmonary disease, and high-risk pregnancy. The big 3 DM programs necessarily have low rates here, because only the few plans without a specific DM program could make that program a priority for implementation.

If these priority programs are implemented, about 40% of plans would have a depression program, another 40% would have a high-risk pregnancy program, and DM programs for diabetes would be almost universal—with 95% prevalence.

Make/Buy Decisions

Plans can either develop a DM program in-house (“make”) or purchase a program (“buy”). The purchasing may be from either a vendor or some other entity (eg, a hospital). Most of the vendors of any size operate nationally,¹⁷ presumably because most of the components do not require geographic concentration.

Sixty-four percent of the diabetes DM programs were developed in-house, 27% were purchased from

a vendor, and the remaining few (9%) were purchased from other sources. The patterns were similar for asthma and CHF. Plan-weighted results were different: in-house 48%, vendor 44%, and other 8%. The difference between enrollment- and plan-weighted results reflects the fact that small plans made disproportionate use of vendors. The cost of many DM components (eg, development of guidelines and software) does not increase proportionately with enrollment size, so DM programs may have considerable economics of scale. Small plans can avail themselves of economics of scale by using national vendors.

Identification and Risk Stratification of Patients

In identifying patients for DM programs, plans relied on 4 methods: physician referral, self-referral, pharmacy utilization data (ie, prescriptions), and other claims or encounter data (Table 3). When stratifying patients by risk, plans relied on 5 methods: physician assessment, patient interview or self-assessment, pharmacy utilization data, laboratory and diagnostic testing, and other claims or encounter data.

In general, the patterns were similar across the big 3 DM programs. One exception was the lower use of pharmacy data for CHF than for asthma and

diabetes. Because CHF medications are not used uniquely for CHF and because 1 of the major deficiencies in the treatment of CHF is underuse of medication (eg, ACE inhibitors), pharmacy data are less useful in identifying patients who would benefit from a CHF program. Most drugs used for diabetes and asthma, such as insulin and inhalers, respectively, are uniquely used for those diagnoses, making the pharmacy data more useful.

Laboratory test databases had higher sensitivity and specificity than some alternatives for identifying patients, but given their structure, they cannot be efficiently searched for all enrollees. However, once patients are identified as having a specific disease, it is efficient to search laboratory databases by hand. For instance, laboratory tests were used to stratify primarily diabetic patients, because the level of blood sugar is 1 of the best indicators of current control and predictors of future complications. Overuse of β -agonist inhalers identified from pharmacy data plays a similar role for asthma patients.

Just as plans need to identify patients with certain diseases to support management of their care, payers (primarily Medicare and Medicaid) are increasingly differentiating their payment according to certain chronic diseases of enrollees. However, such risk

adjustment programs use only encounter data to identify enrollees with those diseases. Several vendors and scholars are developing pharmacy-based risk adjustment systems. More broadly, pharmacy data are probably underutilized by health service researchers, as suggested by their almost universal use in DM programs for asthma and diabetes. Alternatively, one could envision a system of allowing plans to use physician referral and self-referral to identify patients (with clinical laboratory results for certification). The combination of methods used in DM programs emphasizes the limitations of using only encounter data for risk stratification.

Severity, Intervention, and Participation

Once patients are stratified, do they tend to receive differential interventions? Table 4

Table 3. Methods of Identifying Patients and Stratifying Them by Risk, 2000

Method	Percent		
	Asthma	CHF	Diabetes
Patient identification			
Physician referral	91	97	73
Self-referral	76	50	54
Pharmacy utilization data	94	65	94
Other claims or encounter data	95	82	96
Other	12	14	21
Risk stratification			
Physician assessment	64	62	57
Patient interview or self-assessment	61	56	62
Pharmacy utilization data	93	51	79
Other claims or encounter data	93	70	90
Lab and diagnostic testing	17	11	64
Other	13	9	9

CHF = congestive heart failure.

indicates they do. The norm for DM programs is at least 2 levels of intervention: all persons get some intervention, and those with a specified degree of severity get more intensive intervention. For example, patients with diabetes controlled with diet do not need the same intensity of interventions as those whose diabetes is not in control even with insulin. Similarly, patients with asthma who have rare episodes of wheezing do not need the same intervention as those constantly using medication and making frequent visits to the emergency room.

Accreditation standards (eg, those of the National Committee on Quality Assurance) often require some intervention for all patients with a disease, even of relatively low severity. Because the health benefits are so much greater among the relatively small percentage of patients with highly severe disease, this requirement may somewhat lower the cost effectiveness of DM programs.

Because a DM program can be effective only to the extent that the patient population participates, we asked about participation rates for the big 3 diseases. In each case, the overall participation rate was about 60% (57% for asthma, 59% for CHF, and 63% for diabetes). However, few plans had a participation rate close to 60%; more typically the rate was 80% and above or 20% and below. That is, the distribution of rates was bimodal.

Because calculating the participation rate is important for any evaluation of a plan's DM program, either for accreditation, report cards, or scholarly purposes, we note several methodological challenges. First, patients as well as plans play roles in participation rates. Patient interest may vary by disease and the nature of the intervention. For instance, the participation rate is somewhat higher for diabetes because the intervention involves services that all diabetic patients should obtain on a regular basis, such as regular foot and eye exams. Second, DM program participation, especially for low-risk patients, may be on an opt-in or opt-out basis. Participation rates might be much higher if patients are considered to be participating unless they opt out, rather than if they must actively

enroll (ie, opt in). Third, plans may calculate the participation rate using a broad or narrow denominator in terms of severity. Because the more severely ill patients usually receive a more-intense intervention, their participation rates are likely to be much higher than those of other patients. Especially given that one third of the surveyed plans wanted higher participation rates (data not shown), more research is needed on these methodological issues.

Clinical Information Systems

Clinical information systems are key to the operational success of DM. Plan medical directors indicated whether the plans maintained information in electronic form (Table 5). For instance, only three quarters of plans maintained a disease registry for diabetes, even though all of them identified enrollees with the disease. The other one quarter presumably had a list of such enrollees but not in electronic form or not in a single database.

The most prevalent information system tools used by the plans were disease registries (lists of patients with a certain disease) and reminder systems, which may remind either physicians or patients to schedule office visits or diagnostic tests. These systems were followed in prevalence by web sites to educate patients and practice profiling, which compares physicians in terms of the frequency of certain clinical activities (eg, prescribing β -blockers after a heart attack). The least prevalent systems were the ones most related to clinical care—those pertaining to clinical values, risk stratification, and decision support tools.

Table 4. Relationship Between Severity of Disease and Intervention Under a Disease Management Program, 2000

Relationship	Percent		
	Asthma	CHF	Diabetes
All persons with the disease get the same intervention	4	2	9
Only persons with specified severity get an intervention	4	17	5
All persons get some intervention; those with specified severity get more intense intervention	92	81	86

CHF = congestive heart failure.

The prevalence of some systems (eg, decision support tools) varied little across the big 3 diseases, but the prevalence of others varied substantially. For instance, risk stratification software is more common for asthma than for diabetes, and clinical values are more likely to be tracked for diabetes than for asthma.

Plans' ability to implement DM programs depends on their ability to identify patients with the diseases of interest and to risk-stratify them, 2 functions greatly facilitated by clinical information in electronic databases. The advantage plans have over individual physicians is the availability of claims and pharmacy databases, but only physicians typically have detailed clinical information. The challenge plans face

is obtaining more complete data in the least intrusive, most cost-effective manner from physicians.

Evaluations of Disease Management Programs and Their Perceived Benefits

Among the plans that evaluated their DM programs (ie, almost all of them), 90% used clinical outcome measures. These were by far the most common type of measures—by a margin of almost 20 percentage points. Plans also used a variety of measures relating to cost and utilization, such as pharmacy costs (71%), outpatient utilization (51%), and program cost (48%). Other measure types were external measures such as the Health Employer Data and Information Set and the Foundation for Accountability (71%), return on investment in DM programs (67%), patient satisfaction (67%), and provider satisfaction (40%).

Based on these evaluations and those in the scholarly literature, medical directors at virtually all plans perceived their DM programs as reducing morbidity and mortality and improving the functional status of patients (Figure 3). About two thirds of medical directors believed their DM programs lower cost, and a sizable minority believed that the programs improve patient satisfaction. Ninety-seven percent of the surveyed plans use their DM programs to meet quality improvement requirements for accreditation purposes. Overall, clinical benefits were judged to be more important than financial ones.

Barriers

Infrastructure (eg, access to data) inadequacies limiting a plan's ability to identify and stratify the patient population for a DM program were identified as a barrier by 90% of surveyed medical directors, and the cost of program was identified as a barrier by 78%. Plans have been able to overcome these barriers for the programs already in place, but other programs may pose new or stronger barriers. For instance, identifying patients with depression—the disease for which a DM program was most desired by the surveyed medical directors—may be difficult because of stigma associated with depression. Depressed patients may not mention their depression to their physicians.

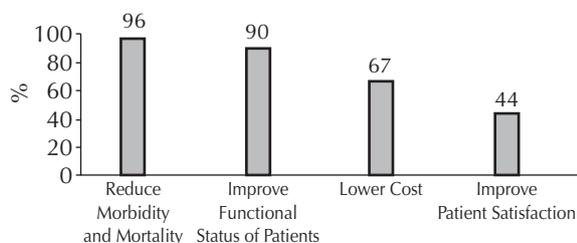
Provider resistance was a barrier in a minority of plans (44%), which generally have taken care to

Table 5. Clinical Information Systems that Support Disease Management Activities, 2000

System	Percent		
	Asthma	CHF	Diabetes
Disease registry	71	70	75
Software for risk stratification	51	38	33
Decision support tools	35	38	35
Tracking of clinical values	39	44	57
Practice profiling	62	59	57
Physician reminder system	67	62	67
Patient care reminder and call-back system	72	63	83
Web site to educate consumers	71	53	66
Other	20	21	18
No information system	8	13	7

CHF = congestive heart failure.

Figure 3. Perceived Benefits of Disease Management Programs, Ordered by Prevalence, 2000



involve their network physicians in review of the programs and have introduced them as activities to support physicians in improving care. Because the programs follow protocols supported by the medical literature and generally provide services that complement those offered by physicians in routine care, there has not been significant resistance from physicians. Patient resistance is rarely perceived (in 8% of cases) to be a barrier.

... CONCLUSION ...

Disease management programs offer structured, evidence-based initiatives that are not otherwise typically available to patients and physicians in the US health system. These programs use systematic approaches to identify patients with chronic disease and implement a range of activities to increase the consistency with which patient care follows evidence-based guidelines and produces better outcomes. They support physicians by providing them and their patients with systematic follow-up, medication review, referrals, and support that is difficult to perform or arrange on their own. Plans complement provider practice with patient education and active outreach. Our survey demonstrates that DM programs are standard components of plans.

Improved data systems at the health plan and provider level will allow these programs to be more effective and cost effective. One significant issue on the horizon involves federal and state confidentiality requirements, which often require advance consent from patients for use of patient-specific information. These requirements will bear close monitoring as plans strive to enable more individuals to benefit from DM programs while complying with confidentiality rules.

Although medical directors perceive their DM programs to be highly effective in reducing mortality and morbidity and perceive them to be effective in lowering costs, our survey instrument was not designed to probe into the methodology by which they reached these conclusions. However, our finding that these programs are almost universal highlights the need for scholarly evaluations of their effectiveness and cost effectiveness. Other findings—such as the prevalence of programs for certain con-

ditions and the relationship between severity and intervention—can help to structure such evaluations.

Acknowledgments

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