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Disease-Management Programs Can Improve Quality of Care for the Chronically Ill, Even in a Weak Primary Care System: A Case Study from Germany

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Abstract: Enhancing the coordination and quality of care for chronically ill patients is a challenge across health care systems. In Germany, following a 2002 reform, physician-based and patient-centered disease-management programs (DMPs) were implemented in a nationwide rollout. These programs are characterized by information technology support, the central role of a designated doctor in ambulatory care, a patient-centered approach that encourages patient self-management, quality assurance (including reminders and benchmarking), and financial incentives for physicians, patients, and sickness funds. Results of a four-year follow-up show that despite the programs' implementation in a weak primary care system, quality of care and patient satisfaction have improved while hospitalization rates, duration of hospital stay, patient mortality, and drug costs have been significantly lowered. In some areas up to 90 percent of all eligible patients are enrolled, thereby giving the programs a broadly representative base.

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OVERVIEW

Disease-management programs (DMPs) were introduced into the German Statutory Health Insurance (SHI) in 2002, following a review by the Advisory Council for Concerted Action in Health Care, a think tank that directly advises the government.^{1,2} In its 2000–01 recommendations, the Council had pointed to a broad quality chasm in the country's prevention, diagnosis, and management of chronic conditions.³ As underlying causes the Council cited inadequate coordination of care, insufficient adherence to evidence-based treatment recommendations, neglect of prevention, deficient support of patient self-management, and variations in quality of care. Additionally, there were no incentives for physicians, patients, or sickness funds in the Statutory Health Insurance (the nonprofit institutions that provide health insurance in Germany) to invest in chronic care.

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Most of these problems were inherent to the German health care system at the time. Inadequate coordination of care arose from the strict segregation of care into ambulatory and inpatient sectors. Fragmentation of care was further exacerbated by a weak primary care system in which specialists in private practice dominated general practitioners (GPs) both in number and income, patient information did not flow timely enough between providers through electronic health records, hospital physicians had few outpatient-care privileges, and the traditional lack of interprofessional cooperation between physicians, nurses, and social care providers had led to discontinuity of services. Insufficient adherence to evidence-based treatment recommendations was fostered by individual physicians working in small practices with few quality-management requirements and by reimbursements not being tied to outcomes. Deficient support of patient self-management was the result of meager reimbursement of patient-education efforts and a paternalistic approach to the patient–physician relationship. Variations in quality of care were common because not very many evidence-based guidelines were accepted both by GPs and specialists. Neglect of prevention mainly resulted from a lack of adequate reimbursement for this approach and from insufficient patient activation.

Context: The German Health Care System

As in the United States, German primary care physicians operate mainly in small private practices and are paid fee-for-service with varying degrees of bundling. Gatekeeping is optional but is incentivized through cost-sharing arrangements, and often by sickness funds (SFs). Roughly half of the country's hospitals are publicly owned and half privately owned. Hospital doctors are generally salaried and not allowed to treat outpatients except under special circumstances. For several chronic conditions, a set of DMPs, guided by national evidence-based recommendations, has been introduced; these programs are implemented by SFs through contracts with providers.⁴

To fully appreciate the process of implementation of the DMPs, it should be noted that the German SHI is a competitive social health-insurance mechanism with a risk-compensation system in place that provides a level

playing field for competition between the SFs.^{5,6} The SHI covers around 90 percent of the population. In 2011 potential members are free to choose between some 156 SFs that are privately operated but federally regulated with defined legal responsibilities.⁷ The basic benefits package offered is broad and universal. What is covered is decided by the Federal Joint Committee, which includes representatives of the physician, hospital, and dental associations as well as of the SFs and patient advocacy groups.

The SHI is financed through tax revenues, and contributions are shared between employers and employees, who usually have job-related insurance. However, contrary to the custom in the United States, employers do not generally negotiate special packages for their employees or contract with a particular SF. Instead, employees are free to choose an SF based on the services offered. Nonworking spouses and children are covered free of charge. For the unemployed, contributions are paid by national unemployment insurance. For pensioners, the employers' share of the premium is covered by the pension fund.

While the Federal Ministry of Health establishes the legal framework of the German SHI, the Federal Joint Committee fills in the framework by issuing law-like decrees and forming contracts and agreements among stakeholders. The Committee also has wide regulatory authority and can issue directives regarding DMPs that are binding for physicians, hospital sickness funds, and patients; the Committee also determines the diseases for which DMPs should be set up. Forerunners of the DMPs can be seen in small, regional programs that aimed at improving quality of care for the chronically ill through a structured approach. Evaluations of these small, regional pilots documented improvements in care. However, they never spread nationally, as they were tailored to regional needs.

Along with the implementation of DMPs in the SHI, several measures were taken to strengthen patients' rights and activation and to implement a quality-improvement agenda, including transparency of outcomes and quality of care within the system. For example, patients in the programs receive printed information regarding diabetes, its complications, treatment options, and management strategies.

The Central Research Institute of Ambulatory Health Care in Germany annually provides the SHI and the KV North Rhine and the KV Westphalia with a quality record of the DMPs in North Rhine and Westphalia, respectively. The Institute has also been charged to provide a recall system for doctors participating in the DMPs in North Rhine to indicate those patients who should be reviewed during the quarter. Biannually the doctors receive feedback reports that include the results of treating their own patients and a benchmark based on their regional colleagues' results. Another element of these feedback reports is a continuing-medical-education measure consisting of an additional brief concerning a specific topic with relevance to the DMPs and evidence-based guidelines.

The Issue: The Challenge of Chronic Care

Management of chronic conditions is a major challenge for health care systems around the world.^{8,9} In its *Global Burden of Disease* report, the World Health Organization ranks chronic diagnoses such as depression, chronic obstructive pulmonary disease (COPD), diabetes, and asthma among the top 10 causes of years lived with disabilities. It is projected that in 2025 an estimated 300 million people worldwide will suffer from diabetes alone.¹⁰

As the prevalence of chronic conditions grows, so do the costs of providing adequate health care to the affected patients. For example, of the 18 million Americans suffering from diabetes in 2002, an estimated 12,000 to 24,000 became blind in the next year, 43,000 needed to start on dialysis, and 82,000 had a lower extremity amputated because of the disease. Corresponding direct and indirect costs reached \$132 billion.¹¹ The Milken Institute projects that reasonable improvements in prevention and management of chronic disease could avert some 40 million U.S. cases over the next 20 years. This would translate into savings of more than \$1.1 billion in 2023, equal to obviating 27 percent of the expected costs.¹²

Similarly, in Germany an estimated 4 million patients (5 percent of the total population) suffer from diabetes, according to data from the 1998 National Health Survey. New data from a telephone-based survey

called "Health in Germany"¹³ give a prevalence of 7.3 percent for self-reported diabetes among adults during any given year and a lifetime prevalence of 8.8 percent. Not surprisingly, in 2001 about 6.8 percent of all health care expenditures involved diabetes.¹⁴

The two most important challenges in achieving reasonable improvement in chronic care and prevention are 1) adequate management of the disease, including prevention, evidence-based treatment standards, and patient self-management; and 2) coordination of care across health care providers. To attain these goals, health care systems worldwide have embraced many different models of disease-management programs, which are as diverse as the systems themselves. Despite their diversity, however, the programs have demonstrated the potential to increase quality of care as well as patient satisfaction with care.^{15,16,17,18,19,20,21,22}

Objectives of the German Disease-Management Programs

Based on these challenges and the recommendations of the Advisory Board for Concerted Action in Health Care, the Ministry of Health prepared a bill, which was passed in December 2001, to implement a national rollout of DMPs in Germany's Statutory Health Insurance. The law clearly states that the main objectives of the programs are to "improve coordination and enhance quality of care for the chronically ill."²³ The Ministry of Health further states that it expects the programs to "facilitate patient empowerment."²⁴

The law also stipulates that DMPs may be set up for diseases that fulfill the following criteria:

- illness is highly prevalent;
- quality of care could be increased;
- evidence-based guidelines are available;
- care coordination is needed across sectors and health care providers;
- disease course is improvable through patient self-management; and
- treatment costs are high.

All sickness funds in the SHI could offer the programs. Actually, the financial incentives are so strong that no SF could afford *not* to offer them.

About the Programs

The rollout of the DMPs started in early 2003, and in 2010 more than 5.7 million insured were enrolled in over 11,000 programs featuring the following diagnoses: diabetes type 1, diabetes type 2, breast cancer, coronary heart disease (CHD), chronic heart failure, asthma, and COPD. SFs are free to design their own programs. However, they must adhere to certain requirements that are clearly stated in the law. These obligations include:

- definition of enrollment criteria and enrollment process;
- treatment according to evidence-based care recommendations or to best available evidence;
- quality assurance (e.g., feedback to physicians, patient reminders for preventive care, and peer review);
- physician and patient education;
- documentation in an electronic medical record; and
- evaluation.

Although the programs may be set up by the SFs themselves, they must be accredited by the Federal Agency for Insurance in a comprehensive process.²⁵ Recertification is required every three years.

Target Population

The programs seek to enroll all patients diagnosed with the relevant disease, and at an early stage. Enrollment criteria are detailed in amendments to the law. In addition to criteria that are medical in nature, physicians are asked to consider whether the patient a) could benefit from the therapeutic targets of the program and its strong focus on secondary prevention, b) is willing to participate in managing his or her own disease, and c) if the patient's quality of life may be improved through program participation. While these criteria led in the beginning to

the enrollment of comparatively well-managed diabetic patients, before long the majority of local diabetes patients were involved. In the region of North Rhine, for example, around 80 percent to 90 percent of patients with diabetes are now enrolled in the programs.²⁶

One of the reasons for this success is the potential for financial incentives—whether directed to patients or physicians—embodied in the law. For patients, copayments for office visits can be waived if they enroll in the programs. Physicians are paid a documentation fee for enrolling patients and for documenting certain parameters. Additionally, they can be paid extra for patient education, counseling sessions, and referrals to specialists.

Program Development and Implementation

The most important steps in implementing the programs were operationalizing the medical and legal program requirements of the law, and gaining physicians' acceptance of the programs.²⁷ For these tasks, the Ministry of Health charged a federal joint committee with forming disease-specific working committees to draft program requirements based on evidence-based recommendations. These committees included experts from insurers, hospital associations, universities, and boards of the different medical associations. A DMP working committee then had responsibility to synthesize the technical experts' recommendations (Exhibit 1).

The final recommendations of the working committee were adopted by the Ministry of Health through legal decrees that now serve as the compulsory basis for contracts between providers and SFs. Thus the programs are relatively uniform in their core elements. They may differ, however, in their types of feedback reports, remuneration, incentives, and program services (such as patient hotlines, patient-education programs, or measures to ensure better access to after-hours care).

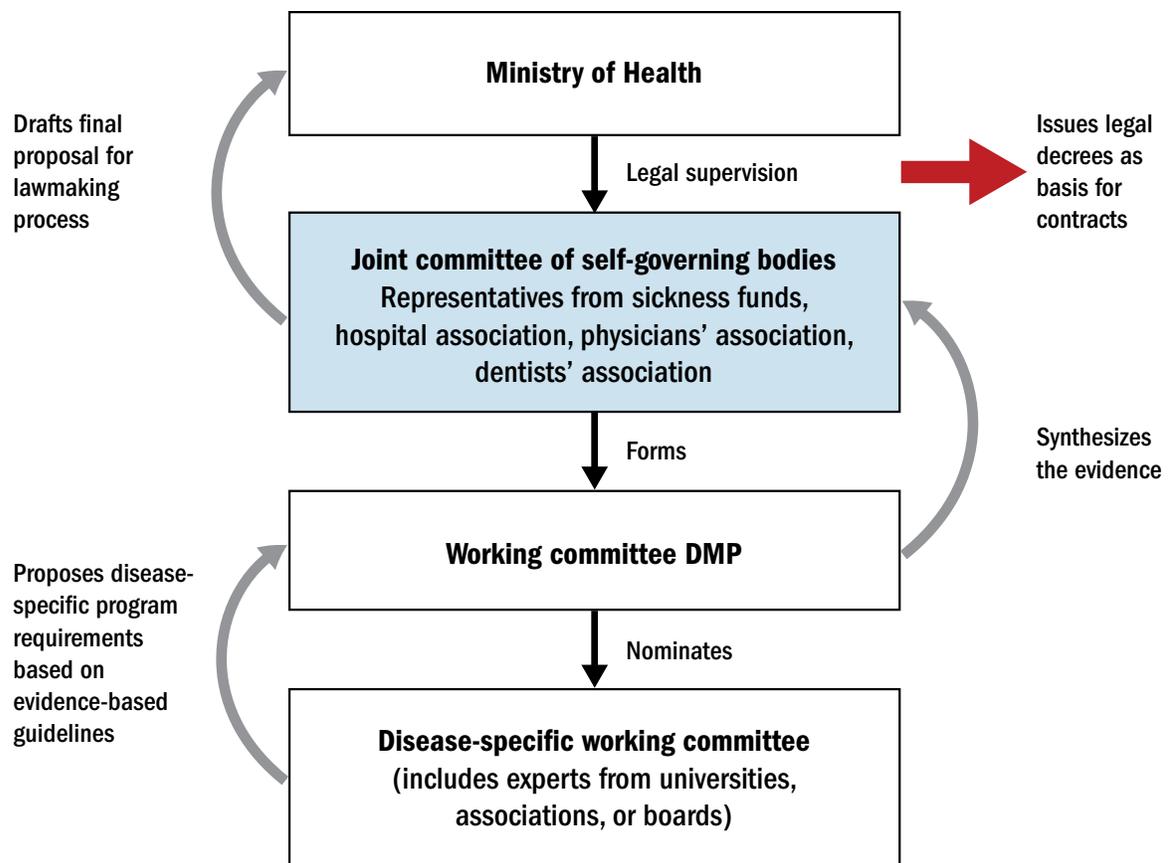
Engaging the Clinicians

Involving clinicians in care programs based on evidence-based guidelines is not always easy, as some may view such participation as limiting their professionalism and contributing to so-called cookbook medicine. Thus,

physicians have to be engaged on several levels. On a national level, the National Association of Physicians (Bundesärztekammer), the National Association of SHI Physicians, and the consortium of German Scientific Medical Associations (AWMF) were charged with drawing up “national management guidelines” (Nationale Versorgungsleitlinien) for enrolled patients. The guideline-forming methodology, overseen by the Agency for Quality in Medicine (ÄZQ), is a consensus process based on national and international literature on evidence-based medicine. There now are different versions of these guidelines—a long version for experts (physicians) and short versions that are essentially algorithms for routine use by patients. The Institute for Quality and Efficiency in Health Care (IQWiG) is charged with regularly checking recommendations in the programs against international norms.

On the individual physician level, participation in the DMPs is voluntary. However, there is a financial incentive: physicians receive various fees for DMP-associated services. Consider, for example, patient education. For teaching a group class the physician is reimbursed at €60 per patient for a 60-minute session. For the care of each diabetes patient the physician receives a lump-sum payment of €15 per quarter in addition to the regular reimbursement. For referral of a patient to a diabetes specialist he or she receives €5.11 per case. Besides these and other financial incentives, physicians earn credits for continuing medical education when they take a training class on the details of the DMP contracts, their new responsibilities, and care goals, among other topics. Such training, offered once a year, is mandatory for program participants.

Exhibit 1. Flow Chart for Determining Program Requirements



Source: Authors' illustration.

How the Programs Work

Core components of the programs. The core DMP elements are listed in Exhibit 2 and include treatment recommendations based on evidence-based guidelines, the use of information technology (IT) to manage disease, the DMP physician as coordinator and navigator of care, tracking and reporting of process and outcome, support of shared decision-making and patient training in managing their own disease, and a focus on prevention.

With these core components, the DMPs represent a major departure from traditional care. Patient activation, treatment according to evidence-based guidelines, the systematic use of IT for documentation, evaluation, and quality assurance—all of which were applied sporadically in the past—are now exercised systematically and comprehensively throughout the German health care system.

Physicians in primary care play a central role. GPs, family doctors, specialists, and hospitalists cooperate closely in the DMPs to care for patients. However, only GPs and family doctors may apply to become a “DMP doctor” (with the exception of gynecologists in DMPs for breast cancer). As such, primary care physicians play a central role in coordinating and ensuring timely access to care. They harmonize care across health care and social care providers, educate and advise patients on self-management of disease and utilization of services, negotiate individual treatment goals with patients, and document the degree of achievement of care targets. Thus, the role of a DMP doctor in many aspects resembles what is currently called for in the concept of a “medical home.”

In addition, DMP doctors ensure treatment in accordance with evidence-based care guidelines, adhere to programs’ referral rules and follow their documentation routines, play an active role in quality-improvement networks, and participate regularly in continuing medical education. DMP doctors may also be required to meet certain service standards—e.g., a maximum of 30 minutes waiting time for patients, or evening office hours to accommodate working patients. Beyond encouraging physicians to participate in DMPs in the first place, financial incentives are used to ensure that their practices are in accordance with program expectations.

Role of nurses and teams in DMP primary care practices. Implementation of the DMPs has facilitated the involvement of nurses—and of other “physician assistants,” as they are called in Germany. Further training of physician assistants has been boosted through the DMPs because services such as education are now better reimbursed. Also, the programs’ characteristic cooperation of physicians with other medical professionals—e.g., dietitians, podiatrists—has been groundbreaking in that these individuals have for the first time become fully integrated into primary care practices. Thus, DMP doctors may now delegate specific tasks to trained physician assistants or other professionals.

Programs aim to activate patients. The DMPs emphasize patient education, individualized patient care, and shared decision-making. Based on national care targets, physicians negotiate individual treatment goals and plans with patients;²⁸ and all patients are required to participate regularly in training programs. Another hallmark of the DMPs is that physicians take time to explain to patients why certain tests or referrals—for example, a yearly checkup at the ophthalmologist’s office—are evidence-based and necessary. SFs may create strong financial incentives, such as the waiving of copayments, for patients to enroll in the programs.

Quality assurance in the programs is extensive. In order to ensure that the targeted improvements in quality of care are achieved, DMP physicians and their office staff must meet certain quality standards with respect to education, advanced training, IT use, and availability of services. National care goals are operationalized into benchmarking algorithms. Feedback reports, designed to support physicians in reaching care goals, allow the cross-sectional and longitudinal analysis of individual patients as well as the analysis of outcomes on an aggregated level. The reports also generally include a benchmark of regional colleagues’ results against which the individual physician can compare his or her own practice’s outcomes. To ensure comparability, the feedback provided is routinely “controlled” for the level of patient complexity or severity, and practice anomalies, such as a higher average age of patients, are pointed out.

Exhibit 2. Core Components of German DMPs

Component	Description
Evidence-based guidelines	Provide a mandatory basis for national care goals, treatment recommendations, physician- and patient-education requirements, quality-improvement networks, physician performance feedback, and reminders for follow-up and preventive care.
Use of information-technology systems	Electronic medical records are required to: routinely document a national set of indicators; create a patient registry; enable the individual physician to track and monitor chronically ill patients with respect to outcomes and process parameters; and support evaluation, feedback, benchmarking, and the generation of reminders for physicians and patients.
Physician-based	The programs are mainly under the responsibility of primary care physicians. They enroll and educate patients, negotiate individual treatment goals, and coordinate care. Physicians may delegate these tasks to trained office staff who operate under the physician's supervision.
Quality improvement, reporting, and tracking	Quality assurance includes individual physician feedback and biannual benchmark reports that compare each practitioner's performance to that of a peer group. Individual physician reminders—e.g., for referring patients to screening for retinopathy—are sent every three months when appropriate; patient reminders are automatically generated every three months for follow-up care and preventive care. Physicians must also participate in quality-improvement circles, where patient cases are presented and medical treatment options are discussed among peers.
Patient activation	Individualized care plans and care goals are negotiated between physicians and patients. Patient activation is also supported by patient education, which is provided directly by the physician and qualified nurses, by information contained in brochures, and by sickness funds' hotlines.
Population-based and prevention-oriented	Approximately 90 percent of the population (i.e., all statutory health insured) have access to DMPs if they are eligible. Programs are uniform with respect to quality standards, national care goals, evidence-based treatment recommendations, evaluation requirements, and quality-assurance measures, though programs may differ in their service aspects. Overall, the focus of the programs is on secondary prevention. All patients are encouraged to enroll in this no-high-risk approach.
Financial incentives	There are financial incentives for sickness funds, physicians, and patients. Sickness funds now receive a lump-sum payment of US\$224 as administration fee for each enrolled patient. Physicians receive a documentation fee of about \$33 for the first documentation and \$13 per quarter thereafter. For enrolled patients, copayments are waived. This benefit can amount to a substantial sum, as copayments are otherwise required of the chronically ill for medication (up to \$13 per prescription) and for hospital use and physical therapy (up to 1 percent of gross income).

Every six months the feedback reports include a specialized subgroup analysis on a specific topic. Results of this analysis are interpreted in the report and combined with topic-relevant physician-education material that is certified as part of continuing medical education. To ensure that feedback reports are tailored to physicians'

needs, annual surveys are conducted. Additionally, quality circles (QCs) are held regularly so that doctors will have the opportunity to discuss individual cases and receive peer feedback in a protected environment. Feedback reports or specially prepared quality reports may be used as the basis for discussions in QCs.

Incentives. Acceptance of the DMPs is due at least in part to the various financial incentives that were created.^{29,30} For physicians, financial incentives include reimbursement for documentation, patient education, and coordination of care; a nonmonetary incentive is that physicians benefit from the high patient satisfaction in the programs. Patients are incentivized with financial bonuses (such as the waiving of copayments), with the assurance that they will receive personalized and evidence-based care, and with improvements in services and more patient-centered care.

For SFs, financial incentives include a lump-sum administration-fee payment of about €168 (US\$224) per enrolled insured. This payment comes from the Risk Compensation Scheme (RCS), which was set up to provide a level playing field for competition between SFs. It compensates for differences in morbidity and income between funds that are due to historical reasons; that is, prior to 1996, workers could only join designated funds. Certain regional SFs, for example, insured only blue-collar workers, who on average had higher morbidity and lower incomes than the insured of the SFs that enrolled only white-collar workers. The RCS was implemented to render such differences in the insured-population structure essentially immaterial.

Examples of Three Large Programs

ELSID study (Evaluation of a Large-Scale Implementation of Disease-Management Programs). The ELSID trial was the evaluation of the DMP for Diabetes Mellitus Type 2 of the AOK (Allgemeine Ortskrankenkasse) sickness funds in the regions of Rhineland Palatinate (around 1 million insured) and Saxony-Anhalt (750,000 insured). In a prospective cluster-randomized comparison, two intervention groups were compared with a control group in routine care.³¹ Intervention Group 1 consisted of a regular DMP group as described in this paper. Intervention Group 2 was made up of patients enrolled in regular DMPs but who receive additional interventions such as outreach visits (outcomes of this group will not be reported in this paper). Two hundred DMP physicians, with each doctor enrolling 20 patients, were recruited for the study.

For the analysis, routine DMP documentation data were provided by the AOK SFs in the two German states, and an intention-to-treat analysis approach was taken to evaluate these data.³² Altogether more than 20,000 insured (with an average age of 70.7 years) in 519 practices were followed over a three-year period. Preliminary results have been published. Additionally, in the ELSID trial all AOKs conducted longitudinal analysis of the routine documentation data. These analyses included medical data such as blood pressure, HbA1c-values, and smoking status.

DMP program of the BARMER sickness fund. The effectiveness of the BARMER SF's nationwide DMP for diabetes mellitus type 2, compared with routine care, was evaluated in a retrospective propensity score-matched approach over a four-year period (2003–2007). The BARMER (now BARMER GEK) is the single largest sickness fund in the SHI. It covers some 10.4 percent of the population and operates across Germany. From the initially identified 234,262 insured, 19,882 matched pairs could be formed. Propensity scores were estimated using a stepwise logistic regression. Variables for matching included disease severity and socioeconomic variables.

Preliminary results, including prior matched-pair analysis and patient surveys, have been published. In 2007 a matched-pair analysis of 221,780 insured was carried out; it compared an intervention group (enrolled in DMPs) with controls in regular care in a retrospective analysis of SF utilization data. Based on the four years of data, overall mortality was significantly lower for in-program patients. Overall drug and hospital costs, average duration of hospital stay, and average number of hospitalizations also were lower for patients enrolled in the program.³³

Evaluation of the DMP for diabetes mellitus type 2 in the region of North Rhine. The evaluation is carried out annually by the Joint Institution DMP in North Rhine (Nordrheinische Gemeinsame Einrichtung Disease-Management Programme GbR) and published in the form of a report.³⁴ In 2009 a total of 423,518, or 79 percent of all insured diabetics, were enrolled in the North Rhine region's DMP for diabetes mellitus type 2. At the

same time, more than 88 percent of all GPs/family doctors in the area were listed as “DMP physicians.”

In contrast to the two above-mentioned studies (ELSID and the BARMER DMP), the evaluation in North Rhine is based not on SF data but rather on data from a consortium of sickness funds and the association of ambulatory care physicians (KV). Therefore medical-outcome data such as HbA1c, blood-pressure control, cholesterol level, or the results of regular checkups with an ophthalmologist can be included in the analysis. The mean age of the enrolled diabetes patients in 2009 was 67.5 years, with an average disease duration of 9.4 years.

Program Outcomes

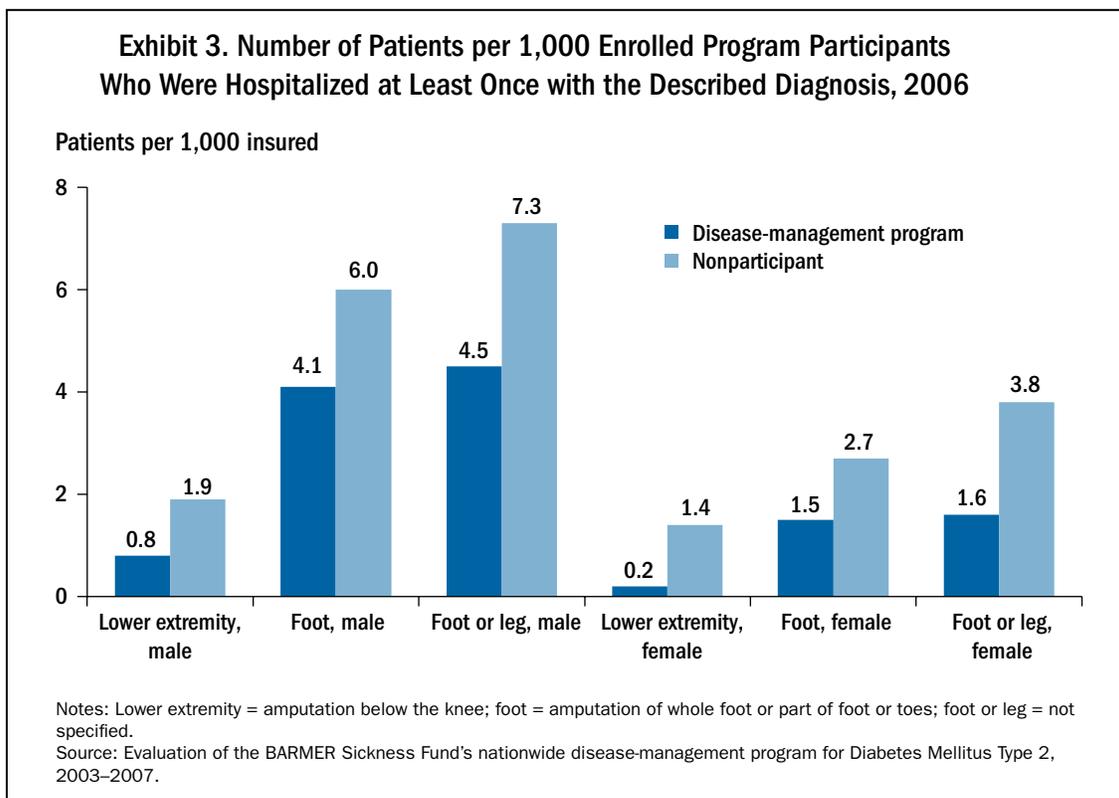
Medical outcomes. Preliminary results of the programs are encouraging.^{35,36,37,38} While the data reported from the various programs reflect different evaluation designs, all evaluation results show improvements in medical outcomes. The ELSID study reported a significant reduction in mortality in favor of Intervention Group 1 (DMP group without further interventions), with a mortality rate of 9.5 percent compared with 12.3 percent in the control group.³⁹ This means that the average insured

enrolled in a DMP had a 1.3-times higher chance to survive the two-and-a-half years of the evaluation period compared with patients of the control group. After adjustment for age, comorbidities, and other variables, the difference was still statistically significant.

Similar results are reported in the DMP for coronary artery disease.⁴⁰ In addition, changes in lifestyle, such as to stop smoking, are described in the routine documentation. In the longitudinal evaluation of the AOKs of Rhineland and Hamburg, 23 percent to 32 percent and 22 percent to 28 percent, respectively, quit smoking in the various cohorts during the first two years of enrollment in a DMP.

The BARMER sickness fund first reported medical outcomes data in 2007, when 221,780 patients were evaluated in a matched-pair analysis. Those enrolled in the DMP had fewer hospital admissions because of heart attack and stroke, had fewer amputations (Exhibit 3), and their medications were more often in line with evidence-based recommendations.

The longitudinal analyses of the DMP of North Rhine support the results reported in the BARMER and AOK studies. Some 70,630 insured patients were



followed over a four-year period regarding their HbA1c levels. They were grouped into four clusters, according to mean value of HbA1c at enrollment (Exhibit 4).

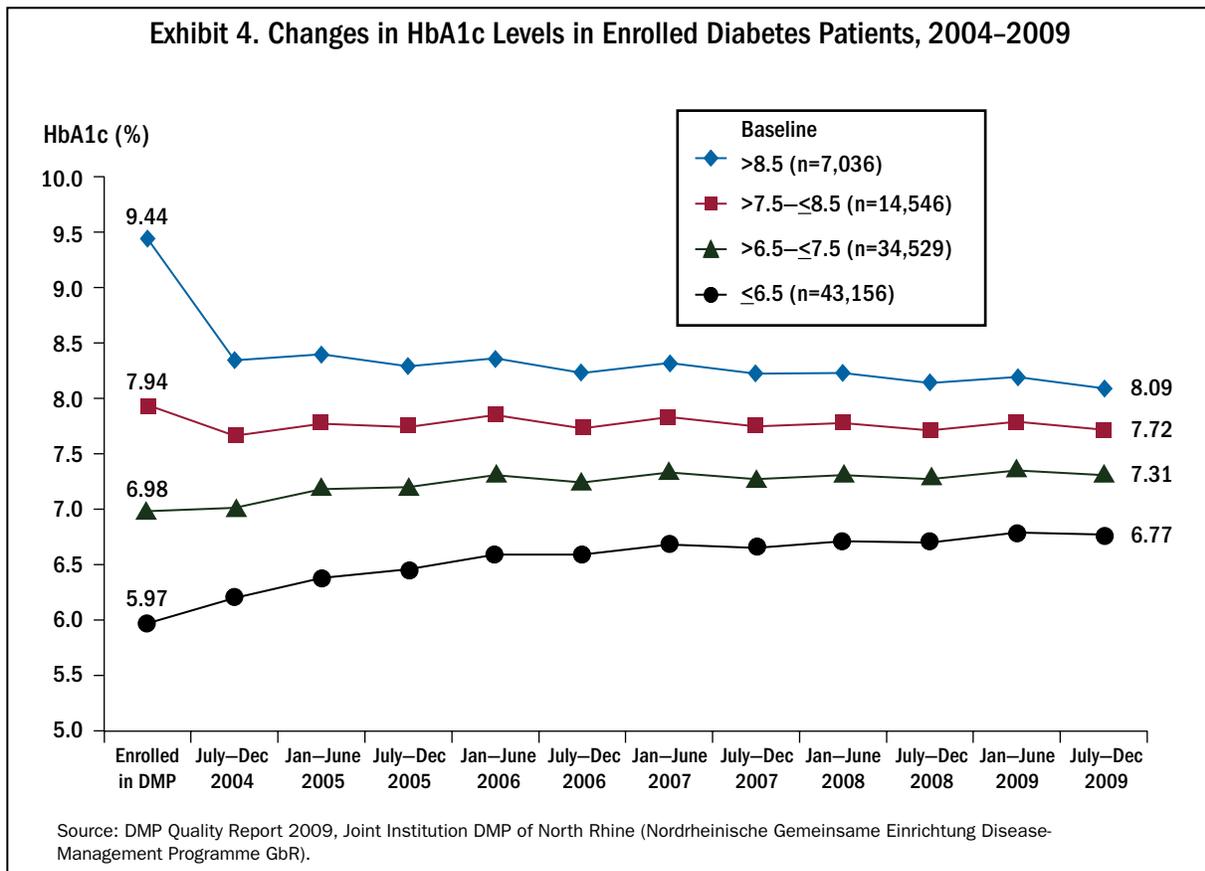
As seen in Exhibit 4, DMP patients with the highest HbA1c levels at enrollment demonstrated the greatest benefit from the programs regardless of age, sex, or duration of disease at the time. (For enrolled patients with low HbA1c levels at enrollment, a slight increase can be noted. One explanation may be that doctors have to essentially walk a tightrope in trying to avoid both hypo- and hyperglycemia.) In addition to closer management by their DMP doctor, other possible triggers for improvements in HbA1c levels seem to be patient education and referral routines (Exhibit 5).

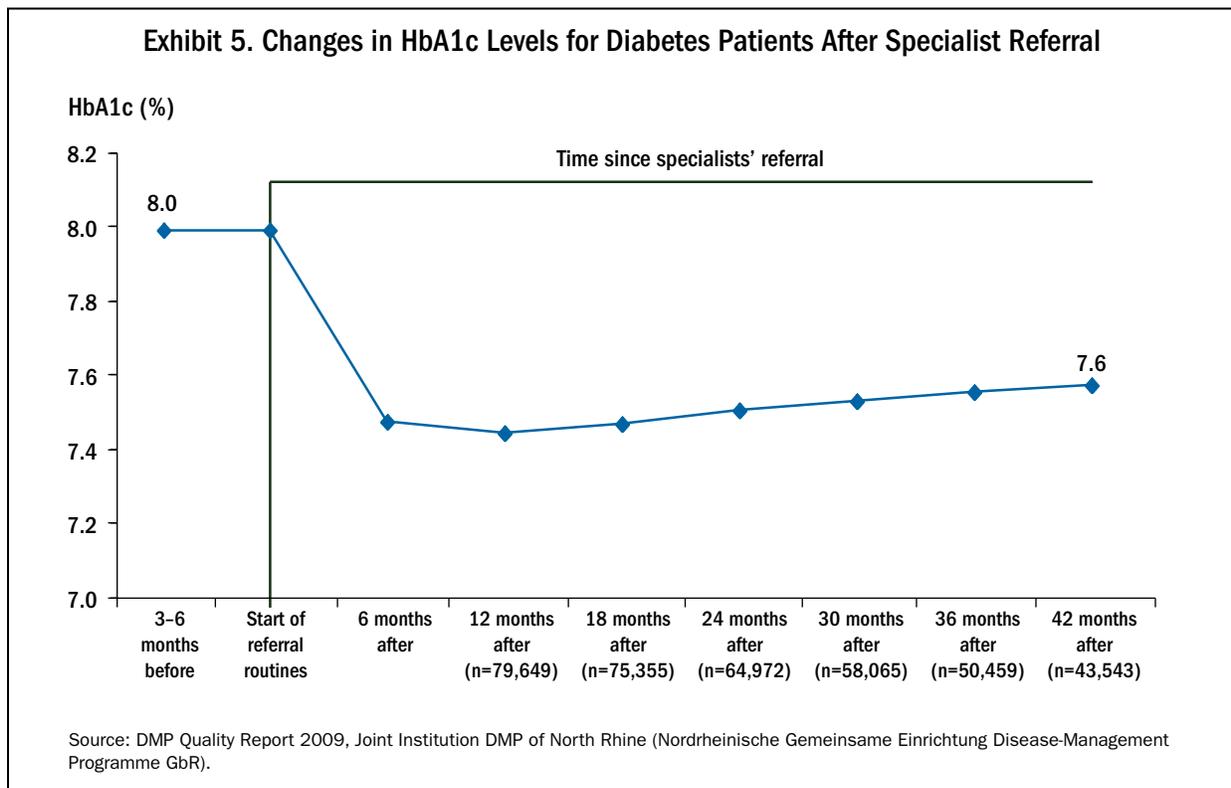
Changes similar to those in HbA1c can be observed in blood pressure. For elderly patients, the blood-pressure target values (below 140/90 mm Hg) were achieved by some 48 percent to 55.6 percent in 2009. For younger insured patients and those with a history of coronary artery disease, the target was set below 130 mm Hg and achieved by almost 40 percent of enrolled

patients younger than 56 years of age. Improvements can also be seen in the incidence of endpoints such as heart attack, stroke, amputation, blindness, and dialysis.

Because DMPs represent a patient-centered approach to care management, patient-centered outcomes are also important in judging the effectiveness of the programs:

Patient-reported outcomes and measures of patient-centered care experiences. In a patient survey of the AOKs (involving more than 1,000 enrolled diabetics, with a mean age of 66 years), 56 percent of the patients agreed that the quality of their care had improved, 95 percent had been referred to an ophthalmologist annually, 88 percent had regularly had their feet inspected, 80 percent had changed their eating habits since enrolling in the program, and only 10 percent said that their DMP doctor had not negotiated individual treatment goals with them.⁴¹ In a survey conducted by the ELSID study group, 63 percent of enrolled patients reported that their doctor had always taken time to explain to them why a referral to a specialist was needed and how it would





impact the disease. In a survey using the PACIC (Patient Assessment of Chronic Illness Care), patients recognized care in the programs as being more structured than routine care.⁴² As an overall trend across surveys, patients in the DMPs tend to be more satisfied with the care they receive and their overall health state. Also, they feel more able to cope with their disease, and they perceive themselves to be well informed about it.

Cost outcomes. The ELSID study group reported fewer hospital stays for enrolled patients in comparison with the control group. Three AOK DMP programs for diabetes mellitus (Bavaria, Saxony, and Thuringia) were evaluated regarding costs of enrolled versus nonenrolled ensured. All three programs showed overall cost reductions for enrolled patients relative to the nonenrolled (Exhibit 6).

The BARMER DMP evaluation showed that the average number of hospitalizations, average duration of hospital stay, and overall drug and hospital costs over a four-year period were lower for patients enrolled in the program.

Lessons Learned from the German Disease-Management Programs

The quest to reorganize chronic care has led to a variety of approaches in different countries' health care systems. Among the most notable are Germany's disease-management programs, which were implemented on a national level—with national regulation and funding—in 2002. Today, a substantial number of diabetes patients are enrolled in the programs nationwide. In some areas, coverage of the programs includes close to 90 percent of all patients with diabetes and more than two-thirds of all primary care physicians.

These programs have had a measurable and positive impact on chronic care; enrolled patients who were surveyed with the PACIC instrument and the EQ-5D (an instrument to measure quality of life) report that their care has become more structured and their health-related quality of life improved.⁴³ Improvements were largest in the areas of follow-up/coordination of care, goal setting and tailoring, and problem-solving. Medical outcomes such as mortality, complication rates, and HbA1c levels improved in the programs.⁴⁴ While quite a few disease-management programs in other countries

Exhibit 6. Cost Experience to Date in the DMPs for Diabetes Mellitus in Bavaria, Thuringia, and Saxony

Cost per insured per year, in US\$

Cost categories	AOK Bavaria	AOK Plus (Thuringia)	AOK Plus (Saxony)
Nonenrolled			
Ambulatory care	990	815	887
Medication	1,846	2,032	2,078
Inpatient care	2,810	2,678	2,315
Overall cost	6,815	6,413	6,400
Enrolled			
Ambulatory care	1,182 (+19.32%)	883 (+7.69%)	954 (+6.96%)
Medication	1,729 (-6.41%)	2,038 (+0.28%)	2,127 (+2.33%)
Inpatient care	2,428 (-13.59%)	1,965 (-36.28%)	1,738 (-33.14%)
Overall cost	6,278 (-7.87%)	5,581 (-14.81%)	5,749 (-11.31%)

Notes: €1 = US\$1.3361; figures in brackets denote difference as percentage.

Source: Modified according to AOK-Bundesverband, and I. Biesterfeld and P. Willenborg, "Chronikerprogramme lohnen sich," *Gesundheit und Gesellschaft*, June 2009 12(6):18–19.

can demonstrate such improvements in quality of care as well, early economic evaluations of the German programs also indicate *cost-effectiveness*,⁴⁵ especially with respect to hospital utilization. Moreover, costly complications, such as amputations, strokes, and heart attacks, are being reduced in these programs.

Factors contributing to the success of the programs.

Evaluation of the first years' medical outcomes of various diabetes disease-management programs in the German SHI supports the following conclusion: A nationwide standardization of care according to evidence-based guidelines, combined with a strong emphasis on quality assurance and primary care doctors as leaders in the process, can lead to improved outcomes in chronic care. Although the programs were implemented from the top, they were drafted through a process that included all major stakeholders (except patients).

Facilitating factors in the German experience include:

- Changes to date have included, for example, the reduction of bureaucracy by reducing documentation requirements and the transition from paper to electronic forms.
- Thus all patients enrolled in the programs can be treated according to the same standards. Physicians do not need to switch treatment standards between patients enrolled in the programs of different sickness funds.
- For patients who opt into the programs, copayments are waived; physicians receive a documentation fee for each enrolled individual per quarter; specialists get training programs reimbursed; and sickness funds receive a yearly administration fee for each enrollee.
- Other quality-assurance measures, such as quality circles in which individual cases are discussed with peers, are more hands-on. They are complemented by national standards for referral routines. For example, if a general practitioner does not succeed in bringing a patient's HbA1c or blood-pressure level into the recommended range within six months, he or she must refer the patient to a specialist, who in turn must refer the patient back within a certain time frame and submit an extensive report.

Implications for policymakers. Although Germany traditionally has had a weak primary care system, the nationwide implementation of DMPs has been successful. Key elements in this success include financial incentives for SFs, doctors, and patients to actively engage in managing chronic care; a sophisticated system of electronic medical records; and a quality-assurance system. Of course, there are also limitations and caveats for policymakers that need to be addressed when considering the implementation of such programs. One is selection bias, which may influence medical outcomes in the programs and thus may affect program results. However, it is noteworthy that in the region of North Rhine, the same medical-outcome improvements as in other regions could be shown despite an enrollment rate of some 80 percent to 90 percent of all diabetics. Under “real-life” conditions, at least, the programs show considerable improvement in the quality of care of chronic illnesses.

Other weak points are the insufficient integration of community resources into the programs and the lack of systematic decision support. Both of these elements are part of the chronic care model, but they were not made explicit when the programs were drafted—they constituted too big a task to tackle at the time. Another limitation is the programs’ single-disease focus, which should be changed to a modular approach in order to mirror the increasing multiple morbidities of the predominantly elderly patients. A first step in this direction has been the DMPs’ integration of all internal-medicine diagnoses into a common documentation routine with separate parts for individual diseases. A second step has been the integration of a heart-failure module into the DMP for coronary heart disease, thereby commencing that modular approach.

In reorganizing care, the programs could benefit from a stronger role for trained nurses in furthering patient education and patient self-management of chronic diseases. In general, trained medical personnel who are nonphysicians need to be central in these programs as they move from a treatment approach to a management approach. The “guided care model”⁴⁶ provides a good example of the integration of various tools to strengthen patient self-management coupled with trained nurses’ administration.

Implications for the United States. Although Germany, like the United States, traditionally has a weak primary care system, the disease-management programs for the chronically ill could be rolled out successfully in a national campaign. This success was due in no small part to the programs’ sustained funding and their rapid and extensive nationwide setup. Moreover, it is expected that regional variations in quality of care will be minimized: care is standardized to evidence-based guidelines, and an extensive database will be used to analyze trends in the quality of care and to adjust program procedures accordingly.

These strengths of the national rollout of the programs are at the same time a weakness that would especially manifest itself in the United States, as they limit the programs’ regional adaptability. A *statewide* rollout might be a more pragmatic solution for the United States. On the other hand, U.S. discussion on the implementation of medical homes shows quite a few similarities with the German discussion around the disease-management programs. Requirements such as timely appointments or the coordination of care through one physician (in the DMPs, the primary care physician) highlight the similarities between the two approaches. In fact, each disease-management GP in Germany could be thought of as providing a medical home for each enrolled patient.

In retrospect, it can be said that the disease-management programs are apt to considerably enhance primary care for chronically ill patients. Our results suggest that intensified care and strengthened self-management can sustain improvement in relevant health outcomes.

NOTES

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