
Germany's Disease Management Program: Improving Outcomes in Congestive Heart Failure

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Hospital admissions among patients with congestive heart failure (CHF) are a major contributor to health care costs. A comprehensive disease management program for CHF was developed for private and statutory health insurance companies in order to improve health outcomes and reduce rehospitalization rates and costs. The program comprises care calls, written training material, telemetric monitoring, and health reports. Currently, 909 members from six insurance companies are enrolled. Routine evaluation, based on medical data warehouse software, demonstrates benefits in terms of improved health outcomes and processes of care. Economical evaluation of claims data indicates significant cost savings in a pre/post study design.

INTRODUCTION

Hospital admissions among patients with CHF are a major contributor to health care costs. For this reason, ArztPartner almeda¹ developed a CHF disease management program. The program's aims were to make up deficits in health care delivery, improve quality of life, and reduce costs for the health insurance companies (e.g., by reducing the hospitalization rate [Stewart, Marley, and Horowitz, 1999; Whellan et al., 2001; Cline et al., 1998]). The conceptual basis of the ArztPartner almeda program is a care management model that integrates

¹ ArztPartner almeda is a for-profit disease management company and all shares are held by a private health insurance company.

The authors are with ArztPartner almeda. The statements expressed in this article are those of the authors and do not necessarily reflect the views or policies of ArztPartner almeda or the Centers for Medicare & Medicaid Services (CMS).

the individual's medical, physical, social, environmental, and emotional needs. Program design is in accordance with current evidence-based guidelines and quality is assured by a board of internationally acknowledged experts. The company's services are offered to private or statutory health insurance companies. Typical elements of the ArztPartner almeda CHF program are patient identification and recruitment, enrollment, telephone calls (care calls), behavior modification, telemetric weight and blood pressure monitoring, health reports, software solution, and evaluation.

The ArztPartner almeda approach is mainly single disease focused. Comorbidities, however, are handled within the program as submodules. If a patient suffers from CHF and diabetes, CHF is considered by definition as the lead diagnosis and the patient is enrolled in the CHF program. Diabetes is then treated as an optional submodule of the CHF program.

The ArztPartner almeda disease management program must be distinguished from the disease management programs that are linked to the risk-structure adjustment (RSA) funds. The latter have been introduced by national regulations on a large scale within the statutory health care sector. The framework for RSA disease management programs and the chronic conditions they cover (currently diabetes, breast cancer, coronary artery disease, and chronic obstructive pulmonary disease) are determined by a Federal Joint Committee with members from the various health care

contributors. For each patient enrolled, the statutory health insurance companies receive financial incentives derived from the RSA funds, a complicated system of cross-subsidization to account for misbalance in age and risk structure between the sickness funds. The major driver for RSA disease management programs is thus, an extrinsic (political) financial incentive rather than intrinsic program success and cost savings.

RSA disease management programs are tightly regulated and controlled, providing only limited scope for competitive approaches. They mainly target the physician, with a focus on documentation and regular physician visits. The RSA disease management programs rely predominantly on standardized and common procedures. In contrast, the ArztPartner almeda disease management program operates outside the RSA regulations. It mainly targets the patient, with a focus on patient empowerment and behavioral modification. Its smaller scale and fewer administrative regulations allow more scope for learning from experiences and flexible program optimization. Because CHF is not listed as a chronic condition within RSA disease management programs, the ArztPartner almeda CHF disease management program can be offered not only to private health insurance companies, but also to statutory health insurance companies.

METHODS

Patient Identification and Recruitment

Participation in the CHF program is voluntary and free of charge. Patients eligible for a health care program are identified in cooperation with the health insurance from claims data. A well-proven method is the identification of patients according to discharge diagnosis, ambulatory diagnosis, and/or specific

medication. In the recruitment process not only the patients, but also their physicians must be convinced of the benefits of the program. For this reason, information brochures are sent to the patient, who is encouraged to discuss the benefit of participation with his physician. Followup telephone calls start approximately 2 weeks after the brochures are sent out. This method ensures participation rates (patients enrolling in relation to patients eligible) between 20 and 30 percent depending on various factors such as age, sex, level of education, and profession. The distribution by age is shown in Figure 1. The maximum age group is 60-70. Participation rate of males is nearly twice as high than that of females.

Enrollment

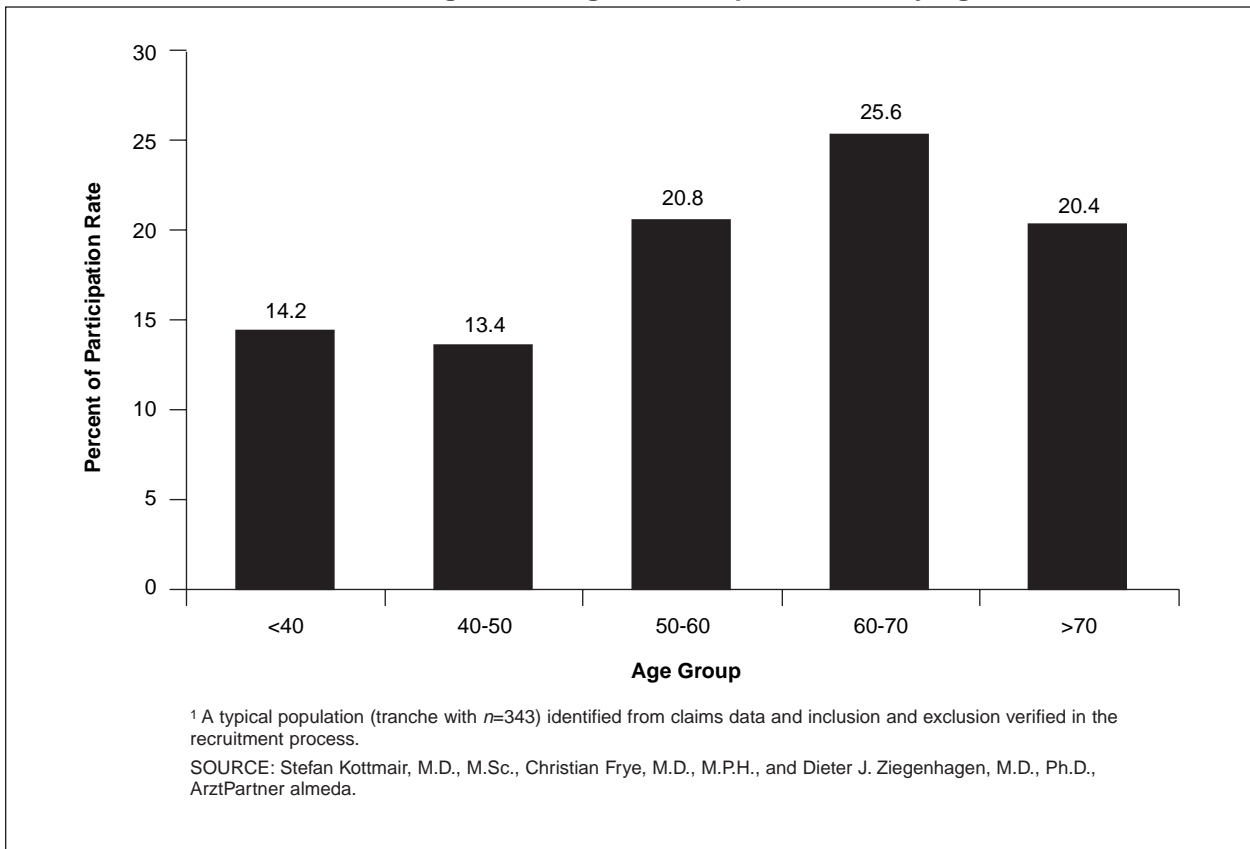
A patient who decides to participate must sign a document to consent to participation and data protection provisions. The patient also releases the physician from confidentiality. After having received informed consent for the program, a nurse in the medical service center initiates care. Each member has an individual nurse who is responsible for their care and supports their health care targets. The physician completes a medical questionnaire containing exclusion criteria, such as dementia, blindness, or severe cancer, as well as a specification of the diagnosis in terms of NYHA² stage. A direct fixed fee incentive of EURO 25 (approximately U.S. \$30) is received by the physician when the documentation has been completed.

Telephone Calls

The initial and continuous monitoring of medical data is part of a personalized coaching regimen. The specially trained

² New York Heart Association (NYHA)—a functional and therapeutic classification for prescription of physical activity for cardiac patients.

Figure 1
Disease Management Program Participation Rate¹, by Age



nurses conduct structured care calls: they collect data and analyze the patient's state of health and quality of life. In addition, health reports, and problem-oriented education material, which have been delivered to the patients, are discussed.

Telephone calls strengthen the relationship between patient and nurse, enhance compliance, and support empowerment, and behavior changes. Nurses in the medical service center telephone the patients at scheduled times. The interval between two telephone calls depends on the individual risk of the patient, ranging from 2 weeks to 3 months. During the care process, medical data, such as laboratory values, medication, or examinations, are regularly screened, target agreements reviewed, and compliance checked. The telephone calls follow standardized guidelines approved by medical experts.

Behavior Modification

The key target of the ArztPartner almeda care telephone calls is to promote positive behavior change in order to achieve better health outcomes (Georgiou et al., 2001) and higher quality of life. Individual level of motivation for behavior change is assessed according to the transtheoretical model (TTM) (Prochaska and Velicer, 1997), which defines five stages of change (1) precontemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance. Coaching actions are adapted to the individual TTM stage of change in order to move the patient forward on the TTM scale from low motivation level (precontemplation) to highest level (maintenance). A positive behavior change not only controls the amount of drug utilization, but can even make part of the medication unnecessary.

Telemetric Weight and Blood Pressure Monitoring

The monitoring of medical data is an important feature of the ArztPartner almeda program. Patients are equipped with telemetric weight scales and blood pressure meters (upper arm device) to support a continuous monitoring of medical data. The systems permit automatic data transfer by modem or cellular telephone. The software developed for ArztPartner almeda, *providinCare*[®], automatically checks the medical data for critical trends. If the underlying algorithm detects a critical trend, an alarm for the patients' personal nurse is generated and the patient is promptly contacted. If there remains any doubt about the patient's situation and acute risk, the nurse advises him to see his physician immediately.

Health Reports

Health reports provide feedback for the patient and his physician on a regular basis (examples are available on request from the author). The nurse discusses the reports with the patient during the care call. The reports help to motivate the patient by depicting goals already achieved. On the other hand, problems can be identified and new targets may be agreed on. The report also contains a reminder of the next medical examination. As a written document, the health report supports the patient's compliance in the process of care and strengthens abilities for self-management.

Risk Profiling

To ensure cost efficiency, the intensity and frequency of the applied service elements are stratified according to the patient's individual risk. Patients with a

lower risk for hospitalization or complications of their disease need less intensive care than patients with high risk, so they are allocated to different risk profiles. Risk is assessed with a score with NYHA stage, left ventricular ejection fraction, and hospitalization during last 24 months as input parameters.

Training Material

Patient empowerment and sustainable lifestyle modification concerning nutrition and exercise are important elements of the ArztPartner almeda programs. Educational material corresponding to disease-specific informational needs aims at self-management and training. All brochures are approved by external medical experts. The nurses discuss the informational material with the patient, provide information about the medical background of the chronic disease, and make the patient aware of the interrelation of medical situation and lifestyle. Health care reports, feedback of monitored data such as body weight and blood pressure, and regular reminders to visit the physician support the interaction among patient, physician, and provider.

Software Solution

A comprehensive data management system is a prerequisite for structured and standardized care. Furthermore, structured data provide the basis for valid evaluations. In order to manage the complex care process and medical data, a sophisticated information technology has been developed. The medical Customer Relationship Management (CRM) and data warehouse system was built to represent all processes of care; in that respect, it is a working tool for nurses, containing information about all kinds of interaction between patient and nurse. On the other

hand, it was established to provide a consistent data structure for storing medical data. Based on these structured data, algorithms for interventions can easily be implemented. Furthermore, reports can be generated for various purposes: feedback for patients and physician, internal quality control, and aggregated reporting for the insurance company.

Thus, the program's software is a key success factor for running cost-efficient health management services and for valid data analysis. In the future *providinCare*[®] may serve as a platform to build up a network of health care involving patients, physicians, hospitals, health insurers, and others who are involved in health care.

EVALUATION

Program Effectiveness

The CHF program is evaluated on a regular basis. This is done in order to demonstrate the benefits of the program, but also to identify possible areas of program optimization. The routine evaluations thus serve as a tool within internal quality management.

The data situation, however, is quite different from that for clinical studies. The evaluation is based on routine data collected from various sources with arbitrary time reference, such as physician's documentation, nurse's care calls, and telemetric devices. In order to allocate these data to a baseline and followup time scheme, it is necessary to synchronize them by applying appropriate timeframes.

Outcomes are measured in various dimensions: quality of care, health and economic outcomes, as well as patient's satisfaction, and quality of life. For privacy reasons, claims data at the health insurance company's site are kept separate from medical data, which are collected by the

provider. Hence, the health insurer can do only the economic evaluation. All other evaluations are provided by *ArztPartner almeda*.

Patient Characteristics

Currently 909 patients with CHF, from four statutory and two private health insurance companies, are enrolled in the program. The following data are taken as an example from one public sickness fund.

There are 185 patients enrolled (25.9 percent female, 74.1 percent male); mean age of participants is 65.6 +/- 10.2 years. The severity of the disease can be described with the distribution of NYHA stage (II: 51 percent, III: 37 percent, IV: 12 percent) and with the rate of comorbidities (Figure 2) (the low rate of diabetes is due to the fact that diabetes patients are selected for a RSA-based disease management program, that is provided by this particular sickness fund itself; without that selection the rate of diabetes varies typically between 15 and 25 percent). Approximately 71 percent of the members were eligible for telemetric monitoring of weight and blood pressure.

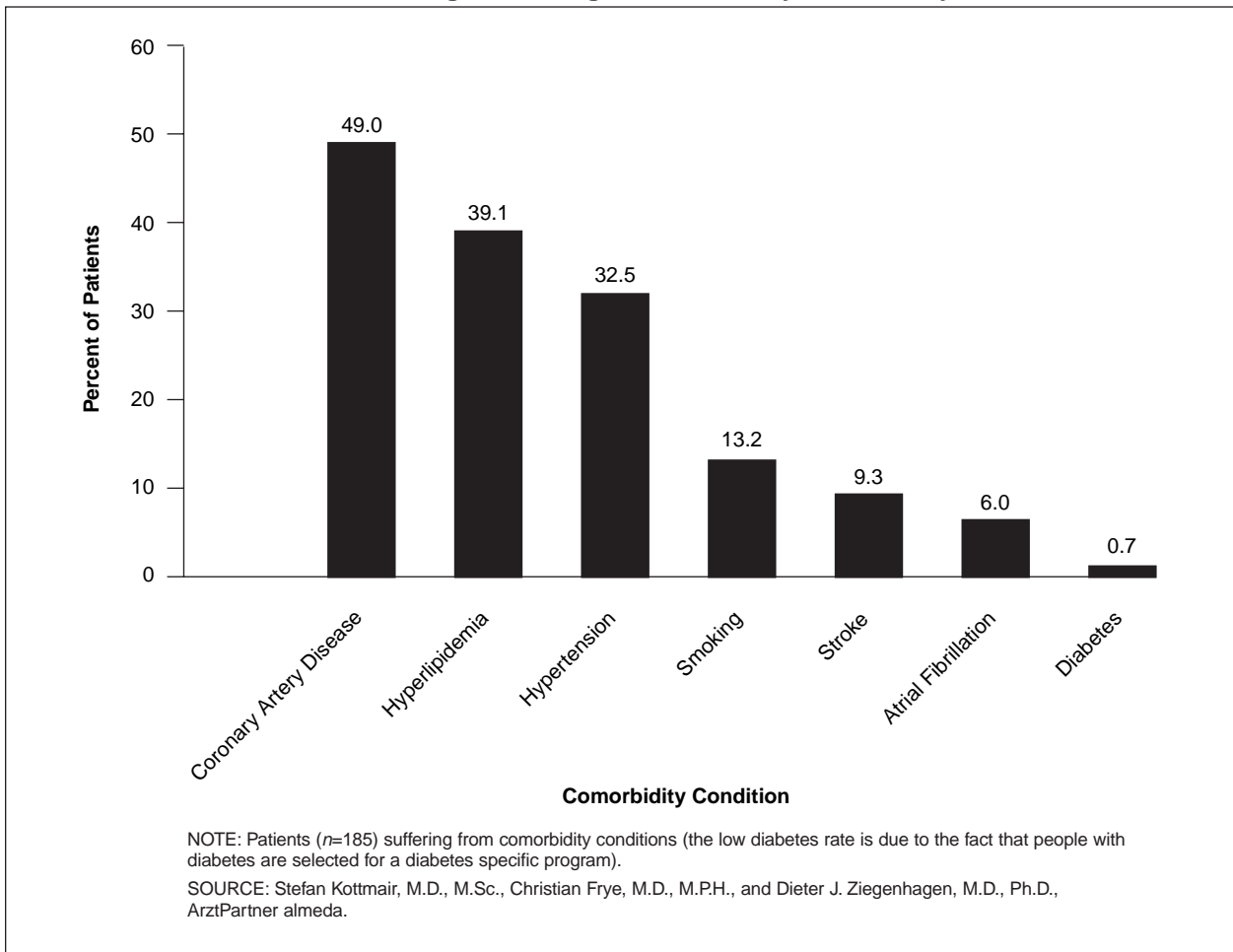
Health Outcomes

Health outcomes such as relief of symptoms (e.g., edema) are monitored on a regular basis within the care calls. Significant improvements can be demonstrated within the first 6 months of care. For example, the proportion of patients with severe edema drops from 21.9 percent at baseline to 4.6 percent at followup (Figure 3).

Quality of Care

Despite the fact that the program makes no attempt at direct intervention in the physicians' prescription behavior, the data

Figure 2
Percent of Disease Management Program Patients, by Comorbidity Conditions



clearly demonstrate an effect of the program as a whole. Quality of care expressed in terms of adherence to therapy guidelines shows significant improvement. For example, the proportion of patients under ACE-inhibitor (or AT1-antagonist) therapy rises from 49.7 to 70.2 percent during the first 6 months of care, and beta-blocker therapy rises from 45.7 to 60.3 percent, which constitutes a significant shift toward guideline recommendations (Figure 4).

Economic Outcomes

To assess economic outcomes, a pre/post study design is used, taking the program members as their own controls.

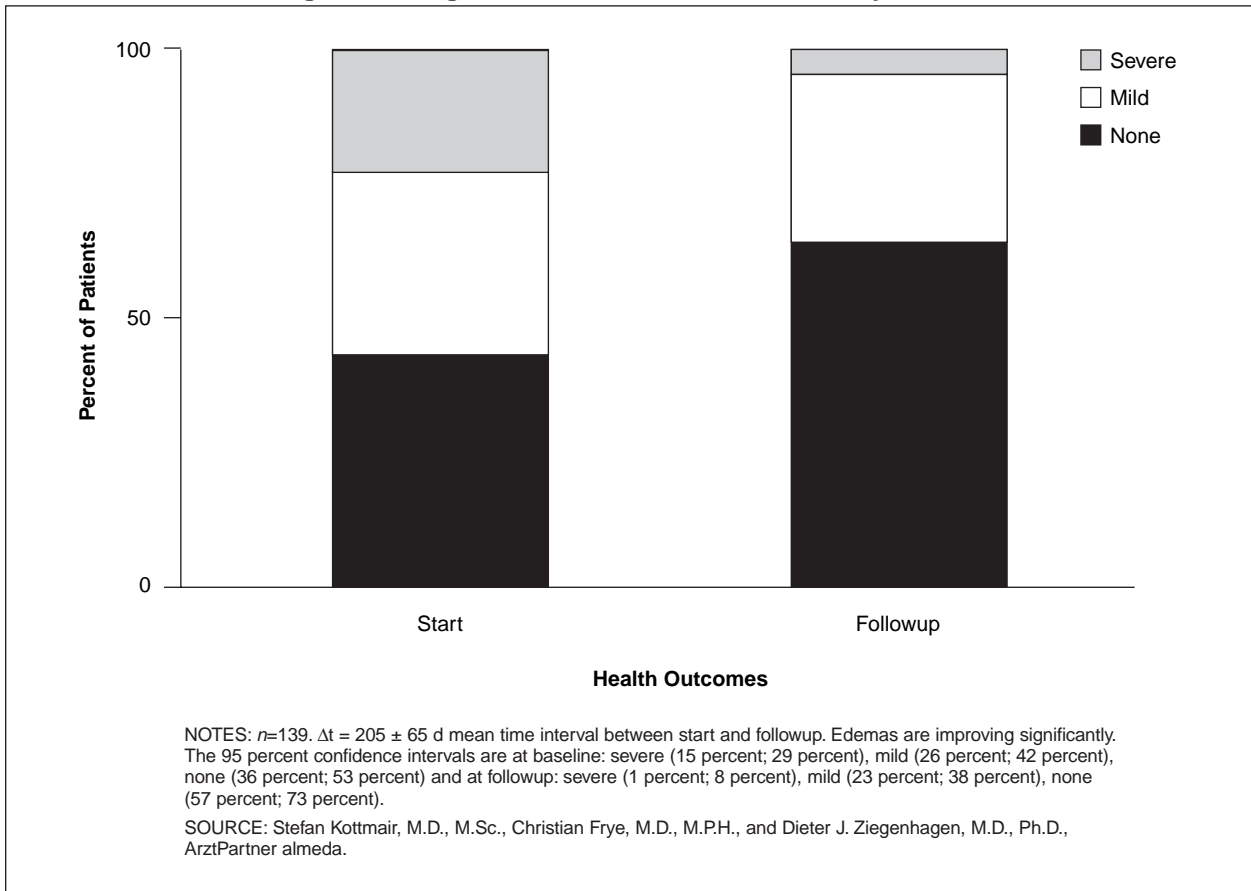
Total annual health care expenditures of the insurance company for the population of interest are compared 3 years prior to program enrollment with the first year after enrollment. Annual health care expenditures thus decline by 35 percent from pre to post-period. The cost reduction is mainly due to reduced expenditures for hospital care.

LIMITATIONS

Program evaluation is based on a pre/post design, taking the patients as their own controls. This approach is subject to possible bias like regression to the mean or placebo effects. A more rigorous study design is desirable for the future to

Figure 3

Disease Management Program Health Outcomes: Edemas, by Percent of Patients



confirm the observed effects. Furthermore, the results are obtained within a German health care system and as such transferable to other health care systems only with caution.

CONCLUSION

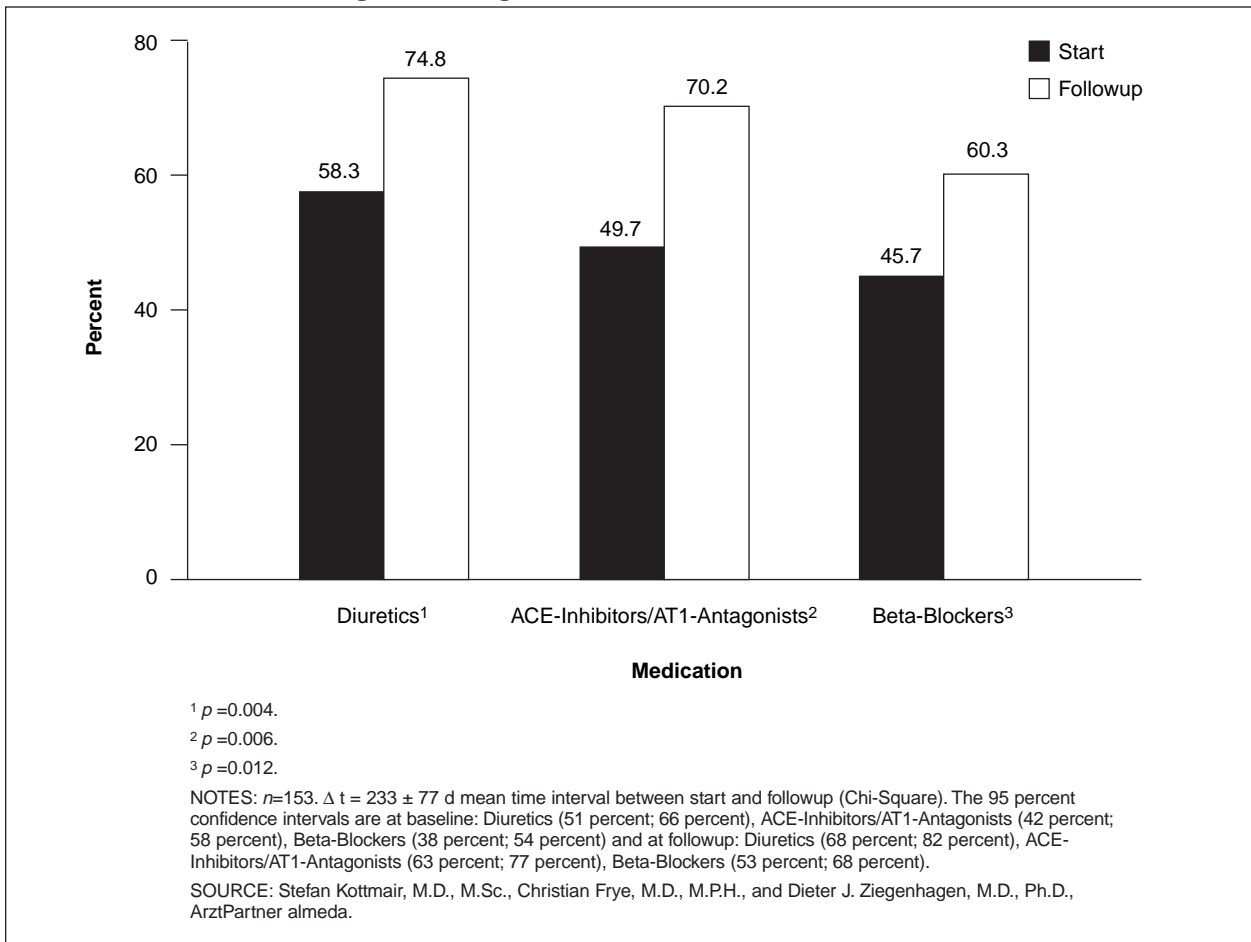
The CHF program as a structured and comprehensive disease management program is operating with stable procedures of care, i.e. every enrollee receives services in a standardized way according to the well defined workflow of the program. There are proven benefits in terms of adherence to guidelines, health outcomes, and economic results. An established software platform supports automated report-

ing of clinical outcomes and continuous quality improvement. Some issues remain open for further investigation, however.

The program attracts significantly more males than females, a fact that cannot be explained by the asymmetry within the invited population (51 percent male) alone. Therefore, the processes of recruitment should be revised in order to close that apparent gender gap.

The economic evaluations indicate substantial cost savings. These data have to be confirmed with further studies and appropriate control groups, addressing questions such as how cost efficiency can be further improved and what are the characteristics of the target group that the program benefits most. Regarding the effectiveness of the

Figure 4
Disease Management Program: Medication Guideline Recommendations



program, it is interesting (not to mention challenging) to learn more about the causal relationships between the observed program effects and particular service elements. Because telemetric monitoring contributes significantly to program costs, it is especially important to assess its influence on program outcomes. To gain further insight, plans are underway to set up a prospective study design with a randomized control group in the near future.

ACKNOWLEDGMENT

The authors would like to thank Katrin Lederer and Dr. Kristina Lickvers for their valuable suggestions, comments, and proofreading.

REFERENCES

Cline, C. M., Israelsson, B. Y., Willenheimer, R. B., et al.: Cost Effective Management Programme for Heart Failure Reduces Hospitalisation. *Heart* 80(5): 442-446, November 1998.

Georgiou, D., Chen. Y., Appadoo, S., et al.: Cost-Effectiveness Analysis of Long-Term Moderate Exercise Training in Chronic Heart Failure. *American Journal of Cardiology* 87(8): 984-988, April 2001.

Prochaska, J. O. and Velicer, W. F.: The Transtheoretical Model of Health Behavior Change. *American Journal of Health Promotion* 12(1): 38-48, September-October 1997.

Stewart, S., Marley, J. E., and Horowitz, J. D.: Effects of a Multidisciplinary, Home-Based Intervention on Unplanned Readmissions and Survival Among Patients with Chronic Congestive Heart Failure: A Randomised Controlled Study. *Lancet* 354(9184):1077-1083, September 1999.

Whellan, D. J., Gauden, L., Gattis, W. A., et al.: The Benefit of Implementing a Heart Failure Disease Management Program. *Archives of Internal Medicine* 161(18):2223–2228, October 2001.

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