

Disease Management Programs: Barriers and Benefits

Racheli Magnezi, MBA, PhD; Galit Kaufman, RN, MA; Arnona Ziv, MBA;
Ofra Kalter-Leibovici, MD; and Haim Reuveni, MD

Objectives: The healthcare system in Israel faces difficulties similar to those of most industrialized countries, including limited resources, a growing chronically ill population, and demand for high-quality care. Disease management programs (DMPs) for patients with a chronic illness aim to alleviate some of these problems, primarily by improving patient self-management skills and quality of care. This study surveyed the opinions of senior healthcare administrators regarding barriers, benefits, and support for implementing DMPs.

Study Design: Cross-sectional survey.

Methods: A 21-item questionnaire was self-completed by 87 of 105 (83%) healthcare administrators included in the study. Participants were 65.5% male and 47% physicians, 25.3% nurses, 17.3% administrators, and 10.3% other healthcare professionals.

Results: The main perceived benefit of DMPs among all respondents was improving quality of care. Other benefits noted were better contact with patients (81.6%) and better compliance with treatment (75.9%). Efficient long-term utilization of system resources was perceived as a benefit by only 58.6%. The main perceived barriers to implementing DMPs were lack of budgetary resources (69%) and increased time required versus financial compensation received (63.2%).

Conclusions: The benefits of DMPs were patient oriented; barriers were perceived as financial and limiting professional autonomy. Information regarding long-term benefits (better patient outcomes) that ultimately provide better value for the system versus short-term barriers (increased costs and expenditures of time without compensation) might encourage the implementation of DMPs in countries faced with a growing population of patients with at least 1 chronic illness.

Am J Manag Care. 2013;19(4):e140-e147

For author information and disclosures,
see end of text.

Healthcare markets are characterized by increasing costs, as well as by gaps in quality, safety, equity, and access. These are the result of market failure, observed when services are funded without evidence of cost-effectiveness. Chronic diseases are a major burden on the healthcare system. Disease management programs (DMPs) are the preferred means for helping chronically ill patients comply with their care. A DMP is defined by the World Health Organization as “ongoing management of conditions over a period of years or decades, by providing and improving the necessary resources and support to enable patients’ self management skills.”^{1,2}

Disease management programs aim to reduce waste, increase the efficiency of healthcare delivery, and reallocate resources to improve value.³ Porter⁴ noted that achieving high value for patients must become the overarching goal of healthcare delivery, with value defined as the health outcomes achieved per dollar spent. If value improves, patients, payers, providers, and suppliers all can benefit, while the economic sustainability of the healthcare system is strengthened.⁴

Disease management programs can lead to improvements in health. Interventions such as patient and provider education, feedback, and reminders have been successful in increasing provider adherence to guidelines, enhancing patient satisfaction,⁵⁻⁷ reducing morbidity⁸ and mortality,⁹ and improving patient disease control and health status¹⁰ in conditions such as diabetes¹¹ and depression.¹² Disease management programs have also been effective for patients with asthma, arthritis, and coronary artery disease.¹³

The economic effectiveness of DMPs is not clear.¹⁴ Some studies have found a net cost savings for DMPs and a return on investment of \$1.26 per \$1.00 spent on disease management services for patients with asthma, congestive heart failure, and diabetes.¹⁵ Other studies showed that DMPs are associated with increased costs for diabetes and coronary artery disease,¹⁶ but not for asthma. Short-term costs might increase, but financial relief appears over the long term from a decrease in the incidence of diabetes-related complications and fewer hospital visits.^{17,18}

Financial savings are realized after about 3 years and depend on the type of intervention program.^{19,20} Some chronic obstructive pulmonary disease (COPD) programs have led to fewer hospitalizations and emergency department (ED) visits.²¹ However, a systematic review of multiple interventions in asthma and COPD revealed no significant improvements in

In this article
Take-Away Points / e141
Published as a Web exclusive
www.ajmc.com

the number of ED visits or in pulmonary function.²² Wennberg and colleagues²³ demonstrated that by using a telephone-care management program, medical costs were reduced by almost 10% after 12 months. Other studies demonstrated that only DMPs that include financial incentives for physicians²⁴⁻²⁶ and/or patients¹⁸ are efficient and lead to improved health outcomes and compliance.

Benefits from implementing DMPs largely depend on the structure of the specific healthcare system, including financial arrangements, staffing, and level of service. Although economic and organizational efficiency in a given system might improve, this does not necessarily imply that the improved efficiency will be replicated in other systems.

Israel's national health insurance law provides all citizens with basic healthcare coverage. Healthcare is provided by 4 health funds, which are structured as health maintenance organizations (HMOs). The HMOs are faced with growing costs of providing health services and increasing numbers of chronically ill patients. They recently implemented DMPs for a number of chronic illnesses, including congestive heart failure, COPD, and depression. In the initial stages of the programs, administrative difficulties were revealed, along with barriers to conducting these programs in primary care clinics. The focus of this study was to investigate the origins of these obstacles. Therefore, we interviewed senior healthcare managers and policy makers in Israel to assess their attitudes toward barriers to implementing DMPs within the national healthcare system.

METHODS

Questionnaire Development

A 21-item questionnaire was composed by the investigators, based on their experience in planning, implementing, and evaluating DMPs. Following a pretest of the questionnaire for clarity, in-depth interviews were conducted with 24 nurses and physicians in the health system who were familiar with implementing DMPs. The questionnaire was revised based on their comments.

The questionnaire included 3 sections: (1) demographic and occupational characteristics; (2) attitudes about the potential benefits of DMPs to the healthcare system, to community medical staff, and to patients with a chronic illness, and opinions about which professionals are most suited to managing a DMP; and (3) attitudes regarding barriers that might prevent healthcare system policy makers and community medical staff from implementing DMPs. Responses

Take-Away Points

A survey among healthcare executives regarding implementing disease management programs (DMPs) found that perceived benefits were patient oriented (improving quality of care, better contact with patients, and better compliance with treatment). Barriers were perceived as increased costs, expenditures of time without compensation, and limiting professional autonomy.

- Long-term advantages (better patient outcomes) need to be weighed against short-term difficulties (increased costs and expenditures of time without compensation) when implementing DMPs.
- Study results could be used as indicators to encourage the implementation of DMPs in countries faced with a growing population of patients with at least 1 chronic illness.

were ranked on a Likert scale from 1 (strongly agree) to 4 (strongly disagree). After each section, the respondent was asked to rank the answers marked "strongly agree" from 1 to 3, to determine a priority ranking for each series of questions (barriers, benefits, and professional management).

Questionnaire Administration

This cross-sectional survey was conducted in Israel from March to September 2010. The study population consisted of 105 senior healthcare administrators and included academic policy makers as well as top managers from the Ministry of Health and all 4 healthcare funds. Respondents' professional backgrounds included physicians, nurses, pharmacists, and social workers. The fields of mental health and dentistry were not included. All respondents had held their current position for at least 2 years. Of these, 87 (83%) respondents agreed to schedule time to complete the survey in the presence of one of the investigators. This was done to improve the response rate. The interviews were conducted by investigators who were familiar with DMPs in Israel. They did not provide any assistance in completing the questionnaires.

Data Analysis

The data were analyzed using SAS version 9.2 (SAS Institute, Inc, Cary, North Carolina). For each statement in each question, 2 variables were built: 1 for the Likert scale responses and 1 for ranking the statements that were marked "strongly agree." Respondents were categorized into 3 groups: physicians, nurses, and others (paraprofessional and administrative personnel). For categorical variables, the Pearson χ^2 test or Fisher exact test, as appropriate, was used to compare the distributions of the 3 groups. The continuity-corrected χ^2 test was used for binary variables.

RESULTS

A total of 87 senior executive managers, representing about 83% of all senior administrators of the national health-

■ **Table 1.** Characteristics of the Study Participants

	No. (%)		
	Employed by an HMO (n = 69; 79.3%)	Employed by the Ministry of Health (n = 18; 20.7%)	Total (N = 87)
Profession			
Physician	31 (44.9)	10 (55.5)	41 (47.1)
Nurse	19 (27.5)	3 (16.6)	22 (25.3)
Healthcare administrator	10 (14.5)	5 (27.7)	15 (17.3)
Other healthcare professional	9 (13)	—	9 (10.3)
Sex			
Male	42 (60.9)	15 (83.3)	57 (65.5)
Female	27 (39.1)	3 (16.6)	30 (34.5)

HMO indicates health maintenance organization.

care system, participated in the study. Most of the respondents (79.3%) held managerial positions in the HMOs, and 18 (20.7%) had positions in the Ministry of Health.

Table 1 presents the background characteristics of the study participants; 65.5% were male, 47% were physicians, 22 (25.3%) were nurses, and the remainder were paraprofessional and administrative professionals. Among the respondents, 63 (72.4%) had experience planning, implementing, or evaluating a DMP.

Survey Responses

Attitudes Toward Disease Management Programs. Almost all respondents (96.6%) replied that DMPs are important for the healthcare system and that healthcare organizations should include them in their 5-year strategic plans.

Managing a Disease Management Program. Overall, 79 (90.8%) respondents indicated that a DMP should be implemented by a multidisciplinary team. Thirty-three (37.9%) stated that the program should be headed by a physician, 28 (32.2%) preferred a nurse, and only 6 (6.9%) indicated that a doctor and nurse should head the program jointly. A significant link was found between the respondents' professions and their views on who should head the DMP, with 58.5% of physicians saying it should be a physician, and 68.2% of the nurses stating that a nurse should head the program ($P < .001$).

Implementing Disease Management Programs. A total of 82 (94.3%) participants responded that implementing DMPs was a very important component of the healthcare system. The majority ($n = 44$ [50.6%]) said that it was the responsibility of the HMOs to implement DMPs. The remaining responses were split between allocating the responsibility to the Ministry of Health ($n = 21$ [24.1%]) or to the Ministry of Health and the 4 national HMOs as a joint venture ($n = 22$ [25.3%]). In the latter case, the ministry would assume

responsibility for administrative management and allocating resources to the programs, and the HMOs would implement and promote them.

Prioritizing Clinical Domains for Disease Management Programs. Diabetes and congestive heart failure were noted by 94.3% and 90.8% of the senior managers, respectively, as conditions that could benefit from a DMP. Only 40.2% agreed that a DMP might be helpful for depression and anxiety. There were no differences between the opinions of senior physicians, nurses, paraprofessionals, and administrative personnel about the priority of implementing these programs. However, more nurses than physicians thought that DMPs would be most effective in improving outcomes in illnesses such as hypertension (81.8% vs 56.1%, respectively; $P = .05$), asthma (72.7% vs 46.3%, respectively; $P = .02$), and COPD (90.9% vs 60% respectively, $P = .03$).

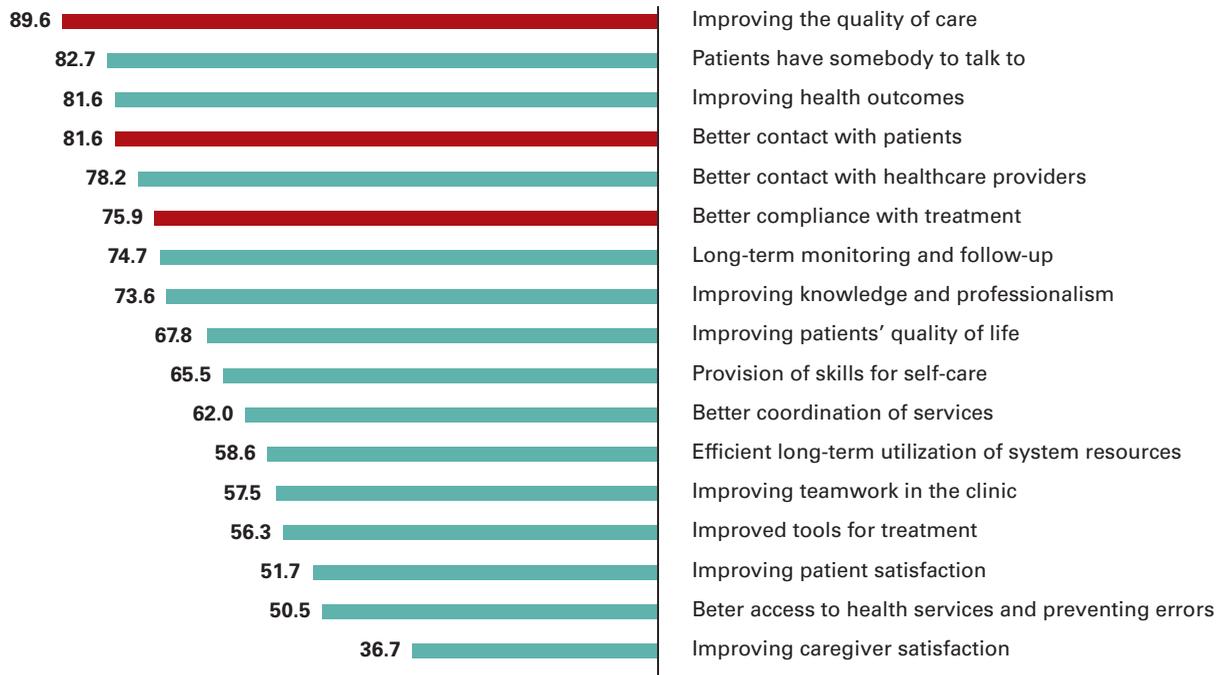
Benefits to the Healthcare System From Implementing Disease Management Programs. **Figure 1** shows the perceived benefits of implementing a DMP. Improving quality of care was ranked as most the beneficial aspect by all respondents (89.6%). As seen in **Table 2**, nurses perceived more benefits from implementing DMP programs than physicians and other professional managers, including improving caregiver satisfaction, improving knowledge and professionalism, better contact with patients, and improving the patient's quality of life.

Physicians and other managers expressed significantly stronger agreement than nurses with the indicator, "Better access to health services and preventing errors." On the other hand, both physicians and nurses agreed that the DMPs would contribute to efficient, long-term utilization of system resources.

There were no significant differences among the study participants regarding the remaining potential benefits. Improved tools for treatment and better compliance

Disease Management Programs

Figure 1. Overall Ranking (%) of the Benefits of Implementing Disease Management Programs in a Healthcare System



Red bars indicate top 3 benefits marked "strongly agree."

Table 2. Disease Management Program Benefits According to the Various Medical Professionals Surveyed

Benefits	No. (%)			P
	Physicians	Nurses	Others	
Improving quality of care	37 (90.2)	20 (90.9)	21 (87.5)	.09
Patients have somebody to talk to	34 (83)	20 (90.9)	18 (75)	.361
Improving health outcomes	31 (75.6)	19 (86.4)	21 (87.5)	.393
Better contact with patients	34 (82.9)	20 (95.2)	17 (70.8)	.102
Better contact with healthcare providers	32 (78)	19 (86.4)	17 (70.9)	.444
Better compliance with treatment	32 (78)	16 (72.7)	18 (75)	.888
Long-term monitoring and follow-up	28 (68.3)	19 (86.4)	18 (75)	.290
Improving knowledge and professionalism	27 (65.9)	21 (95.5)	16 (66.7)	.019
Improving patients' quality of life	26 (63.4)	20 (90.9)	13 (54.2)	.015
Provision of skills for self-care	24 (58.5)	17 (77.3)	16 (66.7)	.325
Better coordination of services	26 (63.4)	12 (54.6)	16 (66.7)	.678
Efficient long-term utilization of system resources	28 (68.3)	14 (63.6)	9 (37.5)	.044
Improving teamwork in the clinic	20 (48.8)	14 (66.7)	16 (66.7)	.244
Improved tools for treatment	24 (58.5)	12 (54.6)	13 (54.2)	.925
Improving patient satisfaction	24 (50.5)	12 (54.6)	9 (37)	.249
Better access to health services and preventing errors	18 (45)	8 (36.4)	18 (75)	.018
Improving caregiver satisfaction	11 (26.8)	13 (59.1)	8 (33.3)	.037

Boldfacing indicates statistical significance.

■ **Figure 2.** Rank Order (%) of Barriers That Prevent Implementation of Disease Management Programs in a Healthcare System



DMP indicates disease management program.
Red bars indicate top 4 ranked barriers marked “strongly agree.”

with treatment were viewed as equally beneficial by all respondents.

Among the questionnaire responses rated “strongly agree,” the top 3 ranked benefits for the healthcare system were improving the quality of care, better contact with patients, and better compliance with treatment. These are denoted by the red bars in Figure 1.

Barriers to Implementing Disease Management Programs. The top 3 perceived barriers to implementing DMPs were lack of budgetary resources (69%), increased investment of time versus reward received (63.2%), and lack of physical resources, training, and manpower (63%) (Figure 2). The barriers marked “strongly agree” were prioritized as lack of resources, increased investment of time versus reward, and fear of losing autonomy, professional status, and authority. These are denoted by the red bars in Figure 2. As seen in Table 3, nurses indicated significantly more barriers than physicians, such as management’s lack of awareness of the importance of DMPs, lack of organizational commitment, and lack of budgetary resources.

The need to invest more time in patient education and increased burden on community medical staff were cited equally by all respondents. Physicians and nurses tended to place more importance on the need for compensation and incentives. A higher percentage of nurses than physicians and other managers noted low caregiver motivation due to lack of organizational support and lack of faith in the success of DMPs, but these differences were not statistically significant.

DISCUSSION

In 2011, the World Health Organization placed DMPs at the top of its global and national agendas, and presented a comprehensive strategy and goals for implementing such programs.² In this study, most participants agreed that healthcare organizations should include DMPs in their 5-year strategic plans.

The profile of patients with chronic illnesses (in terms of prevalence rates and needs) in Israel is similar to that of other Organisation for Economic Co-operation and Development (OECD) countries, the European Union, the United States²⁷⁻³⁶ and other countries such as New Zealand.³⁷ The health system in Israel is similar in many ways to those in countries with national health insurance, including England, Canada, and Germany. However, it differs greatly from countries where the healthcare system is driven by economic factors, such as the United States. In spite of this, we believe that some of the perceived barriers and benefits found in this study—including quality issues, financial and professional concerns, and fear of organizational changes—are common to all healthcare systems.

Similar to other studies, our results show that DMPs are perceived as beneficial to patients.^{5-8,10} Disease management programs can lead to improved communication between healthcare providers and patients, and help patients learn to improve their self-care skills.^{1,2} These programs have led to better compliance with treatment regimens⁵⁻⁷ and could promote efficient long-term utilization of system resources.

■ **Table 3.** Barriers to Disease Management Programs According to Professional Background

Barriers	No. (%)			P
	Physicians (n = 41)	Nurses (n = 22)	Others ^a (n = 24)	
Lack of budgetary resources	29 (70.7)	19 (86.4)	12 (50)	.034
Increased investment of time versus reward received	28 (70)	14 (63.6)	13 (54.2)	.442
Lack of office space, training, and manpower	26 (63.4)	15 (68.2)	13 (54.2)	.601
Lack of organizational commitment	23 (56.1)	14 (66.7)	7 (29.2)	.029
Increased burden on community medical staff	20 (48.8)	10 (45.5)	11 (45.8)	.972
Lack of awareness and knowledge of the importance of DMPs	16 (39)	16 (72.7)	9 (37.5)	.020
Need for compensation and incentive	20 (48.8)	10 (45.6)	6 (25)	.170
The need to invest more time in patient education	16 (39)	9 (40.9)	10 (41.7)	.975
Low caregiver motivation due to lack of organizational support	14 (35)	12 (54.6)	7 (29.2)	.175
Difficulty coping with changes in traditional treatment methods	12 (29.3)	10 (45.5)	10 (41.7)	.376
Fear of losing autonomy, professional status, and authority	10 (25)	10 (45.5)	9 (16.7)	.045
Lack of faith in the success of DMPs	9 (22)	10 (47.6)	8 (33.3)	.116 ^b
Difficulty in providing appropriate multidisciplinary treatment	9 (22)	5 (22.7)	8 (33.3)	.593 ^b
Fear of losing patients to other caregivers	7 (17.9)	6 (27.2)	5 (20.8)	.582 ^b

DMP indicates disease management program.
^aParaprofessional and administrative managers.
^bFisher exact test.
 Boldfacing indicates statistical significance.

Although DMPs have numerous potential advantages, there is no global consensus that DMPs actually increase the efficiency of healthcare delivery or add value to the system.³⁸

We found that the main barriers to implementing DMPs were lack of funding, the need to invest more time with the patient, and lack of organizational support for caregivers. As seen, financial incentives alone will not overcome the barriers to implementing DMPs. Rather, it is important to provide education and information about the experiences of other health systems to help staff believe in the success of DMPs.

In almost every healthcare system worldwide, DMPs are implemented and administered successfully by nurses.³⁹⁻⁴¹ Nurses recognize the potential for professional growth and knowledge through DMPs, as well as the possibility for meaningful improvements in patient care. However, nurse administrators also recognize the structure of the healthcare organization hierarchy and know that it is not easy to successfully implement these programs because of existing barriers. This dichotomy explains the propensity of the nurse administrators to identify both more barriers and more benefits to DMPs than the other professionals queried.

Although nurse managers identified fear of loss of autonomy as a barrier, the opposite usually occurs. Nurses tend to gain increased status and autonomy related to their responsibilities regarding implementation of DMPs. On the other

hand, physicians appeared to feel secure in their autonomy and did not anticipate a loss of status.^{42,43}

Even though some of the differences in responses between the professions were not statistically significant because of the small numbers in each group, the physicians and nurses queried seemed to be more aware of the potential benefits of DMPs than the paraprofessionals and administrative managers (Table 2). That might have been because they were more involved in the daily aspects of direct patient care.

Implementing DMPs requires organizational change. As seen in our results, staff might be afraid of change and will need reassurance that DMPs will not compromise their professional status or prestige. The key for success is the inclusion and collaboration of all parties in the implementation process, enabling them to overcome perceived barriers, including uncertainties and reallocation of resources. The medical team needs information, training, practice, support, empowerment, and reinforcement to increase the skills required by DMPs and to reduce burnout.³¹⁻³⁴ Introducing incentives for implementing DMPs might increase the use of these programs.²⁸ Financial incentives for healthcare staff—in the form of rewards for improved medical results,³⁸ payment for performance,⁴⁴ home visits, and unreimbursed encounters with patients such as phone calls and e-mails—have been found helpful. Incentives for healthcare providers (HMOs) are an additional way to encourage implementa-

tion of DMPs. Such an action plan was successfully initiated in Germany.⁴⁵ Another possible incentive would be for the government to allocate additional funds to the HMOs for program implementation; later, when DMPs demonstrate a financial advantage, the HMO budgets will bear the financial responsibility for them.

Healthcare organizations consider cost-effectiveness when allocating resources. The cost-benefit ratio of DMPs varies greatly across healthcare systems, in particular because of their complexity. The vast array of variables involved in DMPs makes it very difficult to assess both their clinical effectiveness and their cost-effectiveness.^{46,47} Some studies that evaluated DMPs did not find short-term cost savings and revealed unclear long-term results, which are barriers to implementation.^{21,25}

Our results indicate that senior managers recognize the importance of DMPs and their potential benefits. However, because there is not yet strong evidence of their effectiveness, financing their implementation competes with other more urgent needs. It is possible that the results of 3 ongoing clinical trials examining the effectiveness of DMPs among patients with heart failure and chronic lung disease will be an incentive for health policy makers to adopt or reject such programs in the health system in Israel.

This study has a few limitations. The results are based on a survey of senior-level healthcare administrators and policy makers in Israel. However, because the Israeli system is similar to the systems in most OECD countries, these results might be applicable to countries that are also facing increasing numbers of patients with at least 1 chronic illness. Obtaining the opinions of doctors and nurses in the field who would have to implement DMPs within their scope of practice would likely add valuable information about this subject.

The findings reported here add information regarding perceived benefits and barriers to implementing DMPs and suggests that DMPs are important to healthcare systems. The controversies regarding DMPs should challenge investigators to provide more information to policy makers in order to eliminate barriers and to enable the provision of better care to patients with a chronic illness.

CONCLUSIONS

As suggested by the World Health Organization, DMPs add value to healthcare systems. Internal and external barriers to implementing DMPs are common to many countries. Disease management programs can enable organizations to provide better healthcare; therefore, DMPs can be regarded as an important investment in the future of a healthcare organization. The controversies regarding the value of DMPs

should challenge investigators to provide more evidence of their benefits to healthcare providers on all levels.

Acknowledgments

The authors thank the Israel National Institute for Health Policy Research for providing funding for this study, as well as Faye Schreiber, MS, for editorial assistance.

Author Affiliations: From Public Health and Health Systems Management Program, Department of Management (RM), Bar Ilan University, Ramat Gan, Israel; The Gertner Institute for Epidemiology and Health Policy Research (RM, GK, AZ, OK-L), Tel Hashomer, Tel Aviv, Israel; Ben Gurion University of the Negev (HR), Beer Sheva, Israel.

Funding Source: This study was funded by the Israel National Institute for Health Policy Research (grant 32/2009/r).

Author Disclosures: The authors (RM, GK, AZ, OK-L, HR) report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (RM, GK); acquisition of data (RM, GK); analysis and interpretation of data (RM, AZ); drafting of the manuscript (RM); critical revision of the manuscript for important intellectual content (RM, GK, AZ, OK-L, HR); statistical analysis (RM, AZ, OK-L, HR); provision of study materials (RM, GK, AZ, OK-L, HR); obtaining funding (RM); administrative, technical, or logistic support (RM, GK); and supervision (RM, GK).

Address correspondence to: Racheli Magnezi, MBA, PhD, Head, Public Health and Health Systems Management Program, Department of Management, Bar Ilan University, Ramat Gan, Israel. E-mail: magnezir@biu.ac.il.

REFERENCES

1. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, part 2. *JAMA*. 2007;288(15):1909-1914.
2. Beaglehole R, Horton R. Chronic diseases: global action must match global evidence. *Lancet*. 2010;376(9753):1619-1621.
3. Fraser I, Encinosa W, Glied S. Improving efficiency and value in health care: introduction. *Health Serv Res*. 2008;43(5, pt 2):1781-1786.
4. Porter ME. What is value in health care? *N Engl J Med*. 2010;363(26):2477-2481.
5. Welch G, Allen NA, Zagarins SE, Stamp KD, Bursell SE, Kedziora RJ. Comprehensive diabetes management program for poorly controlled Hispanic type 2 patients at a community health center. *Diabetes Educ*. 2011;37(5):680-688.
6. Esposito D, Brown R, Chen A, Schore J, Shapiro R. Impacts of a disease management program for dually eligible beneficiaries. *Health Care Financ Rev*. 2008;30(1):27-45.
7. Brown R, Peikes D, Chen A, Schore J. 15-site randomized trial of coordinated care in Medicare FFS. *Health Care Financ Rev*. 2008;30(1):5-25.
8. Fortin M, Hudon C, Bayliss EA, van den Akker M. Multimorbidity's many challenges. *BMJ*. 2007;334(7602):1016-1017.
9. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med*. 2006;3(11):e442.
10. Landon BE, LeRoit SA, O'Malley J, et al. Improving the management of chronic disease at community health centers. *N Engl J Med*. 2007;356(9):921-934.
11. Stark RG, Schunk MV, Meisinger C, Rathmann W, Leidl R, Holle R; KORA Study group. Medical care of type 2 diabetes in German disease management programmes: a population-based evaluation. *Diabetes Metab Res Rev*. 2011;27(4):383-391.
12. Ryan CE, Keitner GI, Bishop S. An adjunctive Management of Depression Program for difficult-to-treat depressed patients and their families. *Depress Anxiety*. 2010;27(1):27-34.
13. Williams B, Pace AE. Problem based learning in chronic disease management: a review of the research. *Patient Educ Couns*. 2009;77(1):14-19.
14. Linden A. Use of the pre-post method to measure cost-savings in disease management: issues and implications. *Dis Manage Health Outcomes*. 2007;15(1):13-18.

Disease Management Programs

15. Dall TM, Askarinam Wagner RC, Zhang Y, Yang W, Arday DR, Gantt CJ. Outcomes and lessons learned from evaluating TRICARE's disease management programs. *Am J Manag Care*. 2010;16(6):438-446.
16. Mangione CM, Gerzoff RB, Williamson DF, et al; TRIAD Study Group. The association between quality of care and the intensity of diabetes disease management programs. *Ann Intern Med*. 2006;145(2):107-116.
17. Bunn WB 3rd. Best practices in the care of type 2 diabetes: integrating clinical needs with medical policy and practice. *Am J Manag Care*. 2009;15(9)(suppl):S263-S268.
18. Cutler TW, Palmieri J, Khalsa M, Stebbins M. Evaluation of the relationship between a chronic disease care management program and California pay-for-performance diabetes care cholesterol measures in one medical group. *J Manag Care Pharm*. 2007;13(7):578-588.
19. Cromwell J, McCall Nancy, Burton J. Evaluation of Medicare Health Support chronic disease pilot program. *Health Care Financ Rev*. 2008;30(1):47-60.
20. Hoy WE, Davey RL, Sharma S, Hoy PW, Smith JM, Kondalsamy-Chennakesavan S. Chronic disease profiles in remote Aboriginal settings and implications for health services planning. *Aust N Z J Public Health*. 2010;34(1):11-18.
21. Rice KL, Dewan N, Bloomfield HE, et al. Disease management program for chronic obstructive pulmonary disease: a randomized controlled trial. *Am J Respir Crit Care Med*. 2010;182(7):890-896.
22. Lemmens KM, Nieboer AP, Huijsman R. A systematic review of integrated use of disease-management interventions in asthma and COPD. *Respir Med*. 2009;103(5):670-691.
23. Wennberg DE, Marr A, Lang L, O'Malley S, Bennett GB. A randomized trial of a telephone care-management strategy. *N Engl J Med*. 2010;363(13):1245-1255.
24. Eapen ZJ, Reed SD, Curtis LH, Hernandez AF, Peterson ED. Do heart failure disease management programs make financial sense under a bundled payment system? *Am Heart J*. 2011;161(5):916-922.
25. Robinson JC, Casalino LP, Gillies RR, Rittenhouse DR, Shortell SS, Fernandes-Taylor S. Financial incentives, quality improvement programs, and the adoption of clinical information technology. *Med Care*. 2009;47(4):411-417.
26. Matkic S, Seid M, Sai M. Evidence for the effect of disease management: is \$1 billion a year a good investment? *Am J Manag Care*. 2007;13(12):670-676.
27. Buss R, Blümel M, Scheller-Kreinsen D, Zenther A. *Tackling Chronic Disease in Europe: Strategies, Interventions and Challenges*. Observatory Studies Series, No. 20. European Observatory on Health Systems and Policies. <http://www.euro.who.int/en/who-we-are/partners/observatory/studies/tackling-chronic-disease-in-europe-strategies,-interventions-and-challenges> Published 2010. Accessed February 27, 2013.
28. Nolte E, Knai C, McKee M. *Managing Chronic Conditions: Experience in Eight Countries*. Observatory Studies Series, No. 15. European Observatory on Health Systems; and Policies. <http://www.euro.who.int/en/who-we-are/partners/observatory/studies/managing-chronic-conditions.-experience-in-eight-countries>. Published 2009. Accessed February 27, 2013.
29. Busse R. Disease management programs in Germany's statutory health insurance system. *Health Aff (Millwood)*. 2004;23(3):56-67.
30. Lemmens KM, Rutten-Van Mülken MP, Cramm JM, Huijsman R, Bal RA, Nieboer AP. Evaluation of a large scale implementation of disease management programmes in various Dutch regions: a study protocol. *BMC Health Serv Res*. 2011;11(1):6.
31. Benkner S, Arbona A, Berti G, et al. @neurIST: infrastructure for advanced disease management through integration of heterogeneous data, computing, and complex processing services. *IEEE Trans Inf Technol Biomed*. 2010;14(6):1365-1377.
32. Azarmina P, Prestwich G, Rosenquist J, Singh D. Transferring disease management and health promotion programs to other countries: critical success factors. *Health Promot Int*. 2008;23(4):372-379.
33. La Torre G, De Giusti M, Mannocci A, et al; Disability Management Italian Collaboration Group, Damiani G, von Pinoci M, Fanton C, Federico B. Disability Management Italian Collaboration Group, Damiani G, von Pinoci M, Fanton C, Federico B. Disability management: the application of preventive measures, health promotion and case management in Italy. *J Prev Med Hyg*. 2009;50(1):37-45.
34. Gallant CR, MacKinnon NJ, Sprague DA. Disease management in Canada: surmounting barriers to adoption. *Health Manage Forum*. 2007;20(4):27-32.
35. Howlett JG, McKelvie RS, Costigan J, et al; Canadian Cardiovascular Society. The 2010 Canadian Cardiovascular Society guidelines for the diagnosis and management of heart failure update: heart failure in ethnic minority populations, heart failure and pregnancy, disease management, and quality improvement/assurance programs. *Can J Cardiol*. 2010;26(4):185-202.
36. Linden A. Is Israel ready for disease management? *Isr Med Assoc J*. 2006;8(10):667-671.
37. Wheeler A, Harrison J, Homes Z. Cardiovascular risk assessment and management in mental health clients: perceptions of mental health and general practitioners in New Zealand. *J Prim Health Care*. 2009;1(1):11-19.
38. Linden A, Adams JL. Determining if disease management saves money: an introduction to meta-analysis. *J Eval Clin Pract*. 2007;13(3):400-407.
39. Hoekstra T, Lesman-Leegte I, van der Wal M, Luttkik ML, Jaarsma T. Nurse-led interventions in heart failure care: patient and nurse perspectives. *Eur J Cardiovasc Nurs*. 2010;9(4):226-232.
40. Sisk JE, Hebert PL, Horowitz CR, McLaughlin MA, Wang JJ, Chassin MR. Effects of nurse management on the quality of heart failure care in minority communities: a randomized trial. *Ann Intern Med*. 2006;145(4):273-283.
41. Hebert PL, Sisk JE, Wang JJ, et al. Cost-effectiveness of nurse-led disease management for heart failure in an ethnically diverse urban community. *Ann Intern Med*. 2008;149(8):540-548.
42. Landon BE, Reschovsky J, Blumental D. Changes in career satisfaction among primary care and specialist physicians, 1997-2001. *JAMA*. 2003;289(4):442-449.
43. Stoddard JJ, Hargraves JL, Reed M, Vratil A. Managed care, professional autonomy, and income: effects on physician career satisfaction. *J Gen Intern Med*. 2001;16(10):675-684.
44. Dulal RK, Karki S. Disease management programme for diabetes mellitus in Nepal. *JNMA J Nepal Med Assoc*. 2009;48(176):281-286.
45. Greb S, Focke A, Hessel F, Wasem J. Financial incentives for disease management programmes and integrated care in German social health insurance. *Health Policy*. 2006;78(2-3):295-305.
46. Gandjour A. A model to predict the cost-effectiveness of disease management programs. *Health Econ*. 2010;19(6):697-715.
47. Magnezi R, Reicher S, Shani M. Economic value evaluation in disease management programs. *Isr Med Assoc J*. 2008;10(5):331-334. ■