

DISEASE MANAGEMENT

A New Technology in Need of Critical Assessment

Katrien Kesteloot

Katholieke Universiteit Leuven

Abstract

Recently, many disease management programs, especially for patients with chronic diseases, have emerged. This paper discusses the potential benefits and disadvantages of disease management, on the basis of an extensive literature review. Disease management is an innovative technology in health care management, which is diffusing throughout the health care system without critical evaluation. Evidence on its effectiveness and costs is still very scarce, while the legal, ethical, organizational, and social implications of this practice have not been analyzed seriously. Before disease management is implemented on a broader scale in different European settings, first, empirical evidence about its alleged benefits and cost-effectiveness should be collected.

Keywords: Disease management, Continuum of care, Technology assessment

Disease management programs have been introduced since the early 1990s in the United States as an answer to the growing challenges of escalating health care costs and demands for quality. A disease-oriented, horizontal approach to patient care is expected to allow much better coordination of care than the traditional, fragmented, vertical approach with its strict separation between different care settings. There is follow-up of patients by a team of care providers during the entire disease process. Care starts even before the onset of disease (e.g., prevention, health promotion). The care team is encouraged to take all aspects of the disease into consideration, both in the short and long term, including the costs of all clinical decisions. While in the current system each care provider has his or her own particular incentives to deliver cost-effective care, the long-term costs and effects across several care settings are often not addressed, and the nonmedical aspects of health, such as social care, sickness prevention, and health promotion, are mostly neglected. Disease management is expected to improve outcomes for patients and to decrease costs, due to a better coordination of care and the introduction of evidence-based guidelines, by avoiding unnecessary duplication, implementing only effective interventions, and better timing of follow-up visits (30).

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Disease management was stimulated by the evidence that a large share of health care expenses is caused by a rather small part of the patient population. Hence, cost-containment efforts should be directed toward those diseases responsible for a large share of health care costs (13). Once patients have become “high-cost” clients, it is often very difficult to substantially affect the cost pattern. Therefore, strategies should be developed to identify patients at risk of becoming high-cost patients and to prevent this from happening. Additionally, the existence of large practice variations as well as inappropriate care is well documented for many conditions. These are not only associated with major cost differences but often imply important differences in outcome (14).

Finally, case studies show that it is very difficult to achieve cost savings when cost containment efforts are focused on only one type of health care resources, such as pharmaceuticals. On the contrary, in many cases, a balloon effect occurs (9): savings on one item are accompanied by increased expenses in other areas, such as rehospitalizations for complications (19), resulting in even higher total expenses (40). Therefore, cost-containment efforts should span the entire range of health care resources. This approach will not only save money but also will improve outcomes.

As a consequence, substantial cost savings and quality improvements can be expected, especially in the area of high-cost diseases, by focusing on the entire spectrum of health care resources and by reducing practice variations and inappropriate care. While these concerns had been around for a long time, the development of disease management programs was accelerated in the early 1990s in the United States and is gradually gaining ground in Europe for several reasons. These include the growing use of capitated reimbursement, the acceleration of health system integration, the growth of health informatics, the increased development of clinical practice guidelines, outcomes assessment, utilization review and quality assurance, and improvement in health care. Of special relevance is the increasing demand by patients for care coordination (40).

The earliest applications of disease management were carried out in the United States by prescription benefit managers (PBMs), firms managing drug utilization, to contain health care costs through instruments such as formulary lists, generic substitution, and discounting price contracts (20).¹ Gradually, PBMs began to focus on the impact of drugs on other forms of health care consumption and narrowed their focus to drug use in a limited number of conditions responsible for a large share of drug expenses. PBMs managed to erode the profit margins of the pharmaceutical companies, which adopted these ideas—by taking over some of the PBMs—and popularized them as a marketing instrument toward managed care organizations (MCOs). By identifying potential savings in other health care resources, they tried to safeguard or increase their market share. Several major pharmaceutical companies rapidly entered the disease management business. Many created subsidiary firms specializing in disease management. The concept of disease management was first introduced in a report for Pfizer Inc. by the Boston Consulting Group in 1993 (5).²

A second objective, besides cost containment, is risk-sharing. Growing competition between MCOs in the United States forced them to share financial risks with providers by making deals on the nature, volume, and price of health care services for given conditions. Disease management is a tool that allows MCOs to sign contracts that incorporate all care provided to specific patient groups.

Finally, commercial organizations also consider disease management to be a promising new development. In the United States, and more recently in Europe,

Table 1. MEDLINE Publications Dealing with Disease Management

Publications	1994	1995	1996	1997	1998 (Jan–May)
Disease, man	0	6	26	18	9
Probably	0	0	3	3	4

companies have been established to develop disease management programs for health care financing organizations, such as insurers, through which the latter could realize savings. These commercial enterprises also propose risk-sharing agreements with the insurers: if the latter realizes savings, the payment for the commercial firm consists of a share of these savings; if no savings are realized, only a small (or even a zero) fixed payment is requested.

The steady growth of disease management can also be seen in the growth of the number of MEDLINE publications dealing with disease management. Table 1 illustrates this growth. A MEDLINE search for the period 1994–May 1998 for articles containing the term “disease management” in the title or abstract yielded 84 articles.³ In 15 the concept of disease management was not used to refer to a specific way of organizing health care delivery (e.g., chronic disease management, simply meaning management of a chronic disease). Moreover, for a number of articles it was difficult to evaluate from the abstract whether the authors were referring to the disease management concept as intended in this paper.

DISEASE MANAGEMENT: THE CONCEPT

In the literature, as yet, there is no consistent, widely used definition of disease management. In fact, there are almost as many definitions as papers about disease management, although many of them differ only in detail rather than in substance. Part of the confusion comes from the fact that the concept is used by a wide range of stakeholders who emphasize different aspects (10;11;17). Rather than trying to come up with a single and unique definition, it seems more appropriate to describe the key characteristics of disease management. Table 2 provides a summary of these characteristics.

“Disease management is an approach to patient care that coordinates medical resources for patients across the entire health care delivery system” (13). Disease management is based on a comprehensive view of disease. Care plans are developed on the basis of a thorough knowledge of the entire disease process (15). Management of the disease spans the entire life cycle of the disease and involves the full spectrum of care settings. The focus is on integrated care and the continuum of care, contrary to the focus on discrete illness episodes and responding to medical events, which is typical of the current fragmented, component management in health care (14;15;16;21;40).

Disease management is population-oriented. It focuses on the entire population of members, both actual and future patients. This view is similar to that of public health, which is also community-oriented.⁴ In this characteristic, disease management differs fundamentally from the actual approach of clinical medicine, which focuses on the individual, stressing the relationship between the individual patient and the medical doctor.

The current approach of clinical medicine is strongly provider-oriented, but disease management emphasizes the client side. The current approach perceives

Table 2. Key Elements of Disease Management

Traditional approach	Disease management
Fragmented care	Comprehensive care
Illness episodes	Integrated care, care continuum
Responding to events	Care focus on entire person
Individual	Population, group orientation
Supply-oriented	Demand-oriented
Passive patient	Active client (sick and healthy); patient management tools (health education, empowerment, self-care)
Acute care	Acute care + prevention, + health promotion
Monodisciplinary, medical	Multidisciplinary, medical and paramedical
Tradition, habits, opinion	Objective, evidence-based (evidence-based medicine, economic evaluation, outcome assessment)
Therapeutic freedom	Guidelines, protocols, care paths
Autonomy	Accountability
	Information technology (decision support systems, intelligent information systems)
Individual solutions	System solutions
Static	Dynamic
	Continuous quality improvement

individuals mainly as patients, who receive care when they present with a certain event (disease, complication, etc.). However, disease management focuses on the individuals as clients, who may need care not only when sick but also when healthy, to prevent disease (23). Clients are also given a more active role in health care, supported by patient management tools such as self-care, empowerment, health education, and compliance enhancement.

Consequently, disease management is not focused exclusively on acute care (diagnosis and treatment), but also puts a lot of emphasis on the timely detection and prevention of diseases. Some authors additionally stress health and wellness promotion (2;14). Hence, health care no longer involves only medical care, but also may imply a variety of paramedical interventions and several behavioral and lifestyle-related interventions. Important elements are patient and provider education, compliance monitoring and enhancement, and lifestyle interventions.

As a consequence, disease management supports its clients through multidisciplinary teams of different medical and allied health disciplines, such as general practitioners, several medical specialists, nurses, physiotherapists, and dieticians. Patients are no longer followed by a single medical doctor, but by teams of health care workers. Indeed, if a disease is well managed, many of the interventions might even be nonmedical.

Disease management applies the ideas and concepts of evidence-based medicine: care patterns are developed and adjusted on the basis of the available scientific evidence. Likewise, disease management applies the results of economic evaluation in health care to provide cost-effective health care and to obtain best “value for money.” Outcome assessment is also a key ingredient of disease management. Clinical practice guidelines, protocols, and care pathways are therefore critical elements of disease management programs (18;40).

Disease management requires substantial support from information technology. It is an information-driven approach, in which data on clinical contacts are systematically collected and analyzed. These databases facilitate patient follow-up since they

can easily be retrieved across systems or sites of care. Careful and critical analysis of these databases also offers additional opportunities for improving care (14). Through the feedback from outcome data, care processes are continuously updated and improved (13;14). In the future, therefore, teams of health care workers will have to be extended beyond medical and allied health staff to include expertise in information technology. Medical information system managers will become key and influential members of a rational team of disease management providers (16).

Disease management is a dynamic concept (20). Care processes are constantly adjusted on the basis of new and improved information. Disease management will therefore involve continuous quality improvement (21).

DISEASE MANAGEMENT: INDICATIONS

Disease management programs are developed mainly for chronic or recurrent diseases for which much is known about their course and about the distribution of costs⁵ across the different stages of the disease. This knowledge is crucial to developing appropriate interventions for each stage of the disease to stabilize the situation or to prevent deterioration. Symptoms or complications (high cost, acute events) should be avoidable or controllable through appropriate interventions, such that patient outcomes can be improved and/or costs controlled (7;21). Clearly, measurable outcome data, preferably short run outcome data, must also be available to follow up on patients (7). Hence, diseases for which it is very difficult to measure outcomes are not good candidates for a disease management approach (21).

Furthermore, the targeted diseases are often associated with high costs, because of high volume or/and high cost per patient, high prevalence of the disease (21), and high indirect costs due to long periods of work loss (32) or number school days lost. For some diseases, costs are expected to rise faster than average in the future because of the aging of the population.

Disease management programs are likely to focus on conditions in which there is room for cost containment by improving guidelines and by developing integrated guidelines that improve coordination between primary and secondary care. This is the case for diseases with large practice variations (21).

The classic examples of conditions suitable for disease management are diabetes mellitus and asthma (30;40). Other examples of conditions associated with high health care volumes, long periods of work loss, or high health care treatment costs include allergic rhinitis, hypertension, heart disease, cancer, pregnancy and delivery, back strains, sprains, disk injuries, knee injuries, alcohol dependence, and affective psychoses and neurotic disorders (21;32).

IMPLEMENTATION PROBLEMS

Although quite a number of disease management initiatives are emerging, diffusion seems not to be going as fast as could be expected from the substantial benefits it promises. A number of factors still hamper large-scale implementation.

Lack of Evidence

The idea that better coordination of care and comprehensive care packages will improve patient outcomes while containing costs enjoys a lot of intuitive support. However, strong, up-to-date, empirical evidence proving these claims is still very scarce (21). Few of the MCOs that have engaged in disease management are able

to demonstrate the alleged benefits (38). This lack of evidence is a major hindrance toward immediate success of disease management. Many authors (14;18;20;30) further assert that it will still take many years before such evidence can be produced on a large scale. One reason is the lack of long-term follow-up data, since disease management was only introduced a few years ago. Another more fundamental problem is the lack of control groups to compare with disease management patient groups. It will be quite difficult to set up such controlled studies with matched patient characteristics (14). Furthermore, many programs do not have the measurement tools to routinely monitor outcomes and costs for the patient population.

This lack of evidence is caused by a number of methodologic problems. Existing evidence mainly concerns efficacy of interventions⁶ rather than effectiveness.⁷ Many clinical studies only aim at collecting clinical evidence (about the effects of interventions) and do not concentrate on cost data. As a consequence, even if clinical effectiveness can be evaluated, no (or insufficient) data are available to identify cost-effective interventions. These problems hold for clinical practice in general and are not specifically for disease management. Furthermore, it is not always clear which outcome measures should be used to monitor patients' health status. For instance Liang and Shadick investigated the extent to which disease-specific, patient-centered outcome measures could be used in routine disease management settings for two disorders with a long history of patient-centered outcome measurement: arthritis and musculoskeletal disorders. They concluded that, whereas several measures are available, many of them are not validated. Furthermore, at the level of the individual patient, large variations in clinical parameters can be observed. Aggregated results do not always yield good guidelines for intervening in individual patients. It is furthermore difficult to assess how variations in outcome parameters should be evaluated. Hence, the authors conclude that such measures:

... can be used as gross indicators of a population's experience, but would be insensitive to clinically meaningful improvement in the level of the individual patient. . . . they would have little value in direct patient care and would be costly." (27)

The evidence that is so far available is mainly limited to data on decreased utilization of health care resources, often even confined to hospital-based interventions such as fewer emergency department visits, decreased length of hospital stay, and reduction in hospital admissions (17;21;37). While this may be indirect evidence of improved outcomes, it mainly demonstrates decreased costs in a limited number of care settings.

Changing Practice Behavior

An innovation such as disease management is more complicated to implement than many other initiatives because several parties are involved, not only health care providers but also insurers and commercial organizations. Moreover, disease management redefines the roles of many health care professionals, such as nurses and pharmacists (36).

Disease management requires important behavioral changes, both from providers (for instance, to overcome knowledge gaps and to work in teams with protocols and guidelines) and patients (self-care, adherence to treatment). These are often very difficult to implement (19;29). Strong opposition from physicians can be expected. In disease management, physicians make clinical decisions as part of a team of allied health professionals and their behavior is closely monitored through practice parameters, outcomes reporting, and performance measures. This team

approach implies that they lose part of their autonomy while becoming more accountable.

Evidence and guidelines on how to implement behavioral changes are lacking, not only for the individual patient–provider relationship but also for the development and implementation of interventions at group level. Moreover, it is feared that clinicians' decision-making skills and patient–provider communication will deteriorate when providers work in multidisciplinary teams and must adhere strictly to guidelines and protocols (13).

Support of Information Technology

The key to successful implementation of disease management programs is data about practice patterns and variations, their costs, and their impact on patient outcomes, all in routine clinical circumstances.

Collecting and analyzing such data to identify cost-effective care patterns requires tremendous support from computerized information systems. Even collecting the data sometimes poses formidable problems, since fragmented health care systems also have led to fragmentation of information (collected by different providers, in different formats). In many instances the different data sets on costs or outcomes are poor or incomplete (21). Moreover, automation is developed most extensively in administrative settings and in data about health care utilization. Outcome data often are not collected routinely in an automated way.

Having the data about more cost-effective practice patterns is not a sufficient condition for successful implementation. From data on practice patterns and outcomes, recommendations on appropriate care must be developed. Such guidelines and protocols need to be transformed into user-friendly interactive software packages, with automatic warnings when the patient does not adhere to the follow-up scheme (29). Providers need to be re-educated, to be prepared to change their practice, and to work with guidelines, and there must be sufficient information technology and organizational support. Being able to analyze and implement electronically stored information will become a key to successful implementation (16).

Lack of integrated information systems is an important barrier to successful implementation of disease management. The development of integrated data and information systems is likely to take several additional years. In the United States, this development may be accelerated by the rapid integration and consolidation of many health care organizations (40).

Inappropriate Use of Disease Management by MCOs

There is a fear in the U.S. market that MCOs might misuse the disease management concept to achieve cost savings without improving patient outcomes, because the latter are much more difficult to monitor (20). Underlying this fear is concern that many MCOs would compete more on the basis of price than through quality. Even if these companies aim at outcome improvement, their commercial time horizon will be shorter than their clients' lifetimes. They will still focus more on short-term objectives (both outcome improvement and cost containment) than on optimal service for their clients' health status. Relatively few interventions will be offered in the field of sickness prevention, even less in health promotion. Interventions with mainly long-term and indirect benefits, such as cholesterol-lowering interventions and vaccinations, will get limited attention (18). This problem is further fueled by the fact that in the United States many employers switch managed care plans

rapidly. In order to keep their clients, MCOs are thus forced to focus on diseases and interventions that yield a rapid return on investment, meaning cost savings and/or outcome improvements that can be demonstrated in the short run. This approach may even undermine the basic principles of disease management (9;19;21).

Disease management may be an excellent marketing instrument to attract low-risk patient groups to the managed care plan and to enhance client satisfaction. It is known, for instance, that prenatal patient education by means of videos or folders has little impact on outcomes (health status of babies) for patients who already receive prenatal care (22). Despite this evidence, MCOs offer such packages as a mechanism of competitive differentiation (31), to attract mainly young, highly educated middle and higher class adults. Finally, this new management tool may create a dilemma for suppliers of disease management programs. They are stimulated to develop good programs to increase market share. But if they are successful, they will attract many patients, including the higher-than-average cost patients, and they will be forced to drive up their prices, which will deteriorate their competitive position (18). The fear of misuse is also exemplified by the debate in the United Kingdom about whether commercial disease management programs should be allowed to operate within the National Health Service (NHS). Proponents argue that it may improve outcomes and lower costs and therefore encourage careful experiments with commercial partners (39). Opponents fear adverse selection strategies to drain the NHS from its “least cost” patients. Furthermore, there is reluctance to let commercial partners use the NHS patient databases, for legal and ethical reasons (e.g., privacy protection, patient selection) (6). In fact, the labor government discourages health authorities from purchasing clinical services from private companies (26;31).

Role of Pharmaceutical Companies

The fear of misuse is also evident for the programs offered by pharmaceutical companies. Now that (public) expenses for drugs are coming under increasing pressure in many countries, pharmaceutical companies are trying to find new niches in the health care market through forward vertical integration in the health care production chain (4;30). They could use disease management mainly as a marketing instrument for their drugs, even without intending to optimize health care delivery.⁸ Through disease management, they substantially increase their influence in health care delivery, often to the detriment of the medical profession (18). Extending their market power may also yield the opportunity to charge higher prices and/or facilitate price discrimination (4).

However, these potential disadvantages should be confronted with the possible benefits of forward vertical integration. Due to the integration into health care delivery, transaction costs from drug producers, through distributors and toward retailers, may be reduced significantly. This could be translated into lower prices for consumers. Furthermore, disease management is a tool well fitted to secure sales, which may, by increasing expected profits and reducing market uncertainty, lead to more innovations (due to higher expected returns on research and development).

Governments should therefore scrutinize such forward vertical integration strategies—as has usually been the case for horizontal mergers. In each individual case, the potential disadvantages should be carefully weighed against the expected benefits. Potential misuse of disease management should be prevented by strongly emphasizing the need for solid data to prove superior outcomes and lower costs.

Moreover, a number of mechanisms can be built into the system that allow the reduction of monopoly power; for example, the impact of single pharmaceutical companies on the routine management of certain diseases can be reduced by an obligation to allow substitution of drugs. More generally, “bundling” of goods or services should be prevented: if a disease management program is sold, it should not be tied automatically to one brand name of a certain drug.

Fragmented Organization and Financing of Health Care

Up to now, the literature does not provide many indications as to how disease management can be fit organizationally into the classic health care system. One exception is the work of Todd and Nash (38). As far as MCOs in the United States are concerned, they either choose for a “carve in” or a “carve out” strategy. In case of carve in, the disease management program is integrated into the managed care plan of existing networks of physicians and hospitals. The emphasis is on fitting the disease management program appropriately into the existing care system. In the case of a carve out option, a separate network of health care providers is set up to deliver care only to specific high-cost, high-risk disease groups, such as patients with HIV, renal failure, or hemophilia.

Ideally, disease management requires substantial adjustments in the organization and financing of the actual health care system. Fragmentation especially should be counteracted. Disease management cannot be implemented successfully in health care systems with key characteristics running against the disease management philosophy. In such an environment, providers and financers would experience too many incentives to fight the disease management concepts.

A strong integration of care across the entire continuum (general practitioners, hospitals, home care, ambulatory care, etc.) is gradually being achieved in integrated and organized delivery systems (20). These are likely to facilitate a disease management approach (18). Such integration should be pursued in financing systems, such as through capitated and global payments, rather than fee-for-service reimbursement.

One of the fundamental problems is the question of who should get the responsibility for coordinating care. Should coordination be achieved at the national or local level? This will probably depend on the type of disease. For conditions that do not require specialized, tertiary care, coordination can be achieved at the local level. Conditions such as cancer may require a national approach, at least to determine which types of cancer (tumor location and stage) should be treated in specialized, designated cancer centers or units, but the implementation of care coordination should be left to the local level (12). Should coordination be done by the (profit-oriented) disease management organization, or MCO, or should a group of providers be assigned the responsibility, since, after all, they take the ultimate responsibility for patient care? And which types of providers should coordinate care? Limited evidence suggests that for certain conditions, such as renal failure, care is likely to be coordinated from the hospital, while for other conditions (asthma, hypertension, diabetes), primary care physicians may take a larger responsibility in care coordination. In many European countries, general practitioners often follow their patients for life. They have the most global view about their patients' health care needs. But, to date, there are not enough formalized channels supported by information technology through which general practitioners—or hospitals—can implement such coordination.

Alternatively, even if disease management is not fully implemented, the concept offers many suggestions on how cost and outcome performance of current health

care systems can be improved through minor, incremental changes rather than drastic, fundamental ones. For instance, the coordination and interactions between ambulatory and institutional care and between primary and secondary care may be improved in many ways, even without fully redesigning health care systems. In many health care systems reforms are under way to achieve a number of the characteristics of disease management. For instance, in countries like the United Kingdom and the Netherlands, the organizational model for hospitals is shifting from a vertical, service-oriented approach (with separate medical, nursing, technical, and logistic services) toward a horizontal model centered around patient groups (business units, divisions, or product lines). The recent paper issued by the U.K. labor government emphasizes the need for coordinated, integrated care in the most appropriate health or social care location. Health Action Zones, which aim “to bring together all those contributing to the health of the local population to develop and implement a locally agreed strategy for the health of the local people” (28) as well as shared care programs in the United Kingdom (34) can be seen as applications of the disease management concept. In the Netherlands, transmural care initiatives aim at improving coordination between institutional and ambulatory care.

Fragmentation Toward Patients

An integrated but essentially disease-specific approach may disrupt the continuity of care toward individual patients with multiple disorders (13;19). This problem will be most severe in case of carved out disease management programs. An asthmatic patient who gets cancer would fall into two different disease management programs, which would hamper coordination of care, probably with detrimental consequences, due to insufficient attention for comorbidities and interactions between treatments. Moreover, such a fragmented approach will impose a heavy burden on these patients with multiple diseases, who are often among the higher age groups and whose overall health condition will most often be quite fragile. Finally, such a disease-specific approach may be stigmatizing and imply higher costs.

Costs of Implementation

Setting up disease management programs requires substantial preparation and set-up costs. As yet, it has not been demonstrated that the transaction costs associated with starting disease management programs and keeping them operational (e.g., re-education and managing resistance to change) are lower than the potential savings achieved through disease management (18).

THE FUTURE OF DISEASE MANAGEMENT: MORE EVIDENCE IS CRUCIAL

Disease management probably gets a lot of support because it strives to achieve improvements in health care that are attractive to many stakeholders. The concept offers tremendous potential for eliminating fragmentation and discontinuities in health care. However, to date, there is almost no strong empirical evidence for these benefits. Empirical evidence demonstrating the benefits of disease management is the single most important factor for its future success. Prior to collecting the evidence, a more precise definition of disease management is necessary to avoid comparing apples and oranges.

Disease Management: Need for a Clear Concept

The concept of disease management is used to refer to different forms of health care organization and delivery, sometimes with other or only some of the abovementioned characteristics.⁹ Although some authors clearly distinguish and even identify the relationship between different concepts,¹⁰ in general there is a lot of confusion. Following Bernard (2), it is recommended that the concept disease management is used *only* to identify a well-defined, clearly-specified form of health care delivery with the characteristics summarized in Table 2. Innovative approaches that are restricted to improving use of pharmaceuticals, or which focus only on individual patients (such as case management) or on only part of health care resources (such as hospitals or drugs) are not in line with the underlying concepts and should not be called disease management. If not, disease management will become just a buzzword. Its principles are too promising to restrict its use to such marketing purposes. With this approach disease management can be distinguished from different, albeit related, concepts, such as outcome management, health risk management, demand management, continuum of care approach, integrated delivery systems, patient management, population-based care, care mapping, clinical pathways, integrated care packages, case management, and managed care, which all have similarities but are not identical to disease management (3;8;10;18;21;29).

Finally, some authors call disease management a misnomer. The concepts of health management, wellness management (24), or comprehensive patient management, with emphasis on managing patients' overall health rather than just specific diseases, are argued to be more appropriate to identify health care systems with the characteristics mentioned in Table 2 (1;33). These concepts can be considered synonyms for disease management.

More High-quality Evidence Is Needed

A glance at the literature quickly reveals that empirical evidence on the costs and effectiveness of disease management is still very scarce. Controlled studies and experiments need to be set up to test the superiority of disease management over fragmented health care delivery. In calculating the costs of disease management, the costs of setting up a disease management program, including costs of training and information technology, should not be omitted. Based on the data of costs and outcomes of disease management, it can also be investigated whether the potential cost savings can compensate for the start-up costs. Furthermore, besides some anecdotal discussion, the legal, ethical, and organizational aspects and social implications of switching to disease management have not been studied at all. The following examples demonstrate the relevance of such concerns. There is the issue of care coordination and associated responsibilities, including the following questions: Which type of providers should coordinate? How does that choice affect other providers' responsibility toward individual patients? Can (commercial) organizations other than providers assume responsibility for care coordination? Another problem deals with the opportunities and restrictions of using individual patient data, available throughout the disease management system: By whom can such data be used and for which purposes? A full technology assessment of disease management is absolutely necessary.

CONCLUSION

Given all of these elements, large scale diffusion of disease management programs cannot be justified at present. It would be irresponsible to overturn existing health

care systems without sufficient evidence that new models yield superior outcomes and/or lower costs. Small-scale implementation is obviously necessary to allow thorough evaluation of this new management tool.

In the meantime, health care policy makers should not be blinded by the promising benefits and marketing arguments but made aware of the fact the alleged superiority of disease management has as yet not been validated. Disease management is an innovation that urgently needs a full technology assessment.

NOTES

¹ The earliest applications of a disease-focused way of health care delivery date back to the late 1980s in the Mayo Clinic (40).

² The U.S. pharmaceutical industry, which came under increasing pressure due to escalating health care costs, was recommended to redirect their expertise toward managing diseases rather than focusing only on selling products, thereby bringing the message that by using (high-cost) drugs, high expenditures in other health care settings may be avoided.

³ Obviously, more articles exist on this topic. It is well known that MEDLINE does not give full coverage of the literature.

⁴ Despite the similarities, it is important to note that disease management and public health are not identical approaches. For instance, in public health the target group is the entire population, not just the members or the clients belonging to specific disease groups. Disease management will often be restricted to health care (related) interventions, whereas public health will also incorporate social and hygienic care. Disease management will often be more short-term-oriented than public health programs (compare *infra*). While disease management also has an explicit focus on outcomes (compare *infra*), public health programs will attach more attention not only to direct outcomes but also to indirect outcomes (e.g., external effects of vaccination campaigns) (18).

⁵ This is essential to identify most important cost drivers. If costs would not be allocated correctly across phases, lifetime costs across the disease cycle of individual patients would be seriously over- or underestimated (35).

⁶ Effects under ideal circumstances, with strict care protocols, followed by selected, highly specialized physicians, with a limited time horizon, in a select group of patients and where dropouts are not part of the investigated patient population.

⁷ Effects in routine practice, with less strict care protocols, which are not always strictly adhered to, with care provided by less specialized staff, in the total patient population.

⁸ For instance, is drug compliance being encouraged, mainly because it improves patient outcomes or to augment sales?

⁹ Just an example; Langley (25) makes a distinction between type I, II, and III disease management programs. In type III programs, only drug costs are managed; in type II drug costs and certain key resource inputs are managed. Only type I—full cost—disease management programs span the entire spectrum of health care resources. In our approach, only the type I programs are considered as a true disease management approach.

¹⁰ For instance, Juhn (23) clearly distinguished outcomes assessment (which are studies to determine which interventions are effective and which are not, and to identify those providers performing well and those who could do better) from disease management and argues that disease management needs outcomes assessment.

REFERENCES

1. Bernard, S. Disease management: A pharmaceutical industry perspective. *Pharmaceutical Executive*, 1995, 16, 48–60.
2. Bernard, S. The roles of pharmaceutical companies in disease management. In W. E. Todd & D. Nash (eds.), *Disease management—A systems approach to improving patient outcomes*. Chicago: American Hospital Publishing Inc., 1997, 179–205.
3. BeSaw, L. Disease management. *Texas Medicine*, 1997, 93, 40–44.

4. Bloor, K., & Maynard, A. The art of the obvious or an industry conspiracy? In R. Lilley (ed.), *Disease management*. Chichester: John Wiley & Sons, 1998, 89–110.
5. Boston Consulting Group. *The contribution of pharmaceutical companies: What's at stake for America?* 1993, 143–57.
6. Burns, H. Disease management and the drug industry: Carve out or carve up? *Lancet*, 1996, 347, 1021–23.
7. Coons, S. J. Disease management: Definitions and exploration of issues. *Clinical Therapeutics*, 1996, 18, 1321–26.
8. Curtiss, F. R. Lessons learned from projects in disease management in ambulatory care. *American Journal of Health-Systems Pharmacies*, 1997, 54, 2217–29.
9. DaSilva, R. V. A disease management case study on asthma. *Clinical Therapeutics*, 1996, 18, 1374–82.
10. Draugalis, J. R., & Coons, S. J. Introduction: Disease management—Separating fact from fantasy. *Clinical Therapeutics*, 1996, 18, 1318–20.
11. Drummond, M. F. Who needs it and why? In R. Lilley (ed.), *Disease management*. Chichester: John Wiley & Sons, 1998, 7–18.
12. Edwards, B. Making it happen. In R. Lilley (ed.) *Disease management*. Chichester: John Wiley & Sons, 1998, 19–26.
13. Ellrodt, G., Cook, D. J., Lee, J., et al. Evidence-based disease management. *JAMA*, 1997, 278, 1687–92.
14. Epstein, R. S., & Sherwood, L. M. From outcomes research to disease management: A guide for the perplexed. *Annals of Internal Medicine*, 1996, 124, 832–37.
15. Frenkel, M. Capitation, disease management, and physician liability. *Journal of Health Care Finance*, 1997, 23, 87–90.
16. Glasscock, R. J. Optimizing disease management in the next 25 years. *Seminars in Nephrology*, 1997, 17, 387–90.
17. Gross, P. F. International overview. In R. Lilley (ed.), *Disease management*. Chichester: John Wiley & Sons, 1998, 123–52.
18. Harris, J. Disease management: New wine in new bottles? *Annals of Internal Medicine*, 1996, 9, 839–42.
19. Homer, C. J. Asthma disease management. *New England Journal of Medicine*, 1997, 337, 1461–63.
20. Hreben, J. J. Disease management: Has anyone managed to make it work? *American Journal of Managed Care*, 1996, 10, 1419–22.
21. Hunter, D., & Fairfield, G. Managed care: Disease management. *British Medical Journal*, 1997, 315, 50–53.
22. Huntington, J., & Connell, F. A. For every dollar spent—The cost-savings argument for prenatal care. *New England Journal of Medicine*, 1994, 331, 1303–07.
23. Juhn, P. I. *Disease management in managed care: The search for health care solutions*. Short course, 17th Annual Meeting of the Society for Medical Decision Making, Tempe, AZ, 1995.
24. Kirby, S., & Peel, S. Wellness management. In R. Lilley (ed.), *Disease management*. Chichester: John Wiley & Sons, 1998, 71–88.
25. Langley, P. C. Assessing the input costs of disease management programs. *Clinical Therapeutics*, 1996, 18, 1334–40.
26. Lawrence, M., & Williams, T. Managed care and disease management in the NHS. *British Medical Journal*, 1996, 313, 125–26.
27. Liang, M. H., & Shadick, N. Feasibility and utility of adding disease-specific outcome measures to administrative databases to improve disease management. *Annals of Internal Medicine*, 1997, 127, 739–42.
28. Lilley, R. (ed.). *Disease management*. Chichester: John Wiley & Sons, 1998.
29. Lumsdon, K. Disease management—The heat and headaches over retooling patient care create hard labour. *Hospital and Health Networks*, 1995 (April 5), 34–42.
30. Marwick, C. Another health care idea: Disease management. *JAMA*, 1995, 274, 1416–17.

31. McNeilly, H. *Disease management: A health insurance perspective*. Paper presented at the 65th European Health Policy Forum, June 1998, Leuven, Belgium.
32. Mohr, P. *Using administrative data for clinical (disease) management*. Paper presented at the 17th Annual Meeting of the Society for Medical Decision Making, Tempe, AZ, 1995.
33. Moore, D. L. Disease management initiatives in women's health. *Journal of Women's Health*, 1997, 6, 23–29.
34. Panton, R. Medicine management. In R. Lilley (ed.). *Disease management*, Chichester: John Wiley & Sons, 1998, 47–70.
35. Postma, M. J., Jager, J. C., Ruwaard, D., Van Loy, N.C.M., & Leidl, R.M., Disease-staging for modelling current and future health-care impact of disease: Illustrations for diabetes mellitus and AIDS. *Health Policy*, 1998, 43, 45–54.
36. Spreeuwenberg, C. *Is disease management an innovative strategy for health care?* Paper presented at the 65th European Health Policy Forum, June 1998, Leuven, Belgium.
37. Stahl, D. A. Disease management: A challenge to subacute care. *Nursing Management*, 1996, 27, 25–26.
38. Todd, W. E., & Nash, D. (eds.). *Disease management—a systems approach to improving patient outcomes*. Chicago: American Hospital Publishing Inc., 1997.
39. Walley, T., & Barton, S. Commercialisation of disease management. *Lancet*, 1996, 347, 1768–69.
40. Zitter, M. A new paradigm in health care delivery: Disease management. In W.E. Todd & D. Nash (eds.), *Disease management: A systems approach to improving patient outcomes*. Chicago: American Hospital Association, 1997, 1–25.