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Disease Management Interventions: What's in the Black Box?

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ABSTRACT

In discussing evaluation techniques to assess disease management (DM) program outcomes, it is often assumed that DM program interventions are premised on sound clinical judgment, an understanding of the disease process, and knowledge of the psychosocial models of behavioral change that must be used to effect those processes and ultimately improve the health outcomes that are being evaluated. This paper describes eight commonly used behavioral change models applied in the healthcare industry today. They represent programs designed to address individual, interpersonal, and community level factors as well as "packaged" comprehensive approaches. These models illustrate the breadth of approaches to consider when designing or assessing DM program interventions. Careful consideration of the type of behavioral change desired and the theories of how to effect such change should be an integral part of designing disease management program interventions. (Disease Management 2004;7:275–291)

INTRODUCTION

In previous papers,[1–5] we have emphasized the importance of developing appropriate measurement and evaluation tools to ensure that the effects of disease management (DM) program interventions are captured accurately. The underlying assumption thus far has been that these interventions are premised on both sound clinical judgment and understanding of the disease process, as well as knowledge of the psychosocial models of behavioral change that must be used to effect those processes and ultimately improve health outcomes.

However, in a recent survey conducted of 14 DM programs,[6] only four companies indicated that their nurses were expected to have patient education skills or experience. Moreover, it appears that the only psychosocial model used by these firms was the "readiness to change model," which, while being a good model, does not effectively apply to all diseases or patients equally. If this survey represents the DM field in general, it would indicate that there is opportunity for improvement in program interventions through a more thorough understanding and application of behavioral change theory.

The purpose of this paper is to provide DM program developers, both within DM firms and those managing in-house programs, enough detail on the psychosocial models of behavior change to tailor intervention strategies to their specific population needs. For

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those organizations who purchase DM services, this paper will provide a substantive background with which to discuss the theoretical underpinnings of program content with their contracted vendors and determine how those behavior change variables will be evaluated to establish program success.

DM INTERVENTION STRATEGIES

DM programs were developed under the assumption that health services utilization and morbidity could be reduced for those with chronic illness by augmenting the traditional episodic medical care system with services and support between doctor visits. For many chronic diseases, there is much opportunity to improve the quality and consistency of care (eg, diabetics getting regular tests of glucose control [HbA1c] or those with known coronary disease taking a beta blocker). DM programs were developed to assist physicians and their patients to identify and close those gaps in care.

DM programs attempt to achieve these goals by (1) accurately identifying those in the population with the disease or at significant risk of developing the disease, (2) convincing those with the greatest risk of morbidity and health services utilization to participate in the program, and (3) intervening with physicians and patients to effect some change in health behavior. Provider-focused interventions include: identifying patients on suboptimal medical therapy for their condition and encouraging physicians to change the therapeutic regimen, educating and encouraging providers to use lower cost treatment options when available, and coordinating care between providers to reduce redundant or unnecessary services. Patient-focused interventions include: disease-specific patient education (eg, triggers and signs of an exacerbation or impending acute episode of the disease and developing specific plans for what to do if these occur); helping patients change health-related behaviors that cause disease development, progression or abet flare-ups; monitoring patient vital signs and symptoms for evidence of increasing disease severity and alerting the patient and provider for corrective action; coaching patients to increase compliance with care plans; and connecting patients to local support services. For many DM programs, the primary means to execute these intervention strategies is through telephonic interaction between a DM nurse, the patient and physician.

As this list of common intervention strategies illustrates, achieving the ultimate outcome of decreased chronic disease morbidity and cost is highly dependent upon the DM program's success at changing a variety of health-related behaviors. DM programs need to influence a patient's choice of and compliance with medical therapies, sign and symptom self-monitoring, risk factor behaviors, planning for acute events, and decision-making on when and how to seek care.

Understanding what type of health-related behavior change is desired, and the successful strategies to effect such change, is a critical first step to designing effective DM program interventions. When the DM program enrollment specialist calls a patient suitable for the program, which strategy is he employing to convince the patient to enroll and why? When the DM program sends educational mailings to patients, what are the key messages and why? When the DM program nurse wants to improve the likelihood that patients will take their medications, which techniques does she use and why? When a DM program analyst identifies a coronary artery disease (CAD) patient on suboptimal medical therapy, how does he or she influence the MD to change the care plan and why does he or she think that particular strategy will work? Understanding the theories of behavior change can guide DM program intervention designers to the most appropriate intervention for their population needs.

PSYCHOSOCIAL MODELS OF BEHAVIORAL CHANGE

As illustrated in Figure 1, there are three main tiers where behavioral change interventions are targeted. The upside-down pyramid indicates that factors influencing behavior at the individual level are the basis for change in all models. These factors include knowledge, attitudes, and belief systems. The specific mod-

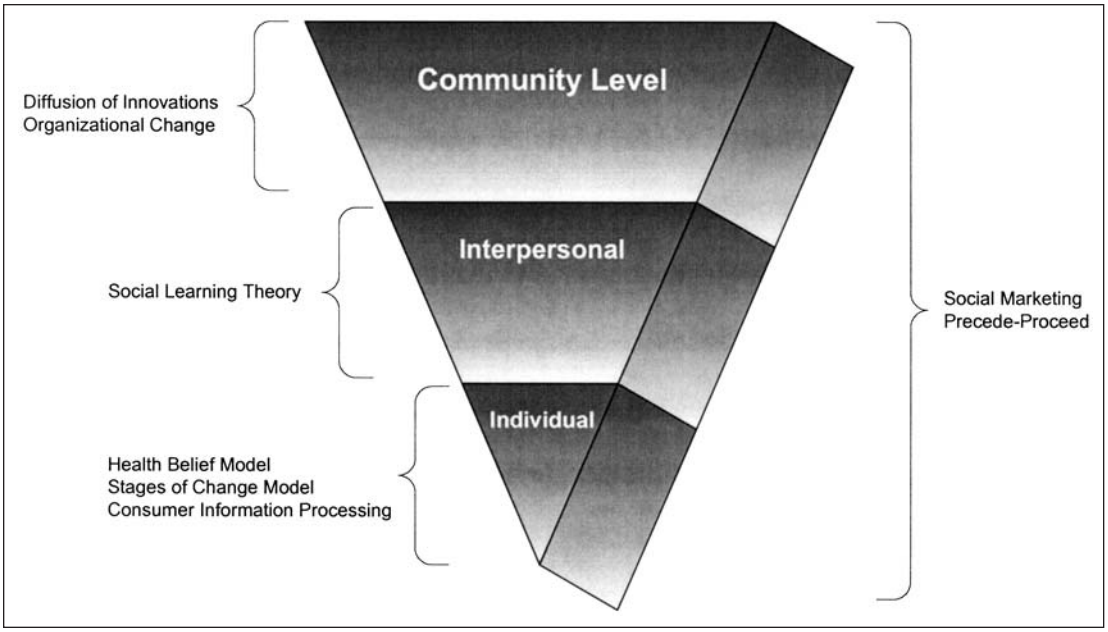

FIG. 1. The behavior modification inverse pyramid. Models are presented according to targeted intervention levels. Social Marketing and Precede-Proceed models are comprehensive approaches and thus impact all levels.

els targeting the individual that will be discussed in this paper include the Health Belief Model, Stages of Change Model, and Consumer Information Processing.

At the interpersonal level, the individual is influenced by close relationships with family, friends, and work colleagues. How the person interacts with his or her immediate environment so that the desired behavioral change is achieved is the focus of the Social Learning Theory.

Community factors include norms or standards of behavior that all individuals are expected to follow within that community. These norms include lifestyle behaviors such as attitudes toward diet and exercise, as well as the threats posed by environmental factors such as pollution or violence. The two theories that target these factors are Diffusion of Innovations and the Theories of Organizational Change.

Finally, it is possible, and often favored, to combine various behavioral models together under the umbrella of an intervention to achieve the greatest impact on the target population. DM programs typically contend that they impact the entire population, not only the enrolled group, vis-à-vis a sentinel effect on both treating physicians and patients not enrolled in the program. These statements are hard to corroborate given that there is currently little being done to influence the behavior of the population as a whole. By instituting a comprehensive program to impact the various levels and factors in the population, these assertions can be tested. Two well-developed models currently being used for these purposes are Social Marketing and the PRECEDE-PROCEED model.

INDIVIDUAL LEVEL

The health belief model

The health belief model (HBM) was one of the earliest behavioral change models developed from the theories of the psychosocial sciences.[7,8] While the initial focus was on increasing the use of preventive services, the HBM has also been used to explain illness[9] and sick-role behaviors.[10]

According to this model there are two major factors that determine whether a person will adopt the suggested course of action. First, the person must believe that they are potentially vulnerable and the condition is threatening. Secondly, the person must be convinced that the intervention is efficacious and perceive few

barriers or difficulties in taking the recommended action.[11,12]

Figure 2 illustrates the components and structure of the HBM. The individual's subjective readiness to take action is dependent upon that person's perceived *susceptibility* to contracting the disease or illness and the perceived probable *severity* of the disease. Additionally, the person's subjective evaluation of the recommended action is manifested by weighing the potential *benefits* of taking action in reducing the susceptibility and/or severity of the disease with the perceptions of the *barriers* preventing the proposed action from taking place (ie, physical, psychological, financial). A cue to action must occur in order to trigger a person to act. This can be based on either internal stimuli (eg, signs and symptoms) or external stimuli (eg, DM nurse advice, mailings). All of these factors impact the likelihood of the individual taking the recommended actions designed to prevent illness in the absence of symptoms, to define the state of their health in the presence of symptoms, to restore good health after diagnosis of actual illness, or to moderate the pace of decline with chronic disease.[12,13]

The HBM is very applicable to DM program interventions. A patient deemed suitable for the program (with the disease or risk factors for the disease) must (1) be convinced that they are susceptible to the given disease, even if they don't exhibit symptoms, (2) believe that the disease will lead to death or disability without taking action, (3) trust that undergoing the appropriate treatment and/or behavior modification will reduce the risk of death, disability or need for acute medical care, (4) consider that the benefits will outweigh the costs, and (5) be provided with the appropriate and consistent cues to action vis-à-vis print materials, ongoing communication with a DM nurse, etc.

There is one important caveat to keep in mind when considering the use of this model for behavioral change. One generalized educational program will not fit the specific needs of every person. For example, most patients suffering from chronic obstructive pulmonary disease (COPD) will attest to the fact that the ill-

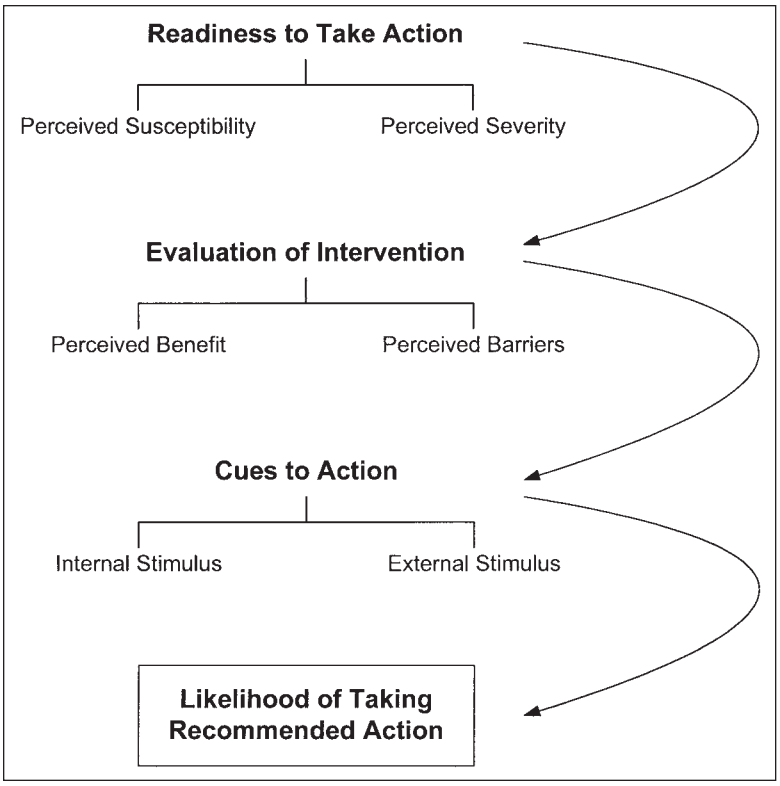

FIG. 2. The Health Belief Model.[12]

ness is extremely serious and that they regularly suffer from symptoms. On the other hand, some asthmatics may perceive the disease as not being serious and they may not regularly suffer from symptoms. In the case of COPD, a DM program may want to focus on reducing fear and attempt to improve adherence to proper medication therapies and lifestyle changes (eg, smoking cessation and inclusion of an exercise regimen). A DM program for asthma may want to increase the fear of acute exacerbations while suggesting simple and inexpensive methods of therapy (eg, having a bronchodilator available at all times, adhering to a therapeutic regimen of long-lasting corticosteroid use). Because a patient's perception of self-efficacy is an important factor in carrying out the necessary behavioral changes, this feature was later added to the HBM.[14] Self-efficacy will be presented later in the discussion of the social learning theory.

Stages of change model

The stages of change model (SCM), was developed by James Prochaska and colleagues and is based on transtheoretical concepts of the stages and processes of change.[15–18] While this model was initially intended for use in treating addictive behavior, it is currently the most prevalent model being applied in DM.[6] The underlying theory behind SCM is that behavioral change is a continual process as opposed to a one-time event, and that individuals are at varying levels of readiness to change along the continuum of five stages. For maximum effectiveness, the DM nurse needs to identify which stage of change the patient is currently in and then provide the cues or education appropriate for that stage.

Figure 3 illustrates the stages of change model.[19,20] *Precontemplation* is the stage at which the individual is either unaware of the problem or has no intention of engaging in behavioral change in the foreseeable future (usually about 6 months).[17]

C*ontemplation* is the stage where people realize that they have a health concern, are seriously considering taking action, but have not yet committed to change. Quite similar to the health belief model, this stage is where individuals weigh the benefits of behavioral change with the costs of that change (eg, effort, energy).[17] Unfortunately, individuals may remain in this stage for indefinite periods of time.

Preparation is the stage where the individuals plan to change behavior, usually within the next month.

Action is the stage in which the individual implements the behavioral modification plan. A person is considered to be in this stage if he or she has begun to perform the required activities to positively effect health status from 1 day to 6 months.[17] In a DM program, this would equate to a patient beginning to take their prescribed medications, alter eating habits, and engage in an exercise routine.

Maintenance is the stage in which an individual continues the desired behavioral modifications to improve their health status and prevent relapse. This stage may extend from six months (short-term) to an indefinite period of time (long-term), even a lifetime.[17]

As can be expected, most attempts at behavioral modification do not succeed on the first try. Since people may enter and exit the process at any stage, this model can be viewed as cyclical as opposed to a linear process. Most people, however, relapse out of the action stage and only regress to either the contemplation or preparation stages. It is anticipated that with each setback, the relapser will gain additional insights as to how to make this attempt more successful than the previous one.

As shown in Figure 3, interventions should be tailored to the individual according to the stage in which that person is situated. In the precontemplation stage, the DM nurse should focus attention on making the patient aware of the problem and gain agreement on the need for change while providing specific information about the benefits of investing in the behavioral modifications. In the contemplation stage the patient should be motivated while being given the skills necessary to take action. In the preparation stage, the DM nurse should assist the patient in developing a specific action plan, setting reasonable and attainable goals. In the action stage, the DM nurse should provide support, feedback, and reinforcement of con-

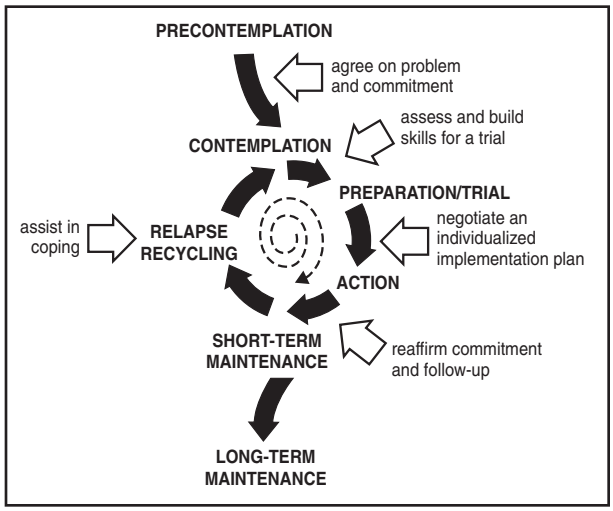

FIG. 3. The Stages of Change Model.[18,19]

cepts. During maintenance, it is important to continue providing the support to patients in an effort to prevent relapses and promote a stronger sense of self-efficacy.

Consumer information processing

The basic theory of consumer information processing (CIP) suggests that consumer decision-making is a multistage process in which information is acquired and processed, a decision is made and acted upon, and the quality of that decision is then evaluated.[21,22]

Figure 4 illustrates the CIP as developed and described by Bettman.[21] As shown this process is cyclical and contains several feedback loops. The basic elements of this model include: (1) *a limited information processing capacity*. As such, an individual's search for information relies on internal (in the form of memory) and external cues. (2) *Motivation* determines how extensively we search for information. As the environment provides different cues, motivation levels change, thereby affecting both the available information and the decision-making process that individuals use, (3) *attention* to the various sources of information constantly changes. Thus an individual may ignore certain sources whether or not that information is valuable. (4) *Information acquisition and evaluation* are concomitant processes. Individuals tend to evaluate information as it comes in. Therefore, the influence of earlier amassed data may inadvertently lead to a premature decision being made before the full array of information is available. (5) *Decision processes* are highly individualized and typically follow a blueprint of evaluation and action. Therefore, people generally do not maximize their decision-making potential. This is most evident when too much information is available, and individuals follow a simple decision-making pattern. (6) *Consumption and learning processes* are intended to provide individuals with ongoing feedback to assist in making effective decisions and choices in the future. However, more often than not,

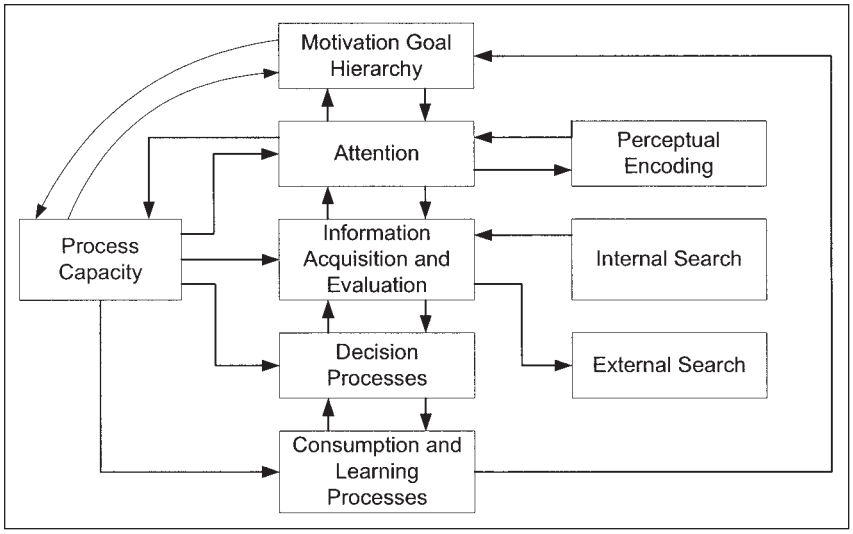

FIG. 4. The Consumer Information Processing Model.[21]

complete information is not available and thus individuals do not learn from their experiences. Moreover, even when complete information is available, people tend to ignore negative information in lieu of the positive, if preconceived notions are followed.[21]

The lesson for DM programs is simple. Patients require health information that is useful, comprehensive yet easy to process, and readily obtainable. Additionally, assistance in explaining the importance of the information as it relates to them individually and the various options should be made available at each interaction with the patient, or as often as necessary. Incorporating negative as well as positive information and guiding patients to learn from past experiences are areas where a DM nurse/coach can be helpful.

INTERPERSONAL LEVEL

In addition to personal knowledge, attitudes and belief systems and their effect on behavior discussed in the individual level theories, behavior change is also influenced by relationships with others and interaction with one's environment.

Social learning theory

The social learning theory (SLT), also referred to as the social cognitive theory (SCT), proposed by Bandura,[23–26] is based on "value-expectancy theories" developed by earlier cognitive theorists. In general, this theory explains behavior as a function of an individual's subjective value of an outcome and his or her expectation that a particular action will achieve that outcome. Implicit in this theory is that individuals continuously interact with their environment, and that behavior is impacted by that relationship.

Figure 5 illustrates the components of the SLT. As illustrated, behavior is a function of an individual's subjective expectancies and incentives. Expectancies include (1) environmental cues—how events are connected (eg, how an individual's current lifestyle may negatively impact his or her health status); (2) outcome expectations—the individual's belief that changing the behavior will achieve the desired outcome; and (3) self-efficacy—the subjective belief that the individual can carry out the behavior to achieve the desired outcome. Similarly, an individual who receives reinforcement or incentives for performing the appropriate behavior will be more apt to continue that behavior.

There are several key constructs in the SLT. The first, as illustrated above, is that of *reciprocal determinism*,[23–26] in which behavior is based on an interaction between itself, the environment and personal factors. Bidirectional interactions occur between any of these categories to varying degrees in every person. For instance, social influences (environment) interact with personal characteristics (beliefs, goals, intentions, self-perceptions) to impact behavior. Similarly personal characteristics interact with one's actions (behavior), with the outcome affecting the individual's thoughts and emotions. Finally, an individual's behavior will govern his or her relationship with the environment. People choose aspects of their environment to which they are exposed, and behavior is, in turn, modified by that environment.

Vicarious capability[23–26] refers to the ability of individuals to learn behavior through observation of others, not just through personal experience. As a result, the appropriate behavior can be modeled rather quickly with little expense of time or resources.

Self-efficacy is considered a major factor that influences self-motivation to perform the given behavior. A person who feels capable of achiev-

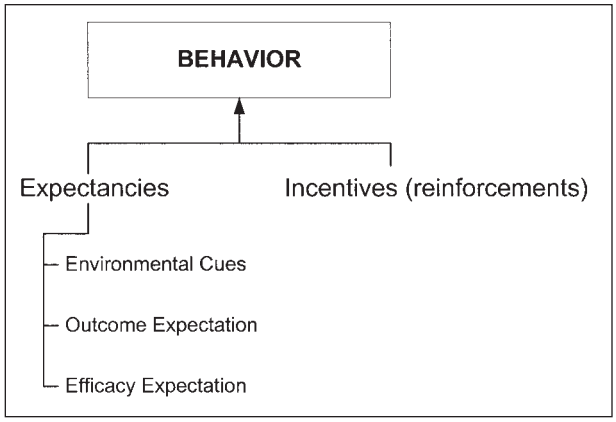

FIG. 5. The social learning theory.[23–26]

ing a given goal will be more apt to perform the desired behavior and less likely to give up when obstacles arise than a person with a low sense of self-efficacy.

The most common application of SLT is found in advertising. People are made to believe that by modeling a given behavior (ie, drinking a certain beverage, wearing a specific outfit, or driving a particular automobile) their popularity will be enhanced. In DM program interventions, a similar approach can be used, together with developing processes for improving self-efficacy, and providing appropriate reinforcements for an individual's performance of the desired behavior.

A couple of limitations of the SLT are that the model is comprehensive and overly complex and thus difficult to operationalize in most settings. Additionally, many organizations that implement the SLT choose to focus on only a couple of the constructs, rather than implementing the model in its entirety. This reduces the probability of achieving the desired behavioral change in the population.

Most DM program interventions focus heavily on the individual without much attention on the interpersonal aspects. By doing so, they are missing opportunities to incorporate elements to support individual change efforts and identify potential barriers to change into the program design. For some health-related behaviors interpersonal and environmental factors play a large part in the likelihood of successful change. For example, asking a woman to change her diet is likely to impact her entire family's eating habits—something they may or may not support. To successfully quit smoking, one might have to dramatically alter both interpersonal relationships and environmental exposure—limiting time with smoking friends and stopping a much loved activity such as going to the smoking-allowed bingo parlor. Likewise, by taking advantage of interpersonal and environmental support for the desired change, DM programs might be more likely to influence successful change. For example, getting a supportive spouse involved in program activities or referring patients to support groups within their communities. DM programs also could encourage peer-level modeling by connecting new program participants with current or past patients who have successfully made the desired change.

Since the SLT is a complex model with many concepts and constructs, only some of the key elements of the model were presented here. For a more detailed explanation of the model, the reader is referred elsewhere.[23–26]

COMMUNITY LEVEL

To gain the full population-wide impact of DM, program interventions should also consider the societal and cultural norms that effect change.

Diffusion of innovations

Diffusion of Innovations (DOI) is a theory that helps explain how members of a social system adopt a new innovation. Rogers[27] synthesized the four most pervasive theories of diffusion currently in use: Innovation Decision Process, Individual Innovativeness, Rate of Adoption, and Perceived Attributes.

Innovation Decision Process theory states that diffusion is a process that occurs over time and is comprised of five stages: (1) knowledge—where the individual learns about the innovation; (2) persuasion—the individual must be convinced of the merits of the innovation; (3) decision—the individual decides to adopt the innovation; (4) implementation—the innovation is examined or tried out; (5) confirmation—the innovation is either accepted or rejected.[27]

Individual Innovativeness theory suggests that those people who are predisposed to innovation will adopt an innovation sooner than people who are less predisposed.[27] Figure 6 illustrates the distribution of individual innovativeness based on their propensity to accept the innovation. As shown, only about 2.5% of the population is inclined to readily accept the innovation early in the diffusion process (innovators). At the other extreme, about 16% of the population resists adopting the innovation until it becomes widely disseminated (laggards).

Rate of Adoption theory posits that innovations are diffused over time in an S-shaped curve pattern.[27] Figure 7 illustrates how this theory works. At the beginning stages of dif-

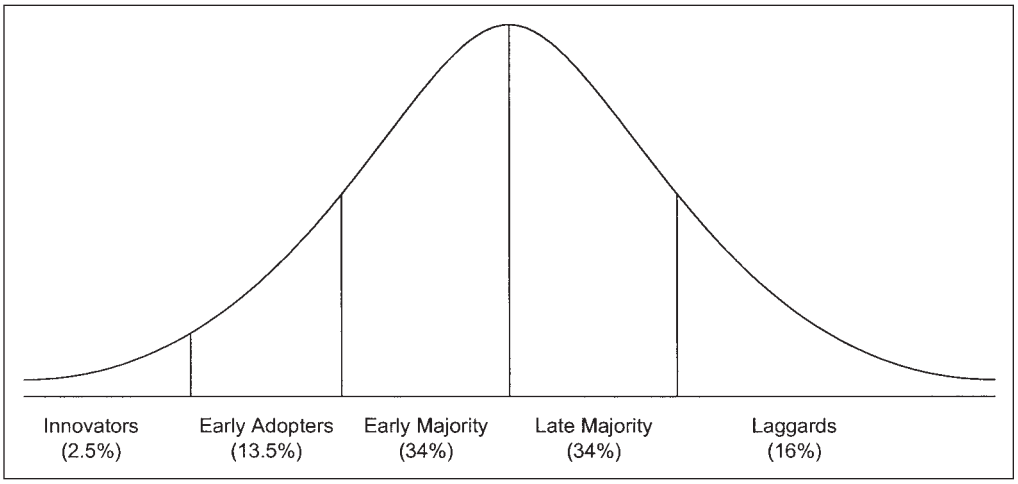

FIG. 6. Distribution of categories of individual innovativeness.[27]

fusion, innovation undergoes a slow, gradual growth, followed by a rapid period of increased diffusion. The rate of adoption will ultimately stabilize and eventually decline.

The *Perceived Attributes* theory[27] postulates that innovation will experience an increased rate of diffusion if individuals perceive that the innovation (1) can be evaluated on a trial basis before committing to adoption, (2) demonstrates obvious results, (3) exhibits an advantage over the current standard practice, (4) is not difficult to understand or implement, and (5) is compatible with existing practice, values, and needs of the individual.[27]

The DOI theory suggests that innovation is communicated over time by means of specific channels within a social system. Mass media channels have been found to be more important at the knowledge acquisition stage, while interpersonal channels are more effective at the persuasion stage. Therefore, DM program nurses, physicians, as well as the health plan should act as conduits for communicating new innovations relative to the patient's disease.

The DM program should carefully consider the type of innovation being promoted, and choose the most effective messenger for it. For new therapeutic regimens, for example, DM companies should actively work with physicians to be the voice. Similarly, DOI theory is also quite applicable to influencing physician behavior to participate in new programs. Hav-

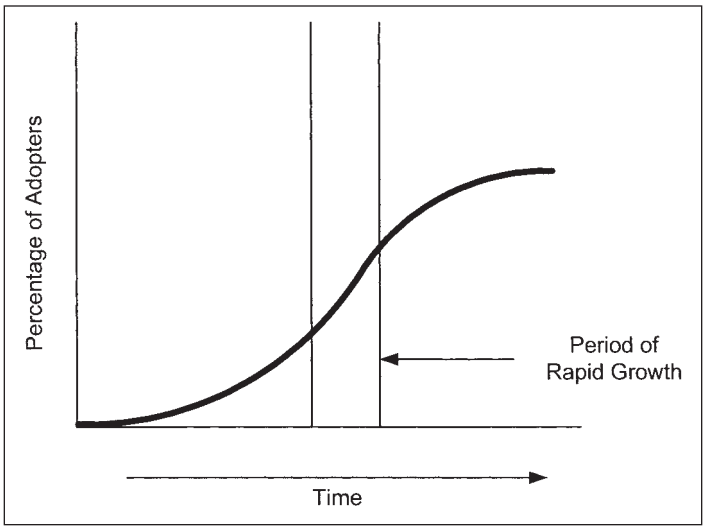

FIG. 7. Rate of adoption of an innovation over time.[27]

ing physicians actively support the DM program though patient referrals, responding to care regimen recommendations, and working collaboratively with DM nurses is critical to program success. Especially in markets new to the DM concept, DM companies should consider these DOI models when designing their physician communication and engagement strategies.

Theories of organizational change

In general, organizations are a microcosm of the community in which they exist. As such, one will find the various layers of a social system that include a distinct culture, norms of behavior, member roles, etc. Therefore, in order to achieve successful change of behavior in an organization, all levels of the company must be engaged in the process. There are many theories of organizational change, some focus specifically on the organizational process side of change,[28] others focus on the employee's personal behavior and mental transition to achieve the desired behavioral change,[29] while others focus on large group interventions.[30,31]

The *Three Phases of Change* theory[28] postulates that organizational change is best managed when it is carried out in three phases: (1) *Initiation*—in which a vision for what the change will look like is created, and a plan of action is developed that will guide that change. (2) *Implementation*—in which the plan is moved into action. In order for a successful change to be realized, the change must be embraced by all levels of the organization. This is best accomplished by empowering individuals and small teams to determine the best method to implement the action plan and get buy-in from peers. (3) *Institutionalism of Change*—which involves incorporating the change into daily activities. Policies and procedures are fully implemented, monitored and restructured as needed with evolution of the organization. Ongoing reinforcement of the desired behavior is necessary to ensure continuation of the effectiveness of the change.

The *Transition Theory*[29] also suggests a three-phase approach to achieving organizational change. However, this theory concentrates on the individual's behavior and mental transition rather than on the larger organizational structure. Transition is described as an internal psychological reorientation that individuals must experience in order for change to be embraced.[29] Therefore, it is generally a lengthy process that includes (1) *saying goodbye*—employees are asked to let go of behaviors that made them successful in the past; (2) *shifting into neutral*—the neutral-zone is the in-between state that is full of uncertainty and confusion; as a result, some people try to hurry through this phase while others cling to past behaviors; this period, if managed correctly can be a creative and energetic launching point into the next stage of change; and (3) *moving forward*—this final stage requires individuals to perform the new behaviors. Reinforcement is necessary to ensure that the individual gains and maintains the competency and experience to continue performing the behavior successfully.[29]

Large group interventions (LGI) is a method that is more suited to the modern organizational structure than that of only a couple of decades ago, given that the kinds of problems that organizations face are more adequately understood in terms of systems as opposed to the individual level.[30,31] As such, LGI emphasizes the involvement of large groups within the organization to develop and implement the change action. Some of the attributes of the LGI are:

1. Analyzing the past and using it as a common ground from which to create the future. Within the LGI, the organization seeks to identify the best characteristics of the past, in order to carry them forward into a new future.
2. Providing structure to manage large group dynamics. Large groups tend to threaten one's sense of identity and induce anxiety. It is important to create structures within the group to allow a sense of identity to develop. This is done by voting, having wall charts posted, allowing individuals to express their thoughts, etc.
3. Choosing a method of facilitation. Some LGI's rely on a trained facilitator to work with small groups and either guide them through the development process or allow them to find their own direction. Conversely, the "open-space

technology" method places the onus on the participants to develop the change strategies with minimal direction from a facilitator.

4. Developing organizational communication channels. In a large group event, individuals from all levels of the organization interact and gain an opportunity to find common concerns and values. Upon returning to the work environment, this openness typically carries over into more successful relationships across strata and departments.[30,31]

While the LGI is system-oriented, individuals gain specific knowledge through planned and unplanned objectives. People learn listening, planning, and teamwork skills during their participation in the large-scale event. Moreover, a new or better understanding of the whole organizational system is typically gained as a result of their involvement in the process. The unplanned learning gained from the LGI include the experience of self-managing meetings and the willingness to innovate and take risks.[30,31]

Considering that many DM companies tout population-wide impact from their programs, surprisingly little attention is paid to community-level interventions. Two "communities" DM interventions could potentially target are health plans and large employer groups. DM programs could, for example, work with their health plan clients to ensure that benefit designs (including services covered and financial incentives) and provider payment and reward systems are compatible with good chronic disease care. A cancer DM program might advocate coverage of palliative care services as a strategy to avoid costly hospitalizations for patients near the end of their lives. A DM program could also work collaboratively with health plans or physician groups to provide bonus compensation for those physicians achieving targeted clinical improvements in their patient population (eg, percent of diabetes patients receiving recommended exams).

The opportunities to intervene at the large group employer level are also promising. Particularly in the arena of lifestyle change DM program/employer collaboration could lead to substantive change in social system norms. For example, decreasing obesity through healthy eating and increased exercise is a goal for improved health in general and, specifically, for individuals with chronic diseases such as diabetes and coronary disease. However, myriad social norms and structures make it difficult for even the most motivated individuals to maintain a healthy weight. A DM program working with an active employer partner could begin to influence these norms through changes such as the types of foods offered in vending machines, offering lower-cost, half-size portions in the cafeteria, discouraging use of high-calorie foods as rewards, allowing flexible schedules to encourage daily exercise, and recognizing those who model healthy behaviors.

COMPREHENSIVE MODELS

Each of the behavioral change models or theories discussed thus far has certain unique attributes that may attract a DM program to select it as the intervention of choice. However, several models have been created that combine elements of the individual, interpersonal, and community models. In this section, two such comprehensive models are presented.

PRECEDE-PROCEED model

The PRECEDE-PROCEED Model[32] (PPM) was designed to provide a systematic approach to the planning, delivering and evaluation of health promotion programs. The core principle of this model is that behavioral change is a voluntary activity. As such, the basic tenet of the PPM is to get individuals to take an active role in defining problems and goals, and to develop and implement action plans.

Figure 8 illustrates the structure and various components of the PPM.[32] As shown, the model is comprised of nine phases, with the first five phases (PRECEDE) being diagnostic and the second four phases (PROCEED) dealing with implementation and evaluation. *Social diagnosis* identifies and evaluates the social problems that may impact the quality of life of the given population. *Epidemiological diagnosis* helps determine which health issues impact quality of life, and how. *Behavioral and environmental diagnosis* ascertains which health prac-

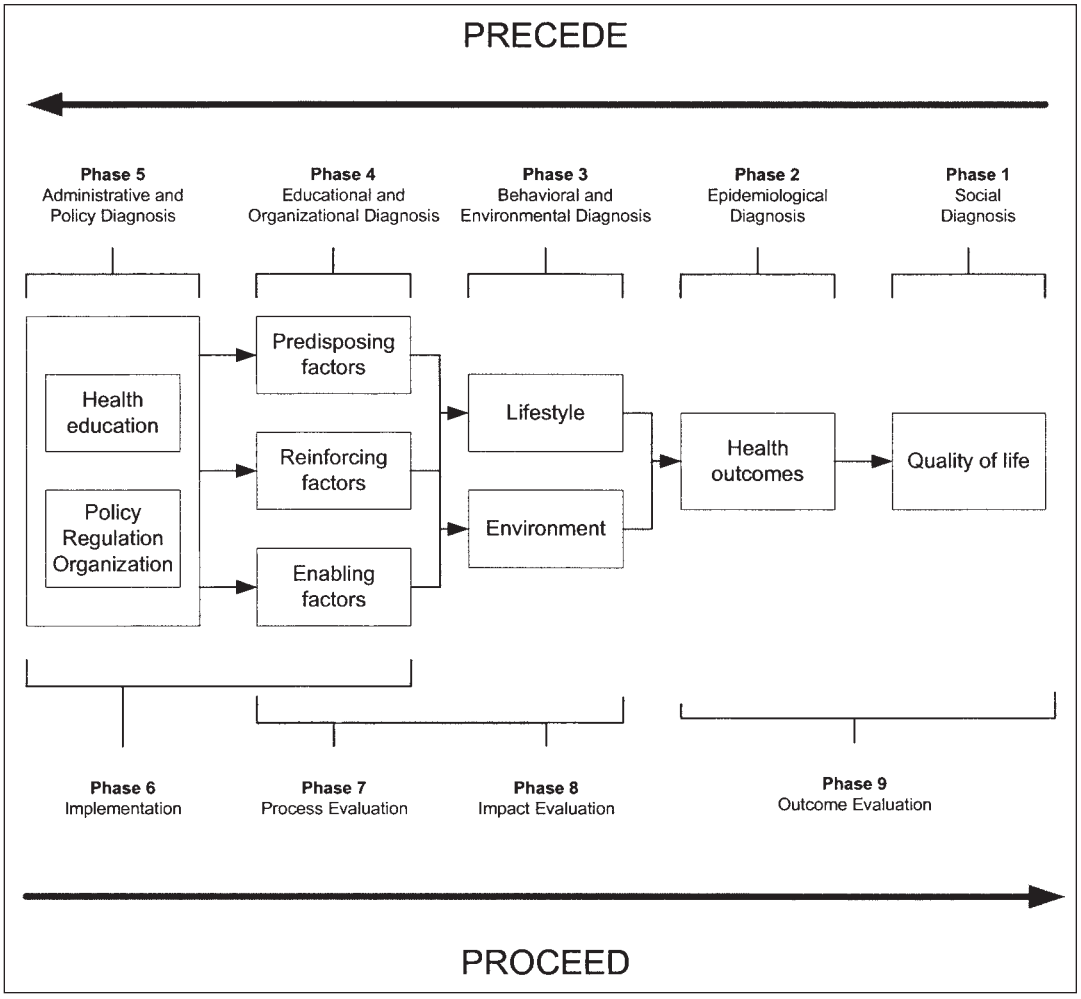

FIG. 8. The PRECEDE-PROCEED model.[32]

tices impact the health issues identified in the previous phases, as well as the environmental factors that impact health status outside of behavioral practices. *Educational diagnosis* assesses the predisposing, enabling and reinforcing factors that lead to the health behaviors in the previous stage. *Administrative and policy diagnosis* addresses the administrative and organizational concerns prior to program implementation (eg, resources, timetables, internal and external coordination).

The remaining phases include actual implementation and evaluation. *Process evaluation* determines the competency and efficiency of the process. *Impact evaluation* assesses the effectiveness of the program to change predisposing, enabling, and reinforcing factors that were determined to be barriers to performing the desired health behavior. *Outcomes evaluation* measures the program's impact on overall health status and quality of life of the population.

The PPM is a very robust program method that follows the rigors of a properly instituted research design. It starts with the identification of a problem, develops and implements the targeted intervention, and ends with measurement and evaluation. As such, the PPM is very suitable for DM programs willing to invest the time and resources to take a comprehensive approach to changing health behaviors.

The social marketing approach

Social marketing (SM) refers to the application of marketing techniques to solve social and health problems at the population or societal level. Although there are many different marketing strategies, the general intent is to use the

same methods that are employed to influence people to buy a particular brand of laundry detergent or other products, to encourage the adoption of positive health behaviors.[33–40]

At the very least, a successful social marketing program intervention should contain the following elements: (a) a consumer orientation, (b) exchange, and (c) a long-term planning outlook.

In social marketing, similar to all other marketing forms, the consumer is assumed to be an active participant in the change process. This means that a relationship is cultivated between marketer and consumer, and their input is sought throughout the development, implementation and evaluation processes.[34,38,39]

Exchange in the social marketing context refers to an exchange of resources or values between two or more parties with the expectation of some benefits.[44] Since the emphasis of social marketing is placed on voluntary behavior by the consumer, the intervention should provide something that is sought after by the target consumer (benefit). This could easily mean that the health behavior message incorporates a "value-added" component to performing the behavior. For example, a DM program that is trying to educate patients on the importance of diet and exercise in reducing risks of diabetes or heart disease may find that highlighting the aesthetic and social benefits that accompany that health behavior achieves the desired effect.[38–40,42,43]

Long term planning is essential for success of any social marketing strategies. Research is a mainstay of every stage of the process, including: identification of a problem worth targeting and internal and external environmental conditions or constraints, segmentation of the market and distinguishing a targeting strategy, developing and pretesting the intervention before implementation, and monitoring and evaluating the outcomes of the strategy.[34]

There are clear differences between social marketing and commercial marketing.[45] For example, the goods tend to be more complex in the social marketing realm. Ideas and behavior changes are being sold as opposed to tangible products. Additionally, social marketing must create a demand for some product that is not easily sold. In fact, most target groups are strongly resistant to a proposed behavior change. In these situations, the intervention must identify and address the predisposing, enabling and reinforcing factors that contribute to this negative attitude.[42,43,45]

In social marketing, target groups are harder to reach than in traditional commercial marketing approaches. These segments are typically uninterested in changing behavior, and lack the psychological, social and practical resources necessary to make the changes.[45] Additionally, these consumers are required to become highly involved in their behavior change intervention. This may lead to anxiety, guilt and denial that may inhibit attempts to change. Social marketing programs must alleviate those fears in order to achieve the goals of the program.[45]

POPULATION AND DISEASE ATTRIBUTES FOR MODEL SELECTION

There are many individual, interpersonal, community and comprehensive behavior change models in addition to those reviewed above which are applicable to health-related behaviors. Those discussed in this paper, however, are the most commonly found in health education programs. In addition, they illustrate the critical elements to consider when designing strategies for a particular disease and population.

Carefully designing program actions using sound behavior change theory is important for two phases of DM programs: enrollment and intervention. DM programs often fail to achieve promised clinical and financial outcomes due to under-enrollment in general, or specifically among those at greatest risk of avoidable health services utilization. The individual theories (eg, Health Belief Model, Stages of Change) provide insight on impacting the likelihood that a targeted patient will consider program participation. However, interpersonal and community strategies may also be needed to boost participation rates to the expected target levels. DM provider- and patient-focused interventions must also be based on a reasoned approach, tailored to the disease process, the specific behavior change desired and the nuances of the individual. Again, the impact of relationships,

environment and community norms should not be overlooked in designing interventions.

Given the variety of approaches to choose from, there is no "right" answer to which model or model combinations a DM program should choose for a given disease. However, there are certain characteristics of diseases that should be considered when selecting behavior change intervention approaches. For example, the symptoms of some diseases (eg, asthma) are quite evident to the patient, while other diseases (eg, hypertension) are symptomatically silent. Gaining patient compliance with a long-term medication regimen in these two scenarios takes quite different behavioral change approaches. Other disease attributes to consider include whether symptoms are chronic (eg, breathing difficulties in COPD) or episodic (eg, chest pain in CAD), whether acute exacerbations develop slowly (eg, congestive heart failure [CHF]) or quickly (eg, asthma), and whether the impact of poor management has short-term impact for the patient (eg, seizure disorders) or develops slowly over time (eg, diabetes).

As with different diseases, there are characteristics of patient populations that DM program developers should consider when selecting behavior change models. For example, young asthmatics may be complacent about taking their medication for entirely different reasons (ie, invincibility—"nothing bad will happen to me") than elderly patients with CHF (ie, fatalism—"the damage is already done"). Other population characteristics to consider include sex, ethnicity, length of time since diagnosis (eg, newly-diagnosed versus long-standing diabetes) and experience with attempting the type of change desired (eg, smokers who have relapsed versus those making a first quit attempt). While these characteristics should be considered when designing the intervention strategy for the entire population and subgroups within the population, they are also valuable to consider at the individual level.

An additional decision for DM program developers is how much emphasis to place on individual level behavior change approaches versus interpersonal or community level. The level of approach is highly dependent on the specific behavior targeted for impact. For example, successfully getting a patient with CHF to measure and record daily weights mainly requires application of individual level behavior change theory. An example of the application of one individual theory (HBM) to CHF is provided in the Appendix. On the other hand, successful long-term dietary compliance for persons with diabetes will likely require not only sound individual strategies, but also a comprehensive approach to behavior change using elements of interpersonal and community models.

MEASURING BEHAVIOR CHANGE IN DISEASE MANAGEMENT

In 1992, the National Institute of Mental Health convened a meeting of developers and principal supporters of many of the most prevalent behavior modification theories discussed in this paper. The outcome of that meeting was a consensus on eight of the variables that appear to account for most of the variation in any given behavior: intentions, skills, environmental constraints, outcome expectancies, norms, self standards, emotional reactions, and self-efficacy.[46,47]

The identification of variables affecting behavioral change is an important first step in evaluating a DM program intervention. In this context, these variables represent intermediate outcome measures, as they are ultimately expected to effect change in the selected clinical or social outcome. In other words, an individual achieving the desired behavioral change is eventually expected to demonstrate an improved health status (by reaching a clinical target or reducing avoidable health service utilization). This distinction is an important one, because while outcomes evaluation compares mean value changes *between* groups (intervention versus controls), the theories discussed in this paper direct attention to differential patterns of change *within* groups. By focusing on individual differences we can better understand the link between intervention and behavioral change.

Evaluation of behavioral change interventions is best done following a two-step approach.[48–50] The first step involves measuring change at the individual level. This model

should include, at the very least, independent variables representing those behavioral constructs listed above.[46,47] The results of this analysis should provide the evaluator with some indication of which parameters appear to have the most influence on an individual achieving (or not) the desired health behavior over time. After adjusting for individual level differences, the second level of analysis investigates the intervention effect by examining systematic differences between participants or groups. For a more comprehensive discussion of these modeling techniques, the reader is referred to Mellenbergh and van den Brink,[48] Speer and Greenbaum,[49] and Willett and Sayer.[50]

CONCLUSION

This paper has described eight commonly used behavioral change models applied in the healthcare industry today. They represent programs designed to address individual, interpersonal, and community level factors as well as "packaged" comprehensive approaches. While not meant to be an exhaustive review of all models applicable to health related behavior change, these eight models illustrate the breadth of approaches to consider when designing or assessing DM program interventions. An understanding of the type of change desired, the disease attributes, population characteristics and individual needs will assist DM program designers in selecting the appropriate change model.

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APPENDIX: HEALTH BELIEF MODEL APPLIED TO CONGESTIVE HEART FAILURE DISEASE MANAGEMENT

Initial contact/enrollment

Assumption. Likelihood that a patient will participate in the program is dependent upon their belief that they have a serious heart problem and that participation in the program can help them.

Strategy:

- Determine if the patient knows/believes they have a heart condition. If not, begin basic education on CHF signs, symptoms, etc.
- Ascertain how serious the patient believes their condition is. If patient believes the condition is not at all serious, begin basic education on the risks of CHF.
- Evaluate the patient's understanding of the ways they could lessen the severity/risk of their condition. If they have limited understanding of self-management of CHF, begin education on self-management tools.
- Assess the patient's perception of the benefits of improved self-management. If they have little belief in the benefits of self-management, begin education on the short- and long-term impacts of better self-management.
- Determine the patient's perceived barriers to better self-management. Discuss how participating in the program can help remove these barriers.

Program interventions

Successful self-management of CHF involves several actions: taking medications as prescribed, daily self-monitoring for signs/symptoms of worsening condition, adherence to low-salt diet, compliance with exercise program as prescribed, and seeking medical care early to avoid serious exacerbations.

Assumption. To successfully self-manage CHF (as described above) a patient must believe that the action will improve his or her condition and that the benefits of taking the action outweigh the barriers/costs to taking the action. In addition, a trigger or cue may be needed to insure the action takes place as planned.

Strategy:

- RN "coach" assigned to each patient to: understand the patient's perceived benefit of each self-management action and the barriers or "costs" to the patient of complying with each self-management action.
- Care plan designed with the individual benefits/barriers in mind. May include specific tools to act as incentives or reminders such as:
  - Daily/weekly calls from the RN to discuss results from vital sign/symptom monitoring
  - Wallet card outlining triggers to call program RN or personal physician
  - Special scale that allows accurate measurement for those over 300 lbs.
  - Low sodium cookbook
  - Pill-splitter to allow use of lower cost medications.