Original Article

Theory-Based Telehealth and Patient Empowerment

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Abstract

Health care technology holds great potential to improve the quality of health care delivery. One effective technology is remote patient monitoring, whereby patient data, such as vital signs or symptom reports, are captured from home monitoring devices and transmitted to health care professionals for review. The use of remote patient monitoring, often referred to as telehealth, has been widely adopted by health care providers, particularly home care agencies. Most agencies have invested in telehealth to facilitate the early identification of disease exacerbation, particularly for patients with chronic diseases such as heart failure and diabetes. This technology has been successfully harnessed by agencies to reduce rehospitalization rates through remote data interpretation and the provision of timely interventions. We propose that the use of telehealth by home care agencies and other health care providers be expanded to empower patients and promote disease self-management with resultant improved health care outcomes. This article describes how remote monitoring, in combination with the application of salient adult learning and cognitive behavioral theories and applied to telehealth care delivery and practice, can promote improved patient self-efficacy with disease management. We present theories applicable for improving health-related behaviors and illustrate how theory-based practices can be implemented in the field of home care. Home care teams that deliver theory-based telehealth function as valuable partners to physicians and hospitals in an integrated health care delivery system. (*Population Health Management* 2011;14:xx–xx)

Introduction

THROUGH UNIQUE APPLICATIONS OF TECHNOLOGIES that facilitate patient data collection, data sharing, and chronic disease management, the potential for care improvement appears limitless. As the number of elderly individuals in our population grows, so does the concomitant number of those with a chronic disease. Patients with chronic diseases make more visits to the emergency room, have a higher rate of hospitalizations, are at higher risk of being institutionalized, and therefore generate more health care expense than patients who do not have chronic diseases.[1,2] Upon discharge from the hospital to home, patients with chronic diseases often need considerable support, including guidance with adherence to medication regimens and treatments, health behavior coaching, and assistance with symptom management.

Remote patient monitoring is currently being employed by home health agencies and other health care providers to help meet these needs, in addition to reducing avoidable rehospitalizations and emergency room visits among the patients they serve. The use of remote patient monitoring to assist patients with chronic disease management is one example of how technology can be used to effectively solve complex medical problems.

Current Use of Telehealth

Telemedicine is defined by the American Telemedicine Association as the use of medical information exchanged from one site to another via electronic communications for the purpose of improving patients' health status. Closely associated with telemedicine is the term "telehealth," which is often used to encompass a broader definition of remote health care that may or may not involve clinical services. Home health agencies have embraced telehealth technology, given that a considerable number of agencies now remotely measure patient vital signs from the home. According to a national telehealth survey conducted by Fazzi Associates,[4] nearly 90% of home health agencies surveyed reported that telehealth improved the overall quality of services provided to their patients. With regard to reducing health care utilization, about 75% of agencies reported a reduction in unplanned hospitalizations and a reduction in emergency room visits. Over 40% of agencies also reported that the use of

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telehealth has reduced their operating costs, presumably through reducing the need for home visits when the patient condition appeared stable. Fifty percent of agencies that did not have telehealth at the time of the survey reported plans to purchase telehealth monitors in the next few years.

Telehealth monitors used by home health agencies typically comprise a monitoring screen and vital sign collection devices (eg, blood pressure cuff, pulse oximeter, blood glucose meter, weight scale), all attached to the monitor via cable or wireless applications. Monitors collect vital signs data, store the data, and forward it to a secure Web site via telephone lines or cellular networks. These data are typically accessed and analyzed by a health care professional who interprets the data and intervenes as appropriate.

Home telehealth plays a role in improving access to care by providing care oversight and health behavior guidance no matter how rural the patient location.[3] Populations, such as the elderly who may have limited mobility, chronically ill patients with low functional ability, and the underserved, may particularly benefit from improved access to health care professionals who provide monitoring and guidance from a distance.

The typical application of telehealth care delivery identifies early signs of disease exacerbation and intervenes in a timely manner, thereby avoiding preventable hospitalizations. A common scenario is a patient with a diagnosis of heart failure who is instructed to send in daily weights, pulse oximetry readings, and heart rate readings via use of their telemonitor. When physiologic values are found to be out of normal patient parameters, the nurse monitoring the data will call the patient and conduct a telephone assessment to determine what interventions are needed. If the patient requires further evaluation, a same-day home health nursing visit may be conducted, or a change in medication orders or a medication adjustment might be sought through communication with the patient's primary care physician. The data may suggest that the patient visit the physician office or emergency room for further evaluation. During these assessment calls, telehealth nurses often provide education regarding cause and effect relationships between personal health behaviors and obtained physiological results, serving to reinforce prior teaching regarding disease self-monitoring and self-management. This "real-time" education and reinforcement is a powerful tool, as the information presented is not only timely but relevant because the patient's own physiological data serves as the framework for mastering the concepts.

Demonstrated results using remote monitoring as part of an overall health care delivery model supports the results reported by home care agencies in the Fazzi Associations[4] survey. In a study by Darkins et al,[5] veterans with chronic conditions were provided services to assist with care coordination and disease management, incorporating nurse case management along with the use of remote patient monitoring. In an analysis of data for over 17,000 veteran patients, this care was shown to reduce the number of hospital bed days by 25% and the number of hospital admissions by 19%. Veterans also reported high levels of satisfaction with the service.

In a randomized controlled study, the use of disease management principles along with remote patient monitoring was evaluated for efficacy in reducing hospital readmissions in patients with heart failure.[6] Home monitoring along with posthospitalization health coaching for heart failure reduced rehospitalizations by 72%. The New England Healthcare Institute[7] conducted a cost-effectiveness analysis of available evidence in the literature for remote patient monitoring and found an overall 60% reduction in hospital readmissions compared to standard care.

Medicare-certified home health agencies are required to submit data to the Centers for Medicare and Medicaid Services for benchmarking purposes. Rehospitalization rates are publicly reported on the government Web site, "Home Health Compare," and will most likely be utilized as a benchmark for pay-for-performance reimbursement methodologies in a reformed health care delivery system. It is anticipated that telehealth services will continue to expand if the trend of positive efficacy seen in the recent literature continues at the current pace.

Expanding Functionality Beyond Typical Applications

Although telehealth is often touted as a method to improve patient self-management ability, it seems reasonable to expand the use of telehealth beyond the illustration of cause and effect relationships. A familiarity with and an understanding of theory-based self-management support directs the health care professional toward some particularly salient areas of work. Specifically, self-efficacy theory, as posited by Albert Bandura,[8] and the learning principles of Jerome Bruner and John Dewey applied to adult education and described by Suter and Suter[9] are relevant with regard to meeting the intent of patient disease self-management support.

One must understand the difference between self-management support and patient education, given that these terms are often mistakenly used synonymously. The goals of self-management support are different from the goals and desired outcomes of patient education. Patient education refers to traditional, largely didactic instruction provided to patients that focuses mainly on information sharing. Self-management support is defined as the systematic provision of education and supportive interventions by health care staff to increase patients' skills and confidence in managing their health problems, including regular assessment of progress and problems, goal setting, and problem-solving support. Self-management encompasses problem-solving skills and patients' collaborative involvement in establishing goals to manage their disease. Self-management relates to the tasks that individuals must undertake to live well with 1 or more chronic conditions. These competencies include having the confidence to deal with medical management, role management, and emotional management of their conditions.

Self-Management Support Theories: Self-Efficacy

Self-efficacy is a key construct within social cognitive theory and is defined as the conviction that one can successfully execute the behavior required to produce outcomes.[10] This outcome expectancy refers to a person's estimation that a given behavior will lead to certain outcomes. Bandura believes that self-efficacy is the most important precondition for behavioral change. Expectations influence motivation, performance, and affect.

Peoples' behavior is strongly influenced by their confidence in their ability to perform that behavior. Self-efficacy tenets have been applied to health-related fields to explain behaviors such as exercise and dieting, as well as affective conditions linked to psychosocial functioning. When people perform daily health behaviors, they begin to cement beliefs in their capability to initiate change. An individual's perceived self-efficacy predicts change in a variety of settings. Seydel et al[11] report that outcome expectancies and perceived self-efficacy are good predictors of intention to engage in behaviors to detect breast cancer (eg, breast self-examination). Postcoronary patients' recovery of cardiovascular function is similarly enhanced by belief in one's physical and cardiac efficacy.[12] When patients with rheumatoid arthritis receive cognitive-behavioral treatment, they have enhanced efficacy beliefs, reduced pain and joint inflammation, and improved mental health.[13]

Sources of Self-Efficacy

According to Bandura,[10] there are 4 major sources of self-efficacy: mastery experiences, social modeling, social persuasion, and psychological responses. Mastery experiences are those associated with successfully meeting a challenge. Subsequent successes fortify strong self-efficacy. Failing to meet a challenge can weaken self-efficacy. Observing others who have similar challenges but are able to succeed by sustained effort can raise expectations of success with a similar challenge. Verbal encouragement related to the ability to succeed also fosters self-efficacy. Patients' responses and emotional reactions to experiences will have positive or negative effects on self-efficacy, yet it is not the intensity of the emotional and physical reactions that matters as much as how they are perceived and interpreted.[10] Individuals who minimize the stress associated with difficult challenges will exhibit stronger self-efficacy over time.

Even though self-efficacy beliefs begin in childhood, Bandura posits that beliefs are molded and changed throughout the life span as individuals acquire new experiences and interpret their meaning. Self-efficacy is clearly modifiable and situational.

Application in Practice

Health care professionals are in an excellent position to assist patients with chronic diseases who have experienced past failures with disease management by structuring experiences that bolster self-efficacy. In particular, home health professionals who have the ability to work with these individuals over time during the episode of care (usually a 60-day time period) are in an optimal position. The major sources of self-efficacy can be harnessed by competent home care professionals and directed toward the effort of building self-efficacy.

Health care clinicians who are skilled at assisting patients with problem solving and utilizing motivational interviewing can successfully facilitate these experiences. These clinicians can work with patients to set goals that are reasonable, meaningful, and achievable. They can provide social persuasion by asserting that they believe that the patient has the skill and ability to meet these goals. They also can provide positive reinforcement and affirmation when the individual has met short-term goals, leading to what Rollnick et al[14]

refer to as patient empowerment. When goals are not met, they can assist with problem solving and frame the experience as a learning experience—not a failure. This process can work only after a foundation of trust has been established within the provider-patient relationship.

In our home care agency, clinicians are formally trained in the application of the Home-Based Chronic Care Model,[15] which provides our foundation for comprehensive, consistent, patient-centered chronic care delivery. The "aggressive use of technology" serves as one of our model's 4 anchors. Clinician training specifically includes clinical applications of Bandura's theory and the utilization of motivational interviewing as a communication approach.[14] Clinicians are exposed to tools that enhance communication with patients and practice problem-solving skills and methods to help the patient identify their own intrinsic motivation for change. The clinician who has taken the time to understand life from the patient's perspective, and who also understands the patient's future aspirations, is in a unique position to utilize these competencies, work with the patient on a more personal level, and facilitate change. This knowledge of future aspirations can be linked to the disease management behaviors that are necessary to realize these aspirations. Short-term achievable goals linked in this way are highly relevant to the patient, especially if the clinician is skilled in facilitating these links. As with all new methods, clinician practice with their use over time holds the key to future successes.

In our agency, telehealth is utilized specifically to assist the clinician with the entire spectrum of behavior change facilitation. Our telehealth nurse manager attends weekly multidisciplinary patient case conferences, during which the patient's long-term goals are presented and discussed. Even though telehealth is utilized to identify untoward physiological trends, positive trends are also identified. When physiological data reveal an improvement, the telehealth nurse will telephone the patient to discuss the positive actions that the patient has taken and to provide reinforcement and affirmation to continue with this action plan. This reinforces the behavior and builds on the concept of social persuasion by aligning with the case manager in his or her affirmation of patient ability.

George. An illustration of this principle in action follows: George is a 33-year-old male who was admitted to our home health agency for observation and assessment as well as teaching and training for the management of his chronic diseases. George has multiple diagnoses, including heart failure, type 2 diabetes, hypertension, obesity, and severe obstructive sleep apnea, which resulted in the need for a tracheostomy and nightly bi-pap (a bilevel pressure generating device for increasing oxygenation and ventilation) use.

George was nonadherent to his disease management plan of care as outlined by his physician. He did not use his glucometer to check daily blood glucose levels, and in fact had not purchased glucometer strips for the past 4 months prior to home health admission. He did not follow a low-sodium diet as prescribed and could barely walk a few feet without shortness of breath. George was told by his primary care physician that his prognosis would remain poor until he lost weight and started complying with his disease management behaviors. On admission to home health, George rated his confidence in his ability to manage his chronic diseases as a "zero." George had lost hope.

When telehealth was placed in George's home, his weight was 276 pounds and his blood pressure averaged 170/116. The telehealth nurses began daily phone contact with George with the explicit purpose of building his self-confidence. Small goals were set with George, such as removing the salt shaker from his kitchen table for 1 day. Every positive trend noted in his transmitted data was acknowledged with a phone call, along with continued education linking cause and effect with behaviors. George's mother became involved in his efforts and began preparing lower salt, moderate carbohydrate foods for both of them. Within 3 months, George had lost 24 pounds and was able to walk around his neighborhood block without stopping. He had been adherent with his medication regimen and his blood pressure was averaging 130/80. George was experiencing success and that success engaged him in his disease self-management.

Adult Learning Theory

Because learning is enhanced by perceived relevance, patients need to know how new learning affects them directly. Learning is also enhanced by activity, hence patients tend to remember what they do (their actions) more than what they have been told. Further, we know that information of all sorts is retained most easily by patients when it becomes meaningful, a task that simply involves linking new information with patients' preexisting understanding (their storehouse of knowledge). We also know that memory cannot be overloaded; we all have a very limited-capacity short-term memory bank, though it can be expanded by "chunking" related bits of information. (This is contrasted with our long-term storehouse of information, which is apparently infinite in its capacity for all practical purposes.) Learning theory reveals that learners need organization of content; isolated pieces of information are exceedingly difficult to remember. We seek a type of "order" almost naturally by integrating information into well-structured, meaningful wholes. Finally, we know memory for visual content, namely images, is superior to verbal or language content.

These principles of learning are applied in the following case example of Mary.

Mary. Mary lives with her adult son Kevin who cares for her because of her cognitive deficits. Mary has a diagnosis of advanced heart failure and had been experiencing frequent hospitalizations from fluid overload. Kevin was feeling frustration with the "uncontrollable nature of these episodes" and requested assistance from her primary care physician, who ordered home health services. The home health nurse case manager assigned to Mary's care conducted a comprehensive patient and family assessment in the home and developed a care plan that included the use of telehealth. This care plan was sent to Mary's primary care physician to ensure that both he and the nurse case manager were aligned with the goals for planned care. Telehealth was placed in Mary's home and her nurse case manager began an educational program with both Mary and Kevin, with an emphasis on symptom identification and knowledge of appropriate actions. Mary's physician ordered Lasix to be given daily, with additional doses to be taken as needed, based on daily weight results and symptoms.

Telehealth nurses worked with Kevin, progressing through stages of symptom recognition to making informed decisions and taking action on his own. Telehealth nurses began this process by calling Kevin when Mary's weight was up, reviewing symptoms with him, and providing instructions for any additional Lasix needed. Subsequent steps included requesting that Kevin call the telehealth nurse when he noticed symptoms or weight gain, along with coaching about how to report those symptoms to the telehealth nurse. The last step included telehealth instruction for Kevin to note symptoms, take proper actions, and then call telehealth to report those actions. Kevin quickly mastered identification of the early signs of heart failure exacerbation, the proper actions to take, and when and how to report his mother's status to health care professions. He is now armed and ready for when home health services are discontinued. Mary has not experience any hospitalizations thus far.

The implications for health care expenditure reduction in this scenario go beyond what would be experienced in the home care setting. In future reimbursement structures, which will reward good outcomes instead of volume, physicians and hospitals will benefit financially from a reduction in preventable hospitalizations for the patients in their care. Home care agencies should work collaboratively with their stakeholder partners toward service integration that is aligned with stakeholder goals. In this way, everyone wins, especially patients, who remain safely in their environment of choice—the comfort of their home.

Self-Management

Within 1 year of instituting telehealth services, our agency staff noted a trend that we believed was not in most patients' best interests. Some patients expressed the desire to retain the telehealth monitor in the home when it was time for home health discharge; patients were becoming dependent on the device. This was in direct opposition to the goals of self-management support—to foster confidence in skills and independence with disease management.

Since that realization, we adopted the process of outlining expectations for telehealth monitoring with the patient on the day of deployment in order to set the stage for transition to independence in self-management over time. Nurse case managers and telehealth technicians who deploy the units inform patients that the device will be in the home only until the patients have learned how to monitor their signs and symptoms on their own, and that there will be a "graduation day" that they can look forward to when they have the ability and skills to self-manage. Vital sign patient records have been developed that provide a method for the patient to keep a paper trending record of daily readings. Within the record are prompts for decision making, based on readings and trends. Patients are instructed to keep their own log, independent of telehealth transmitted data, which is reviewed by the nurse case manager during visits, or by the telehealth nurse. In this manner, patients are prepared for the time when telehealth is removed from the home, usually 3 to 4 weeks prior to home health discharge. At the time of unit removal, the staff acknowledge this as a milestone. The patient now has the ability to self-manage his or her disease.

Many telehealth applications permit not just the recording of vital signs data but also the delivery of educational content or daily queries. Most agencies make use of queries to identify and record untoward symptoms such as increased

shortness of breath or fatigue. Agencies with units that permit customization of content delivered or questions asked can harness this functionality to reinforce important concepts and educational efforts. We utilize this functionality in 2 ways. Short educational topics that are appropriate for the individual patient are sent out daily on the telemonitor and are viewed by the patient on the monitor screen. For example, patients with diagnosed depression can receive information on stress reduction techniques or be reminded that the effects of antidepressant medication may take up to 6 weeks and that they should continue to take their antidepressant medicine as ordered.

Our agency is currently evaluating a process where units would deliver weekly depression symptom assessments. This would ensure that our agency would have timely knowledge as to whether patients are experiencing symptom reduction as anticipated, and thus would help to identify those who may need medication adjustments. It should be noted that this would not take the place of face-to-face nursing assessments in the home, but instead would augment the information the nurse case manager has at her or his disposal, enabling better decision making at the point of care.

The practice of sending out daily survey questions related to symptoms can serve to paint "the whole picture" for the patient in an illustrative way. When telehealth nurses note changes in symptoms over time and also are armed with physiological data, they can help "connect the dots" for the patient with regard to how changing physiological variables are related to changing symptoms.

Inez. To illustrate this principle, consider Inez, an 89-year-old female who was admitted to home health with a diagnosis of advanced heart failure. On admission, Inez could not articulate which symptoms heralded her exacerbations. A telehealth monitor was placed in Inez's apartment, and telehealth nurses designed a symptom survey that was unique to Inez, based on her previous symptom history. On a daily basis, Inez was asked to evaluate the amount of ankle edema, shortness of breath at rest, and number of pillows used at night by answering a series of questions on the telehealth monitor. Telehealth nurses utilized this information when speaking with Inez by phone and paired the information with weight trends and heart rate. Eventually Inez was able to evaluate her signs and symptoms in total, progressing from dependence on the telehealth nurses for actions, to total independence by using her own equipment (bathroom scale, portable blood pressure device) and daily log to guide her decision making. When she was discharged from home health, Inez stated that she finally felt comfortable enough to recognize when she was getting into trouble and when to ask for help. She attributed the knowledge gained to the use of telehealth.

Discussion

Technology, like all tools, is only as effective as the skill level of its users. Telehealth has been employed for specific reasons, primarily to illustrate cause and effect relationships between data and outcomes and to herald the onset of a disease exacerbation to facilitate timely interventions. In this regard, telehealth's efficacy has been more than fruitful, with demonstrated reductions in preventable rehospitalizations

and, ultimately, in health care spending. A new, robust use of telehealth may augment the outcomes already experienced. Efforts designed specifically to build patient self-confidence, offer educational information, improve retention, and reinforce disease management knowledge are examples of expanded use that would be easy to incorporate within the current care delivery model of home health agencies. Specifically, telehealth can maximize the opportunity to meet the goals of improving disease management skills and patient confidence with the disease management process. Patients who have confidence in their ability to manage their disease experience fewer disease-related complications. Improved health outcomes net cost savings for patients, payers, and the nation as a whole.

According to the Fazzi Associates telehealth survey,[4] almost 90% of home health agencies that already provide telehealth services indicate that their investment of time and resources to start such a program was worthwhile. Providers considering the addition or expansion of telehealth programs can work toward maximizing realized outcomes by putting those theories into practice that optimally support disease self-management. In order to do so, providers must be knowledgeable and competent with self-management support through the facilitation of true collaborative relationships and the fostering of patient trust. Providers must possess skill with communication styles that work to identify patient barriers to behavior change such as ambivalence, depression, or lack of confidence and hope. Paramount is provider understanding of the role that patient confidence plays in disease management and recognizing the value of structuring services that bolster self-efficacy.

The foundation and understanding of the theories presented in this article, along with their clinical application, will place providers of care in a prime position for future value-based reimbursement models. Home health care professionals who possess competencies to promote patient empowerment can share responsibility for outcome attainment with physician and hospital partners so that all can realize and maximize positive health outcomes for the patients they serve. Such teams of home care professionals can answer the call to function as a prepared, proactive team to facilitate physician participation in patient-centered medical home models.

Home care agencies already have working relationships with physicians, hospitals, case managers, and community groups. Agencies that effectively retool their staff can strengthen these relationships further by adding service value. By utilizing the existing infrastructure of home care agencies located throughout the nation, and working collaboratively with physicians and hospitals to collectively care for patients with chronic diseases, costly construction of new delivery systems can be avoided. Additionally, care delivery in the home is cost-effective and is an attractive care venue under a bundled payment methodology. Retooled agencies that work in concert with their physician and hospital partners can be a virtual "army at the ready" to address the current chronic care crisis, both clinically and financially on a broad scale.

Another health care reform approach gaining momentum expands upon the bundled payment concept through the formation of Accountable Care Organizations (ACO). ACOs are local networks of providers who agree to work together

to share responsibility to improve patient outcomes while simultaneously controlling costs. In these expanded models, ACOs strive to meet clinical and spending targets that are established by the third-party payer. Clinical targets are set using evidence-based guideline recommendations. Spending targets are established based on predicted future costs for the patients the ACO serves. Those organizations that meet both predetermined quality and cost benchmarks would share among themselves bonus payments that were derived from a portion of realized savings. Retooled agencies would be optimally positioned to be included within local networks of physicians and hospitals that chose to form an ACO.

One significant barrier to broad-scale application of theory-based telehealth delivery is the current lack of reimbursement for remote patient monitoring by third-party payers. Tightened payment methodologies for home care services have resulted in diminished dollars available for the purchase of monitoring hardware and software. Even though agencies have embraced this technology, many have purchased limited monitoring units because their finances preclude them from making a significant capital investment. In addition, a telemonitoring visit is not counted as a "visit" by payers; therefore, these infrastructure costs are borne solely by the home care agency. As a result, home care supported by telehealth can be locally and regionally disparate. Payment reform is needed to promote the robust use of remote monitoring in order to enable more agencies to provide cost-effective, comprehensive chronic care.

The maintenance of patients at home, with the ability to self-manage their chronic diseases, holds the key to realizing meaningful change in health care today. Most importantly, the patient-centered approach of theory-based telehealth delivery by competent health care and home care providers can foster and sustain patient empowerment, resulting in improved quality of life for the patients served.

Author Disclosure Statement

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