Telehealth Technology in Case/Disease Management

Eun-Jun Park, MSN, RN

Case managers can better coordinate and facilitate chronic illness care by adopting telehealth technology. This article overviews four major categories of telehealth technology based on patients’ roles in self-management: surveillance, testing peripherals and messaging, decision support aids, and online support groups related to patients’ subordinate, structured, collaborative, and autonomous roles, respectively. These various telehealth technologies should be selected on the basis of patients’ care needs and preferences. Moreover, when they are integrated with other clinical information systems, case management practice can be better performed. However, the specific role functions and skill sets needed to be competent in telehealth environments have not yet been clearly identified. Considering role ambiguity and stress among telehealth clinicians, clarifying relevant roles is an urgent task.

Although information and communication technology has rapidly changed healthcare environments, telehealth has attracted growing interest from both health professionals and consumers. Telehealth, a broader concept than telemedicine or telenursing, is defined as “the use of telecommunication technologies and computers to exchange health care information and to provide services to clients at another location” (Hebda, Czar, & Mascara, 2005, p. 356). Telehealth services are being provided to licensed health professionals, including physicians, nurses, social workers, psychologists, and nutritionists, in various care settings, such as community health, home health, school health, and disease management (Schlachta, 1998). A consensus has been reached that case/disease management for patients with chronic illness needs to take advantage of telehealth technologies (Meyer, Kobb, & Ryan, 2002; Roupe, 2004; Ryan, Kobb, & Hilsen, 2003; Young, 2004). This is expected to lead to projected cost savings, increased convenience for patients, and increased self-care management outcomes.

Outcomes of telehealth implementation are not conclusive (Currell, Urquhart, Wainwright, & Lewis, 2005). A large number of studies found favorable clinical outcomes from telephone-based case management (Bowles & Dansky, 2002; Cleland et al., 2005; Howe et al., 2005; Little, Saul, Testa, & Gaziano, 2002; Montori et al., 2004; Riegel et al., 2002; Wong, Wong, & Chan, 2005). However, the cost saving resulting from telehealth is not convincing because only a limited number of studies of telehealth in chronic disease management demonstrated cost-effectiveness; this was partially because only short-term evaluation periods were used (Celler, Lovell, & Basilakis, 2003). Even though the cost per telephone case management episode may be lower than the cost of a face-to-face visit, total healthcare costs per patient can be higher in telephone case management because of increased use of healthcare resources in the short term as a result of intensive case management interventions. Nonetheless, one important driving force of telehealth is that telehealth technology strongly supports current changes in healthcare: from provider-centered to patient-centered care and from hospital-based to community-based care. By adopting telehealth, point-of-care service moves to the patients’ home location and is more convenient.

Self-care management is vital for patients with chronic illness to maintain or promote health

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status and requires four essential elements to be successful:

1. collaborative definition of problems;
2. targeting, goal setting, and planning;
3. creating a continuum of self-management training and support services; and
4. active, sustained follow-up (Von Korff, Gruman, Schaefer, Curry, & Wagner, 1997).

The elements of patient training/support and active monitoring require more than regular face-to-face visits with primary care providers in order to coordinate and facilitate chronic illness care (Wagner, Austin, & Von Korff, 1996). Telehealth augments this system.

The lack of comprehensive and coordinated services can now be tackled by using telehealth technologies. Patients who are newly diagnosed, or in an unstable condition, can be closely monitored using various telehealth technologies. Therefore, it is important for case managers to understand telehealth environments so as to be able to apply this technology appropriately and achieve quality improvement and cost savings in healthcare. This article overviews available telehealth technologies used in case/disease management, discusses evolving roles and skills needed in telehealth environments, and provides recommendations for practice.

**TELEHEALTH TECHNOLOGY IN CASE/DISEASE MANAGEMENT**

A live telephone conversation between a care provider and a patient is a traditional mode of telehealth practice because it is not face to face, but in some research it is categorized with usual practice such that nurses whose job is answering patients’ questions via telephone were not included in the telenurse sample (Schlachta-Fairchild, 2002). Today, video and computer technologies are combined with telephone for providing telehealth services; these enable transmitting texts and images, as well as voices. In Alemi, Stephens, and Butts’s (1992) research, their telecommunication practice model in case management used (1) a telephone recorder system and telephone support groups for patient empowerment, (2) a voice mailbox shared by a multidisciplinary care team and shared progress notes for care coordination, and (3) a patient care system containing a voice mailbox, telephone assessment systems, service check systems, and follow-up systems for improving case managers’ productivity. Although the potential deficit of human care was of concern in computerized assessment, many findings were encouraging regarding the use of telehealth technologies for better case management outcomes.

Although a range of telehealth technologies are discussed in the literature, four major categories of telehealth technology that reflect the extent of patient participation in self-management when using telehealth technologies have been identified (Barrett, 2005). The four groups are

1. surveillance tools for subordinate roles,
2. testing peripherals and messaging for structured roles,
3. decision support aids for collaborative roles, and
4. online support groups for autonomous roles.

This typology was chosen because it helped to illustrate different purposes of technologies when considering patients’ healthcare needs. In addition, essential activities of case management (Commission for Case Manager Certification, 2004), which includes assessment, coordination, planning, monitoring, implementation, and evaluation, are discussed related to different telehealth technologies.

**Surveillance**

Telehealth technologies are used for home surveillance, in which patients have subordinate roles (Barrett, 2005) and case managers can perform mainly monitoring activity. Tools like sensor-based surveillance and video camera surveillance are examples. For instance, a video camera is established at a patient’s home to observe a stroke patient, or distributed sensors are used to track the movement of frail elders. These 24-hr surveillance tools allow patients with chronic conditions to stay in their homes with the family, instead of at an institution; they also serve to decrease patients’ and caregivers’ anxiety (Berendt, Schaefer, Heglund, & Bardin, 2001). Even if case managers themselves may not be in charge of directly monitoring patients, these surveillance tools can help case managers immediately respond to changes in patients’ health status and ensure patient safety.

**Testing Peripherals and Messaging**

The second category of telehealth technologies includes tools for interactive consultation, monitoring
and messaging systems with multiple peripherals, and portable testing peripherals (Barrett, 2005). These technologies facilitate patients’ structured roles in a more active way than subordinate roles. Patients are responsible for measuring their vital signs and other physiological signs, and these clinical data are sent to case managers or others via telephone lines or other means for data interpretation. These tools help case managers assess and monitor patients’ health status or compliance with a treatment regimen, based on which the care plan is modified. According to the literature review, these technologies are frequently used in the case management of chronic illnesses, such as heart failure, diabetes, asthma, coronary obstructive pulmonary disease, or hypertension.

Interactive voice response (IVR) systems are one of the popular tools in case management. These systems have computer support, and thus “patients receive recorded messages and report clinical information using their telephone’s touch-tone keypad or voice response technology” (Piette, 2000, p. 818). Although traditional telephone-based interventions that deliver counseling or feedback are labor intensive and time consuming (Alemi et al., 1992), IVR systems save these costs and allow a large number of patients to communicate with case managers (Hall & Huber, 2000; Mortara et al., 2004). Also, many studies reviewed in Piette’s (2000) article consistently supported the feasibility, reliability, and validity of IVR systems used for the purpose of diagnosis and management of chronic illnesses. In addition, patients prefer tools like IVR systems to face-to-face visits when reporting sensitive information such as psychiatric symptoms, drug use, or sexual behaviors (Alemi et al., 1992; Piette, 2000).

A telephone set like the Vista 350 (Edmonds et al., 1998) or a device like the Accu-Chek Acculink modem (Bergenstal et al., 2005) can be used to report blood glucose levels, insulin doses, and relevant events of the day among patients with diabetes. The Health Buddy is a well-designed telehealth communication tool for patients with heart failure (LaFramboise, Todero, Zimmerman, & Agrawal, 2003). Using this device, patients answer a set of questions about their disease status or health behaviors and transmit them to a care provider via the Internet at night. The next day, a clinician reviews the patients’ responses and provides either directions for better care consistent with clinical guidelines or reinforcement for positive changes. The Health Buddy is easy to use and as effective as home visits in terms of improving self-efficacy, functional status, depression, and quality of life.

Portable testing peripherals and biosensors attached to computers also are easily usable at home. These devices measure, for example, the cardiac cycle, bowel sounds, blood pressure, arterial oxygen saturation, spirometry, weight, or temperature, and then send these data to a central server for retrieval and case management analysis (Benatar, Bondmass, Ghitelman, & Avitall, 2003; Bowles & Dansky, 2002; Dimmick et al., 2003; Johnston, Wheeler, Deuser, & Sousa, 2000; Mortara et al., 2004; Roupe, 2004). Technologies in this category often require patients to measure their health status at home, but interpretation of these measures is performed by clinicians at a distance.

**Decision Support Aids**

On the other hand, technology like disease management aids (decision support aids) facilitates patients’ understanding of clinical test results and helps in making the right decision for self-management. In this case, patients play collaborative roles. Decision support systems are often used by case managers in order to assign a suitable case management level, to develop a care plan, and to predict hospital admissions (Finkelstein, O’Connor, & Friedmann, 2001; Riegel et al., 2002). Decision support software also automatically generates feedback by linking patients’ clinical data with decision algorithms based on clinical guidelines; for example, they can help patients to adjust insulin dosage (Albisser, 2003) or asthma medication immediately (Finkelstein et al., 2001). If clinical pathways tailored to individual patients are programmed in the software, case managers’ implementation activity can be assisted. Thus, this type of technology empowers patients and brings about true self-management.

**Online Support Groups**

Information and communication technology makes online support groups available for patients with diverse chronic illnesses. Previously, such groups were conducted face to face. Patients who access online support groups tend to want an autonomous role in their healthcare management and prefer to minimize dependency on care providers. The effects of online support groups have not been conclusively demonstrated (Eysenbach, Powell, Englesakis, Rizo, & Stern, 2004). Patients can access an online community without constraints of time or place, and share experiences with people who have similar treatments or self-care problems. Although the ultimate users of these Web resources are patients and not case managers, case managers need to know about online support groups; case managers need to assess their value in serving patient needs and refer patients to these resources as appropriate.
Effective Use of Telehealth Technology

An appropriate type of telehealth technology should be chosen on the basis of patients’ clinical needs and individual characteristics and preferences. In Delichatsios, Callahan, and Charlson’s (1998) study, younger people and women used a physician telephone service more frequently. Thus, acceptance of telehealth technology may be varied depending on individual characteristics, such as age, gender, health problems, or computer skills. Tailoring strategy to individuals was demonstrated in the literature. A questionnaire that assesses patients’ functional health status (Celler et al., 2003) or educational information (Finkelstein et al., 2001; Hall & Huber, 2000) was administered, and strategies were modified on the basis of previous patient data. Also, the communication interface (Web sites vs. paper reports) and the format of reports were designed differently for clinicians versus patients (Finkelstein et al., 2001). For example, telephone case management does not require patients’ computer skills or literacy level to be high, so telephone technology can be advantageous over computers for certain groups of people.

The Community Care Coordination Service at the Sunshine Network of the Veterans Health Administration used home telehealth technology to take care of Veteran’s health (Meyer et al., 2002; Ryan et al., 2003). One extraordinary feature of their telehealth services is a technology algorithm, which was applied to tailor technology selection to patients’ clinical needs, literacy level, and technology skills. For example, “education, impaired vision, manual dexterity, willingness to use technology, and compliance with the medical regimen” (Ryan et al., 2003, p. 83) influenced the choice of technology and ultimately the effects of case management. It is suggested that case managers be alert to tailoring issues when using telehealth technology and learn how to tailor communication options as well as content of services.

Another significant issue is that telehealth technologies ultimately need to be integrated with other clinical information systems. Patient data collected automatically from telehealth devices were documented in electronic health records without delay (Duke, 2005; Riegel et al., 2002). This feature creates more accurate and real-time patient information that is available for both clinicians and patients and that is critical for treating diseases in a timely manner before exacerbations occur (Benatar et al., 2003; Duke, 2005).

The Informatics for Diabetes Education And Telemedicine (IDEATel) project exemplifies the integration of telemedicine into existing hospital information systems (Shea et al., 2002; Starren et al., 2002). In this project, home telemedicine, case management software, a clinical information system, Web-based educational material, data security, and networking and telecommunication were integrated and proved more effective in achieving outcomes. Case management activities using telehealth technology were recorded automatically on electronic health records, thus helping to secure patients’ privacy and confidentiality. Also, Web-based resources, including the case management site, the American Diabetes Association’s educational Web site, and the IDEATel project site, were used for patient education. Case management activities were information intensive, and useful for comprehensive patient education.

Case Manager Roles/Skills in Telehealth Environment

Because telehealth has changed care delivery modes and care environments, health professionals were challenged to learn new role functions and skills needed to build therapeutic relationships with patients while utilizing technology (Pellegrino & Kobb, 2005). Nonetheless, little is known about human factors, such as evolving roles, personal attributes, and skills, related to telehealth (Pellegrino & Kobb, 2005). The 2000 US telenursing role study (Schlachta-Fairchild, 2002) is one of few reports of research available to form the evidence base. In the survey, telenurses had a higher educational level (e.g., graduate degrees: 46% of telenurses vs. 6% of general nursing population) and a higher level of role stress, role ambiguity, and role conflict. Role functions of the telenurses included administrative, coordination with other agencies/personnel, in-person direct patient care, telemedicine-delivered patient care, research, supervision, and teaching. In addition,
younger nurses tended to have multiple role functions requiring business and technical skills. This study implies that nurses’ roles are influenced by telehealth technology, and thus clarifying relevant roles is an urgent task in nursing.

In Hibbert et al.’s (2004) ethnographic study, 12 telehealth nurses reported mostly negative views of technology: for example, technologies upset nurse–patient relationships and threatened professional security when they had to use telehealth technologies for care delivery. Jennett, Watson, and Watanabe (2000) found positive effects of telehealth because health professionals in remote areas reached specialists for consultation or improved their clinical skills with increased sense of competency. However, some nurses reported threats to job security if telehealth strategies were to replace nurses. Mixed responses to telehealth reflect the undefined roles of nurses in practicing telehealth services. Considering that a larger number of case managers are working in a telehealth environment, better information about the influences of technology on case management roles need to be further investigated.

In addition, skill sets required for case managers to effectively use technology need to be established. Among the essential skills for case managers identified by More and Mandell (1997) were interpersonal skills (e.g., communication, collaboration, negotiation) and personal skills (e.g., organization/time management, prioritization, delegation, creativity, and self-discipline). These can become more important in telehealth, while professional skills (e.g., marketing/networking, investigation) or knowledge-based skills (critical thinking/problem solving, research, and assessment) are relatively less likely to change because of telehealth technology. For example, case managers need to understand characteristics of telecommunication when facial cues are not always available or the transmission of voices or images is delayed. Miscommunication was reported in telephone communication (Leclerc et al., 2003). Thus, telecounseling or teleadvice from case managers may be less effective unless case managers develop expanded skills for telecommunication environments.

A study of the Community Care Coordination Service at the Sunshine Network of the Veterans Health Administration identified skills sets, core knowledge areas, and personality traits needed for the role in telehealth (Meyer et al., 2002).

The seven skills sets are listed in Table 1.

Telehealth care coordinators also needed knowledge about

1. organizational culture,

2. community resources,
3. team building,
4. service delivery, and
5. psychosocial support.

The important personality traits related to telehealth are displayed in Table 2.

However, the Veterans Health Administration study was not designed to identify characteristics specific to the telehealth environment; the findings were anecdotal. Little evidence exists about roles and skill sets relevant to case management using telehealth technology.

**DISCUSSION**

The boundaries of telehealth technology are expanding, and most healthcare professionals must deal with computers and other sophisticated technologies to care for patients. In this new care delivery mode, care providers are attempting to adapt their traditional roles and skills to be competent in telehealth services. Case managers were early adopters of telehealth technologies and change agents in this revolutionary age of healthcare. Importantly, the development of telehealth services should be led by health professionals and patients’ needs rather than technology.

**TABLE 1**

Seven Veterans Health Administration Skill Sets

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**TABLE 2**

Ten Personality Traits Useful for Telehealth

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<td>Flexible</td>
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Case managers were early adopters of telehealth technologies and change agents in this revolutionary age of healthcare.

Available telehealth technologies impact case management activities and patient roles. Telehealth technologies are facilitating a range of patient roles: subordinate, structured, collaborative, and autonomous. These technologies complement case management activities like assessing and monitoring in an obvious, direct way and further care planning, coordinating, implementing, and evaluation activities indirectly.

However, there is little research to show how health professionals’ roles are different and what kinds of skills are required to effectively utilize telehealth technology. Although health professionals recognize many advantages of telehealth (e.g., more opportunities for education and consultation), their roles are often unclear in the telehealth environment. A higher level of role ambiguity and stress were reported among telenurses. Nursing research is needed to clarify the evolving roles and unique skills in telehealth.

There are barriers and unsolved problems in the telehealth field, which include issues of reimbursement, licensure, liability, confidentiality, ethical concerns, and high costs. However, telehealth is projected to grow in use. Benefits related to case management include the following:

1. Telehealth facilitates multidisciplinary care, including the family, for complex and chronic care even in rural areas where specialists are often not available.
2. Evidence-based guidelines can be adhered to by patients themselves at home using decision support software.
3. Average case loads of case managers (productivity) can increase as a result of the reduction in travel time and monitoring a large number of patients at the same time.
4. Comprehensive patient data are available for analysis in real time without additional data collection and data entry efforts.

Therefore, the two recommendations for the use of telehealth technology in case and disease management are that telehealth strategies should be tailored to individuals and that telehealth technologies should be closely integrated with other clinical information systems. Telehealth technology alone cannot achieve quality of care; it must be integrated into case management practice for the best individualized care.

References


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