Telehealth Applications to Enhance CKD Knowledge and Awareness Among Patients and Providers

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CKD affects 13% of the US adult population, causes excess mortality, and is associated with significant sociodemographic disparities. Optimal CKD management slows progression of disease and reduces cardiovascular-related outcomes. Resources for patients and primary care providers, major stakeholders in preventive CKD care, are critically needed to enhance understanding of the disease and to optimize CKD health, particularly because of the asymptomatic nature of kidney disease. Telehealth is defined as the use of electronic communication and telecommunications technology to support long-distance clinical health care, patient and professional health-related education, and public health and health administration. It provides new opportunities to enhance awareness and understanding among these important stakeholders. This review will examine the role of telehealth within existing educational theories, identify telehealth applications that can enhance CKD knowledge and behavior change among patients and primary care providers, and examine the advantages and disadvantages of telehealth vs usual modalities for education.

Key Words: Telehealth, CKD, Education, Chronic kidney disease

Telehealth is defined by US Department of Health and Human Services as the use of electronic communication and telecommunications technology to support long-distance clinical health care, patient and professional health-related education, and public health and health administration.[1] The goal of telehealth is to optimize the delivery of health care, particularly in underserved areas, while achieving the quadruple aim,[2] with enhanced health outcomes at the individual and population level, improved provider, and patient experience of care at reduced cost. Telehealth applications include digital media, short messaging service (text messaging), mobile applications, interactive voice response, video conferencing, asynchronous store-and-forward communication, and wireless communication using peripheral objects such as scales, BP cuffs, and glucometers.

CKD is a major public health concern, affecting an estimated 13% of the US population.[3] Better management of CKD can slow progression of kidney dysfunction, prevent metabolic complications, and reduce cardiovascular-related outcomes.[4] Patient awareness of CKD and engagement with treatment and management plans are crucial to achieve better health outcomes for this population. Provider identification of CKD and its complications, understanding of treatment options, and knowledge about when to refer to nephrologists are also critical.[5,6] Resources for patients and primary care providers, major stakeholders in CKD care, are critically needed to optimize CKD health. Awareness of CKD and its risk factors among patients has been persistently low.[7] Recent estimates of individual CKD awareness among diverse populations range from 6% to 12%, with higher levels of awareness among individuals with more severe kidney disease and other cardiovascular comorbidities.[3,8,9] Primary care provider recognition of CKD is also persistently suboptimal. Estimates of primary care provider recognition of kidney disease range from 6% to 50%, influenced by severity of CKD, primary care specialty, and experience. Studies have shown low awareness is associated with poor guideline concordant CKD care delivery,[10] especially among minorities.[11]

Telehealth applications afford new opportunities to enhance awareness among these important stakeholders. This review will examine the role of telehealth within existing educational theories, identify telehealth applications that can enhance CKD knowledge and behavior change among patients and primary care providers, and examine the advantages and disadvantages of telehealth vs usual modalities for education.

HOW TELEHEALTH FITS WITHIN EDUCATIONAL THEORY

It is well understood that successful health educational interventions incorporate content and a strategy to facilitate the process of change.[12] This is consistent with Kolb's theory of experiential learning, which posits that most adult learning is gained through experience and engagement.[13] Kolb's theory describes a "cycle" of learning divided into 2 parts: knowing and understanding. Knowledge may come from abstract conceptualization (ie, reading,

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Support: D.S.T. is supported by 1K23DK094850 and R01DK104130-01A1. L.E.B. is supported by 1R01DK098759-01 and FC14-1409-20967 (Patient Centered Research Outcomes Institute).

Financial Disclosures: The contents of this manuscript are solely the responsibility of the authors and do not represent the official views of the NIH or the Patient Centered Outcomes Research Institute. The authors have no conflicts of interest to report.

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1548-5595/$36.00

http://dx.doi.org/10.1053/j.ackd.2016.11.017

lectures/classes) and concrete experience (ie, simulations or real patient encounters). Understanding is the ability to apply such knowledge and is reached through reflective observation or active experimentation. It is this "learning by doing" that enables adult learners, including patients and providers, to incorporate new knowledge into actions and enact behavioral change to achieve desired outcomes. Because they provide flexible and adaptable platforms for education, telehealth applications can be uniquely leveraged to provide knowledge via diverse modalities to reach individuals with differing learning styles and preferences and provide understanding, encouraging subsequent behavior change through engagement with others, iterative self-reflection, and trial and error.

TELEHEALTH APPLICATIONS FOR PATIENT EDUCATION AND SELF-MANAGEMENT

Web-Based Applications

The Internet has become one of the most important sources of health information for patients and their families. Recent studies suggest that most adults seek health information online.[14] Many digital educational materials have been available online for patients with CKD by professional societies and patient advocacy groups, satisfying the knowledge component of Kolb's learning cycle. Systematic reviews of these educational materials suggest that most are adequate for use as determined by validated instruments, although relatively few are outstanding and many are written at a literacy level too high to be appreciated by most patients with CKD.[15,16] A well-established repository of educational materials for patients with kidney disease is the National Kidney Disease Education Program (NKDEP), which promotes kidney disease education via digital media. The NKDEP Web site contains several links to kidney disease educational topics (www.nkdep.nih.gov), including pamphlets available for download. Importantly, the Web site content is directed at an elementary school-level reading capability and has been modified based on an iterative process of review.[17] This same iterative process was used to develop the Safe Kidney Care Cohort study Web site (www.safekidneycare.org) that provides information to patients, family members, and providers, on topics relevant to patient safety in CKD.[18] Health education videos may also be found on these Web sites as adjuncts to the written educational materials or they may stand on their own on Web sites such as YouTube.

CLINICAL SUMMARY

- Telehealth applications provide flexible and adaptable platforms that can be uniquely leveraged to enhance knowledge via diverse modalities to reach individuals with differing learning styles and preferences and to encourage behavior change through engagement, iterative self-reflection, and trial and error.
- Telehealth is largely nascent in the field of nephrology, but early examples leveraging digital media, videoconferencing, mobile applications, and store-and-forward technology illustrate great promise to increase general awareness and understanding of kidney disease among patients and to enhance renal knowledge and optimal CKD management among primary care providers.
- Efforts to ensure that telehealth applications are widely accessible and designed for individuals with all levels of e-literacy will be needed. Rigorous evaluation will be critical to determine benefits relative to traditional educational modalities and to identify and mitigate unanticipated consequences.

Virtual Support Groups

The Internet has also become a resource for the development of social support systems for those affected by chronic diseases, including kidney disease.[19] Internet support groups with videoconferencing and virtual group education classes, facilitated by health educators or peer leaders, deliver chronic disease education and promote collaborative problem solving, self-reflection, and conceptualization. Although these types of classes have not yet been tried for patients with CKD, a trial comparing virtual diabetes classes to in-person classes demonstrated equal improvements in glycemic control among participants in both groups (decrease in glycosylated hemoglobin of 0.4-0.5% groups).[20] Importantly, these classes facilitate both the knowledge and understanding components of Kolb's learning cycle, and they have been well received by older individuals with chronic illnesses, who report appreciating the benefits of group learning without enduring the burden of travel.[21]

Text Messaging

Short message service text messaging has been the most extensively studied telehealth application in chronic diseases, although it is still a burgeoning area for research for individuals with CKD. Text messages can deliver succinct educational reminders to patients, prompting them to review previously learned material, as well as web links with access to more in-depth educational content.[22] Standard educational messages satisfy the knowledge component of the Kolb learning cycle and may be sent in bulk via 1-way interactions to many patients simultaneously. More tailored 2-way text message communications can also be sent to individual patients by health workers or health educators, allowing them to not only self-reflect but also apply their knowledge, completing the Kolb learning cycle.[23] One challenge of text message-mediated education lies in the need to transmit substantial education with few words or written characters. Nonetheless, studies of text-based interventions have been associated with improved medication adherence,[24] greater tobacco cessation,[25] increased weight loss among obese adults,[26] and enhanced diabetic control.[27] Still, there is a paucity of information about the best way to tailor text-based educational programs for different subgroups of individuals, based on age, gender, socioeconomic status, or type of chronic disease. In particular, more research is needed to determine the utility of text-based services in improving disease outcomes among CKD populations