

Telehealth: A Balanced Look at Incorporating This Technology Into Practice

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Abstract

This article explores the use of telehealth and the ability to provide health care to patients through interactive technology and telecommunication tools. The use of telehealth continues to grow, reaching multiple medical specialties and providing care to a greater population of patients. The purpose of this article is to increase the knowledge of telehealth, identify positive outcomes associated with telehealth as well as potential barriers, and evaluate the benefits against the downfalls to determine whether the positive outcomes outweigh the barriers.

Keywords

telehealth, outcomes, barriers, benefits, technology

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According to Dowling (2015), health-care delivery is being changed by the introduction of new technology, a major contributor of change being the use of telehealth. Telehealth has been around longer than one might think; Wesson and Kupperschmidt (2013) state that telehealth has been used since the early 1900s when providers implemented two-way radios for communication of services needed, and Andrews (2014) indicates that advising and guiding patients through the use of telephones have been explained in the literature since the 1960s. Dowling (2015) defines telehealth as the use of electronic communications used to share medical information from one site to another, for the purpose of improving the patient's health. Telehealth facilitates communication and information sharing among providers, allowing interactive teleconferencing between multidisciplinary care teams to suggest diagnosis of radiology images, medical reports, and records (Goodini, et al., 2015).

Telehealth includes numerous routes of delivery including “patient consultations via video conferencing, transmitting still images, e-health with patient portals, remote monitoring of vital signs, continual medical education, consumer-focused wireless applications and nursing call centers” (Dowling, 2015, p. 27), e-mail, text messaging, remote data capture, and surgical training (Bramstedt et al., 2014). Telemedicine routes can also

be described with specific associations within a particular medical specialty such as teleradiology or remote intensive care monitoring of vital signs (Dowling, 2015). The terms telehealth and telemedicine are synonymous and used interchangeably (Wicklund, 2018). However, for the purpose of this article, the term telehealth will be used.

The introduction and implementation of telehealth possess the implication of many benefits to the health-care industry as well as possible downfalls. The Centers for Medicare & Medicaid Services recently announced that changes have been made to expand reimbursement for telehealth, which indicates that telemedicine has gained official recognition by the largest payer in the nation (Dowling, 2015). The purpose of this article is to evaluate and discover possible benefits and barriers of telehealth, in which it can be determined if the benefits exceed the barriers.

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Specific Uses of Telehealth

Telehealth involves numerous medical modalities, encompasses a variety of delivery methods, and incorporates multiple types of technological advanced pieces of equipment. There is a broad range of current uses with telehealth. Both nurses and nurse practitioners are increasing the use of telehealth in practice with remote patient monitoring, patient education, and consultation (Ali, Carlton, & Ali, 2015). To gain broader understanding of some telehealth uses and technological capabilities, the following subsections will identify current telehealth uses in health care.

Teleradiology

The invention of digital imaging has provided the opportunity for radiologists to access medical images in a far more proficient manner than the previous technology of film-based radiologic image acquisition. "Teleradiology is one of the oldest, most established, successful, and widely used clinical telehealth specialties" (Krupinski, 2014, p. 5). According to Nyeem, Boles, and Boyd (2012), teleradiology is a technology that allows medical images to be transmitted over electronic networks for improved health-care access, delivery, and standards. Teleradiology allows a physician to virtually be anywhere in the world that has Internet access, the ability to receive medical radiological images and make a diagnosis. Considered an important part of telehealth, teleradiology's primary goal is to provide expedited diagnosis with more specialized interpretations in order to improve patient outcomes in health care (Goodini et al., 2015). Radiology has been a major contributor in the development of telehealth, as it allowed the first implementations of telehealth (Babic, Milosevic, & Babic, 2012).

Telesurgery/Remote Robotic Surgery

The technology of robotic surgery was first developed to decrease the negative outcomes associated with conventional laparoscopic surgeries and to perform telesurgery (Jain & Gautam, 2015). Telesurgery allows a physician to participate in surgeries without being physically present in the operating room. Robotics and visual or audio technology allow the surgeon to participate in the surgical procedures. According to Jain and Gautam (2015), the original telesurgery-based robotic system was developed to assist during surgeries within the battlefields. Since the introduction of the da Vinci surgical robot in 1999, the use of telesurgery has become the epitome of minimally invasive surgical procedures (Jain & Gautam, 2015).

The science and technology of robotic surgery is advancing at a rapid pace, requiring nurses to provide

a critical analysis of new developments (Lichosik, 2013). Nurses provide the support and specialized knowledge that enables a surgeon to complete complicated robotic surgeries. The nurse is responsible for collecting data, analyzing outcomes, identifying safety issues, maintaining the standard of care, charting, undocking the robot, inventorying the review of robotic instruments, and cleaning up and setting up of each surgical procedure (Lichosik, 2013). The nurse's specialized knowledge and skill allow robotic surgery to be completed remotely. According to Lichosik (2013), nurses who are involved with robotic surgery are as specialized in their role as the surgeon is in theirs.

Teleconsultations

Teleconsultations include using technologies in communication to provide medical advice by consultation with the use of video conferencing, phone calls, nursing call centers, text messaging, e-mail, and other electronic technology. Teleconsultations have gained popularity in recent years with the ability to provide patients with information that will assess a particular health-care problem, manage the problem through advice, or provide a referral to the patient for the appropriate service (Iseli, Kunz, & Blozik, 2014). Teleconsultations are completed by nurses and nurse practitioners for a broad range of medical needs including mental health evaluations, home care follow-up appointments, and respiratory illness. Teleconsultations are being used by the U.S. military to reduce costs associated with noncombat-related injuries, by distinguishing the appropriate treating facility prior to the soldier leaving their post (Waterman, Laughlin, Belmont, Schoenfeld, & Pallis, 2014).

Remote Patient Monitoring

Remote intensive care unit monitoring, along with teleradiology, and retinal imaging were among the first forms of telemedicine (Dowling, 2015). Remote patient monitoring allows providers to watch critical monitoring systems, such as vital signs, from a distance rather than being physically present, and through the communication with staff or family members, the physician, nurse practitioner, or nurse can relay instruction related to the patients care. Access to critical care specialists is proven to increase patient outcomes, reduce mortality, and decrease health-care costs; however, the availability of medical intensivists is limited (Ramnath, Ho, Maggio, & Khazeni, 2013). The growing number of elderly patients presents additional need for medical intensivists. The introduction of remote intensive care monitoring or remote patient vital sign monitoring enables health-care professionals to monitor a great number of

patients without having to be physically present (Ramnath et al., 2013).

Remote Retinal Imaging

According to Annolino (2011), the increase in premature births and the survival of premature infants has increased the occurrence of retinopathy. Retinopathy is a potentially blinding disease that affects preterm, low-birth-weight infants, or diabetic patients; it is caused from damaged blood vessels that supply the retina (Annolino, 2011; National Eye Institute, 2015). The number of ophthalmologists qualified to diagnose retinopathy is limited, making remote retinal imaging one of the possible solutions to the growing need to monitor at-risk patients (Annolino, 2011). Remote retinal imaging requires the use of images acquired after eye dilation and the expertise of a qualified ophthalmologist to read the images obtained. Much like teleradiology, remote retinal imaging is completed with images being sent to the physician for review.

Benefits of Telehealth

Implementation of telehealth is beneficial for health-care providers and patients receiving care; in certain situations, higher levels of care are provided with the use of telehealth (Wesson & Kupperschmidt, 2013). Introducing telehealth can change daily activities dramatically, benefiting patients with fewer outpatient visits, allowing providers more time to focus on treatment and diagnosis, promptly treating the most problematic and emergency cases, increased knowledge, increased availability of knowledge from colleagues, and faster healing times (Jelnes, 2014). Cost-effectiveness studies in telehealth systems show promise for cost reduction in medical services (De La Torre-Diez, Lopez-Coronado, Vaca, Aguado, & De Castro, 2015).

Cost Reduction

Although basic forms of telehealth have been around since the early 1900s, the major advancements with technology are more recent. Ekeland, Bowes, and Flottorp (2010) systematically reviewed prior reviews and studies of telehealth and found there to be a lack of knowledge and understanding of the costs associated with telehealth. However, there was increasing evidence of the potential for cost reduction. Since the Ekeland et al.'s study in 2010, there has been recent research showing that telehealth does prove to reduce costs. Goodini et al. (2015) state that information and communication technologies have a great potential to decrease costs of health-care services in developed and developing countries. Wesson and Kupperschmidt (2013) state that

telehealth implemented in rural communities significantly reduces trauma center costs and increases patient days in community hospitals rather than in specialty care centers that have a higher cost. Wesson and Kupperschmidt also identify the potential to eliminate unnecessary costs from delayed patient transfers to urban facilities. In a longitudinal study of 814 trauma patients (pretelemedicine, $n=351$; posttelemedicine, $n=463$), Wesson and Kupperschmidt found that there was a hospital cost savings of US\$6,505,941 due to the implementation of telehealth.

The personal and often unseen costs incurred by the patient are reduced with telehealth as well. The use of telehealth allows patients to save on travel costs associated with doctor visits as well as decreases the time a patient would be required to be away from work. Research found that behavioral therapy delivered face-to-face and via telehealth was similarly as effective in treatment; however, the cost of telehealth was substantially less (De La Torre-Diez et al., 2015).

Access to Health-Care Professionals, Service, and Improved Care

According to Goodini et al. (2015), the principle benefit to telehealth is the ability to reduce or eliminate the geographic distance causing spatial barriers for patients to receive care and treatment from providers using advanced telecommunication technologies. Telehealth can be beneficial to individuals residing in rural areas allowing access to medical care that otherwise is unavailable (Wesson & Kupperschmidt, 2013). Aspects of telehealth, such as teleradiology, allow access to geographically distant health-care providers for expert advice, support, and cooperation (Babic et al., 2012). The use of telehealth tools such as a web-based database provides researchers and physicians with a substantial amount of data to evaluate and adjust treatment methods ensuring optimal treatment solutions (Jelnes, 2014). Telehealth is also used as a teaching instrument allowing surgeons the ability to teach medical students through live, interactive surgical sessions, and nurse educators the ability to provide distance learning to educate a broader population of nursing students and professionals (Bramstedt et al., 2014).

Potential Barriers

The remote transmission of medical images through teleradiology, as well as other important patient information aspects of telehealth, raises concern with legal and ethical issues including fraud, privacy, and malpractice liability (Nyeem et al., 2012). All telehealth practices in the United States need to be aware of the 2009 Health Information Technology for Economic and Clinical

Health (HITECH) and the 1996 Health Insurance Protection and Accountability Act (HIPAA) in order to maintain security of patient information (Krupinski, 2014). It is the providers' responsibility to secure patient information; before patient information is entered into a telehealth system, informed consent must be established and secured with a point-to-point-type encryption (Jelnes, 2014).

Licensure and standards are other important considerations in telehealth. States vary in the way credentials and licenses are obtained (Dowling, 2015). Health-care providers including nurses and nurse practitioners, living in a different state other than where the patient needing consultation resides, may find discrepancies in licensing requirements, thus preventing the legal practice of medicine (Wesson & Kupperschmidt, 2013). Nurse practitioners experience state-to-state licensing restrictions resulting in a barrier to reduced medical costs due to the inability for these professionals to utilize their specialized skills fully. Health-care providers should check with state licensing agencies for varying practice standards to determine whether additional licensure is required. There are advancements being made to allow nursing professionals the ability to provide care to patients in states other than where their current license was obtained. The Enhanced Nurse Licensure Compact has begun to make advancements to prevent this barrier. However, the implantation of Enhanced Nurse Licensure Compact is not a national standard, which is limiting to nursing professionals.

The initial cost is high for implementation due to providing the necessary equipment such as software, hardware, and other communication devices, although government grants are available to assist in the implementation of telehealth (Wesson & Kupperschmidt, 2013).

The fear of dehumanization or loss of human connection is present with the topic of telehealth. Professional-patient relationships are considered a main attribute of high-quality care (Vaes & Muratore, 2013). Some fear that providers who communicate with patients solely by way of telehealth lack the empathy and compassion required of a health-care provider. Telehealth may also cause a gap in communication between physician and nurse as well as physician-to-physician and nurse-to-nurse. Relationships that instill collaborative education such as that of the radiologist and radiographer are decreasing due to fewer personal interactions.

Conclusion

Although there are potential concerns associated with telehealth, there are also cost reductions and improved access to care, thus the overall benefits outweigh the potential negatives (Krupinski, 2014). The advancements in telehealth are being integrated into modern medicine

and are likely to become the standard of care in particular aspects of health care. The advancing technology, shortage of providers in certain geographical locations, opportunity for insurance reimbursement, government grant opportunities, and government acknowledgement are all signs that telehealth is here to stay and potentially changing the direction of the health-care industry.

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References

- Ali, N. S., Carlton, K. H., & Ali, O. S. (2015). Telehealth education in nursing curricula. *Nurse Educator*, 40(5), 266–269. doi:10.1097/NNE.0000000000000149
- Andrews, V. (2014). Using telemedicine in clinical decision-making. *Practice Nursing*, 25(1), 42–46. Retrieved from <https://doi.org/10.12968/pnur.2014.25.1.42>
- Annolino, H. (2011). Retinopathy of prematurity: Understanding and managing the risks of remote retinal imaging. *Journal of Healthcare Risk Management*, 31(2), 38–40. doi:10.1002/jhrm
- Babic, R., Milosevic, Z., & Babic, G. (2012). Teleradiology: Radiology at a distance. *Acta Facultatis Medicae Naissensis*, 29(3), 145–151. doi:10.2478/v10283-012-0020-8
- Bramstedt, K. A., Prang, M., Dave, S., Ng Hung Shin, P., Savy, A., & Fatica, R. A. (2014). Telemedicine as an ethics teaching tool for medical students within the nephrology curriculum. *Progress in Transplantation*, 24(3), 294–297. doi:10.7182/pit2014289
- De La Torre-Diez, I., Lopez-Coronado, M., Vaca, C., Aguado, J. S., & De Castro, C. (2015). Cost-utility and cost-effectiveness studies of telemedicine, electronic, and mobile health systems in the literature: A systematic review. *Telemedicine and e-Health*, 21(2), 81–85. doi:10.1089/tmj.2014.0053
- Dowling, R. A. (2015). Telemedicine: Are we reaching a tipping point? *Urology Times*, 43(2), 27–30.
- Ekeland, A. G., Bowes, A., & Flottorp, S. (2010). Effectiveness of telemedicine: A systematic review of reviews. *International Journal of Medical Informatics*, 79(11), 736–771. doi:10.1016/j.ijmedinf.2010.08.006
- Goodini, A., Torabi, M., Goodarzi, M., Safdari, R., Darayi, M., Tavassoli, M., . . . , Shabani, M. (2015). The simulation model of teleradiology in telemedicine project. *The Health Care Manager*, 34(1), 69–75. doi:10.1097/HCM.0000000000000049
- Iseli, M. A., Kunz, R., & Blozik, E. (2014). Instruments to assess patient satisfaction after teleconsultation and triage: A systematic review. *Patient Preference & Adherence*, 8, 893–907. doi:10.2147/PPA.S56160
- Jain, S., & Gautam, G. (2015). Robotics in urologic oncology. *Journal of Minimal Access Surgery*, 11(1), 40–44. doi:10.4103/0972-9941.147687

- Jelnes, R. (2014). Reflections on the use of telemedicine in wound care. *European Wound Management Association Journal*, 14(2), 48–51.
- Krupinski, E. A. (2014). Teleradiology: Current perspectives. *Reports in Medical Imaging*, 7, 5–14. doi:10.2147/RMI.S48140
- Lichosik, D. (2013). *Nurses' role in robotic surgery*. European Oncology Nursing Society, 22–24. Retrieved from https://www.researchgate.net/profile/Rosario_Caruso2/publication/278410721_Nurses'_role_in_robotic_surgery/links/55808ba508ae607ddc32263c.pdf
- National Eye Institute. (2015, May). *Facts about diabetic eye disease*. Retrieved from National Eye Institute: <https://www.nei.nih.gov/health/diabetic/retinopathy>
- Nyeem, H., Boles, W., & Boyd, C. (2013). A review of medical image watermarking requirements for teleradiology. *Journal of Digital Imaging*, 26(2), 326–343. doi:10.1007/s10278-012-9527-x
- Ramnath, V., Ho, L., Maggio, L., & Khazeni, N. (2014). Centralized monitoring and virtual consultant models of tele-icu care: A systematic review. *Telemedicine Journal and E-Health: The Official Journal of the American Telemedicine Association*, 20(10), 936–961. doi:10.1089/tmj.2013.0352
- Vaes, J., & Muratore, M. (2013). Defensive dehumanization in the medical practice: A cross-sectional study from a health care worker's perspective. *British Journal of Social Psychology*, 52, 180–190. doi:10.1111/bjso.12008
- Waterman, B. R., Laughlin, M. D., Belmont, P. J., Schoenfeld, A. J., & Pallis, m. P. (2014). Enhanced casualty care from a Global Military Orthopaedic Teleconsultation Program. *Injury*, 45(11), 1736–1740. doi:10.1016/j.injury.2014.03.012
- Wesson, J. B., & Kupperschmidt, B. (2013). Rural trauma telemedicine. *Journal of Trauma Nursing*, 20(4), 199–202. doi:10.1097/JTN.0000000000000012
- Wicklund, E. (2018, April 10). *Is there a difference between telemedicine and telehealth?* Retrieved from mHealth Intelligence: <https://mhealthintelligence.com/features/is-there-a-difference-between-telemedicine-and-telehealth>