

Telehealth Enables Meaningful Use of Technology in Heart Failure



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Introduction

Modern healthcare technology is transforming our care delivery system. Given the technology capabilities in utilizing the virtual visit and remote monitoring, these enhanced communications with patients place nurses at the cusp of a new era for healthcare. There is the need for healthcare professionals to be everywhere at all times, treat more people than ever before, and provide state-of-the-art evidence based care, stretching the shortage of medical personnel beyond its current limitations. We have now reached an age where it is possible to address barriers to healthcare delivery using technology and change the model where patients must present themselves to the provider face-to-face to receive care, to one where providers can connect with patients without geographic boundaries using modern telehealth technologies including remote monitoring and sensors as well as real time videoconferencing. It is the nature of nursing to respond to the healthcare needs of people and form efficient, patient-centered, sustainable systems of care for our patients. As an important part of the healthcare team, nurses are called upon once again to take notice of the changes underfoot related to the availability of telehealth technology as a tool to assist in providing access to care to those in remote regions, as well as remotely monitoring those with chronic conditions, such as patients with heart failure.

Since more frequent management of chronic conditions enables more frequent adjustments in therapy, and since this is possible using telehealth technology, remote monitoring can serve to improve outcomes and self-care abilities in the heart failure patient. (Stachura, M.E., & Khasanshina, E.V., 2007) The concept of frequent monitoring improving outcomes is not new

but is demonstrated in a variety of health care settings, such as in hospital intensive care units. Patients in intensive care units have frequent assessments and adjustments in therapy according to frequent data via monitoring of their physiologic state, and this is one strategy used to improve their care outcomes. In the ambulatory setting, remote monitoring allows ambulatory patients to have more frequent monitoring of their physiologic status than would be possible through face-to-face visits alone. Remote monitoring can enable the clinician to receive and evaluate data and assessments at closer intervals than possible seeing the patient in the routine office visit. This more frequent monitoring through remote or home monitoring allows for better adjustments in therapy, fine-tuning it on a more frequent basis, improving the health of the patient. (Dang, S., Dimmick, S., & Kelkar, G., 2009).

Remote monitoring has been shown to be effective in improving outcomes in the heart failure patient (Pandor, Gomersall, Stevens, Al-Mohammad, Bakhai, Cleland, Cowie, & Wong, 2013), and nurses should be educated as to what telehealth remote monitoring technologies are as well as how they can be used to assist in the management of heart failure. Nurses knowledgeable regarding these technologies and the best patient candidates for remote monitoring programs can develop and participate in model telehealth programs for heart failure patients. This article will describe remote monitoring and how it can benefit the management of heart failure. It will discuss the ideal patients that can benefit from remote monitoring and barriers to use in this population so that heart failure nurses can participate in use of telehealth technology to improve patient care outcomes and be part of the revolution in health care.

What is Remote Monitoring and What are the Benefits and Barriers to Use?

Technology has forever changed the way we communicate as mobile devices are intimately connected to our everyday lives. Telehealth technology is also a disruptive technology in healthcare as enhanced communications between patients and providers have altered how and when patients can receive care. Technology is changing the architecture of our current health care system from a provider controlled delivery system to one where the patient is regaining control over access and choice through the use of telehealth technologies. To address problems of access to care, frequency of care, and cost in our healthcare system we can turn to telehealth technology. Towards this end remote monitoring lends to this flipped care delivery model, where providers bring the care to the patient, rather than requiring the patient present face-to-face with the provider. Telehealth enables the nurse to monitor and measure sensitive and important patient health data without geographic or time boundaries. With remote technology we have effectively increased patient access to health services, improved their disease management, specifically improving self-care abilities. Patients can engage in proactive care and management using remote monitoring.

Telehealth technologies, including remote monitoring, have been shown to be effective in being able to provide an improved quality of care in patients with chronic diseases, including heart failure (Klersy, De Silvestri, Gabutti, Regoli, & Auricchino, 2009). Remote monitoring is a form of telehealth technology that uses small, portable monitors placed in the patient's home

and/or sensors placed on the patient that can obtain, record, and transmit the patient's physiologic data to a provider or monitoring center for evaluation. Remote monitors use wireless or landline internet access and mobile devices in combination with live videoconferencing to collect and transmit data and enable communication between the patient and the provider. Using remote monitoring technology the patient can be frequently evaluated for progress and changes via their physiologic data. Also, educational surveys and information, coaching and reminders, and surveillance questionnaires for grading and assessing symptoms can be incorporated into the program of care.

The United States (US) population has a high rate of chronic diseases and as the population ages the care needs and use of healthcare resources has overburdened the capability of our healthcare system. Our healthcare resource capabilities as a whole are deficient in response to these care needs. Chronic diseases require an extraordinary amount of healthcare resources to manage despite having a high rate of recurrence, exacerbations, and poor health outcomes in many (Boehmer, J.P, et al., 2014). Remote technology has been shown to be especially effective in managing chronic diseases, such as heart failure, and it improves chronic care management. (Stachura, M.E., & Khasanshina, E.V., 2014). For example, it can enable daily monitoring and give timely guidance and feedback. Remote monitoring allows for real time data analysis as it alleviates need for only face-to-face visits, helps prevent health declines and decreases emergent situations (Suh, M., Chen, C., Woodbridge, J., Tu, M., Kim, J., Nahapetian, A., Evangelista, L., & Sarrafzadeh, M., 2011). In addition to the patient history and physical assessment, there are a variety of physiological measurements that give important indication as

to the heart failure patient's health status and wellbeing, including weight, blood pressure, heart rate, and oxygen saturation. Sensors and remote monitors can collect this information on a frequent basis and by using wireless or landline internet access and this data can be sent to a clinician or monitoring center. This data can then be evaluated and adjustments in care based on the data received can be communicated back to the patient using these technologies.

Over 5 million people in the US suffer from heart disease, accounting for almost 10% of all deaths in the US (CDC, 2013). This serious and prevalent disease causes death in about half of all patient within 5 years of diagnosis. The economic impact is overwhelming our healthcare system at an estimated 32 billion dollars a year spent in the care of this patient population (CDC, 2013). Part of this cost is due to the high readmission rate in heart failure. Up to a fourth of all patients admitted to the hospital for heart failure symptoms are readmitted within three months of their discharge. When patients with heart failure have a worsening of their symptoms, their symptoms will be reflected in their physiologic data. For example their blood pressure may be elevated or decreased, their oxygen saturation may decrease, their respiratory rate may increase, and their weight can increase. Remote monitors can collect patient physiologic data before a decompensation and allow for remote patient consultations and evaluations using this data. It does this by collecting then transmitting this remotely collected data to a provider who can make real time adjustments in therapy to treat the exacerbation of symptoms, alleviating the health decline and enabling the patient to maintain a better health status and quality of life due to less severity of symptoms. (Suh, M., et al., 2011). A benefit of remote monitoring programs include using the remote data collected from the heart failure patient by the provider, who would then

have that data available for a consultation. The consults could be on an as needed basis or at a regularly scheduled time. The data monitoring could be connected to an alert system to the patient or to the provider for an abnormal or critical value, or to a connection to clinical decision support tools and best practice guidelines including algorithms for self-care enhancements. Therefore, these technologies improve the frequency of patient assessment, evaluation, and management which translate to providing a higher level of care for the heart failure patient. (ATA, 2014). This frequent, two way communication improves and helps to better control heart failure patient symptoms resulting in improved health of heart failure patients.

Another benefit of remote monitoring in heart failure is that patient satisfaction using remote monitoring and home monitoring is high. Technology is integrated into every facet of our lives, and healthcare is no exception. Technology brings efficiencies and conveniences, and this also applies to using telehealth technologies like remote monitoring. Patients like the convenience of integrating the technology as part of their care into their daily lives. They express comfort in the more frequent assessments and communications regarding their current health status and the feeling of better monitoring is perceived positively by the patient. Remote monitoring has the benefit of quicker identification of potential and real changes in the patient's physiologic status, allowing for a quicker response to needed therapy adjustments or care. Therefore there are many benefits to the patient to using remote monitoring in the management of heart failure. Basically, the daily remote patient assessment and data collection serves to improve patient management thereby improving patient healthcare outcomes. However, there are also barriers to use of remote monitoring. Barriers to patients being able to be included in a

remote monitoring program include lack of internet connection from their home, lack of ability to use the equipment cognitively or in regards to hearing and eyesight. The patient would also have to be willing to perform the daily monitoring and transmit the data as well as allow the setup of the equipment in their home and be willing to use it as directed. (ATA, 2014).

Case Studies

This case study describes a typical heart failure patient and some difficulties he has managing his disease and accessing care. Case Study part 1 involves the use of remote monitoring as is focused on what remote monitoring is, how it is used in heart failure, and benefits and barriers to its use. In the part two you will follow this same patient as you focus on the patient selection for your remote monitoring program.

Case Study Part 1

Mr. Miller is a 65 year old male recently been discharged from the hospital for the second time this month after having an exacerbation of symptoms related to heart failure. Mr. Miller has diabetes as well as heart failure and he has a difficult time managing both chronic diseases, and ends up in the clinic, the Emergency Department, and hospital on a frequent basis. This patient has frequent worsening of his symptoms and low health literacy related to his chronic diseases and would benefit from better self-management through behavior modification. He lives alone in a rural area 2 hours from the hospital and does not drive which causes him to miss clinic appointments due to his lack of reliable transportation. After his last hospitalization, he has a desire to learn more about self-management regarding his heart failure and diabetes. You are the

nurse in the ambulatory clinic who is part of a newly developed remote monitoring program for heart failure patients. In this program participants are chosen according to their risk of admission over the next 30-60 days and potential to improve symptom control with behavior modification. As you begin to consider Mr. Miller for the program, you reflect upon what you have learned about using telehealth technologies like remote monitoring.

Heart Failure Patient Selection using Remote Monitoring

Telemedicine has been successful in providing access to care to those in remote areas, and the application of remote monitoring to patient care is a natural extension of these technologies. Advances in telecommunications and technology allow advances in meaningful use of this technology. Remote monitoring, real time videoconferencing, mobile devices and peripherals, and the development of the remote sensor technologies empower patients with more convenient, more frequent care that is integrated into their own home and lifestyle. The purpose of a remote monitoring program is to improve care using technology that allows patients to remain in their home: it allows people with chronic diseases to remain at home with adequate and frequent access to quality care, preventing health decline and more costly care needs. (Landolina, M., Perego, G., Lunati, M., Curnis, A., Guenzati, G., Vicentini, A., Parati, G., Borghi, G., Zanboni, P., Valsecchi, S., & Marzegalli, M., 2012). Patients that need to improve their health literacy related to heart disease can benefit from remote monitoring and the health information, education, and consultation for disease management that they can gain from such a program. Heart failure patients have great need for education regarding behavior modification

for their disease state as well as medication compliance education that a remote monitoring program can provide and enable them to gain self-efficacy through improved self-care.

Basic, universal requirements for remote home monitoring for the heart failure patient include need for better heart failure disease management and improved outcomes, availability of a remote monitoring program, access to the internet, willingness and ability of the patient to use the remote monitors, and a common language for comprehension. To be included in a remote monitoring program the patient would need to have either landline or wireless home internet connection in order to connect to the internet to transmit the data and connect with providers. They would need space in their home for the monitoring equipment, as well as willingness to collect and transmit the data. Good candidates would be open and willing to use the remote monitoring and sensors in their home. They need to have the capacity to see, hear, and use the equipment. Although not required, it is also helpful if the patient has adequate family or friends as advocates or resources that can assist the patient in using the remote monitors and sensors.

The data collected from remote monitors and sensors applies nicely to the heart failure patient's needed data collection and monitoring needs. It therefore proves to be a useful technology for this population. Excellent candidates for remote monitoring include patients with chronic diseases since more frequent monitoring frequency improves the patient's health status and self-care abilities. Evidence shows that these telehealth technologies are an asset in the management of chronic disease, including heart failure (Pandor, et al., 2013; Boehmer, J.P, et al., 2014). Remote monitoring can enable better clinical management of chronic diseases, better management of patient care behaviors and medication compliance, so important in heart failure. Good patient candidates would have needs of frequent physiologic monitoring and frequent

assessment and management of symptoms. Patients can benefit from management in a remote monitoring program from frequent review of trends in their physiologic data to avoid clinical declines. Those at high risk of frequent declines in their health status needing medical treatment, or who have an unstable condition, are at risk for costly hospitalization and are also appropriate patients to enroll in a remote monitoring program.

When developing a remote monitoring program, each program will develop its own set of criteria for including patients. Remote monitoring programs can be developed and tailored to the provider's, the patient's, and the system's specific needs and desires. General criteria for the use of remote monitoring in the heart failure patient include those with frequent exacerbations of their heart failure. Patients with recent hospitalizations for heart failure symptoms or other chronic conditions are also good candidates for inclusion into a remote monitoring program. If the patient is receiving home health services, this already speaks to this patient's need for home care and incorporating telehealth remote monitoring is a natural extension for this group of patients. Patients who have been recently diagnosed with a second chronic illness or who have been hospitalized twice within the past year for symptoms related to heart failure or other chronic disease also will benefit from using remote monitoring. Additionally, patients who need or would benefit from frequent assessments would also benefit from being included in a remote monitoring program. Providers should enroll patients in their remote monitoring programs who meet the criteria as defined by their program's population, resources, and defined goals and objectives. Importantly, frequent re-evaluation of patients not meeting the program criteria should be performed since patients do change over time and may benefit from inclusion if their condition changes (ATA, 2014).

Also, the US has such chronicity of disease with high acuity that adults with heart failure of all ages can be considered for remote monitoring if they meet the criteria. Additionally, patients aged 65 will now benefit from another aspect of remote monitoring, that of the Centers for Medicaid and Medicare (CMS) coverage for remote monitoring and chronic care patient management, available to be used on any covered patient regardless of geographic location. CMS now agrees that data collection is a valuable service and should be incorporated into chronic care management. Beginning in January, 2015 CMS will reimburse, as a telehealth service, remote patient monitoring (ATA, 2014). This coverage of remote patient monitoring will enable patients to enroll in more remote monitoring programs and improve their disease management through the use of telehealth.

Remote monitoring provides access to data evaluation and health care needs, increases health literacy and therefore self-care abilities. It can improve outcomes and quality of life of the heart failure patient. Remote monitoring enables the provider to have frequent physiologic patient data transmitted to them on a regular basis. This allows more timely adjustment in the management of the patient's care regime on an up to date basis, and adjusting therapy on a more frequent interval enables fine tuning of the patients medical symptoms on a real time basis, irrespective of geography or time of day. Nursing looks to find innovative ways of meeting the health care needs of our patients. With the resources available through telehealth technology, we have a way to address these care needs in our present health care arena using available technology. Heart failure is a serious and prevalent disease. Strategies such as remote monitoring are needed to address the serious health issues in the heart failure patient. Nurses can use telehealth technology and develop models of care to improve treatment of heart failure. Remote

monitoring enables clinicians to collect and evaluate patient physiologic data more consistently and more frequently. Using clinical judgment based on best evidence, the provider can then make more frequent real time, continual adjustments in patient therapy to provide better disease control. Patients need to be empowered with a high level of health literacy regarding the self-management of heart disease to maximize their optimal health. Telehealth and remote monitoring combine technology with needed healthcare functions to improve care outcomes. They serve as valuable tools in the management of chronic diseases, such as heart failure.

Case Study Part 2

When considering Mr. Miller for your remote monitoring program, you will consider many factors related to his overall health condition and ability to set up the remote monitoring equipment in his home and connect it to the internet to transmit the monitoring data and conduct the virtual visit.

References

- American Telemedicine Association. (2013). *Remote patient monitoring and home video visits*. <http://www.americantelemed.org/docs/default-source/policy/state-medicaid-best-practice---remote-patient-monitoring-and-home-video-visits.pdf?sfvrsn=6>
- American Telemedicine Association. (2014). *Update on CMS payment decisions-two steps forward, one step back*. http://www.americantelemed.org/news-landing/2014/11/07/update-on-cms-payment-decisions---two-steps-forward-one-back#.VJBPVdLF_kV
- Boehmer, J., Saxon, L., Lobban, J., Kaplan, A., Villareal, R., Mirza, I., Jones, P., Seth, M., & Meyer, T. (2014). Clinician response to remote active monitoring in patients with heart failure: results of the RAPID-RF trial. *The Journal of Innovation in Cardiac Rhythm Management*, 5, 1551-1560. <http://www.innovationsincrm.com/images/pdf/crm-05-03-1551.pdf>
- Centers for Disease Control and Prevention. (2013). *Heart disease*. <http://www.cdc.gov/heartdisease/>
- Dang, S., Dimmick, S., & Kelkar, G. (2009). Evaluating the evidence base for the use of home telehealth remote monitoring in elderly with heart failure. *Telemedicine Journal and e-Health*, 15(8); 783-796. doi: 10.1089/tmj.2009.0028.
- Klersy, C., De Silvestri, A., Gabutti, G., Regoli, F., & Auricchino. (2009). A meta-analysis of remote monitoring of heart failure patients. *Journal of the American College of Cardiology*, 54(18); 1683-94. doi: 10.1016/j.jacc.2009.08.017.
- Landolina, M., Perego, G.B., Lunati, M., Curnis, A., Guenzati, G., Vicentini, A., Parati, G., Boroghi, G., Zanaboni, P., Valsecchi, S., & Marzegalli, M. (2012). Remote monitoring reduces healthcare use and improves quality of care in heart failure patients with implantable defibrillators (EVOLVO) Study. *Circulation*, 125, 2985-2012. Doi 10.1161/CIRCULATIONAHA.111.088971
- Pandor, A., Gomersall, T., Stevens, J.W., Al-Mohammad, A., Bakhai, A., Cleland, J. G., Cowie, M. R., & Wong, R. (2013). Remote monitoring after recent hospital discharge in patients with heart failure: a systematic review and network meta-analysis. *Heart*, 99(23); 1717-1726. Doi: 0.1136/heartjnl-2013-303811
- Stachura, M. E., Khasanshina, E. V. (2007). Telehomecare and remote monitoring: An outcomes overview. *Advanced Medical Technology Association*.

http://www.viterion.com/web_docs/Telehomecarereport%20Diabetes%20and%20CHR%20Meta%20Analyses.pdf

Suh, M., Chen, C., Woodbridge, J., Tu, M., Kim, J., Nahapetian, A., Evangelista, L., & Sarrafzadeh, M. (2011). A remote patient monitoring system for congestive heart failure. *Journal of Medical Systems*, 35(5): 1165-1179. Doi: 10.1007/s10916-011-9733-y