Telehealth Technology: A Report from the Health Resources and Services Administration Grant

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The rapid deployment of telehealth has left gaps including knowledge of telehealth technologies – current and future. The informatics nurse can assist with rapid workflow integrations and troubleshooting technology to ensure it will work for both clinicians and patients.

Key Words: Telehealth, competencies, informatics, telehealth education model.

Telehealth has grown exponentially during the COVID-19 pandemic. Use in 2019 was reported in only 8% of the American population, whereas non-urgent video visits grew from 100 visits per day to over 800 visits per day in one organization (Bakken, 2020). The pandemic also compelled providers to adopt telehealth and forced regulators – at least temporality – to relax requirements which may have prevented widespread adoption. The rapid deployment of telehealth, however, has left gaps that will need to be filled in when emergency use is over, including knowledge of telehealth technologies – current and future.

The American Medical Association (AMA) defines *telehealth* as real-time audio and video visits, images, and data collection store and forward, remote patient monitoring and virtual check-ins through telephone, patient portals, and other messaging systems (AMA, 2020). Providers as well as patients benefited from the expanded use and definitions of telehealth. Inpatient telehealth visits, for example, allows providers to care for patients in isolation and reduced the need for personal protective equipment. Implementing using consumer-grade technology such as tablets mounted on wheeled poles, along with consumer grade applications such as Zoom® and FaceTime©, patient care could be delivered safely. In addition, patients could use the same technology to communicate with family while isolated in the hospital (Vilendrer et al., 2020).

Relaxed Health Insurance Portability and Accountability Act (HIPAA) regulations, and changes in billing and in state requirements, also allowed for an increase in non-hospital provider visits. Using consumer grade technology and applications greatly shortened the implementation cycle. Practice guidelines, workflows, and education around telehealth best practices lagged in both practice and education arenas. Implementation best practices were often skipped because of the urgent need due to the pandemic. The purpose of this article is to describe the state of telehealth and discuss the intersection of technology and best practices from an informatics framework.

Background & Framework

Despite well-established benefits of care delivered through telehealth, the rapid growth of provider use of telehealth during the pandemic has progressed much faster than provider training (Chike-Harris et al., 2021). This is concerning as best practice telehealth requires a unique understanding of patient privacy, consent, telehealth etiquette, billing, and more. Integrating telehealth education into the healthcare curriculum for nurses addresses both education and practice requirements, and will ultimately lead to practice ready telehealth providers.

In January 2019, the Health Resources & Services Administration (HRSA) had a call for applications for the Advanced Nursing Education Workforce (ANEW) Program. The purpose of this program is to support innovative academic-practice partnerships to prepare primary care advanced practice registered nursing students through academic and clinical training for practice with a focus on rural and underserved populations. One of their key 2019 program priorities – notably pre-pandemic – was to support programs focused on telehealth. Many of the funded grants included telehealth as a key initiative for the 2019-2023 grant period. In August 2019, a group of 59 advanced practice nursing faculty from 32 schools/colleges of nursing, from 22 states across the United States, met to begin the process of developing a telehealth education toolkit. The goal of the toolkit was to provide faculty with knowledge and resources to facilitate the integration of telehealth education into their curriculum.

The telehealth toolkit was designed around the Four P's of Telehealth Framework (Rutledge et al., 2021), and the four-prong multimodal approach to telehealth education model (Rutledge et al., 2017). The Four P's of Telehealth includes the stages of planning, preparing, providing, and performance evaluation. The planning phase of telehealth represents the steps necessary to plan for telehealth in advance of developing a program such as identifying the population, determining legal, regulatory and billing issues, and selecting the appropriate equipment. The preparing phase considers telehealth protocol development, training, consenting, and other essential preparatory steps to ready for telehealth delivery. The providing phase is delivery of the telehealth encounter and the final phase is performance evaluation. In this last phase the impact of telehealth is measured which is critical for program assessment, but also as a tool for lobbying at the state and national level for telehealth reimbursement.

Using the Four P's of Telehealth Framework, competencies, educational content, and outcomes of telehealth can be used to develop telehealth curriculum in graduate health professions programs (Rutledge et al., 2021). Six telehealth workgroups were established to create educational resources across the areas of didactic, clinical, simulation, student projects, technology, and evaluation. The purpose of the technology workgroup (TW) was to provide information on how a program can get started with using or purchasing equipment for a telehealth program (i.e., types of equipment, uses, cost, HIPAA & HPI, benefits and barriers, etc.).

Overview Types of Telehealth

Telehealth technology has had a significant impact on the way people interact with health care providers and receive care. Selecting the appropriate equipment and un-

derstanding the different types of technology available to manage health needs are equally challenging for the healthcare provider and consumer. The rapid adoption of telehealth may not have considered traditional clinical workflows and how telehealth technology interfaces with existing informatics and electronic health records (Triana et al., 2020). Similarly, faculty and universities attempting to shift to a virtual format to increase social distancing and protect vulnerable populations face different challenges such as how to incorporate telehealth technology and didactic content into the curriculum. The first task for the technology workgroup was to identify the specific categories of telehealth technology and its various uses. The technology workgroup consisted of seven members from the larger workgroup who met virtually, monthly, and over a nine-month interval. The technology workgroup developed a template to ensure content consistency and researched telehealth technology types. Each of the technology workgroup members were assigned to one of the five technology types. The five telehealth technologies include, video-conferencing, store and forward, remote patient monitoring (RPM), mobile health (m-Health), and peripherals.

The template contained specific essentials such as description, purpose, reimbursement, technology examples, important considerations, and selected resources and links. The template was presented to the larger telehealth workgroup members for review and further refined to include example pictures and content. The template guided content and resource collection. Upon completion, each member of the workgroup peer-reviewed the content and resources. The final technology workgroup product was presented to the larger telehealth toolkit workgroup, approved, and uploaded to the toolkit website. This section highlights the types of telehealth technology. An overview of the types of telehealth technology is presented in Table 1.

Video Conferencing

Any patient population with a good internet connection may use video conferencing – the basis for telehealth. Requirements include the ability to see and hear. Additional external devices or peripheral attachments may be used within the videoconferencing software to allow for additional assessment of the patient. These may include stethoscopes, exam cameras, otoscopes, ophthalmoscopes, or other RPM devices (Mallow et al., 2016). Questions to consider include:

- Is the computer/tablet compatible with peripherals?
- Do you have a working camera, microphone, and/or headphone dock?
- Do you need to have a device that is easily transported such as a tablet or smartphone?
- Does it integrate with the electronic health record (EHR)?

Store & Forward

Asynchronous telehealth has been primarily utilized for collection of diagnostic data, specialist review and consultation, or monitoring of patients at a distance (LeVasseur, 2020). The provider and patient will need access to the internet, sensors, and a computer, tablet, or smartphone with text, email, and video capabilities. An example is transferring EEG images of stroke patients from critical access hospitals to the neurologist to determine treatment or cardiac monitoring/Holter monitor for diagnoses and management of cardiac patients.

Remote Patient Monitoring

RPM is often used to treat and manage chronic illnesses like asthma, cardiovascular disease, and diabetes, and used often with the elderly. RPM is used with pediatric patients receiving palliative care, and with health promotion/lifestyle management. Participants may be considered healthy but require basic engagement including reminders and tracking of routine health activities to ensure they are still on the right path and do not increase their healthcare exposure. When selecting a vendor, begin with your network including asking for word-of-mouth referrals from experienced practices and researching third-party reviews. Evaluate vendors across six critical areas:

- Business.
- Information technology.
- Security.
- Usability.
- Customer service.
- Clinical validation. (Northeast Telehealth Resource Center, 2016)

Consider consulting external resources such as the American Telemedicine Association, or your state telehealth resource center for support. Incorporate legal feedback and security standards to make sure risk and liability are accurately assessed and mitigated. Important considerations include EHR integration and compatibility, sharing of patient health information with business associates (ask about formal business associate agreements and how the vendor will protect patient health information and perform reasonable due diligence to verify security practices), broadband connectivity in rural areas, patient preferences and acceptability, cloud-based storage, ease of use in home, and sanitation and safety features.

mHealth

mHealth is frequently used in the treatment and management of chronic illnesses like asthma, cardiovascular disease, and diabetes. It is now being used with many populations including the elderly, women's health, pediatrics, and those with mental health issues. Wearables and other electronic monitoring devices are being used to collect and transfer vital sign data including blood pressures, cardiac stats, oxygen levels, and respiratory rates. Equipment includes blood pressure monitors, glucometers, pulse oximeters, EKGs, stethoscopes, otoscope, and EEG sensors. Many vendors are selling devices to the public to measure health parameters, and many can be connected to smartphones. Consider using readily available applications such as the devices' camera and microphone prior to purchasing more expensive peripherals (Northeast Telehealth Resource Center, 2016). Patients will need some education before they can accurately report data from many of these devices. For example, not wearing a fitness tracker correctly can over or underestimate steps and heart rate. Cost can be an important factor as many devices and peripherals come in a variety of price points.

Peripherals

Peripherals are physical attachments used to collect clinical data that can be used with other modalities such as remote patient monitoring, store and forward, and videoconferencing. External devices or attachments may be used within the videoconferencing software to allow for additional assessment of the patient. These may include stethoscopes, exam cameras, otoscopes, ophthalmoscopes, or other RPM devices (Northeast Telehealth Resource Center, 2016).

Role of the Informatics Nurse in Telehealth

While telehealth is already in use today, standard implementation processes may

Table 1.
Overview of Telehealth Technology Types

Type	Description	Purpose	Reimbursement	Technology Example
Video Conferencing	Platform for live (synchronous) interactive consultation between 1) primary care provider and specialist/allied health professional, 2) primary care provider and patient, and/or 3) Primary care provider, specialty health services, and the patient. The videoconferencing session can be accompanied with store and forward (asynchronous) data to aid in the assessment. Store and forward allows for the transmission of diagnostic images, vital signs, lab values, and/or video clips along with patient data for review by a primary care or allied health professional.	To provide live video and audio communication between a clinician and patient.	Video conferencing is considered the same as an office visit (CPT codes 99202-99215 for telehealth services). The telephone, which is not considered videoconferencing or telehealth, allows for audio-only encounters and can be used for some evaluations and management (CPT codes 99441-99443).	Telehealth Cart (mobile) Telehealth Kiosk (stationary) Telehealth Backpack (mobile) Travel Kit (mobile) Tablet Laptop Stationery Computer Smartphone
Store and Forward	Asynchronous telehealth is the transmission of recorded health history/information or clinical/diagnostic data through an electronic communications system to a healthcare provider who uses the information to evaluate the case or render a service outside of real-time or live interaction. The data that is stored and then forwarded may include medical images, lab work, vital signs, or other clinical data that can easily be transmitted using technology. Since the data is not transmitted real time, it is considered asynchronous.	Allows the provider to receive data on a patient via technology from a distance. The provider is then able to review the data at an optimum time. This process may be used to reduce unnecessary referrals and to increase the timeliness for treating patients. If the system is set up properly, it can increase the chances of having a more precise and robust diagnosis because healthcare providers will be able to obtain specialist consultations (Wicklund, 2019).	The reimbursement codes include CPT Code 99451, CPT Code 99452, and Code G2010.	SMS Text Messaging Asynchronous Video Computerized guided therapy Mobile device ecological momentary assessment Mobile device sensors Mobile app-based psychotherapy and psychoeducation
Remote Patient Monitoring (RPM)	Remote patient monitoring (RPM) is sometimes called self-patient management or self- testing, is a means of monitoring patient health and clinical information at a distance. It uses the latest advances in information technology to gather patient data outside of traditional healthcare settings. RPM is often provided using specified platforms to collect patient data such as lab readings, weight, vital signs, EKG, and Pulse Ox. It also involves the reporting, collection, transmission, and evaluation of patient health data through electronic devices such as wearables, mobile devices, smartphone apps, and internet-enabled computers. The devices used in RPM are built to gather data measurements and connect with a specific facility or provider for data transmission.	To simplify patient compliance with diagnostic testing and lower the cost of frequent monitoring and hospital readmissions. Increases the ability to identify potential complications.	CPT Codes 99453, 99454, 99457 reimbursement for "Chronic Care Remote Physiologic Monitoring" Reimburses for initial setup, patient education, device monitoring, and extends eligible care provider definition to include clinical staff.	RPM kits include: Internet connected scales, blood pressure monitors, glucometers, pulse oximetry, and connect via a mobile kiosk, tablet, or smartphone from home. This technology reminds patients to do things like weigh themselves, measure their blood pressure, etc. and send the measurements to their physicians. Wearables and other electronic monitoring devices are being used to collect and transfer vital sign data such as heart rates, oxygen levels, and respiratory rates.

Table 1. (continued)
Overview of Telehealth Technology Types

Type	Description	Purpose	Reimbursement	Technology Example
Mobile Health m-Health)	Use of wireless technologies to connect, communicate, and promote health and wellness for the user. m-Health gathers and transmits data from electronic devices such as wearables, mobile devices, and smartphone apps. Smartphone compatible attachments connect with applications and collect health parameters including blood pressure, blood sugar, oxygen saturation and more. As telehealth increases, the use of standard applications on smartphones such as the microphone, flashlight or camera have also been used to support remote assessment. Physical attachments used to collect clinical data that can be used with other modalities such as remote patient monitoring, store and forward, and videoconferencing.	The use of mobile wireless technologies for public health, or mHealth, is an integral part of eHealth, which refers to the cost-effective and secure use of information and communication technologies in support of health and health-related fields.	Using mobile devices to assess health is usually done through a telehealth visit and is reimbursable in the same way. No specific reimbursement exists for patient transmitted data unless it is associated with a visit.	Smartphones, tablets, and computers with access to the internet, a camera and a microphone are the minimum requirements for a telehealth visit. Other types of technology that are part of m- Health include smartwatches, fitness trackers and peripherals such as an EKG pad, and the mobile health applications required to use them. Devices are changing daily, and are dependent on the type of platform (i.e., Apple, Windows, Android, etc.).
Peripherals	Physical attachments used to collect clinical data that can be used with other modalities such as remote patient monitoring, store and forward and videoconferencing	Used in conducting the physical exams	N/A	Horus Scope Pulse oximeter Stethoscope Ultrasound 12-lead ECG All-in-one (AIO) Scope includes dermascope and otoscope Spirometer Dental Camera Colposcope Hemodynamic Monitoring System

have been omitted to provide care during the COVID-19 pandemic in both ambulatory care and hospital settings. Marrying implementation processes with the Four P's of Telehealth Framework can help to optimize telehealth delivery.

Planning

Much of the initiation and planning phases is not needed; however, there are some activities that would benefit from a formal implementation process. During a typical planning process, an implementation plan with defined risks, assumptions, issues, costs, requirements, and change management process is created. Following the detailed change management process during the optimization is key to both improve the processes and track any changes. Since healthcare regulations about telehealth were relaxed due to COVID-19 (U.S. Department of Health & Human Services, 2021), many facilities may need to review the telehealth applications to assure they will meet the HIPAA and reimbursement regulations once the rules are enforced again. Consumer grade video conferencing technology may need to be replaced with healthcare level applications to ensure they are secure and private; with the ability for a virtual waiting room for patients to wait in a virtual lobby until they can be seen by a provider. Informatics nurses can help lead with analysis and to assuring – if needed – a detailed selection plan.

If new documentation tools were rolled out for telehealth, these flowsheets and forms should be reviewed to see how they fit into the EHR. Additional fields to identify documentation from a telehealth visit will allow for analysis of the telehealth visits to determine if different information is collected or needed. Analysis should include any pre- and post-visit questionnaires so patient satisfaction can be compared between telehealth and in-person visits. Physical exam questions may need to be altered to allow for telehealth, rather than in-person visits. Hardware may also need upgrading or replacement if telehealth visits continue. Provider privacy may require telehealth rooms that are sound proofed or include white noise devices. Cameras and audio equipment should also be reviewed to assure they are adequate for health assessments. For example, headsets may need to be noise canceling so the patient can be heard and understood. Automated transcription may require additional hardware and software to assist with translation or for the hard of hearing. Peripherals may be desired for improved assessments and diagnosis, and processes to support their use developed. Infection control practices may need future review to assure

the devices are cleaned between patients and clinicians if shared.

Preparing

Documenting new workflows integrating telehealth need to be a part of a standard implementation process. Informatics nurses can work with providers and staff to revise workflows to include decisions about whether a telehealth visit will meet the patient's needs or if an in-person visit is needed. Telehealth visits are similar to in-person visits and require many of the same support processes. Some telehealth applications include a virtual waiting room which could be used to let the patient know the provider is running behind. Time to prepare for the visit and connect to the technology should be built into the scheduled visit time and workflow. Patients are often asked to complete questionnaires prior to their visit which replaces the patient rooming process in an in-person visit. Providers may need to review this information prior to starting a telehealth visit since they may not be in the same space as their staff.

During the rapid deployment of telehealth, education was more a 'need to know' if it was offered at all. Informatics nurses play a key role in optimizing education by merging technology and care. They can also help implement telehealth specific printouts for patient summary of care visit documentation to better support patient needs. Providers and staff should be taught not just how to use the technology, but also about the differences between telehealth and in-person visits and telehealth etiquette when providing care remotely. Informatics nurses could share etiquette details such as dressing as they would for an in-person visit, being prompt or having a person manage an electronic waiting room, maintaining eye contact with the patient and not the camera, explain when it's necessary to look away to take notes, etc., and be prepared for lag time especially on a wireless connection.

Providing

Telehealth visits should start with a discussion about privacy and safety. Creating fields in the EHR to capture current location, who may be with the patient and could hear or see the visit, and whether the patient feels safe where they are, may be needed. The provider may be able to do a quick scan of the patient's environment which may also require additional fields they do not usually address such as when there is a face-to-face visit. Providers will need to depend more on facial ques since that may be all they can see via the camera, so normal review of systems may need to also be revised. Patients may not have good internet connections and/or may have problems downloading the telehealth application, so informatics nurses can help create patient materials and/or be a resource to assist the patient prepare for a visit.

Before starting a telehealth visit, providers may need to adjust their environment as well. Taking the time to look behind and see what the patient can see on the camera is necessary, and informatics nurses can help remind providers to prepare their environment. While many applications include virtual backgrounds, these are not recommended for healthcare visits as they can allow others to hear or see the patient during a visit without their knowledge. Whether or not these virtual backgrounds are used, the provider needs to assure patient privacy. Professional dress and single tasking should be practiced the same as an in-person visit. If the provider is unavoidably interrupted by a call or someone knocking, they should excuse themselves and mute their audio and video. Ideally, email, texts, and phone notifications should be silenced during telehealth visits as they can be distracting to the patient as well.

Performance Evaluation

Evaluation of patient and provider satisfaction with telehealth is essential. Informatics nurses should be a part of generating evaluative questions specific to the telehealth visit as it is often the technology that can make or break a visit. Poor internet connections, inadequate or broken audio or video equipment should be replaced or repaired. While this is often the IT department's responsibility, informatics nurses can help to determine causality and best practice to prevent technology from interfering with care.

Data from provider satisfaction surveys can also help improve telehealth processes. Informatics nurses can help with identified issues such as ergonomics and workflow in ways to optimize visits. Combining telehealth visit data, results of satisfaction ratings, and patient clinical outcomes can also help support optimized care. While telehealth regulations may get tighter again, it is likely that telehealth is here to stay. As technology evolves, workflows and best practice will need to be incorporated in regular training and competency assessments.

Conclusions

The rapid implementation of telehealth technology has created opportunities for the informatics nurse. The informatics nurse is educationally prepared to assist with rapid workflow integrations and troubleshooting technology to ensure it will work for both clinicians and patients. The informatics nurse can organize and participate in testing, make sure the right people are involved with the technology changes – compliant with laws, security, and regulations – to ensure reimbursement for services (Tyler, 2020). Although some video conferencing platforms provide access to an EHR, the informatics nurse will need to make sure the technology is compatible or able to integrate into existing EHR and make changes such as new charting fields, orders, billing codes, displaying results, alerts, and problem solving. Another key responsibility is to ensure that staff has education and knowledge about the five telehealth technology types and how to use them. Informatics nurses are involved in all aspects of the 4 P's, from selecting and ensuring compatibility with EHR in the planning phase to outcomes in the performance evaluation phase and minimizing interruption to service and technology to maximize both clinician and patient experiences.

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