



Tips for Seeing Patients via Telemedicine

Jennifer Shih¹ · Jay Portnoy²

Published online: 15 August 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract

Purpose of Review Telemedicine is a technology that permits patients to be seen at a distance. This review describes different types of telemedicine, why they might be useful for a practice, what equipment is needed, and how to select and schedule patients.

Recent Findings The use of synchronous telemedicine is increasing rapidly and has surpassed 50% of ambulatory encounters in some instances. Management of patients is particularly germane for an allergy practice since it is an outpatient specialty with patients who live in widely distributed locations with limited access to allergists. With utilization of digital exam equipment, in vitro tests for diagnosis, and spirometry at the patient location, there are few clear advantages of seeing patients in-person over virtual visits.

Summary Telemedicine is here today. As its use increases, it is critical that allergy specialists embrace this new technology.

Keywords Telemedicine · Telehealth · ehealth

Introduction

According to the American Telemedicine Association, telemedicine (TM) can be defined as “the remote delivery of health care services and clinical information using telecommunications technology” [1]. TM is particularly useful for managing patients who have limited access to certain types of medical resources such as specialists in rural communities; however, it has become increasingly popular even when in-person visits are readily available due to its convenience and potential lower cost [2••]. Patients generally prefer this convenience over the ability to see a provider in-person which is why use of telemedicine services has been increasing exponentially in recent years. In 2016, Kaiser Permanente reported that 52% of their member-provider outpatient encounters were performed using TM [3]. According to a report by Grand View Research, the global TM market is predicted to become a \$113.1 billion industry by the year 2025 [4].

The Centers for Disease Control and Prevention reports 16 million diagnoses of allergic rhinitis and 20.4 million diagnoses of asthma in adults in 2016. With the *Allergists Report* published by the American College of Allergy, Asthma and Immunology, citing demand for allergists will increase 35% by 2020, telemedicine can offer several strategies to meet this demand.

A variety of strategies for remote management fall under the broad category of TM including remote monitoring of chronic diseases (e.g., asthma, diabetes, congestive heart failure), web-based interactions that provide education and instructions (e.g., Conferences Online Allergy [5]), reminder systems (both app-based and text-based) and remote store and forward of diagnostic tests for subsequent interpretation by specialists including EKGs, Echo cardiograms, imaging studies, and photographs of rashes (Fig. 1). In addition, a variety of apps have been designed to help patients manage their own asthma more effectively [6].

This article is part of the Topical Collection on *Telemedicine and Technology*

✉ Jay Portnoy
jportnoy@cmh.edu

¹ Emory University, Atlanta, GA, USA

² Children’s Mercy, 2401 Gillham Road, Kansas City, MO 64108, USA

Asynchronous Telemedicine

More recently, the exchange of e-mail messages, usually via electronic medical record-based patient portals, has become routine. These TM strategies are defined as asynchronous since the provider and patient do not need to be online at the same time. Such asynchronous encounters can arguably be the

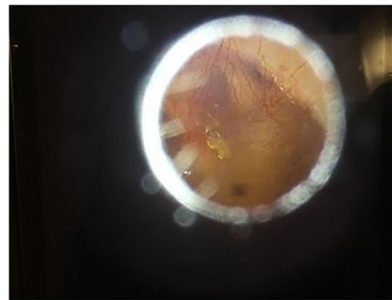
Fig. 1 Use of digital equipment to perform a physical examination via telemedicine. Peripheral devices including otoscopes, high-resolution cameras, and stethoscopes can be obtained from a variety of sources



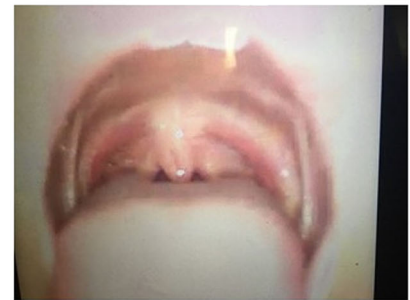
Digital Otoscope



Digital Stethoscope



Tympanic Membrane



Oropharynx

most useful type of health information exchange because providers and patients can interact with each other on their own time. It gives them an opportunity to gather their thoughts and to interact in a more meaningful manner than if a provider or patient makes a telephone call and interrupts the other when they are occupied in other activities or leaves a message initiating a round of “phone tag.”

Synchronous Telemedicine Visits

While asynchronous forms of TM have advantages, real-time synchronous visits also are of value in certain circumstances. They are a means for establishing a healing relationship between a provider and patient and they provide a platform for dealing with sensitive issues that might be uncomfortable to discuss using an asynchronous strategy. Synchronous visits can be divided into direct to consumer (DTC) and facilitated visits (FV). DTC visits are initiated by patients and usually occur with the patient remaining in their house or workplace. As such, DTC encounters generally are unscheduled, though scheduled DTC visits can occur.

DTC visits can reduce the need for the patient to travel to a healthcare facility. This potentially reduces the cost of overhead and permits patients to avoid increased cost to travel to a clinic. In a Veterans Affairs (VA) healthcare system study, telemedicine resulted in an average travel savings of 145 miles and 142 min per visit. This led to an average travel payment cost savings of \$18,555 per year [7]. While the convenience of

DTC visits is high, the disadvantages include an inability to do more than a cursory examination and failure in most cases to establish an ongoing provider-patient relationship. In addition, current CPT codes provide limited mechanisms to bill for services delivered by DTC. Due to these limitations, only certain types of problems can be addressed using DTC visits.

Facilitated visits, on the other hand, require a patient to travel to a medical facility where a healthcare professional (usually a nurse or respiratory therapist) facilitates the interaction. This type of visit typically is scheduled and is more convenient than an in-person visit, particularly if the patient lives a significant distance away from the provider’s location. The distance that a patient needs to travel before they prefer to see a provider by TM has not been fully determined though it likely is affected by the traffic between a patient and provider, the travel distance, the types of roads and weather conditions at the time of a scheduled visit. Participants in a recent survey on primary care video visits stated preference of video visits to office visits, noting that rising costs of in-person visits and transportation as the main considerations for favoring video visits [8].

An advantage of synchronous facilitated visits is that a physical exam (i.e., examination of the lungs, ears, nose, throat and skin using digital equipment to perform an allergy exam) can be performed by the provider with help from the facilitator and services therefore can be billed for using CPT codes with a g-modifier. In addition, diagnostic tests can be performed at the patient’s location and visit-related teaching can be done by the facilitator. Patient instructions can be

printed to the remote site and prescriptions can be sent to the patient's pharmacy. There is very little that can be done during an in-person visit that could not also be done in a facilitated TM visit.

Determine Your Purpose

When initiating a telemedicine program, it is important to determine why such a program is needed. Three reasons to provide telemedicine services include (1) provision of more convenient care to current patients who live at a distance, (2) reduction in overhead to achieve cost savings by using less expensive space, and (3) increased access to patients who might not otherwise travel to your practice. Any one or a combination of these could serve as a justification for initiating a telemedicine program.

Provision of services to patients who must travel long distances or who do not have access to allergy services is particularly germane for practices in large rural states or in underserved urban areas that have poor healthcare access. In addition, certain populations such as elderly or disabled patients often have difficulty traveling to a medical clinic and may benefit from being seen at home or in a closer facility. According to a 2015 study, the mean no-show rate for doctor appointments was upwards of 20%, with an average cost per patient of approximately 200 dollars [9]. Telemedicine technologies can connect patients with the clinician without having to incur long travel times and associated expenses, making it more likely that they will attend appointments if these access barriers are diminished.

Telemedicine is also a way to reduce costs both to an allergy practice and for the patient. While a telemedicine program itself has overhead costs, it may permit patients to be seen in facilities that are less expensive to rent than the central office where the provider is located. Whether this is a consideration depends on the overhead of a practice's primary location relative to a satellite location. Reduced costs can be increased if space is rented part-time and use of clerical staff is shared with other practices. In a retrospective study of a TeleAllergy clinic, 112 TeleAllergy visits resulted in an estimated savings of 200 workdays or schooldays, US \$58,000 in travel-related costs, and 80,000 km not driven [10]. Patients experience cost savings and increased convenience by avoiding extensive travel.

Telemedicine offers an opportunity to extend a practice's market by delivering services over a greater distance. By implementing a telemedicine practice, patients who might otherwise go to a nearer provider or decide to forgo treatment altogether can be recruited into a practice. By clearly defining the reasons for setting up a telemedicine program, the success of the program can be judged objectively.

Work Environment

The first step in establishing a telemedicine program is to determine where patient visits will take place. We will refer to this location as the origination site. To determine where the origination site should be located, it is helpful to identify where a practice's more distant patients live and whether there is a location that would be more convenient for them to be seen.

Origination sites can be in medical office buildings, hospitals or part-time space can be rented in private practices. The only restriction on the type of location for origination sites depends on regulations that are specific to the state in which the patient is to be seen. Some states restrict origination sites to specific venues such as within a hospital or other designated medical building. Others allow care to be given in schools, daycare centers, residential centers, and even a patient's home if appropriate to the type of visit.

In the origination site, it is necessary to set up a sending room in which the patient can be seen. The sending room should be set up like a regular examination room with standard lighting, and layout including an examination table and medical equipment. This creates a familiar medical atmosphere which hides the technology as much as possible.

One piece of equipment that is not typical of an examination room is the Clinical Telemedicine Cart which runs the Provider Access Software (PAS). The main function of a Telemedicine Cart is to permit video conferencing between a provider and patient or facilitator. Carts should have a video screen and a camera that can be controlled by the provider or facilitator. Cameras should permit zoom and pan so that the patient and family can be clearly seen. A telemedicine cart also should have a microphone and speaker permitting high-quality voice communication. In addition to video conferencing, a telemedicine cart should have ports for attachment of digital exam equipment including a digital stethoscope, otoscope, high-resolution camera and other devices that are necessary for the provider to do an exam that is consistent with their specialty (Fig. 1). A specialty-specific exam is required to bill for an E&M visit that is consistent with current CPT codes.

To function properly, the telemedicine cart should be compatible with the Provider Access Software that is used to connect patients with providers. Examples of PAS include Intouch (Intouch Technologies, Inc., Santa Barbara, CA) and AGNES Interactive (AMD Global Telemedicine, Chelmsford, MA). The software should provide a means for the provider to control the telemedicine cart including the camera, audio connection and to select digital examination equipment when needed. It needs to preserve patient confidentiality and ideally should permit multi-presence (more than one provider or family member to join the session) when needed.

The provider location is referred to as the receiving site. This is usually a venue located centrally such as in a hospital or at the primary location for a private practice. Technically, it is possible for the provider to be located anywhere including at their home. The only requirement is that they have access to a reliable internet connection and there is sufficient privacy to protect the patient's health information. While the provider needs to be licensed to practice medicine in the state where the patient is located, it is not necessary that they hold a license where they are located during a telemedicine encounter (Table 1).

Delivering Care via Telemedicine

Telemedicine can be used to offer care to patients who live at a distance from an allergy specialist. It can be used for an initial consultation and for subsequent care using a combination of in-person and virtual visits. Once the goals of the program are defined and the infrastructure is in place, it is time to identify and schedule patients to be seen by telemedicine.

Selecting Patients

Once the space and staff are established and the telemedicine cart is connected, it is necessary to identify patients who might benefit from a facilitated telemedicine visit. This can be done when a patient calls to schedule an appointment by noting the patient's address. If they live nearer to a telemedicine location than to the location where the provider is located, they can be offered the option of seeing the provider virtually. In our experience, 81% of patients prefer the telemedicine option over traveling for an in-person visit, even for their initial encounter. The most common reason given for this is a preference for convenience. Another survey found that patients who used MinuteClinic telehealth visits reported high satisfaction,

identifying convenience and perceived high quality of care as contributors [11].

Certain types of visits should not be performed by telemedicine. These include visits where procedures need to be performed that require the presence of a provider. For allergy encounters, skin tests, immunotherapy injections, and challenges should not be done unless a provider is present at the originating or sending site who is willing to be responsible for treating a systemic reaction should one occur. If allergy tests are needed, currently, in vitro tests can be performed in lieu of skin tests. Pulmonary function tests can be done by the facilitator at the originating site since they pose no increased risk to the patient; however, bronchial challenges should not be performed by telemedicine without a provider present.

Scheduling

Scheduling for telemedicine depends on how an individual practice tends to schedule its patients. In general, it takes slightly less time to see a telemedicine patient than it takes to see a patient in-person. This is because some tasks such as documenting in the EMR can be done at the same time as other tasks such as performing a physical exam. In addition, patients tend to ask fewer questions when seen by telemedicine and the amount of "chit chat" that occurs tends to be less [12]. While these may seem like negative features of a telemedicine visit, current data suggest that the quality of an encounter, patient satisfaction, and patient outcomes are not compromised [13•]. Initially, it is reasonable to schedule the same amount of TM time for a given type of patient as would normally be scheduled for an in-person visit. Once the provider is comfortable with this type of visit and the time it takes to see patients is measured, the schedule can be adjusted as needed.

Some clinics tend to schedule half- or full-day blocks of time for telemedicine. This is most appropriate when the

Table 1 Resources needed to provide care via telemedicine

Origination (patient) site	Receiving (provider) site
Location <ul style="list-style-type: none"> • Near where distant patients live • Medical building or hospital • Schools with multi-presence 	<ul style="list-style-type: none"> • Can be anywhere- even outside of the country • Usually the central practice location • Could be provider's home
Environment <ul style="list-style-type: none"> • A sending room where the patient is seen • Set up like a traditional exam room 	<ul style="list-style-type: none"> • A private room to preserve confidentiality • Backdrop should be professional
Resources <ul style="list-style-type: none"> • Trained facilitator • Clinical telemedicine cart (robot) • Digital exam equipment • Diagnostic tests (e.g., spirometry, blood) 	<ul style="list-style-type: none"> • Access to EMR • Computer running provider access software (PAS) • Reliable internet connection

facilitator is hired part-time and will only be available on certain days. If a full-time facilitator is available, as would be the case if multiple providers or specialties use the telemedicine resource, then virtual patients can be scheduled mixed in with in-person visits. In the latter situation, the demand for telemedicine determines the number of virtual visits. The disadvantage is that resources where the provider is located are harder to allocate.

Training

To be successful, a telemedicine program needs to ensure that providers and facilitators are properly trained to use the software and telemedicine equipment and that they are familiar with the work flow that a telemedicine encounter requires. To minimize the need for additional training, the workflow should be similar to the flow of an in-person visit. Providers should practice connecting to the origination site and using the software to control the camera and digital equipment before patients are seen. They should also review protocols for coping with software failures should they occur during a patient visit. A list of technical support numbers should be provided in case there is a software or equipment malfunction.

Facilitators at the initiation site should be trained to activate the clinical telemedicine cart and to troubleshoot exam equipment should it malfunction. It is helpful to keep spare parts, including cables, available at the origination site to repair equipment should it stop working. Facilitators also should practice using equipment such as an otoscope and stethoscope. If palpation is necessary, the facilitator will need to be trained to identify abnormalities since the provider will be unable to do this by telemedicine. A properly trained nurse can provide this information via telemedicine while under the direct supervision of a provider. Special training is needed for other procedures such as spirometry and pertinent patient education.

Seeing a Patient via Telemedicine

A telemedicine visit starts when the provider logs into the provider access software. As discussed earlier, the software needs to be both HIPAA compliant and FDA approved to transmit accurate images to the provider. The PAS permits a provider to interact with patients and to control the digital examination equipment. It also helps to have the patient's electronic medical record (EMR) open either on the same screen or ideally on a separate screen to avoid window overlap. One way to do this is to see the patient on a tablet device and have the EMR open on a larger desktop computer. Some EMRs open a telemedicine window that is integrated into the application. The latter may provide the capability to record parts of the encounter if desired.

Once a connection is established, it is a good idea to test it by asking if the patient can hear you and to orient the patient by indicating who you are, where you are connecting from and where the patient is located. After that the encounter can commence. The provider should ask about the medical history by telemedicine as they would for an in-person visit. During this process, it is common for the virtual nature of the visit to disappear quickly. Most providers report almost forgetting that they are talking to the patient through a screen.

After the history has been obtained, a physical examination needs to be performed. A physical examination can be performed with the use of peripherals, such as an electronic stethoscope, dermascope, otoscope, and ophthalmoscope. The provider should indicate to the facilitator which device is desired and they should click on that device in the software to activate it. Instructions should be given indicating where to move a stethoscope or how to point a camera to examine a rash. Manual procedures such as abdominal palpation will need to be done by the facilitator under observation by the provider. This requires that the facilitator be trained to identify abnormalities in the exam and to report accurate information about what they feel. For joint evaluations, range of motion can be performed and reports of heat or crepitation described as needed. Most components of a typical allergy exam involve listening to lungs, looking at tympanic membranes, examining the head, eyes, mouth, nasopharyngeal areas, examining the skin for rashes, and looking for digital clubbing (Fig. 1).

Once the physical examination is complete, it is necessary to write orders, prescriptions, and instructions to the patient. This is when spirometry can be performed (if it is not done prior to the encounter), blood can be drawn, and inhaler technique, discussion of an asthma action plan and general education can be performed to conclude the patient visit.

Who Should Perform Telemedicine?

While use of TM does not require specialty training, it is a new technology that requires training to use it effectively [14]. Allergists who offer virtual care need to overcome whatever intimidation they may have regarding being on camera and operating electronic devices. To do this, it is best to see patients via telemedicine regularly. Providers who are most likely to succeed with TM should have the ability to be flexible and tolerant. In addition, they should be creative, have problem solving skills and a suitable "television personality." A seasoned clinician is better since they have medical skills and only have to focus on interacting via technology. Younger graduates tend to succeed better if coached by a seasoned provider [15].

Specialists such as allergists are more likely to use TM than generalists. In addition, TM is more likely to be used in larger facilities than in smaller ones due to differences in

standardization, documentation, and systems to support medical encounters. The use of TM encourages evidence-based approaches because providers who use TM tend also to use those methods [16].

The use of video equipment to see patients can influence their interaction. In a study designed to evaluate factors that determine the quality of communication between providers and patients it was noted that during TM visits there was less small talk and eye contact than found during in-person visits. In addition, providers tended to look at the EMR more often when seeing patients by TM. Because of this, patients reported not always understanding what the provider was looking at. This suggests that attention to these non-medical behaviors may improve patient satisfaction with a TM encounter [17].

One other consequence of the provider not being physically present is the need to feel comfortable giving some control of the visit to a telefacilitator while retaining enough to provide patient care. Some providers find this difficult to do. In addition, it is important that the provider continue to feel that they have status as the patient's medical caregiver. Some providers may feel that their caregiver role is threatened.

Other Uses for Facilitated Telemedicine

While telemedicine has a clear utility when used to see patients who live at a distance, it also can be used in the school setting both for asthma training [18] and for facilitated visits. For the latter, a student would go to a school-based telemedicine clinic and be seen by a provider who is at a different location. Using multi-presence technology the parent could join the video from their workplace. This approach allows the student to be seen without having to leave school and the parent to be present during the encounter without having to leave work. Before such visits can take place, the parent needs to sign a Telemedicine consent giving the school and provider permission to see their child by telemedicine.

In a prospective cohort study in three urban California schools, students were seen virtually by an asthma expert experienced a significant improvement in family social activities and in the number of asthma exacerbations. In addition, over 90% of the students rated the program as good or excellent [19]. In another study, children with persistent asthma who were assigned to a school-based telemedicine program had more symptom-free days and they were less likely to have an emergency department visit or hospitalization for asthma than children in a control group [20•].

Another use of telemedicine in allergy would be for inpatient consultations. In one study, Telemedicine was used to facilitate inpatient consults in which skin testing was performed by a Physician Assistant and interpreted by an allergist [21•]. This was followed by an oral antibiotic challenge. By using TM to rule out the diagnosis of antibiotic allergy,

patients were able to use less expensive medications with fewer side effects. Since most allergists practice outside of the hospital setting, they have a limited ability to see a hospitalized patient during the day because of the need to leave a busy practice and travel to the hospital. Consequently, most inpatient consults are performed before or after the workday. Hospitals that provide an origination site for telemedicine could permit an allergist to see a patient during the workday leading to faster treatment and possibly to earlier discharge.

Conclusions

Telemedicine is a booming technology that is affecting how providers and patients see each other today. Allergists who wish to consider seeing patients via TM should understand what their goals are and design their TM program to meet those goals. This should be done after reviewing information regarding where their patients live, whether there are locations that might be more convenient, less expensive and that could increase the number of patients seen in a practice.

Once the decision is made to start a TM program, an appropriate venue needs to be secured, equipped, and staffed and training needs to be given both to providers and facilitators. Patients can then be scheduled to be seen by TM. The actual visit should be managed as similarly to an in-person visit as possible to reduce the need for special training.

During an encounter, providers tend to talk more, patients are more passive, and there is less "small talk." Providers who tend to engage in this activity are likely to be less satisfied with TM though patients tend to be just as satisfied, suggesting that the small talk is more for the benefit of the provider than for the patient. As a result, TM encounters are shorter than in-person ones. This is likely because such visits tend to focus more on efficient problem solving.

Common misconceptions regarding TM are that the technology is unreliable, hard to use, and insecure and that a provider will not be paid if they use it. While the facts refute these beliefs, many providers rely on thought leaders to tell them when it is time to use a new technology such as TM. By carefully designing a program, implementing it and using it to see patients, it should be possible to be one of those leaders. The time is now to inform our colleagues of the benefits of telemedicine.

Compliance with Ethical Standards

Conflict of Interest The authors declare no conflicts of interest relevant to this manuscript.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major Importance

1. ATA. About Telemedicine. American Telemedicine Association, Arlington, VA. 2018. <http://www.americantelemed.org/main/about/about-telemedicine/telemedicine-faqs>. Accessed June 21, 2018.
2. •• Elliott T, Shih J, Dinakar C, Portnoy J, Fineman S. American College of Allergy, Asthma & Immunology position paper on the use of telemedicine for allergists. *Ann Allergy Asthma Immunol*. 2017;119(6):512–7. <https://doi.org/10.1016/j.anai.2017.09.052>. **Guidelines for telemedicine by allergists developed by an American College of Allergy, Asthma & Immunology taskforce.**
3. Kokalitcheva K. More than half of Kaiser Permanente's patient visits are done virtually. *Time, Inc*. 2016. <http://fortune.com/2016/10/06/kaiser-permanente-virtual-doctor-visits/>. Accessed Feb 22, 2018.
4. Telemedicine Market Size Worth \$113.1 Billion By 2025. *Grand View Research* 2017. <https://www.grandviewresearch.com/press-release/global-telemedicine-industry>.
5. COLA. Conferences online allergy. Children's Mercy Hospital/ American College of Allergy, Asthma & Immunology, Kansas City, MO. 2018. <https://www.youtube.com/user/ACAAICOLA>. Accessed June 21, 2018.
6. Katwa U, Rivera E. Asthma management in the era of smart-medicine: devices, gadgets. *Apps Telemed Indian J Pediatr*. 2018; <https://doi.org/10.1007/s12098-018-2611-6>.
7. Russo JE, McCool RR, Davies L. VA telemedicine: an analysis of cost and time savings. *Telemed J E Health*. 2016;22(3):209–15. <https://doi.org/10.1089/tmj.2015.0055>.
8. Powell RE, Henstenburg JM, Cooper G, Hollander JE, Rising KL. Patient perceptions of telehealth primary care video visits. *Ann Fam Med*. 2017;15(3):225–9. <https://doi.org/10.1370/afm.2095>.
9. Kheirkhah P, Feng Q, Travis LM, Tavakoli-Tabasi S, Sharafkhaneh A. Prevalence, predictors and economic consequences of no-shows. *BMC Health Serv Res*. 2016;16:13. <https://doi.org/10.1186/s12913-015-1243-z>.
10. Waibel KH. Synchronous telehealth for outpatient allergy consultations: a 2-year regional experience. *Ann Allergy Asthma Immunol*. 2016;116(6):571–5 e1. <https://doi.org/10.1016/j.anai.2016.03.028>.
11. Polinski JM, Barker T, Gagliano N, Sussman A, Brennan TA, Shrank WH. Patients' satisfaction with and preference for telehealth visits. *J Gen Intern Med*. 2016;31(3):269–75. <https://doi.org/10.1007/s11606-015-3489-x>.
12. Liu X, Sawada Y, Takizawa T, Sato H, Sato M, Sakamoto H, et al. Doctor-patient communication: a comparison between telemedicine consultation and face-to-face consultation. *Internal medicine (Tokyo, Japan)*. 2007;46(5):227–32.
13. • Portnoy JM, Waller M, De Lurgio S, Dinakar C. Telemedicine is as effective as in-person visits for patients with asthma. *Ann Allergy Asthma Immunol*. 2016;117(3):241–5. <https://doi.org/10.1016/j.anai.2016.07.012>. **A study comparing the outcomes of patients with asthma seen by telemedicine vs seen in-person showing no inferiority of telemedicine.**
14. Waller M, Taylor L, Portnoy J. The medical virtualist: is pediatric patient care using telemedicine a new specialty? *Pediatric Annals*. 2018;(In press).
15. LeRouge C, Garfield MJ, Collins RW. Telemedicine: technology mediated service relationship, encounter, or something else? *Int J Med Inform*. 2012;81(9):622–36. <https://doi.org/10.1016/j.ijmedinf.2012.04.001>.
16. Dünnebeil S, Sunyaev A, Blohm I, Leimeister JM, Krcmar H. Determinants of physicians' technology acceptance for e-health in ambulatory care. *Int J Med Inform*. 2012;81(11):746–60. <https://doi.org/10.1016/j.ijmedinf.2012.02.002>.
17. Bulik RJ. Human factors in primary care telemedicine encounters. *J Telemed Telecare*. 2008;14(4):169–72. <https://doi.org/10.1258/jtt.2007.007041>.
18. Perry TT, Halterman JS, Brown RH, Luo C, Randle SM, Hunter CR, et al. Results of an asthma education program delivered via telemedicine in rural schools. *Ann Allergy Asthma Immunol*. 2018;120:401–8. <https://doi.org/10.1016/j.anai.2018.02.013>.
19. Bergman DA, Sharek PJ, Ekegren K, Thyne S, Mayer M, Saunders M. The use of telemedicine access to schools to facilitate expert assessment of children with asthma. *Int J Telemed Appl*. 2008;159276:1–7. <https://doi.org/10.1155/2008/159276>.
20. • Halterman JS, Fagnano M, Tajon RS, Tremblay P, Wang H, Butz A, et al. Effect of the school-based telemedicine enhanced asthma management (SB-TEAM) program on asthma morbidity: a randomized clinical trial. *JAMA Pediatr*. 2018;172(3):e174938. <https://doi.org/10.1001/jamapediatrics.2017.4938>. **A description of a school-based telemedicine for treatment of students with asthma.**
21. •• Staicu ML, Holly AM, Conn KM, Ramsey A. The use of telemedicine for penicillin allergy skin testing. *J Allergy Clin Immunol Pract*. 2018; <https://doi.org/10.1016/j.jaip.2018.04.038>. **An important study demonstrating the utility of performing inpatient allergy consults via telemedicine.**