Telehealth as a Method for Increasing Access to Specialized Care for Wyoming Patients

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Abstract

Individuals in Wyoming often have to travel hundreds of miles to receive specialized types of care, such as cardiology, neurology, specialized surgeries, etc. Travel is difficult for patients as it costs money, takes time, and if the person is unable to drive, they cannot access needed care. Telehealth is a booming new industry that is being used to provide various levels of care and has been shown to be successful in many instances. However, it seems that Wyoming has not embraced this new method of providing care, nor have physicians who provide specialized care. Pilot studies around the country and globe have demonstrated the feasibility and accuracy of telehealth in providing care to patients in a variety of medical specialties. Economic analysis of telehealth networks suggests monetary benefits to patients, physicians, and the hospitals they work for. Patients and physicians who participate in telehealth services report feeling that excellent care was provided, and a vast majority said they would use telehealth again for providing or receiving healthcare. For these reasons, physicians and patients in Wyoming should look to telehealth for medical services that are not offered locally or within the state. This method of care will benefit patients and physicians financially, and increase access to necessary care for Wyoming residents.

Introduction

Since the passage of the Affordable Care Act (ACA) in 2010, health insurance, and more broadly healthcare has captured the attention of citizens of the United States. The Republicans used widespread skepticism of the ACA to win a majority in the House of Representatives in 2012, and the senate in 2016. After the Republicans showed an inability to repeal or replace the ACA during the first two years of the Trump administration, the Democrats used healthcare
coverage to propel them to a takeover of the House in historic fashion. This interest in healthcare promises to continue to influence the candidate Americans support in the 2020 elections. A Pew research poll released in February 2019 showed that 69% of Americans felt that reducing healthcare costs should be a top priority for the president and congress, second only behind strengthening the economy (Fig 1).¹

**Figure 1**

<table>
<thead>
<tr>
<th>Public’s policy priorities for 2019</th>
<th>% who say ___ should be a top priority for Trump and Congress this year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>70</td>
</tr>
<tr>
<td>Health care costs</td>
<td>69</td>
</tr>
<tr>
<td>Education</td>
<td>68</td>
</tr>
<tr>
<td>Terrorism</td>
<td>67</td>
</tr>
<tr>
<td>Social Security</td>
<td>67</td>
</tr>
<tr>
<td>Medicare</td>
<td>67</td>
</tr>
<tr>
<td>Poor and needy</td>
<td>60</td>
</tr>
<tr>
<td>Environment</td>
<td>56</td>
</tr>
<tr>
<td>Immigration</td>
<td>51</td>
</tr>
<tr>
<td>Jobs</td>
<td>50</td>
</tr>
<tr>
<td>Reducing crime</td>
<td>50</td>
</tr>
<tr>
<td>Drug addiction</td>
<td>49</td>
</tr>
<tr>
<td>Budget deficit</td>
<td>48</td>
</tr>
<tr>
<td>Race relations</td>
<td>46</td>
</tr>
<tr>
<td>Military</td>
<td>45</td>
</tr>
<tr>
<td>Transportation</td>
<td>45</td>
</tr>
<tr>
<td>Climate change</td>
<td>44</td>
</tr>
<tr>
<td>Global trade</td>
<td>39</td>
</tr>
</tbody>
</table>

Source: Survey of U.S. adults conducted Jan. 9-14, 2019. PEW RESEARCH CENTER

Methods for reducing healthcare costs get a justifiably large amount of coverage in the media but are not the only issue patients face. For many rural patients, access to medical care is difficult and in some cases forces people to go without necessary care. Wyoming patients face particular difficulty in this regard, as many specialties such as neurosurgery, cardiothoracic surgery, dermatology, radiation oncology and others are not available or very limited in the state.
A lack of availability forces patients to travel to surrounding states adding additional costs, time and resources during an already stressful time. This exacerbates existing barriers to healthcare access, and disproportionately affects the elderly or those living with certain physical or psychological disabilities. Many elderly patients lose the ability to drive due to vision defects, decreased reaction times, or a variety of other reasons. For these patients, traveling hundreds of miles for care is not feasible, and they will have to rely on family or friends if they are available, or potentially ambulance services, adding enormous costs and stress. Similarly, some individuals have disabilities which preclude them from driving, again reducing access to care. Unfortunately, the elderly and patients living with disabilities tend to require higher levels of care than the average population so this decreased access takes on an increased importance. Winter weather conditions can also make travel to surrounding states dangerous or impossible, and for many patients, going without care during the long Wyoming winters is not feasible.

Rural patients also represent an untapped patient base for many specialized physicians living and working in more urban areas. As physicians and the hospitals they work for look for ways to expand their patient base, they often turn to rural patients who do not have access to specialized care. In order to reach rural patients, physicians often travel to hospitals or doctor’s offices in these communities 1-2 times per month to check in with patients and in some cases, perform minor procedures. While this does provide some benefits for both patients and physicians, the system has many limitations. If the specialist is in high demand, a patient may be unable to get an appointment for months due to the limited number of available days, which in some conditions is not realistic. This also presents significant costs and time to the physician, which can increase burnout and lead to physicians restricting the amount of times they travel to rural communities. Perhaps the most pressing limitation however is the limits this places on
doctor-patient relationships. In fact, some studies suggest that impaired doctor patient relationships lead to worse outcomes for patients, and patients are less likely to be satisfied with treatment from physicians with whom they do not have a strong relationship.\textsuperscript{2,3} Physicians who travel to see patients and therefore do not know the patients as well will be less familiar with the specifics of the person’s medical history and diagnosis, and therefore may not be able to provide the same level of care as someone who knows the patient better. This lack of knowledge can lead to fragmented care and frequent changes in a patient’s medication regiment, both of which can have major physiological consequences and leave patients disillusioned with the healthcare system.

The federal government, along with many states, have recognized a problem with recruiting and retaining physicians in rural areas. A recent study predicted a shortage of 45,000 primary care physicians, and 46,000 surgeons or specialists in the next decade in the United States.\textsuperscript{4} While this will affect urban areas as well, the most significant shortages will exist in rural communities. The same study notes that while 19.2% of the U.S. population exists in rural areas, only 11.4% of physicians practice in these communities (Fig 2). Recognizing this as an issue, programs have been developed at various levels of government to incentivize physicians to practice in rural areas.\textsuperscript{5} One of the more successful programs is the National Health Service Corps which provides scholarships and loan repayment plans for primary care physicians and other primary care providers who practice in rural or urban underserved areas.\textsuperscript{6} With the average medical school debt now approaching $250,000, loan repayment programs such as this can be very attractive and have been relatively successful. Many states have their own program modeled on the National Health Service Corps, in an attempt to recruit primary care physicians and providers to underserved areas in their state.\textsuperscript{7} Unfortunately, the terms of service for the National
Health Service Corps and most state programs range from 2-4 years, with many physicians choosing to leave these communities after this period. This can again lead to fragmented doctor-patient relationships, and make it difficult for patients to stabilize chronic conditions. This program is also specific to primary care specialties so doesn’t improve access to specialized care for rural patients. This is similar to the WWAMI program from the University of Washington School of medicine which recruits students to complete medical school at low costs with an agreement to serve in their home state (Wyoming, Washington, Alaska, Montana, or Idaho) for three years after residency. Although this program has shown success, it is again directed towards primary care specialties, and therefore does not increase access to specialized types of healthcare.

Figure 2

Fig 2: Displays the difference in physicians per 100,000 people in urban vs rural populations, including a breakdown of the types of rural areas. Figure retrieved from Rosenblatt et. al., 2010.
While it is possible that similar programs could be developed, or current programs expanded, to recruit specialized physicians to rural areas, there are major limiting factors that would make this difficult to achieve. In order to perform complex procedures or surgeries, a hospital must have technologies that can be very expensive, including MRI machines (which range in cost from $1-3 million), advanced operating rooms with specialized equipment, and others. Hospitals must also have intensive care units, rehabilitation facilities, and more physicians to be able to perform certain procedures. With the budgets of many rural hospitals being relatively small, it is not feasible for them to purchase and operate such equipment, which makes it impossible for specialists to work in these areas, and leaves patients searching for care in surrounding states.

Telehealth is a relatively new field which has been rapidly expanding in an effort to provide patients with increased access to care, and expand the patient base for physicians and other care providers. Telehealth allows patient-physicians interactions in locations convenient for both, and take place via telephone call, audiovisual systems, cell-phone apps, or other technological means (See Figure 3). Although telemedicine has only recently gained attention in the medical community, providing medical care/advice long distance has been occurring for decades. Some trace the advent of modern telemedicine all the way back to 1905, when Dutch physician Willem Einthoven was transferring and reporting on electrocardiograms over long distances via mail to reach patients without traveling. Since this very early application, telemedicine has been used to provide long distance consultation via radio in the 1920s-40s, particularly in Europe, and transfer of radiographic images in the United States starting in the 1950s. In recent years, organized telemedicine programs have ballooned in recent times, largely from state-based or national initiatives. Many of these programs are in rural states, or aimed at
sparsely populated areas which generally lack access to healthcare. Until very recently, telemedicine has been utilized primarily by primary care providers, and has lacked the support of specialists. However, recent studies may change this and help expand specialized care to rural patients across the country and globe.

Figure 3

Despite recent advancements in telemedicine, and its expanding sphere of influence, there are still reservations about its use among patients and providers. For physicians and patients alike, patient privacy is often one of the top concerns and prevents some from being willing to try this method of care. Although the various platforms used in telehealth are designed with patient privacy in mind, there are still concerns that a patient’s privacy may be at risk. Even for patients who are willing to try telehealth, this worry about privacy may lead them to divulge less information or even provide false answers, making treatment difficult to impossible. Physicians may opt not to use telemedicine for fear of being liable should a patient’s information be compromised. In addition, lack of continuity of care is a major concern.
among those considering telemedicine. Many of the telehealth services currently available
connect a person with whichever doctor is currently available which can lead to disjointed care
and the physician is likely unfamiliar with the patient. Trust is often cited as one of the most
important factors in a doctor-patient relationship, and if there is no relationship between the two,
it is difficult for trust to exist. Finally, physicians who choose not to use telemedicine often cite
concerns about how, when, and in what amount they will be compensated by insurance
companies for these visits. With telehealth expanding rapidly and new methods of care
constantly evolving, insurance companies have not been able to keep up, so the reimbursement a
physician can expect is often unclear, leaving many to prefer to use more traditional routes of
providing care. While these concerns are real and must be addressed if telemedicine is going to
continue its expansion, there are many benefits which make it a realistic and useful option that
would benefit many rural patients.

Hypothesis

As the use of telemedicine has increased in the United States and around the world, so
too has the research into its efficacy, application, and acceptance by patients and physicians. This
project aims to review current literature on telemedicine to evaluate its effectiveness, methods of
delivery and potential specialties that might be able to implement telehealth services. By
compiling current knowledge in the field patients, physicians, and hospitals will be able to make
a more informed decision on whether or not to use telehealth to provide or receive specialized
care, and potential benefits to Wyoming residents will be evaluated. Current research will
demonstrate telemedicine to be highly efficacious, with applications in a variety of medical
specialties and show that patients and physicians are willing to use technological means to
provide or receive care.
Research

Patient/Physician Satisfaction

In order for telemedicine to be useful in providing specialized care, it must be established that physicians and patients are confident in this method of healthcare delivery. In one study looking at patients who received the post-operative urology care via telemedicine, 86% of physicians reported that they delivered the same level of care as they would have during an in-person visit.\textsuperscript{11} Similarly, in a study comparing women who had just given birth, those patients who received their obstetrics care virtually reported significantly higher levels of satisfaction than those who received care during in-person visits.\textsuperscript{12} Interestingly, mothers who already had kids were more likely to choose virtual visits than those having a child for the first time. In a separate study focused on diagnosis of Autism Spectrum Disorder (ASD) in children, 97.5% of parents felt overall satisfaction with their telemedicine experience, and 93% said they would be interested in participating in future telemedicine visits.\textsuperscript{13} The results of this study are shown in Figure 4 below.
Figure 4

<table>
<thead>
<tr>
<th>Item</th>
<th>Average rating (1 = very satisfied; 5 = very dissatisfied)</th>
<th>Mean (SD)</th>
<th>1 (%)</th>
<th>2 (%)</th>
<th>3 (%)</th>
<th>4 (%)</th>
<th>5 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel the telemedicine provider was engaged and part of the visit</td>
<td>1.05 (0.29)</td>
<td>94.87</td>
<td>5.13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I was able to communicate my concern to the telemedicine provider during the visit</td>
<td>1.05 (0.22)</td>
<td>94.87</td>
<td>5.13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I felt that my telemedicine provider was able to collect important information about my child?</td>
<td>1.12 (0.33)</td>
<td>86.11</td>
<td>13.89</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>The information I received through the telemedicine appointment will help me make decisions for next steps in our child's support plan?</td>
<td>1.05 (0.22)</td>
<td>94.87</td>
<td>5.13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I felt the equipment used during the telemedicine visit was not distracting and did not take away from the effectiveness of the visit?</td>
<td>1.29 (0.81)</td>
<td>85.37</td>
<td>4.88</td>
<td>7.31</td>
<td>0</td>
<td>2.44</td>
<td></td>
</tr>
<tr>
<td>My telemedicine visit was just as private as an in-person visit</td>
<td>1.10 (0.37)</td>
<td>92.68</td>
<td>4.88</td>
<td>2.44</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Telemedicine made it easier and more convenient for me to visit with a provider</td>
<td>1.05 (0.22)</td>
<td>94.87</td>
<td>5.13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I am likely to recommend telemedicine to others</td>
<td>1.07 (0.26)</td>
<td>92.11</td>
<td>7.89</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I am interested in participating in future telemedicine visits</td>
<td>1.10 (0.37)</td>
<td>92.68</td>
<td>4.88</td>
<td>2.44</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Overall, I am satisfied with my telemedicine experience</td>
<td>1.02 (0.16)</td>
<td>97.50</td>
<td>2.50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Fig 4: Shows the results of a post-visit questionnaire filled out by parents whose children participated in a virtual ASD screening. Retrieved from Juarez et. al., 2018.
Efficacy

It is important when thinking about implementing telemedicine to consider its efficacy and whether or not the treatment provided in this way is as effective as more traditional in-person visits. In a study referenced earlier using telehealth in diagnosing ASD, researchers found that physicians were able to correctly identify around 80% of children who eventually received a diagnosis of ASD in in-person visits using gold standard identification tools. This study also noted that zero children were incorrectly diagnosed with ASD via the audiovisual system. Weintraub and colleagues used telemedicine in an attempt to treat rural patients dealing with opioid addiction by helping them access buprenorphine, which has been shown to help curb addiction. Of those patients still enrolled in the program at three months (57%), 86% had opioid-negative urine toxicology. A study from South Africa showed 100% specificity but only 65.2% sensitivity in diagnosing hearing impairments in rural children. The diagnostic accuracy was 91.7%. The authors attributed the lower sensitivity to the testing device, the testing procedure, and other child-related variables.

When evaluating the efficacy of telemedicine, it is important to consider the reliability of the technological system being used to perform these services, as severe technological difficulties might drastically affect the level of care transmitted. Importantly, the authors of the audiology study mentioned above listed the technology used in the study as one of the factors that contributed to the 65.2% sensitivity in diagnosing hearing impairments. However, other studies report much better outcomes in regard to technology. In the previously discussed study using telemedicine as a method for diagnosing ASD, the researchers found that 90% of the patient’s parents felt the equipment used during the visit was not distracting and did not take away from the effectiveness of the visit. For women who chose to conduct obstetrics visits
remotely, 92% felt that the ease of connecting for virtual visits and the quality of the connection during the visit was either good or very good.\textsuperscript{12} Finally, physicians reported 96% technical success when using the designed software for conducting post-urological surgery visits.\textsuperscript{11}

**Economic Value**

As discussed at the beginning of this proposal, healthcare coverage and how to pay for care is perhaps the most important issue of the time. So, the economic feasibility of telehealth must be examined and compared to current practices to determine its usefulness. One study looking into the economics of a psychiatry telehealth system targeted towards rural American Indians in New Mexico and Alaskan Natives, found that provider travel was $88.44 more expensive, and patient travel $174.33 more expensive than telehealth visits.\textsuperscript{16} The authors also found that a larger, multistate telehealth network was able to provide care at $44.44 less per patient than smaller state-based networks. Many of the other studies discussed in this review reference economic benefits for patients and physicians as one of the driving forces for researching the usefulness of telemedicine as a method for healthcare delivery.\textsuperscript{11-15, 17, 18}
### Potential Applications

While telehealth has had the largest impact in primary care specialties, there are many other applications in a wide variety of specialties which have proven successful. These include psychiatry in rural areas, diagnosis of ASD and audiological impairments, post-surgical care in multiple subspecialties including urology, obstetrics care after childbirth, and opioid addiction treatment. In addition to the applications already discussed, telemedicine can also be useful in expanding access to some procedures. For example, Cucca et al. looked at using an audiovisual means to connect centralized expert physicians to more rural clinics to oversee the use of transcranial direct current stimulation (tDCS) in treating patients with Parkinson's disease. The authors reported no negative clinical outcomes, and the procedure produced similar results to in-person tDCS delivery. The University of Michigan Medical School has also
introduced a cell-phone app that patients can use to assist with post-operative care. Patients are able to communicate with physicians and ask questions, upload pictures of the incision site, and input some clinical measurements such as blood pressure which are measured using at-home devices.\textsuperscript{18} The article reports high levels of physician and patient satisfaction, noting the convenience and economic benefits of this system.

**Discussion**

Upon review of current literature regarding telemedicine, it appears to be a viable option to work on expanding access to specialized care for Wyoming patients and patients in other rural underserved areas. This holds true when evaluating issues of patient/physician satisfaction, efficacy, economic value, and when considering the broad array of potential applications.

Physician satisfaction is extremely important in establishing the worth of telehealth, because if physicians do not buy in, they will not participate and the scope of care available decreases. There is ample evidence discussed above which suggests physicians who use telemedicine in pilot studies find it very similar to in-person visits. The 86\% satisfaction reported by urologists post-surgery is very high considering that it is a completely different method of care than they are used to.\textsuperscript{11} This, in combination with the reliability physicians experienced with the technological systems they used, provides important evidence that can be used to attract more physicians to the telehealth field.

Patients also overwhelmingly reported satisfaction with telemedicine visits, which again suggests that the expansion of this method of care would be well received. In the articles discussed above, satisfaction rates are as high as 97.5\%, with 90-93\% of patients reporting they would use telehealth again. The satisfaction rate is actually greater than many in-person visits
and is remarkably high for pilot studies in which patients are unfamiliar with the method of receiving care. With patients experiencing such high rates of satisfaction, it seems that telehealth would be well received and provide a more convenient way for patients to communicate with health care providers.

Of great concern to healthcare providers and patients alike is the efficacy of telehealth compared to an in-person visit. Naturally if care provided via this method is not as effective, both sides will be far less likely to take advantage of it. Current research discussed here suggests that telemedicine is in fact efficacious and in some cases, seems to be just as effective as traditional office visits. This holds true for a number of types of treatment including diagnosis (80% success rate in diagnosing ASD and 91.7% in determining audiological deficits), addiction treatment (86% opioid negative toxicology screen at 3 months), and others.13-15 With these rates being reasonable considering the inherent lack of ability to perform a physical exam, telehealth seems like a strong option for patients to consider.

In the case of diagnosis such as in ASD or audiological defect, telehealth can provide an initial screening to determine whether a person needs to make an in-person appointment to be examined further, or whether they do not exhibit any cognitive deficits and do not need to travel to a clinic. This will save patients who do not require an in-person visit time and money and can also help inform those patients who do need to go to a clinic that a follow-up visit is warranted. Saving money is particularly important for patients who come from lower socioeconomic backgrounds, who may not be able to travel for a screening visit, and therefore may go without this care, leading to later diagnosis and further progression of the condition. As opioid addiction continues to be a growing problem, telehealth may prove to be an extremely effective tool in curbing this epidemic. One of the major barriers in access to addiction treatment is that for those
who have come to terms with their addiction and want help, the stigma of entering a rehabilitation program may give them pause and prevent them from entering treatment. With telemedicine, people suffering with addiction would be able to receive counseling and necessary prescriptions in a place comfortable for them, thus eliminating the need to make the addiction public.

This paper began with a discussion of economic considerations of healthcare delivery, which is the major impetus for the exploration of telemedicine. With healthcare costs on the rise, and new and expensive technologies making their way to the clinic, patients and insurance companies must look for more cost-effective options. The major economic study discussed in this summary found that telemedicine was significantly lower in cost than either provider or patient travel in rural areas very similar to Wyoming. Importantly the study also notes that larger multistate networks are able to provide even more affordable telehealth visits, due to higher patient volumes. This would suggest that rather than trying to establish its own telehealth system, Wyoming would be better served trying to enter into an existing system in surrounding states such as Colorado or Utah which have large medical systems that could support Wyoming patients. Combining the clear economic benefits with high levels of satisfaction among patients and physicians and the high efficacy, telemedicine appears to be a useful option in expanding access to care.

Although telehealth has established itself in many primary care specialties, this review attempted to establish whether telemedicine would find similar success in more specialized types of care. As discussed, there is significant research which suggests that telemedicine has uses in psychiatry, diagnosis of ASD and audiological deficits, opioid addiction, post-surgical treatment, obstetrics after childbirth and much more.11-17 There has even been success in performing some
procedures via telemedicine, as discussed with the tDCS study. These are particularly important because access to specialized health care is severely limited in rural areas, and the application of telemedicine in these areas would begin to help patients receive needed care. These studies should also prompt further inquiry in other specialties including cardiology and neurology and prompt physicians and patients to more seriously consider telemedicine as a method for healthcare delivery.

After considering all of the information presented in this literature review, it becomes clear that telemedicine is a cost-effective, efficacious method of healthcare delivery, a conclusion that is supported by both patients and physicians. For these reasons, telehealth should be considered very heavily by patients, physicians, and insurance companies in and around Wyoming and other similar rural areas. Expanding telemedicine would ensure that more patients have access to necessary specialized care, without having the burden of travel and the associated costs. This would also benefit physicians, who would be able to greatly expand their patient base without incurring additional travel costs. Insurance companies would benefit as well, as telemedicine visits can be conducted in a much more cost-effective way, lowering reimbursement rates, and allow more doctor-patient interactions to occur, thus increasing volume and revenue.

As the debate surrounding healthcare continues to capture the public’s attention and will play a large role in the 2020 presidential election, it seems only reasonable that telehealth expansion be a part of the discussion. There are certainly inherent limits with telemedicine, in that a physical exam cannot be performed, and certain procedures would be very difficult. This review is not suggesting that telemedicine be the only method of healthcare delivery used but instead finds that there are many instances where this system would save money and time
without sacrificing efficacy. As research continues to evaluate telehealth’s effectiveness and expand its current scope of specialties, its use will likely increase, and will allow many forgotten patients to receive the care they need.
References

7. National Health Service Corps. Student/Resident Experiences and Rotations in Community Health