MERCATUS CENTER
George Mason University

3434 WASHINGTON BLVD.
4TH FLOOR
ARLINGTON, VA 22201

PHONE: 703.993.4930 / 800.815.5711
FAX: 703.993.4935
WWW.MERCATUS.ORG

From the Desk of Jared Rhoads

February 28, 2019

Chairman Lamar Alexander
United States Senate
455 Dirksen Office Building
Washington, DC 20510

Chairman Alexander,

Thank you for the opportunity to respond to your call for ideas on rising healthcare costs and to discuss telemedicine with you. Telemedicine is the provision of medical care or services at a distance, involving the use of information technologies or electronic communications.[1]

There are two main categories of telemedicine: provider-to-provider telemedicine and patient-to-provider telemedicine. Provider-to-provider is the oldest and most prevalent type of telemedicine. It refers to physicians and other practitioners using communications technologies such as videoconferencing, secure email, or even the telephone to share information about patients and come to decisions about diagnoses and treatments. Using a digital camera to capture and share images (as in a nurse sending a photo of a patient's rash or wound to a remotely located physician) is also an example of this type of telemedicine, even though the two clinicians are not communicating in real time.

Patient-to-provider is a relatively newer type of telemedicine. It refers to patients communicating directly with their healthcare provider, whether it be a physician, a nurse, or another type of clinician. The electronic visit (or e-visit), in which a patient has an encounter with a physician by way of live videoconferencing, is the classic example of patient-to-provider telemedicine.

In the past ten years, the term *telehealth* has also emerged. For the most part, the terms telemedicine and telehealth are interchangeable.[2] Many people do not make a distinction. When a distinction is made, telemedicine tends to be used to refer to remote medical treatment of a specific disease or condition, and telehealth tends to be used to refer to remote health monitoring, tracking, and coaching (and other uses that imply less critical or less acute needs). Another related but narrower term, *mHealth*, has also appeared on the scene and refers specifically to mobile health technologies.

Early telemedicine can be traced back to at least the 1960s. For example, following an incident at Boston's Logan International Airport in 1960 in which crowded highways delayed the arrival of emergency personnel responding to a plane crash, physicians from Massachusetts General

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[1] HealthIT.gov, "Telemedicine and Telehealth," accessed February 10, 2019, https://www.healthit.gov/topic/health-it-initiatives/telemedicine-and-telehealth.
[2] American Telemedicine Association, "Telemedicine Glossary," accessed February 9, 2019, http://thesource.americantelemed.org/resources/telemedicine-glossary.

Hospital set up an emergency medical station at the airport.[3] From that point on, people needing urgent medical evaluation at the airport could be seen by a physician without delay. Across the country, early programs such as this one provided proof of concept for the telemedicine capabilities that we have today.

Today, most hospitals use some form of both the provider-to-provider type and patient-to-provider type of telemedicine. However, the sets of telemedicine services that are offered vary by facility, and overall adoption remains far short of its potential.

Review of Telemedicine's Effects on the Cost of Care
The literature on the effect of telemedicine on the cost of care is notoriously difficult to summarize and evaluate. Most commentators acknowledge the myriad intuitive arguments for telemedicine (e.g., e-visits reduce unnecessary emergency room visits, remote monitoring technologies catch patients' warning signs before their conditions deteriorate, and use of tele-neurologist consults reduces travel costs for rural patients). In addition, most cost-effectiveness studies find that telemedicine can reduce costs.[4] However, academics are cautious to make broad generalizations about telemedicine's ability to reduce total healthcare costs because not all telemedicine programs are cost effective—some are too expensive in general or too expensive for certain subgroups and patient populations—and because it is difficult to study telemedicine as an industry-wide movement, since it can be deployed in so many different settings for different purposes.

Specific examples of telemedicine programs found to be cost effective include (1) a telemedicine-based intensive care unit program for sick patients across a large health system,[5] (2) a telepsychiatry program for the delivery of cognitive behavioral therapy for bulimia nervosa,[6] (3) a program of outpatient pulmonary consultations via telemedicine for rural patients,[7] and (4) use of telemedicine for remote diagnosis of congenital heart disease for patients with atopic dermatitis.[8]

Specific examples of telemedicine programs not found to be cost effective include (1) a telemedicine-based collaborative care model designed to increase rural veterans' engagement in evidence-based treatments for posttraumatic stress disorder,[9] and (2) a rural telemedicine-based collaborative-care depression intervention that was found to be effective but expensive.[10]

There are reasons to believe that the potential for telemedicine to reduce costs is better than the somewhat mixed literature implies. First, telemedicine programs that are evaluated in studies are typically being pilot tested or have been in place for fewer than two years.[11] They tend not to be mature programs in routine use (which is important because programs will become more efficient once they become standard care). Second, the success of a program at reducing costs depends

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[3] E. Thomas Ewing, "An Introduction to Methods, Tools, and Data from the Digital Humanities," *NIH Catalyst* 24, no. 4 (2016): 14.
[4] Isabel de la Torre-Díez et al., "Cost-Utility and Cost-Effectiveness Studies of Telemedicine, Electronic, and Mobile Health Systems in the Literature: A Systematic Review," *Telemedicine and e-Health* 21, no. 2 (2015): 81–5.
[5] Luisa Franzini et al., "Costs and Cost-Effectiveness of a Telemedicine Intensive Care Unit Program in 6 Intensive Care Units in a Large Health Care System," *Journal of Critical Care* 26, no. 3 (2011): 329.e1–329.e6.
[6] Scott J. Crow et al., "The Cost Effectiveness of Cognitive Behavioral Therapy for Bulimia Nervosa Delivered via Telemedicine versus Face-to-Face," *Behaviour Research and Therapy* 47, no. 6 (2009): 451–3.
[7] Zia Agha, Ralph M. Schapira, and Azmaira H. Maker, "Cost Effectiveness of Telemedicine for the Delivery of Outpatient Pulmonary Care to a Rural Population," *Telemedicine and e-Health* 8, no. 3 (2002): 281–91.
[8] Ignatios Ikonomidis et al., "Cost-Effectiveness of Telemedicine for Remote Diagnosis and Management in Congenital Heart Disease during Two Years of Practice," *European Heart Journal* 22, supplement S (2001): 77.
[9] Jacob T. Painter et al., "Cost-Effectiveness of Telemedicine-Based Collaborative Care for Posttraumatic Stress Disorder," *Psychiatric Services* 68, no. 11 (2017): 1157–63.
[10] Jeffrey M. Pyne et al., "Cost-Effectiveness Analysis of a Rural Telemedicine Collaborative Care Intervention for Depression," *Archives of General Psychiatry* 67, no. 8 (2010): 812–21.
[11] De la Torre-Díez et al., "Cost-Utility and Cost-Effectiveness Studies."

greatly on how well it was implemented. Project management is not easy for any business. Thus, some of these negative findings could be attributed to factors other than telemedicine. Third and finally, some of the most successful telemedicine programs are unlikely to be written up in the literature (a form of publication bias), as the details about how they work represent a form of proprietary knowledge. In other words, hospitals in competitive markets might be reluctant to share the details of their cost-enhancing telemedicine programs.

Review of Telemedicine Effects on Quality and Access to Care
The state of the academic literature on the effect of telemedicine on quality and access to care is similar to the literature on cost effectiveness described above. Studies abound that demonstrate how care quality is preserved and access improved with telemedicine in particular programs for specific combinations of patients, diseases or conditions, and interventions. However, no metastudy sums up this issue for all of telemedicine in a way that would be helpful here.

Specific examples of telemedicine programs improving care quality, access to care, or both include (1) a program that offered low-cost and convenient care for patients with irritable bowel syndrome without compromising care quality,[12] and (2) a program that used telemedicine-based group psychotherapy to increase access to care for young adults with cancer.[13]

In the literature, quality and access are sometimes represented by "overall effectiveness." Perhaps the broadest study of this topic—a review of 80 different reviews of telemedicine effectiveness—found that 21 reviews concluded that telemedicine is overall effective, 18 found that evidence is promising but incomplete, and the remaining 41 reviews found that evidence is limited and inconsistent.[14]

Telemedicine Accelerators and Inhibitors
The growth of telemedicine (and telehealth in particular owing to its emphasis on consumer involvement) is accelerated by the development and availability of inexpensive, high-functioning technologies and the unhampered ability of their users (healthcare providers and consumers alike) to experiment and develop new, value-added uses. For many years (from approximately the early 1960s to the late 1990s) telemedicine matured at a glacial pace. Institutional programs existed, but they were rare, and the high cost of the technologies involved rarely provided an opportunity for a sustained return on investment. Then, as personal computers, digital cameras, cell phones, and wearable devices became increasingly powerful and increasingly available, providers and consumers discovered they could connect in new and more efficient ways.

The main inhibitor of telemedicine development has been the sluggishness with which the medical and healthcare establishment has extended reimbursement practices to services delivered via telemedicine. As late as the 2000–2010 period, it was fair to argue that there was insufficient evidence to show that care and services delivered via telemedicine were consistently as clinically effective and cost effective as their traditional counterparts. Even after the rapid improvement in technological capability and precipitous fall in cost of the mid-2000s (to present) and the influx of studies showing success, however, payers and providers were slow to adopt the change. Private payers have been slow to adopt because to minimize risk and maximize predictability, their models of which services to pay for and how much to pay for them are highly tied to Medicare—and

[12] Shawn X. Li et al., "Delivering High Value Inflammatory Bowel Disease Care through Telemedicine Visits," *Inflammatory Bowel Diseases* 23, no. 10 (2017): 1678–81.
[13] Laura Melton et al., "Increasing Access to Care for Young Adults with Cancer: Results of a Quality-Improvement Project Using a Novel Telemedicine Approach to Supportive Group Psychotherapy," *Palliative and Supportive Care* 15, no. 2 (2017): 176–80.
[14] Anne G. Ekeland, Alison Bowes, and Signe Flottorp, "Effectiveness of Telemedicine: A Systematic Review of Reviews," *International Journal of Medical Informatics* 79, no. 11 (2010): 736–71.

Medicare's acceptance of telemedicine has been gradual and conservative. Providers have been slow to adopt because, unless the payers agree to pay for a service delivered using telemedicine, it is better to see a patient in person (a service for which reimbursement is certain). Many providers who embrace telemedicine, despite not getting reimbursed for it, do so on the reasoning that it is "the right thing to do" for patients. Providers working under capitated arrangements sometimes justify it financially on the basis that they believe it will keep patients healthier, and thus savings will come back to them in the form of lower future costs.

Sincerely,

Jared Rhoads
Research Project Manager, The Dartmouth Institute for Health Policy & Clinical Practice