



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Invited Commentary

Surgical telemedicine here to stay: More support from a randomized controlled trial on postoperative surgery visits

Rachel C. Forbes^{a,*}, Carmen C. Solorzano^a, Beatrice P. Concepcion^b^a Vanderbilt University Medical Center, Department of General Surgery, 1313 21st Avenue South, Oxford House, Suite 912, Nashville, TN, 37232, USA^b Vanderbilt University Medical Center, Department of Medicine, 1313 21st Avenue South, Oxford House, Suite 912, Nashville, TN, 37232, USA

ARTICLE INFO

Article history:

Received 22 March 2020

Received in revised form

22 March 2020

Accepted 24 March 2020

Telemedicine, the use of electronic information and communication technologies to provide health care when the participants are physically separated, has grown exponentially since its introduction in the 1950s. Today telemedicine has an estimated global market share of \$38.3 billion dollars and a United States (US) market share of \$12.5 billion with projected growth to \$43.4 billion by 2025.¹ There has been significant interest by the surgical community in utilizing telemedicine for perioperative care with multiple studies in various surgical specialties demonstrating excellent clinical outcomes and patient satisfaction with cost-savings to patients and health care systems.^{2–4}

In this edition of the *American Journal of Surgery*, Cremades et al. report their findings from a trial including 200 patients randomized to outpatient clinic or telemedicine follow-up via video call for general surgery postoperative visits conducted in a tertiary care university hospital in Catalonia, Spain.⁵ The primary outcome was feasibility of follow-up which was defined as being able to complete the follow-up in the modality to which they were assigned. They were successfully able to complete 90% of the follow-up in the office visit group while only able to complete 74% in the telemedicine group; cited reasons for these issues included technical difficulties and requests to switch to the standard follow-up visit group. Feasibility is an important consideration for implementing telehealth visits. There are many studies which have highlighted the ability to use technology including videoconferencing telehealth (VCT) and smartphones successfully.^{2–4} The penetrance of technology continues to increase and a recent analysis of the US showed that over 80% of Americans used a smartphone.⁶ At our

institution, the electronic medical record (EMR) has the capabilities for patients to download a hospital-EMR app to have VCT outpatient visits with providers. Improving portability and ease for patients will likely contribute to increasing feasibility for telemedicine visits.

The secondary endpoints highlighted by Cremades et al. included clinical results and patient satisfaction.⁵ They found no difference in clinical results with a similar number requiring extra visits after the initial visit. Clinical results have consistently been similar for telemedicine versus traditional follow-up visits in numerous previous studies.^{2–4} Notably postoperative complication rates for general surgical procedures are quite low (0–4.8%) and some centers have even shown safe postoperative follow-up via telephone calls.³ Patient satisfaction in this study by Cremades et al. was also assessed systematically and found to be extremely high for both groups, which is also consistent with previous reports.^{2–5} Patients using telemedicine do not need to travel to medical centers, take time off work, or spend time waiting for providers when using these modalities which likely contributes to the high satisfaction. Although this study did not have a cost-analysis, other studies have shown telemedicine allows for significant cost-savings to patients and healthcare systems.^{2,7}

In a 2017 Telehealth review article several factors were enumerated that need optimization prior to widespread adoption; these factors included: physician leadership, reimbursement, licensure, liability, human factors, device interoperability and data integration, privacy and security, performance measurement, and patient engagement and the evolving patient-physician relationship.⁸ In light of the COVID-19 pandemic many of these barriers are rapidly eroding in the US. Institutional and societal leadership, as well as healthcare providers and patients, are calling for increased utilization of telemedicine to evaluate and treat patients due to the acute need for social distancing and quarantining. Reimbursement is achieving parity to in-person visits due to the recent pandemic with specialized considerations for licensure due to a rapid response from the Centers for Medicare and Medicaid Services.⁹

* Corresponding author.

E-mail address: rachel.forbes@vumc.org (R.C. Forbes).

Mobile and internet-based devices with EMR-supported services are widely available and increasingly prevalent. Surgeons will need to adopt telemedicine with the understanding that high-quality studies including Cremedes et al. have investigated the feasibility, clinical outcomes, patient satisfaction, and even cost-effectiveness which have all been overwhelmingly positive.^{2–5,7} In addition to direct patient care, telesurgery has also been shown to be effective for remote education, consultation, and mentoring.⁴ Although the shift to telemedicine has been accelerated due to COVID-19, surgical telemedicine appears to be an avenue for healthcare delivery that is here to stay.

References

1. <https://www.marketwatch.com/press-release/north-america-telemedicine-market-to-reach-usd-43379-billion-by-2025-market-size-growth-and-forecast-analysis-2019-04-26>. Accessed March 20, 2020.
2. Gunter RL, Chouinard S, Fernandes-Taylor S, et al. Current use of telemedicine for post-discharge surgical care: a systematic review. *J Am Coll Surg*. 2016;222(5):915–927. <https://doi.org/10.1016/j.jamcollsurg.2016.01.062>.
3. Williams AM, Bharti UF, Alam HB, Nikolian VC. The role of telemedicine in postoperative care. *mHealth*. 2018;4(11):1–9.
4. Huang EY, Knight S, Guetter CR, et al. Telemedicine and telementoring in the surgical specialties: a narrative review. *Am J Surg*. 2019;218(4):760–766.
5. Cremedes M, Ferret G, Pares D, et al. Telemedicine to follow patients in a general surgery department. A randomized controlled trial. *Am J Surg*. 2020;219(6):882–887.
6. <https://www.statista.com/topics/2711/us-smartphone-market/>. Accessed March 20, 2020.
7. Forbes RC, Rybacki DB, Johnson TB, et al. A cost comparison for telehealth in the kidney transplant waitlist evaluation process. *Transplantation*. 2018;102(2):279–283.
8. Tuckson RV, Edmunds M, Hodgkins ML. Telehealth. *NEJM*. 2017;377:1585–1592.
9. <https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet>. Accessed March 20, 2020.