

Tele-medicine and its impact on academic medical centers: A narrative review

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ABSTRACT

Telemedicine is a potential complementary modality with remarkable benefits for future healthcare delivery when incorporated appropriately. This review article examines the importance of telemedicine in various types of healthcare facilities and its utility in remote and underserved settings. PubMed, Google Scholar, Scopus, and Embase databases were used for the literature review. The terminologies commonly searched were “Telemedicine”, “Academic”, “Medical Centers”, and “Prospective”, resulting in a total of 12 articles spanning the past 20 years. All articles included in the study suggest that telemedicine can play a significant role in elective, outpatient, inpatient, and urgent care, including emergencies, particularly for patients living in rural or underserved areas.

Keywords: Academic, center, impact, literature, medical, review, telemedicine

Introduction

The impacts of COVID-19 on the healthcare system across multiple facets include delay in medical care delivery, fewer office visits, and dramatically less cancer screenings for chronic medical conditions such as COPD and liver cirrhosis. Not only did the COVID-19 pandemic increase the burden on the healthcare system and detract from vital medical services across U.S. cities, but rural and underserved communities plagued with pre-existing infrastructural shortcomings, were especially vulnerable to the sudden loss of already limited resources. The sharp rise in demand has given legitimacy to

the idea of teleconsultation, through which healthcare can be delivered immediately and anywhere at minimal cost, regardless of existing service availability in a region. Thus, it may be a useful modality to facilitate the prevention of delays, removal of financial barriers, and reduction of unnecessary hospital load. The objective of this study was to highlight the benefits of incorporating telemedicine in temporality strained healthcare systems (i.e. pandemics) and in perpetually strained healthcare systems. One of the most urgently under-resourced areas of medicine is primary care, especially family medicine, where geographical restraints that impede a considerable population of patients seeking first-line care can be greatly expedited through the use of telemedicine. This addendum further elucidates the relevance of the article to this specific journal’s interests and area of focus.

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Methods

The literature review was conducted using PubMed, Google Scholar, Embase, and Scopus databases. The keywords searched were “Telemedicine”, “Academic”, “Medical Centers”, and “Prospective”. An extensive literature search from 2003 to the present was included in our study. Most of the data was studied on telemedicine and its role in different situations, including outpatient medicine, elective procedures, emergency room visits, and consult services, mostly in rural or underserved regions in the United States. Information was gathered from the 12 most relevant articles.

Literature Review

Rapid advancements in technology, when incorporated appropriately, can be utilized as a powerful tool in medicine. The introduction of Telemedicine is one such advancement. Telemedicine has been in clinical practice mostly in the outpatient settings, but since the COVID-19 pandemic, it has gathered more attention as a method that health care systems are analyzing to incorporate to provide efficient care to all the patients, irrespective of their geographical location. A study discussed the pitfalls and solutions in telemedicine and determined that proper training in transitioning to telemedicine, combining with Good Medical Practice principles—consent, confidentiality, greetings, and documentation—can prevent delays in care, cut costs, and reduce turnover in the emergency department (ED)^[1] Square brackets were added per citation guidelines. In the ED, diabetic ulcers accounts for one of the most common presentations, yet, 94% of cases can be managed via telemedicine with podiatrists. Kavitha *et al.*^[2] proved this point by presenting cases of diabetic foot ulcers of varying severity. They were remotely treated by podiatrists, with patients ranging from simple outpatient treatment to complex inpatient management. All patients demonstrated effective healing following treatment, showcasing telemedicine as a robust alternative for treating and triaging, which reduces costs, time, and workload.

Similarly, in the inpatient setting, a retrospective observational study of progressive care unit patients compared a telemedicine group to a non-telemedicine control. Telemedicine patients demonstrated a higher survival rate and shorter hospitalizations, but slightly longer post-PCU stays and higher cost of care.^[3] Similar issues were readdressed a year later at a higher level of care, when a retrospective, observational, multicenter study centered in the ICU found an improvement in adherence to 3-hour sepsis campaign bundles from 33% to 76%, an adherence improvement from 50% to 95.2% when using 6-hour sepsis campaign bundles, and an improvement from 80% to 100% adherence in administering IV fluids to hypotensive patients. With telehealth ICU rounds, patients were cared for in a more systematic manner compared to in-person ICU rounds, which led to better rates of adherence to the standard of care for sepsis and septic shock.^[4]

Logically, this method can be versatile in rural areas, where a range of medical conditions can occur without substantial infrastructure for emergent care. Approximately 30% of the United States population resides in rural geographical locations. A study investigated the value of telemedicine consultations in screening cirrhotic patients for hepatocellular carcinoma and disease. It was found that patients living in rural areas benefit from telemedicine primarily because of the limited supply of hepatologists. This emphasizes the importance of telemedicine in treating patients who require a high standard of care from specialists.^[5] Another study that used trained non-physicians to perform diagnostic endoscopy, which was then read by a gastroenterologist in rural areas, found that upper gastroenterology (GI) endoscopy was highly sensitive to major findings. Despite limitations with this technique, including suboptimal image quality and misinterpretations of minor findings, there is substantial benefit to telemedicine in providing care by specialists to rural areas who lack providers such as gastroenterologists.^[6] Even patients living near major healthcare facility can be discouraged from going to an in-person appointment with a physician, as observed with high-risk patients during the COVID-19 pandemic. A study from a government-operated hospital in North India found that patients with hematological conditions benefited from regular telemedicine visits, with a 75% rate of appointment attendance ultimately improving patient satisfaction scores by 80%.^[7] A randomized clinical controlled trial investigated the significance of telemedicine in the management of Chronic Obstructive Pulmonary Disease (COPD). The study proved that with the introduction of telemedicine, cases of moderate COPD exacerbations increased, required outpatient treatment, but hospital admissions for severe COPD exacerbations decreased. Overall, comparable care for patients can feasibly be achieved through telemedicine, particularly those in underserved areas who have trouble accessing healthcare.^[8]

Cost-effective medicine and a reduction in length of stay are prevailing trends in recent times. A Study conducted over a span of 4 years back in 2012 in Italy, emphasized these parameters. According to their study, 75% of neurosurgical consultation were completed in 15 min, and this number went up to 90% under 30 min, with an average cost of €2,326 compared to €4,173 in the face-to-face group. Telemedicine also saved 139,916 km of travel distance for patients over the 4-year span, equaling €365. Costly neurosurgical emergencies can be initially evaluated by neurosurgeons to properly recommend either transfer to a center capable of the necessary procedure or medical management in conjunction with specialist consultation.^[9] Furthermore, proof of the effectiveness of telemedicine in one of the most radically unequipped scenarios, even more so than in rural areas, occurred during the onset of COVID-19. Among the passengers aboard ships in 2019, more than 50% presenting with COVID-19 symptoms were promptly provided diagnosis and treatment. This study emphasized the importance of telehealth in the management of minor COVID-19 cases which can potentially be expanded to other non-emergent medical conditions to increase provider efficiency and patient convenience.^[10]

Within the realm of perinatal care, where an ever-increasing demand for more than 6 million pregnancies in the U.S. per year strains hospitals, telemedicine can play a preemptive role. A retrospective study investigating its integration in the management and early diagnosis of high-risk pregnancies found that those using telemedicine had more prenatal visits than the usual care group and had a drastically lower rate of maternal mortality compared to the usual care group, which further highlights the importance of telehealth visits in addressing care gaps in high-demand fields.^[11] From the perspective of physicians, a survey of telemedicine in hospitals on its impact on physician recruitment, retention, and work environment suggested that telemedicine is beneficial in all these categories. Clients emphasized that it plays a vital role in enhancing physician confidence, easing their burden, and supplementing care and education opportunities, which can improve physician recruitment and retention. Especially when competition among physicians is intensifying, telemedicine facilitates them more inclined to work in rural facilities that lack the resources available in well-equipped tertiary care hospitals can readily access.^[12] Another review article examining the reduction of healthcare system costs using telehealth demonstrated fewer costs to the system in the short to medium term respectively.^[13] Travel with appropriate equipment for either patients or clinicians is expensive to coordinate and execute. Thus, the saving from system-funded travel, made possible by telemedicine, reduces expenses that were previously unavoidable. In addition, other advantages were productivity gains, reductions in secondary care use, emerging alternate funding models for care provision, and savings resulting from telemonitoring effects.

Discussion

COVID-19 revolutionized how healthcare is delivered, with telemedicine becoming more widely utilized. During the COVID-19 pandemic, patients who were not infected and wanted routine follow-up for their chronic conditions could access routine treatment without the risk of exposure in hospital or doctor's office.^[10] Irrespective of a global pandemic, healthcare can be provided to patients who reside in underserved or remote areas of the United States without delay through teleconsultation.

Another advantage of telemedicine lies in the capacity to provide healthcare in remote areas where physician specialists are limited. This provides for immediate specialized care by a consulting doctor, as in the case of diabetic patients with foot wounds where a quick tele consult enabled quality treatment for a complication otherwise resulting in costly outcomes.^[2]

Patients in the rural areas of the U.S. (approximately 30% of the U.S. population) have limited access to specialists, which increasing the disease burden by delaying treatment from a specialist for chronic conditions.^[5] Due to the convenience of teleconsultations, patients in rural areas can access specialists in a timely manner. This will result in fewer complications associated with chronic diseases and would allow for early intervention and treatment.

Even within medical centers, many cases initially deemed operative emergencies were reclassified as nonsurgical follow-ups after additional investigation. The unnecessary cost, space, and time spent on this excess portion of in-person patient volume can be avoided through a thorough initial consultation, which is possible via telemedical consultation by capable specialists.^[9]

In conclusion, telemedicine offers advantages in triaging and screening patients who need inpatient care compared to outpatient care, giving access to remote areas where specialists are limited and reducing healthcare cost significantly. The evidence suggests that telemedicine can provide prompt healthcare in both tertiary care academic centers and underserved, under-equipped regions across the nation, optimizing patient outcomes and minimize physician burnout. Large medical centers can reduce their own in-person volume by allowing patients to consult from home, which frees up providers to also fill the gaps in less serviced areas. This systematic approach can potentially ensure efficient, inexpensive, and appropriately specialized care for all patients anywhere and anytime, while simultaneously relieving excess burden on care centers. However, implementation of such a large-scale system that fully integrates telemedicine into its protocol requires additional staff training to maintain its potential for efficiency and cost-effectiveness. Due to the limited amount of data, we encourage that the system of telehealth consultation should be implemented, tested, and verified to make it accepted universally all over the U.S.

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Conflicts of interest

There are no conflicts of interest.

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