Rapid Response Brief

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How effective is telemedicine in improving patient outcomes?

In recent decades, many countries have turned to telemedicine as a potential solution for increasing access to care, reducing costs and improving patient outcomes. In the midst of the ongoing COVID-19 pandemic, telemedicine has become even more relevant as healthcare systems struggle to manage the surge of COVID-19 patients without neglecting people with other health conditions.

This brief presents evidence on the effectiveness of telemedicine on measures of access, quality, cost and patient outcomes. The findings are primarily drawn from a review of 80 systematic reviews evaluating telemedicine services implemented mostly in high-income countries. These include e-health interventions, information and communication technologies for communication in healthcare, internet-based interventions for diagnosis and treatments, and social care considered to be an important part of healthcare. Additional findings are drawn from qualitative reviews evaluating the barriers to adoption of telemedicine and the role of telemedicine during the COVID-19 pandemic.

Key Findings

- Telemedicine has improved health outcomes in some contexts, such as with mental health patients and patients with cardiovascular diseases in high-income countries, but findings are very mixed and generalizations are difficult.
- Barriers to adopting telemedicine include poor computer literacy, lack of high-speed internet, outdated equipment, low application usability, lack of interoperability, resistance to change, high costs and privacy concerns.
- Telemedicine can be a useful strategy for curbing transmission of COVID-19 by reducing in-person health visits and reducing the burden on the healthcare system, tentative evidence suggests.

Key Recommendations

- Telemedicine interventions are most successful when patients are easily able to access high-speed internet connections.
- Mental health interventions, such as telepsychiatry, may be a good starting point for implementing telemedicine services.
- Provider incentives, such as monetary rewards, may encourage use of telemedicine.
- Telemedicine interventions should include training programs for health workers to enable them to more effectively use new technologies.

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Background

Providing accessible, affordable and high-quality healthcare continues to be a challenge in the Philippines, particularly in rural and poorer provinces where there is a shortage of doctors and equipment. These challenges have become even greater because of the COVID-19 pandemic, which has overwhelmed healthcare systems worldwide and resulted in nationwide restrictions on movement. As of November 2020, the Philippines had reported 427,797 cases and 8,333 confirmed deaths from the virus.

Telemedicine, which allows healthcare professionals to provide healthcare remotely via information and communication technologies, can increase healthcare access and quality, in addition to potentially reducing costs. Substituting in-person visits with telemedicine has also become popular in the Philippines and around the world for managing the spread of COVID-19 and reducing the burden on the healthcare system.

Details of interventions

The review provides a qualitative synthesis of evidence from 80 quantitative and qualitative systematic reviews of research on telemedicine published after 2005. These results represent findings from hundreds of individual studies on telemedicine services. Additional findings were drawn from a systematic review that discusses barriers to adoption of telemedicine globally.

All studies included some form of telemedicine, defined as the delivery of healthcare and information via electronic information and telecommunication technologies. A wide range of telemedicine services was evaluated, including internet- and computer-based interventions, video conferencing, virtual reality, robot-aided therapy, remote monitoring, smart home technologies, and information and communication technologies.

The interventions targeted many different medical conditions, including cardiovascular disease and heart failure, respiratory conditions, psychiatry, anxiety and depression, diabetes, dermatology, obesity, cancer, physical disability, dementia, and alcohol abuse. The outcomes of interest include health -related outcomes, such as morbidity, mortality, quality of life, and patient satisfaction; process outcomes, including quality of care, adherence to recommended practice, and provider satisfaction; and costs.

The included interventions were conducted all over the world, but a vast majority were in Asia, Australia, Canada, Europe and the United States.

COVID-19-specific evidence is drawn from another qualitative systematic review on the role of telehealth during the pandemic, which summarizes findings from 8 studies published since December 1, 2019. 5 studies were conducted in the United States, 2 in Canada, 2 in China, 2 in the United Kingdom, 1 in Iran and 1 in Italy. All studies evaluated telehealth services during the COVID-19 outbreak.

A qualitative study summarizing lessons from the implementation of telemedicine services in low- and middle-income countries was also included, with the specific goal to develop recommendations for implementing sustainable telemedicine services in the Philippines.

Findings

Results from the review of systematic reviews were mixed. Twenty reviews found that telemedicine works and has positive effects on patient health and healthcare use, 19 reviews found tentatively positive effects, and 22 reviews found limited or inconclusive evidence of effectiveness.

The interventions that found therapeutic effects included several mental health interventions, such as telepsychiatry, virtual reality exposure therapy for anxiety, and computer-based cognitive behavioral therapy for anxiety and depression. Positive effects related to chronic disease management, especially for patients with cardiovascular diseases, were also identified. One review, for example, found that in the detection and follow-up of cardiovascular diseases, information and communication technologies led to better clinical outcomes, mortality reduction and lower utilization of health services. Another review evaluating automated monitoring of vital signs and telephone follow-up by nurses found them to be effective strategies in improving clinical outcomes and reducing hospital admissions.

Telemedicine was also promising in terms of health service utilization and costs. One review, for example, found positive results from asynchronous telehealth developments, also known as 'store-and-forward technologies', which allow patients or providers in one location to send digital samples and medical data electronically to health providers at distant locations for assessment at a convenient time. The review found that asynchronous health technologies could result in shorter waiting times, fewer unnecessary referrals, higher levels of patient and provider satisfaction, and equal or better diagnostic accuracy, because they don't require real-time consultations. Another review found that telemonitoring for patients with heart failure could reduce travel costs and hospital admissions. Other findings noted positive patient experiences related to home telemonitoring for respiratory conditions.

Evidence around cost-effectiveness is still somewhat limited, but one review found that 91 percent of studies showed telehomecare to be cost-effective, in that it reduced hospital use and improved patient compliance, satisfaction and quality of life.

Computer literacy was listed as the main barrier to adopting telemedicine in several countries, according to a qualitative review on the many barriers to the adoption of telemedicine around the world. Other significant barriers include:

- lack of high-speed internet,
- outdated equipment,
- issues with application design, such as low usability or information overload,
- lack of interoperability between systems,
- patient age and education, due to lack of exposure to new technologies,
- patient preferences for personal care and communication,
- provider resistance to change,
- high start-up costs,
- lack of reimbursements available for telemedicine services,
- time and resources needed to update existing workflows, and
- data confidentiality, privacy and security.

Qualitative findings on the role of telehealth during the COVID-19 outbreak suggest it is effective in reducing transmission of the disease and freeing up medical staff and equipment required for COVID-19 patients. Live video conferencing, phone calls and electronic health records make it possible to provide chronic disease management, mental health services, medication checks, screening, triage and follow-up for cancer patients without risking exposure of the virus to patients and physicians. In general, the impact of the telehealth interventions in preventing morbidity was considered to be significant.

Recommendations

Telemedicine interventions are most successful when high-speed internet is available for patients. Conducting a connectivity diagnostic in targeted communities may help identify the places where telemedicine could be most effective, or where an expansion of connectivity might yield the most health benefits. Increased access to high-speed internet – at home or via a community clinic – could help bridge geographic disparities in healthcare access in rural settings.

Mental health interventions, such as telepsychiatry, may be a good starting point for implementing telemedicine services. They have been effective in a number of contexts and are simpler to implement than other interventions because they usually don't require physical exams.

Provider incentives, such as monetary rewards, may encourage the use of telemedicine and address providers' resistance to change.

Training programs for health workers to enable them to more effectively use new technologies may also be beneficial. Specifically, offering professional certification and holding regular conferences could be useful strategies. Teaching patients the technological skills they need to use telemedicine services may also help increase computer literacy and remove barriers related to patient age and education.

Evidence quality, strengths and limitations

Most findings included in this brief are based on a review that evaluated 80 high-quality quantitative and qualitative systematic reviews on telemedicine services. The review assessed the risk of bias of the included studies and excluded those with major limitations. However, the systematic reviews included in the study were predominately conducted in high-income countries, so the applicability of the findings to a middle-income country like the Philippines is not clear. That said, many studies were published over a decade ago, so the technological infrastructure and healthcare systems that existed in these countries then may be a relevant comparison for the Philippines today.

Additional findings and recommendations were based on three qualitative reviews. These findings are useful for assessing the effectiveness of telemedicine as a COVID-19 prevention strategy and understanding some of the potential barriers to telemedicine adoption in various contexts. However, they should not be treated as comprehensive, systematic syntheses of evidence. Moreover, two of the reviews primarily focused on high-income countries, so the results and recommendations should be interpreted with caution.

About the Philippines Evidence Program

3ie's country evidence program in the Philippines is a tripartite partnership between the National Economic and Development Authority (NEDA), the country's independent economic development and planning agency as mandated by the Philippine constitution; the Department of Foreign Affairs and Trade of the Government of Australia; and 3ie. This decade-long partnership started in 2014, and it aims to build interest in and capacity for evidence-informed decision-making in the Philippines. Priority sectors are identified by the government, with 3ie providing technical oversight on evaluations assessing major governmental reforms and service delivery programs.

This rapid response brief is primarily based on the following systematic review

Ekeland, AG, Bowes, A and Flottorp, S, 2010. Effectiveness of telemedicine: a systematic review of reviews. *International Journal of Medical Informatics*, 79(11), pp.736–71.

Additional findings are based on the following papers:

Kruse, C, Karem, P, Shifflett, K, Vegi, L, Ravi, K and Brooks, M, 2016. Evaluating barriers to adopting telemedicine worldwide: a systematic review. *Journal of Telemedicine and Telecare*, 24(3).

Macabasag, RL, Magtubo, KM and Marcelo, PG, 2016. Implementation of telemedicine services in lower-middle income countries: lessons for the Philippines. *Journal of the International Society for Telemedicine and EHealth*, 4(e24):1–11.

Monaghesh, E and Hajizadeh, A, 2020. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. *BMC Public Health*, 20(1193).

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