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Evidence Scan: Telemedicine

Questions

(1) What telemedicine care models have the strongest evidence with relevance to KPWA?

(2) What key elements of existing telemedicine models are most relevant to the KPWA model?

Answer

There is insufficient evidence to determine what types of telemedicine interventions are effective, for which patients and in which settings, and whether such interventions can be used as a replacement for the standard treatment. However, the early evidence is promising and shows similar or improved outcomes using telemedicine for most conditions.

Key points

- Telemedicine is generally cost-effective, though the mechanisms by which cost reductions occur are poorly reported. Important factors that determine cost-effectiveness include equipment costs, adequate patient volumes, personnel time (clinician and IT tech), and fixed costs (office space & phone/software service).
- Quality of care for telemedicine interventions was mostly the same or better than face-to-face interventions.
- Patients generally view telemedicine as acceptable and are satisfied with services.
- Videoconferencing is particularly effective and well-accepted by patients.
- Patient and provider training influences uptake of telemedicine. Other strategies to improve implementation include developing contingency plans for technical issues, identifying implementation champions, and creating systems for ongoing monitoring, evaluation, and improvement.

Supporting evidence

Based on 26 systematic reviews 9 primary studies, we found that the evidence for telemedicine is overall low quality and inconclusive. However, there are many promising early results. The studies varied widely by type of intervention, condition, population, and setting. The below summarizes the evidence on the impact of telemedicine interventions on cost, quality, and patient satisfaction. We've also included a summary of implementation barriers and strategies for improvement.

Cost-effectiveness

There is not conclusive evidence that telemedicine interventions are more cost-effective overall than usual care. This is primarily due to the lack of high-quality studies in this area. Despite not presenting detailed cost information, many studies report cost reductions through telemedicine.

- A systematic review reported that all **12 included studies reported cost reductions,** though detailed information on costs was missing. Costs varied substantially by program components, disease type, equipment used, and services provided (Michaud 2018).

- We found that telemedicine costs ranged from $1,352 to $206,718 annually, or from $24 to $39 per patient visit. There was wide variation across studies (Michaud 2018).
- Key variables to determine costs include equipment, personnel time (clinician and IT technician), fixed costs (office space and phone/software service), variable costs (toner, paper, envelopes, stamps).
- Cost effectiveness of telemedicine in rural populations for COPD was related to three major factors: cost sharing (i.e., adequate patient volume and sharing of telemedicine infrastructure amongst various clinical users); effectiveness of telemedicine in terms of patient utility and successful clinical consultations; and indirect cost savings accrued by decreasing cost of patients' lost productivity (Reed 2004).
- We found some evidence that **telemedicine is cost-effective in the fields of cardiology, pulmonary care for rural populations, and ophthalmology**. There was no evidence of reduced costs compared to conventional care in dermatology. Telemedicine was reported to be cost-effective for self-management support, CBT for eating disorders, tele-ICU, physical therapy, and psychotherapy for depression (Delgoshaei 2017, Grona 2017).
- Telemedicine for screening for retinopathy in diabetes patients is cost-effective (Lee 2018). Another review found evidence that telemedicine is cost-effective for chronic heart disease (Kruse 2017).
- Case studies show cost benefits of telemedicine are dependent on successful implementation (Freed 2018).

Quality outcomes

Evidence shows that telemedicine has the potential to improve clinical outcomes in patients with diabetes, heart failure, COPD, mental illness, and other conditions, though the overall quality of the evidence is low.

- There is stronger evidence that videoconferencing is effective in improving patients' overall health conditions and in assessing patients' health conditions successfully (Almathami 2020).
- High-level evidence from 46 systematic reviews suggests that **telemedicine interventions can be effective in improving clinical outcomes in patients with diabetes.** We found consistent evidence that there are significant and clinically relevant reduction rates for glycated hemoglobin (HbA_{1c}; ≤-0.5%) in patients with diabetes There was no clear impact on blood pressure in diabetic patients from telemedicine interventions vs. usual care (Timpel 2020, Flodgren 2015).
- One systematic review of 93 studies found **no difference in all-cause mortality** for heart failure when telemedicine interventions were compared to usual care. There was some evidence **of improved quality of life, decreases in LDL, and decreases in blood pressure** across the studies (Flodgren 2015).
- Telemedicine appears **to reduce hospitalizations and emergency room visits** overall. A review on chronic heart disease, specifically, found evidence of **improved mortality and reduced hospitalizations and readmissions** for patients using telemedicine (Flumignan 2019, Kruse 2017).
- Telemedicine for mental illness was shown to be an **effective and adaptable solution to the care of mental illnesses** (Langardizadeh 2017). Results were comparable to in-person services with the benefit of cost savings. Telemedicine was found to be **promising for depression and anxiety** as well. However, it is unclear which populations benefit most from telemedicine and which have greater challenges (Coughtrey 2016).
- Videoconferencing for **physical therapy showed improved outcomes in pain, functioning, and quality of life**, though the quality of evidence was low (Laver 2020).

- Telemedicine has the potential to reduce health disparities for rural patients. A study of a virtual urgent care program found it increased access to care for rural patients (Khairat 2019).

Patient acceptability and satisfaction

Patient acceptability of telemedicine interventions varies by the mode of intervention (e.g. phone, video, chat). Systematic reviews found high patient satisfaction with video telemedicine interventions, but several studies found patients still consider in-person visits to be the gold standard (O'Cathail 2020).

- We found telemedicine via video conferencing was effective in delivering online treatment and was **well-accepted by patients**, **as it simulated in-person, face-to-face consultation** (Almathami 2020).
- We found consistent evidence that telehealth has an overall positive impact on patient and caregivers' satisfaction in rural and remote settings (Orlando 2019).
- Qualitative studies found **benefits of telemedicine for patients included convenience, reduced travel, better accessibility to specialty care, and greater flexibility of appointing** (O'Cathail 2020).
- Telemedicnne has the potential to offer benefits beyond convenience. One study found **patients felt more empowered to ask questions during a video visit**; a study of cancer patients found **people preferred to receive bad news in their homes** rather than in a hospital (O'Cathail 2020).
- Acceptance, or resistance, by patients was impacted by several facilitators and challenges. Acceptance increased when more facilitators were present in the study and there was greater resistance when challenges were present. A list of reported facilitators and challenges is in Table 1 below.
- **Internet speed and ease of use** of the system were key factors in whether patients were satisfied with the telemedicine experience.
- **Patients need internet access and a device to engage in telemedicine**. Studies exclude patients who do not have basic requirements, and therefore, knowledge about these patients is underrepresented and limited.
- **Patient and provider training influenced uptake of telemedicine interventions**. In most studies, training was provided by the health care provider to patients before starting the online therapy. Providers received in-person training aimed to familiarize clinicians with the system, the system's equipment, and treatment procedures.
- **Provider continuity** may be an important factor in patient satisfaction.
    - A nationwide survey found 52% of respondents were willing to see their own provider via telemedicine, and 35% of respondents were willing to see at different provider within the same organization (Welch 2017).
    - Many studies did not report on whether telemedicine involved the patient's own primary care provider, but those that did demonstrated high patient satisfaction. For example, a study of patient experiences with video visits at KP Northern California in which 70% of visits were with the patient's usual care provider, 93% reported their need was addressed by the visit (Reed 2019).
    - The importance of provider continuity may vary by age or other demographic factors. A consumer survey showed younger people were more willing than older people to switch primary care providers to access virtual care (American Well 2019).

Table 1. Facilitators and challenges associated with patient satisfaction and acceptability of telemedicine (adapted from the 2020 Almathami review).

	Facilitators	Challenges
Internal	• Time saved for both patient and provider • Convenience • Familiarity with the system • Patients' past treatment experiences • Patients' familiarity with clinicians and staff • Family members' involvement • Engagement and motivation • Excellent body language and communication • Providing emotional and technical support to patients • Patients' positive perceptions of telemedicine system's privacy	• Resistance to technology • Poor body language and communication • Patients' negative perceptions of telemedicine system's privacy and security
External	• High Internet speed • Saving costs for patients on health care services • Easy system to use • Training for both patients and clinicians • System's approach to enforce patients' compliance with treatment management • Accessibility	• Slow Internet speed • Poor network signal (weather or signal coverage) • System difficult to use • Lack of organizational support (policy & law) • Home obstructions (watching TV, talking with others, young kids)

Implementation: common challenges and strategies to improve

Implementation challenges can be categorized into technological (issues with connectivity and systems) and non-technological (everything else). The health literature focuses primarily on non-technological issues.

Challenges

Many of the non-technological barriers associated with telemedicine implementation are related to provider and staff resistance to change. Several of these barriers were rapidly confronted and overcome by the emergent circumstances by which KPWA switched to virtual care. Non-technological implementation barriers reported in the literature include:

- Difficulty fitting telemedicine into routine practice (i.e. disruption of workflows),
- Resistance to changing tasks and responsibilities,
- Disagreements within an organization about whether telemedicine is an appropriate care delivery model,
- Problems in the interaction between healthcare professionals,
- Problems related to the building, coordinating and sustaining of telemedicine services in addition to the existing care delivery system.
- Fear of technology from both patients and providers

Strategies to improve implementation

Though the settings and circumstances for implementation of telemedicine interventions were substantially different, given the rapid nature of implementation at KPWA, the below are evidence-based strategies that are likely still applicable as we improve our system (Ross 2016, Reed 2018).

- Key stakeholders and **implementation champions** should be included as early as possible in the implementation process.

- **Financial and legislative support** needs to be in place to support implementation.
- Standards for technology which address interoperability, security and privacy may improve acceptability and implementation. **Include contingency plans for technical issues** (i.e. patients can use phone if video difficulties).
- Providing training and education for all those involved with implementation is a key success factor.
- Implementation does not stop with 'go-live'—**there is a need for ongoing monitoring, evaluation and adaptation of systems** to ensure intended goals are being met, benefits realized, and ongoing identification of barriers to effective use, along with strategies to overcome these barriers.

Additional considerations

- As telemedicine interventions are implemented, consider the target population's level of health and digital literacy and which types of health information technology could be effective to ensure that all users receive the full health benefits from these technological advances (Mackert 2016).
- This review focuses on telemedicine interventions that involve direct patient-provider interaction and are delivered in addition to, or substituting for, usual care. We excluded remote monitoring, app-based interventions, provider to provider communications, social media, and patient portals. Some literature aggregates results from multiple types of interventions, so results could not be parsed apart.

Additional Resources

Other organizations have expanded telemedicine in recent months and offer robust resources on implementation and protocols.

- Ontario, Canada launched a Digital First for Health strategy in late November 2019 with a focus on expanding virtual care options including video and secure messaging. The Ontario Telemedicine Network made public several tools for successfully implementing virtual care.
- Privia Health expanded the adoption of virtual visits in response to COVID-19 and is using lessons learned from Hurricane Harvey to guide implementation. They have published several primers on telemedicine for various clinical situations.

Supporting documentation

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