

Remote Consultations in Clinical Practice: A Review of Modalities and Current Challenges

Consultas Remotas na Prática Clínica: Uma Revisão das Modalidades e Desafios Atuais

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Acta Med Port 2025 Oct;38(10):605-607 • <https://doi.org/10.20344/amp.22628>

Keywords: Delivery of Health Care; Remote Consultation

Palavras-chave: Consulta Remota; Prestação de Cuidados de Saúde

Remote consultations have emerged as a critical component of healthcare delivery, particularly during the COVID-19 pandemic. While telemedicine has been around for decades, the global health crisis accelerated its adoption, pushing remote consultations from a convenient option to an essential practice. As we transition into a post-pandemic world, remote consultations are not merely a temporary measure but a fundamental shift in delivering care in an increasingly digital landscape. At its core, a remote consultation is an interaction between healthcare professionals and patients facilitated by technology, where physical presence is not required. These consultations can be conducted through various modalities, including text, audio, video, and combinations of these mediums. Understanding these classifications is crucial for optimizing their use in clinical practice and guiding innovation.

Text-based consultations, for instance, involve communication through messages that can be synchronous, such as real-time chat, or asynchronous, like emails or messaging platforms. While this method may be limited by the absence of visual and auditory cues, it provides a practical solution for follow-up care, medication adjustments, and addressing patient queries in areas with limited access to high-speed internet. For example, Eriksson *et al*¹ observed that text-based consultation improved access for patients needing frequent appointments and those with mental health problems, where efficiency gains among patients with simple cases were also noted. Moreover, recent advancements in artificial intelligence, particularly chatbots and large language models, have expanded the potential of text-based consultations by enabling automated patient triage, personalized health guidance, and real-time symptom assessment, improving accessibility and efficiency in remote healthcare settings. Audio-based consultations, typically conducted over the phone or through voice messaging apps, offer a more nuanced interaction by incorporating tone and inflection, which can convey important emo-

tional and clinical information. Recently,² telephone-based consultations for adjuvant endocrine therapy (AET) were perceived as a promising strategy. The study concluded that nurse-led telephone-based motivational interviewing-guided consultations about AET were found to respond to participants' needs and enhance their perceptions of being informed and supported. On the other hand, video-based consultations closely mimic in-person visits by allowing real-time visual and auditory interaction. This modality has proven particularly effective in primary care, mental health, and specialties where visual cues, patient behavior, and non-verbal communication are critical to diagnosis and treatment. For instance, Steenbergen *et al*³ designed a video-based eHealth program to reduce unplanned healthcare in the first six weeks after coronary artery bypass graft surgery. The strategy, comprising educational videos and video consultations, reduced unplanned healthcare use and hastened patient-reported recovery. Other emerging technologies, such as robotic-assisted telemedicine, biochemical remote diagnostics using portable biosensors, and Internet-of-Things-based health-monitoring devices (that enable remote monitoring of various health metrics, facilitating proactive and personalized care), also hold significant potential to enhance the accuracy and scope of remote consultations. These innovative solutions enable real-time patient monitoring, remote collection of biochemical markers, and even robotic-supported procedures, thus expanding clinical capabilities beyond traditional telemedicine limits (Table 1).

Combined modalities, which use a mix of text, audio, video, and images, represent the most comprehensive form of remote consultations. Nonetheless, regardless of the modalities, the rapid adoption of remote consultations has enhanced their potential to address several longstanding challenges in healthcare. One of the most significant advantages of remote consultations is their ability to improve access to care by transcending geographical barriers. For patients in rural or underserved areas, where healthcare

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Recebido/Received: 18/11/2024 - Aceite/Accepted: 02/04/2025 - Publicado Online/Published Online: 23/05/2025 - Publicado/Publicated: 01/10/2025
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Table 1 – Comparison of remote consultation emerging technologies: key characteristics, advantages, and limitations

	Key characteristics	Advantages	Limitations
Text-Based	Synchronous (chat) or asynchronous (emails, messaging)	High accessibility; suitable for follow-ups and simple queries	Lacks visual/auditory cues; risk of misinterpretation
Audio-Based	Telephone or voice messaging	Captures tone and emotional cues; effective for motivational interviewing	No visual assessment; limited contextual understanding
Video-Based	Live video interaction	Mimics in-person visits; allows visual and non-verbal communication	Requires stable internet; privacy concerns
Robotic-Assisted Telemedicine	Remote-controlled robotic systems for patient interaction	Enables presence in remote locations; useful in ICUs and surgical settings	High cost; requires trained personnel
Biochemical Remote Diagnostics	Portable biosensors for real-time biochemical marker analysis	Enables presence in remote locations; useful in ICUs and surgical settings	High cost; requires trained personnel
IoT-Based Health Monitoring	Wearable health devices and smart sensors	Enables continuous monitoring; real-time alerts for health deterioration	Data privacy concerns; accuracy variability

facilities are sparse, and specialists are few and far between, remote consultations offer a vital opportunity to receive timely medical advice, follow-up care, and specialist consultations without the need to travel long distances, which can be both costly and logistically challenging. Additionally, remote consultations are crucial in ensuring continuity of care, particularly in managing chronic conditions where regular monitoring and prompt intervention are essential. During the pandemic, routine care for chronic conditions,^{4,5} post-operative follow-ups,⁶ and mental health support⁷ continued seamlessly through remote channels, highlighting the importance of these consultations in maintaining patient care even when in-person visits were impossible. Moreover, remote consultations offer unparalleled flexibility and convenience for patients and healthcare providers. Patients can schedule appointments around their daily lives without the need to take time off work or arrange childcare. For healthcare providers, remote consultations allow more flexible work hours and the ability to manage patient loads more efficiently. This flexibility enhances patient satisfaction and allows healthcare professionals to optimize their practice to accommodate their needs and those of their patients.

However, despite their numerous advantages, remote consultations are not without significant challenges.⁸ Technological barriers remain critical, particularly in regions with limited internet connectivity or populations with reduced digital literacy. The lack of digital literacy substantially limits patient autonomy, frequently necessitating reliance on family members or caregivers to facilitate consultations, potentially compromising confidentiality. Furthermore, inadequate internet infrastructure may intensify healthcare inequalities, especially in rural or underserved areas, disproportionately

affecting socio-economically vulnerable populations. Targeted policy interventions, including subsidies for internet access, provision of affordable telemedicine-compatible devices, and structured digital literacy programs, are essential to ensure equitable telemedicine access. Healthcare professionals also face considerable obstacles, including difficulties acquiring, implementing, and efficiently using telemedicine technologies in daily practice. Insufficient training and technical support can reduce provider efficiency, potentially causing frustration and negatively impacting patient outcomes and professional satisfaction. Additionally, the absence of a physical examination component poses risks of misdiagnosis or overlooked conditions. Although the careful integration of patient-shared multimedia tools, such as images and videos, and peripheral monitoring devices (e.g., home blood pressure monitors or glucometers), may partly mitigate these concerns, their effectiveness remains reliant on sufficient digital literacy and infrastructure availability.^{9,10} Addressing these barriers requires targeted interventions, including improved patient and provider digital literacy, investments in technological infrastructure, policy support for equitable access, and comprehensive telemedicine training. Effective integration of remote consultations requires structured professional training and addressing usability challenges healthcare providers face.

Looking to the future, remote consultations have the potential to serve as a valuable complement within healthcare delivery, thoughtfully integrated alongside traditional face-to-face consultations rather than supplanting them. Emerging technological advancements, including artificial intelligence for patient triage, enhanced medical imaging analysis, biosensors, wearable health devices, and

interoperable healthcare platforms, could significantly enrich the capabilities of remote consultations. However, deploying these benefits requires carefully addressing barriers such as disparities in digital literacy, infrastructural limitations, confidentiality concerns, and ensuring comprehensive training for healthcare providers. It is essential to pursue structured educational initiatives, targeted policy measures, and strategic infrastructure investments, all specifically aimed at fostering equitable and optimal use of telemedicine. Rather than viewing remote consultations as an inevitable replacement, healthcare systems should strategically deploy them where they can most effectively enhance patient care. Ultimately, this balanced approach will

strengthen healthcare delivery, making it more accessible, equitable, patient-centered, and efficient, while preserving and respecting the indispensable role of in-person clinical interactions.

COMPETING INTERESTS

The author have declared that no competing interests exist.

FUNDING SOURCES

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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