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TELEMEDICINE AND REMOTE PATIENT MONITORING: OPPORTUNITIES AND CHALLENGES IN MODERN HEALTHCARE

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Relevance

Telemedicine, the delivery of healthcare services at a distance using information and communication technologies, has evolved from a niche solution for remote and underserved areas into a mainstream component of national healthcare systems. The rapid expansion of broadband internet access, smartphone penetration, and wearable physiological sensors has made it technically feasible to monitor patients with chronic conditions, such as diabetes, hypertension, and chronic heart failure, continuously and remotely, rather than relying solely on episodic in-person visits. The World Health Organization has explicitly identified telemedicine and remote monitoring as priority components of global digital health strategy, recognising their potential to extend the reach of limited clinical workforce, reduce travel burden for patients in rural areas, and enable earlier detection of clinical deterioration [1].

Keywords: Telemedicine, remote patient monitoring, digital health, chronic disease management, wearable sensors, e-health

Introduction

The core technical architecture of a remote patient monitoring system typically comprises three layers: a sensing layer, consisting of wearable or home-based devices that capture physiological parameters such as blood pressure, blood



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glucose, oxygen saturation, or heart rhythm; a transmission layer, which securely relays this data, usually via cellular or Wi-Fi networks, to a central clinical platform; and an analysis and alerting layer, in which collected data is reviewed, either by clinical staff or increasingly by automated decision-support algorithms, with threshold-based or trend-based alerts triggered when values fall outside expected ranges. Video-consultation platforms complement this architecture by enabling synchronous clinician-patient interaction without requiring physical presence, which has proven particularly valuable for follow-up consultations, mental health services, and chronic disease management [2,3].

Despite its substantial promise, telemedicine implementation faces a number of persistent challenges. Technical barriers include inconsistent internet connectivity in rural areas, the cost of monitoring hardware, and the need for interoperability between different vendors' devices and electronic health record systems. Clinical and organisational barriers include the need to redesign care pathways and reimbursement models around remote rather than in-person encounters, as well as legitimate clinician concerns about the adequacy of remote assessment for certain conditions. Regulatory and legal barriers include jurisdictional questions about cross-border practice, licensing of remote clinicians, and liability in the event of a missed or delayed diagnosis based on remotely transmitted data. Finally, patient-side barriers include digital literacy gaps, particularly among elderly patients who often carry the highest burden of chronic disease, and legitimate concerns about the privacy and security of continuously transmitted personal health data.

Conclusion

Telemedicine and remote patient monitoring represent a technically mature and clinically validated extension of conventional healthcare delivery, with particular value for chronic disease management and for extending specialist access to



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underserved populations. Realising this potential at scale requires coordinated progress on four fronts simultaneously: robust and affordable connectivity infrastructure, interoperable technical standards, adapted clinical and reimbursement pathways, and digital literacy support for patients, so that remote monitoring complements rather than replaces the clinical judgement and continuity of care provided by direct patient-clinician relationships.

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