CHAPTER 4

REMOTE MONITORING FOR EARLY DETECTION AND MANAGEMENT OF ATRIAL FIBRILLATION

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Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia worldwide, with a rising global prevalence that nearly doubled from approximately 33.5 million in 2010 to about 59 million in 2019.[1] Recent estimates indicate that atrial fibrillation (AF) affects roughly 3 to 6 million people in the United States, a figure expected to climb to approximately 6 to 16 million by 2050. Across Europe, about 9 million adults aged ≥ 55 years were living with AF in 2010; this burden is projected to rise to nearly 14 million by 2060. [2–5] This growing epidemic poses a major public health challenge, as AF confers a fivefold increase in stroke risk and contributes to heart failure, cognitive decline, and mortality. [6] Many AF cases are asymptomatic or paroxysmal (intermittent), which means the condition often remains undiagnosed until a serious thromboembolic event such as ischemic stroke occurs. In fact, stroke is the first manifestation of previously unknown AF in roughly 1 out of 4 patients, underscoring the critical need for earlier detection. [7] Detecting AF before complications arise enables timely initiation of anticoagulation (which can reduce stroke risk by two-thirds) and other interventions to prevent adverse outcomes. These considerations have spurred interest in remote monitoring technologies that allow continuous or frequent heart rhythm assessment outside of traditional clinical settings for the early detection and management of AF. Remote monitoring encompasses wearable sensors, mobile devices, and other telemedicine tools that can capture arrhythmias in real time, alert patients and clinicians, and facilitate prompt management. This chapter provides a comprehensive overview of how remote monitoring is revolutionizing AF care, with a balanced discussion of the clinical implications, technological approaches, and health system perspectives. Current state-of-the-art technologies – including

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ments based on a patient's true AF burden and symptom patterns rather than intermittent snapshots. [33,44,47] echnologically, innovations in wearables and mobile ECG devices have made it feasible to continuously or intermittently monitor heart rhythms in everyday life, with accuracy approaching that of traditional clinical monitors. [49–51] The integration of artificial intelligence is further enhancing the capability to detect and even anticipate arrhythmias, as well as manage the large volumes of data generated. Health systems around the world are grappling with how best to incorporate these advances – balancing enthusiasm for preventing AF-related strokes with the pragmatism of limited evidence on long-term outcomes and the practical challenges of implementation. [14,37] Europe has cautiously embraced AF screening in guidelines for older patients, while U.S. and U.K. authorities await more definitive trial results before broad endorsement. [37] Nonetheless, numerous pilot programs and trials globally are actively testing the real-world benefits, and early signs suggest that with careful targeting and follow-up, remote monitoring can be a cost-effective strategy to reduce AF morbidity.[47,52] As we look to the future, a convergence of cardiology and digital health is likely to produce integrated care pathways: imagine an AF patient whose smartwatch not only detects an arrhythmia episode but also automatically schedules an anticoagulation clinic tele-visit and delivers an app-based education module on AF management. Achieving this vision will require continued collaboration between clinicians, engineers, and policymakers, along with rigorous research to guide evidence-based use. In conclusion, remote monitoring for AF stands at the forefront of preventive cardiology and electrophysiology – a prime example of how technology can extend the reach of care beyond clinic walls. By embracing these tools thoughtfully and addressing the accompanying challenges, the global cardiology community can move closer to the twin goals of reducing stroke incidence and improving quality of life for millions of individuals living with atrial fibrillation.

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