Whitepaper

Connected Health: How Advanced Remote Patient Monitoring is Transforming Health and Social Care

Optimizing Remote Patient Monitoring to improve patient care and drive better clinical outcomes

innovaccer

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Executive Summary

Societies are aging globally. According to the World Health Organization, the number of people over 60 years old will almost double between 2015 and 2050, reaching 2 billion[1]. With an aging population and increasing number of chronically ill patients, maintaining high-quality care and reducing costs has become difficult.

Patient monitoring, an inherent part of patient engagement, involves using intermittent and continuous measurements to define disease states, characterize disease progression, and monitor recovery. However, the monitoring of patients within a clinical setting is changing.

The global remote healthcare market by revenue is expected to grow at a CAGR of over 33% during the period 2019–2025[2]

The shift from treating illness to managing health is demonstrated by an increase in the use of monitoring outside of the clinical setting. In the context of COVID-19, leveraging patient monitoring technology to ease the burden on hospitals and healthcare facilities has been extremely beneficial. Especially for older patients as they are more likely to develop severe coronavirus symptoms. With the reduced frequency of hospital visits and reduced time spent waiting in the Outpatient Department, it ensures minimized exposure to diseases for vulnerable patients and healthcare workers.

Remote Patient Monitoring (RPM) is a digital technology that obtains physiological measurements (such as blood pressure, heart rate, blood glucose levels) and behavioral measurements (such as medication adherence and compliance). It is an example of the implementation of the P4 medicine idea, which implies predictability, prevention, personalization, and participation.

RPM is revolutionizing the healthcare industry as it minimizes hospital visits and reduces patient waiting time. In the past few years, RPM has witnessed an increase in demand due to the constantly growing penetration of the internet and the rise of advanced technologies.

In this whitepaper, we explore some of the key factors driving RPM's growth and the role that technology is playing in supporting these changes. We also discuss what the future of RPM looks like and why many organizations need to revamp their technology roadmaps to improve the patient and caregiver experience.

Remote Patient Monitoring and Healthcare

There is enormous pressure on healthcare systems to provide integrated and personalized care plans and improve outcomes while minimizing costs. This places a substantial economic incentive on healthcare providers to carry out procedures and protocols that reduce the incidence of complications across the entire care continuum.

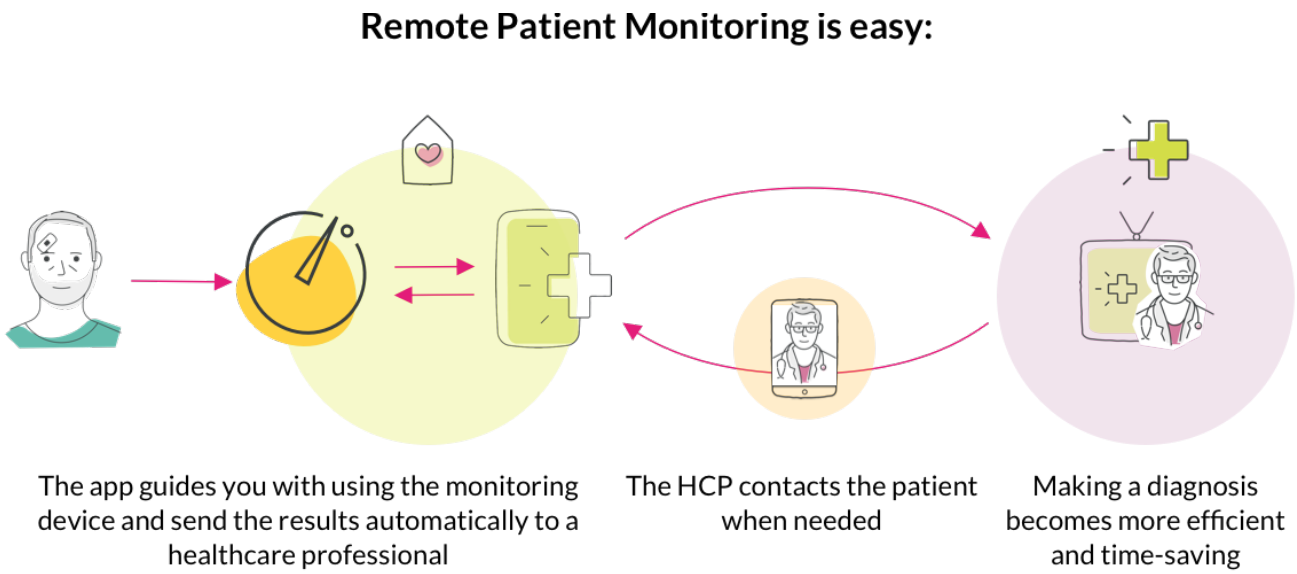
RPM has expanded in scope to support users in lifestyle improvements. This is possible due to the use of integrated measuring devices, patient applications, and a data processing platform that provides the information to medical personnel.

Most models and technologies that are used for remote patient monitoring have four main components:

- Integrated devices that enable wireless communication to deliver vital signs measurements
- Central repository of data received from local patient repository, sensors, diagnostic applications, etc.
- Patient repositories that liaise between devices and the care provider
- Software that analyzes incoming data and prepares recommendations, and shares this information with medical staff

All components can be adapted to the needs of the patient, particular diseases and controlled parameters as well as the requirements and capabilities of a medical facility or the care provider. Most measuring devices currently work with technologies configured for remote patient monitoring. They use different standards for wireless data transmission, such as Bluetooth, Wi-Fi, or GSM.

Patients are under constant care of specialists who have real-time access to up-to-date information about their health. This helps medical personnel monitor several patients simultaneously and spend more time on communication and patient education which is crucial for the prevention and control of chronic diseases.



Some measuring devices check specific parameters and automatically send results, while others require the patient to enter data into a mobile application, website or another device that acts as a connector. The convergence of RPM with long-term healthcare objectives aims to shift care from the hospital to the home.

What Is Driving the Growth

Rise in the Aging Population

Life expectancy is rising - now exceeding 60 years of age for the first time in history. This immense demographic change is a challenge for healthcare and social systems around the world.

Seniors have an important role to play in society and family, and longer life is associated with more and better opportunities including education and travel. However, this all depends on a given individual's state of health. Elderly people more often suffer from hearing and vision problems, osteoporosis, joint and bone pain, respiratory diseases (including COPD), diabetes, depression, and dementia. Moreover, in this age group, the risk of multiple diseases is increased. Unfortunately, this often results in exclusion from social life or a significant reduction of independence.

Remote monitoring provides a system for long-term care for seniors, increasing their safety, restoring independence and allowing greater participation in social life. Constant observation of vital signs enables trends and changes to be observed, so that treatment can be optimized.

Increase In The Occurrence of Chronic Diseases

Non-communicable diseases, including chronic diseases such as diabetes, heart failure and COPD, cause 70% of all deaths.[3] They kill 41 million people a year, including 15 million between 30 and 69 years old. The most dangerous are cardiovascular diseases (coronary heart disease and stroke) which have been the leading cause of death for over 15 years. COPD is almost twice as deadly as lung, tracheal, and bronchial cancer. Diabetes mortality rose by 60% in the last 16 years.

Regular control of vital signs has a real impact on the results of chronic disease treatment. Remote monitoring is a great tool to manage this group of patients, allowing quick response and improving communication and health education. It also increases the patients' involvement and self-awareness in their own treatment which is equally important for the therapy results.

Significant Increase in Obesity and Related Diseases

The number of obese people has almost tripled since 1975, and over 39% of adults are overweight and 13% are obese[4]. Currently, more people die as a result of being overweight than from malnourishment. Among diseases that may be a direct result of being overweight are diabetes, hypertension, atherosclerosis, arthrosis, sleep apnea, and colorectal cancer.

Remote monitoring of obese patients is one of the solutions that will help to manage this growing problem. Medical care for overweight patients generates many costs - it requires special ambulances, hospital beds, and even MRI devices. Obese patients require holistic support and regular control. Remote monitoring provides them all of this while reducing general care costs.

Limited Access to Medical Care

Difficulties in access to medical care arise almost everywhere in the world. Reasons vary, but the effect is the same - patients receive a late diagnosis and treatment is delayed, which has a direct, negative impact on the effects of therapy.

The shortage of qualified medical personnel is a global problem. According to data published by the Association of American Medical Colleges (AAMC), it is estimated that by 2033, in the United States alone, there will be a shortfall of between 54,100 and 139,000 physicians[5].

In rural areas and developing countries, the percentage of doctors per 100,000 patients is much lower than in cities and developed, wealthier countries. Often, this involves significant distances that separate patients from hospitals and clinics.

RPM in rural areas with limited access to medical care is perfect for monitoring the population's health status and caring for chronically ill or disabled patients. The system, for example, in the form of diagnostic points, will facilitate systematic medical examinations and consultations for everyone in the area.

How Technology will Impact Remote Patient Monitoring

The world is becoming progressively digitized. As the healthcare ecosystem evolves, remote patient monitoring will play a major role in the growth of connected health, where data is collected, analyzed for insights and delivered back to key stakeholders, and uniformly transferred to records. Systems will not just report numbers but will also support the user in making prompt clinical decisions.

New technologies will emerge to meet the growth in behavioral and physiological sensing. The need for monitoring outside high-acuity settings will spur the development of devices that are compatible for everyday use. These aspects are explored in more detail below.

Predictive Insights and Trends

Monitoring can provide data and help identify trends, but it is ultimately up to clinical staff to decipher these within the context of the overall health of patients and decide the desired treatment plan. Patterns of critical illness, however, can be extremely complicated and take years of training and experience to understand.

It has been estimated that approximately a million data points can be generated every hour from a critically ill patient. The facts available for each clinical decision saturate human cognitive capacity and the data is expected to rise rapidly. There is a core need to find ways to analyze and present data in a way that reduces cognitive load and supports resource prioritization.

The technologies that will empower the progression of clinical decision support (CDS) and closed control systems include data analytics and Artificial Intelligence (AI). AI techniques being developed can help create more balanced datasets for use during algorithm development. AI will be important for the recognition of these technologies by regulatory bodies, as there may be notable resistance to handing control over to a 'black box,' that makes decisions without furnishing an underlying rationale.

The Emergence of New Modalities

Clinical decision making is based on an all-inclusive view of the patient. The patient is not managed against just a single variable. New monitoring methods will give an all-encompassing picture of the patient, both in terms of new quantities measured and the ability to monitor metrics that are currently available only as point measurements.

Many measurements and assessments, from blood pressure to body temperature, are done on an intermittent basis. The period between readings is guided by a clinical perspective of what is a practical and reasonable interval. This can result in delays in detecting and responding to a considerable change in patient condition.

Continuous monitoring can identify a critical value more quickly than an intermittent approach and detect an underlying trend at an early stage. Direct, regular monitoring of gold standard markers, such as those requiring blood tests, may not be particularly feasible. In some cases, measurement of interrelated biometrics is suitable. For example, measuring and monitoring chronic stress throughout a clinical trial can optimize clinical and commercial success.

Facilitating non-contacting or non-invasive technologies is likely to be key. AI is also going to play an important role in the development of monitoring solutions based on biomarker correlates.

Interoperability

The EHRs (electronic healthcare records), introduced in the 1960s, were intended to collate an individual's health data in a repository, providing doctors with a comprehensive clinical picture of the patient for effective care coordination. However, due to the lack of mandatory interoperability standards, each EHR provider created and maintained their own data silo, usually on-premises and accessible only to hospital or department-specific practitioners enrolled in that program.

The prevalence of disparate EHRs, and inability to communicate data among each other's platforms using APIs (application programming interfaces), led to disconnected patient records spread across many different systems. This, in turn, led to inadequate diagnosis and treatment regimens across the entire patient care continuum.

The new FHIR (Fast Healthcare Interoperability Resources) standards were developed by Health Level Seven International (HL7), a healthcare standards organization, to encourage interoperation between legacy healthcare systems. Many EHR vendors have developer programs that employ FHIR and open APIs to allow third parties to write software that uses their EHRs. Note that the 21st Century Cures Act necessitates certified EHRs to have open APIs.

The stage is set for significant advances in health information exchange that will allow RPM solutions to be fully integrated into the patient health record. However, technology hurdles are not the only obstacles. A cultural shift is required by practitioners, industry leaders, and patients alike when it comes to data transparency, sharing, and security.

The Future

Patient care will be reformed in the next 10 to 15 years and new types of products, solutions, and technologies will emerge. In this environment, RPM will play a significant role in facilitating the healthcare landscape transformation.

With both patients and providers trying to decrease in-person care, RPM is seen as a fundamental enabler of the virtual care relationship.

Multi-feed Remote Patient Monitoring

Traditionally, RPM has largely been associated with the transmission of a single form of data. As technology advances, new types of data (e.g., voice data, data from facial scans) have become prevalent and clinically valuable. The future of RPM will likely not be determined by an organization's ability to assess and monitor one type of data at a time, but its capacity to combine data from different channels and make inferences across these channels.

We expect cross-functional data and analytics companies to win the race if they can build a platform that successfully connects all the data silos, uses advanced algorithms that combine biometric data with self-reported information, and draws data-driven insights to establish and maintain a personalized care plan.

Data Pooling

Concurrent pooling and synthesis of data from seamless measurements and interval-based assessments is likely to give rise to more meaningful, personalized insights for each patient.

1. Continuous measurements

Come from monitoring of physiological and behavioral variables that physicians conventionally use to examine patients who are recovering from acute episodes. These include:

- Traditional Biometrics: Biological data such as temperature, heart rate, and blood pressure.
- Emerging Physiological Biometrics: New measures suitable for analysis of functional integrity, such as sleep patterns, daily activity levels, and exercise patterns.
- Environmental Metrics: Used to measure external factors such as pollutant levels, weather conditions, and the presence of sunlight that could affect the health of patients.

2. Interval-based Assessments

Come from measures taken during frequent evaluations. Physicians often use such measures for chronic care management. Data from interval-based assessments comprises:

- Patient Reported Outcomes - Come from questionnaires concerning the patient's health status, mental well-being, and quality of life. They could be used to measure pain, satisfaction/mood, and optimism as well as how the patient feels after a procedure.

- Socio-biometrics - Come from personal and community data. This could include an individual's eating habits, social media activity, community crime rates, and commute patterns. Clinicians can use this information to understand the effect that specific drivers of health have on the patient.

- Personalized Treatment Plan Information - comprises patient-specific details regarding key events along the patient's care continuum. This might include prescriptions, previous interventions, physical therapy recommendations and outcomes.

Staying Competitive

With changes in the reimbursement environment and growing evidence pointing to the as-yet untapped potential of RPM, many healthcare organizations understand the value of structured data and AI. Data is permeating every component of the healthcare ecosystem and has the potential to make healthcare predictive, preventive, and personalized.

But the storage, integration, and managing huge incoming data can be a daunting task. To realize the full potential of this data, knowledge extraction and data mining techniques have to be deployed. The progression of big data analytics in healthcare continues with the central goal of improving outcomes while reducing costs. Care of the future will be more agile and remote patient monitoring systems more deployable.

Why Innovaccer's Advanced Remote Patient Monitoring Solution?

In an era where different specialties are involved in patient care, intelligent use of solutions such as remote patient monitoring is essential to achieve better care management outcomes while improving cost and quality of care.

Innovaccer leverages an advanced Remote Patient Monitoring solution that is designed to track patient's health at home, boost post-acute care outcomes and reduce the 30-day readmission rate. It helps significantly in simplifying care coordination, which is a critical success factor, by streamlining interoperability.

So how does this solution manage complex people and process challenges, and drive sustainable care management?

1. Enhancing Virtual Care Capabilities

- Monitor patient data through multiple-screens to deliver coordinated care
- Manage patients with chronic conditions and provide remote monthly CCM service with or without a face-to-face encounter
- Empower your patients to seek care through simplified care navigation and recreate the in-person visit

2. Leveraging State-of-the-Art Analytics

- Measure the quality of initiatives using cost and quality dashboards for a holistic view of hospital performance
- Stratify high-risk patients and make necessary interventions to reduce avoidable ED visits
- Manage resources and enable necessary interventions by monitoring network performance in real-time
- Gather case assignment and telehealth management reports to optimize the gaps in care

3. Complying with Regulatory API Requirements

- Leverage automated outreach and share resources to address patient needs during and post a virtual visit
- Identify the non-clinical needs of your patients and connect them with appropriate community resources
- Collect key insights on team productivity and the effectiveness of care plans for enhanced workforce planning

4. Maximizing Holistic Care Management

- Excel at chronic care management with augmented and streamlined workflows
- Stratify high-risk patients with carefully designed SDoH assessments
- Experience effortless RPM hardware integration

The FHIR-enabled Data Activation Platform allows providers access to care insights and enables priority actions that they cannot take using their EHRs alone. It offers an in-workflow approach to enable cost-effective care delivery at the point-of-care without any EHR integration dependencies. With this platform, providers have the resources that enable them to improve clinical outcomes and boost the overall network performance.

The following solutions are built on Innovaccer's FHIR-enabled Data Activation Platform:

Innovaccer's advanced healthcare data integration engine, providing one-click interfacing mechanisms to a wide breadth of healthcare data systems and a seamless bidirectional flow of data.

Smart, AI-assisted care management solution, with patient-centered medical home (PCMH) level care delivery, hardcoded into the workflow. InCare streamlines the care management process enabling systems to scale care management programs at lower costs, and with higher quality.

InGraph is the most intuitive healthcare analytics offering for population management health strategies in the industry with over 800+ measures to track network performance and outcomes, customizable measures and dashboards accessible across the network, and automated reporting on quality measures.

A smart, lightweight physician's digital assistant that surfaces critical system and population health insights derived from multiple data sources, at the point of care. Using InNote, insights such as care gaps, dropped codes, process measures and referrals information can be shared with the clinician - without their having to leave the EHR experience.

An automated analytics-driven patient engagement solution to scale patient outreach workflow and bring patients closer to the care team.

About Innovaccer

Innovaccer, Inc. is a leading San Francisco-based healthcare technology company committed to making a powerful and enduring difference in the way care is delivered. The company leverages artificial intelligence and analytics to automate routine workflows and reduce manual overhead to facilitate more person-centered care. Its KLAS-recognized products have been deployed all over the U.S. across more than 1,000 locations, enabling more than 37,000 providers to transform care delivery and work collaboratively with payers. Innovaccer's FHIR-enabled Data Activation Platform has been successfully implemented with healthcare institutions, private health plans, and government organizations. By using the connected care framework, Innovaccer has unified records for more than 24 million members and generated more than $600M in savings.

For more information, please visit innovaccer.com.

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