

Remote Patient Monitoring

Value for Patients and Applications During a Public Health Emergency

Linda's Story¹

Linda was diagnosed with type II diabetes at age 40, requiring routine appointments with a health care provider to manage her condition. Travel to her appointments had been difficult at times given the frequency of appointments and the distance she had to travel. At her last appointment, Linda enrolled in a remote patient monitoring (RPM) program offered by her provider. The program allows Linda to share her daily blood glucose readings and other physiological data (i.e., "patient-generated" data) using a digital scale, glucometer, and blood pressure cuff. These devices (referred to as "peripherals") are synchronized to a mobile application on her smartphone. The data is sent to Linda's provider for review. The application prompts Linda daily to complete a brief health assessment about her carbohydrate intake, adherence to her medication regimen, weight, blood pressure, and physical activity. Linda also receives automatic reminders (referred to as "push notifications") to take blood glucose readings and complete the health assessment, in case she forgets.

Continuous monitoring of Linda's type II diabetes through real-time patient generated-data helped Linda and her health care provider identify and address issues that impacted her ability to maintain a healthy lifestyle. The RPM program provided Linda with more frequent care and contact with her provider enabling her to feel in control of her condition. Linda now maintains a healthy weight and her blood glucose readings and metrics are within normal range. Linda's provider continues to use RPM to supplement care and management of Linda's type II diabetes, reducing Linda's number of in-office visits.

The Evolution of RPM

The concept of RPM dates back to the 1800's when providers would consult each other over the phone.² In 1961, the boundaries of RPM were tested when providers monitored Alan Shepard, the first American in space, by electrocardiogram using a respiration sensor in his microphone and a thermometer. RPM became more common with the emergence of the internet in the 1990's, which opened the door for fast connected care.³

Today, RPM uses various digital health technologies to collect data outside of a clinical setting (typically the patient's home) and transmits that data to the patient's care team in another location.⁴ RPM collects data through an array of devices, including peripheral devices (e.g., digital stethoscope, blood pressure cuff, scale, etc.), implantables (e.g., pacemaker), wearables (e.g., activity tracker), and other mobile health applications installed on smartphones, tablets, or smartwatches.⁵ Such devices

¹ Linda is a fictional character in this story intended to illustrate what could be a real-life scenario of how remote patient monitoring can be used to treat a medical condition.

² RPM evolved from sharing X-ray images over telephone wires to electronically transmitting neurological exams for consultation, and transferring psychiatric evaluations by closed circuit telehealth. More information is available at: www.docwirenews.com/blog/what-is-the-future-of-remote-patient-monitoring-rpm/.

³ Neoteryx, *A Brief History of Remote Patient Monitoring*, January 2019. Available at: www.neoteryx.com/microsampling-blog/a-brief-history-of-remote-patient-monitoring.

⁴ Center for Connected Health Policy, *Remote Patient Monitoring (RPM)*. Available at: www.cchpca.org/about/about-telehealth/remote-patient-monitoring-rpm.

⁵ DocWire News, *What is the Future of Remote Patient Monitoring*, February 2020. Available at: www.docwirenews.com/blog/what-is-the-future-of-remote-patient-monitoring-rpm/.

have become more widespread, portable, and less expensive.⁶ The devices are designed to be user-friendly and intuitive; many collect and transmit data to providers automatically.⁷

How RPM Benefits Patients

A wide range of patient data, physiological (e.g., vitals, respiration rate, blood glucose levels) and subjective (e.g., well-being, pain level, satisfaction with health, access to healthy food), can be collected using RPM technology. This data can be used to manage a variety of medical conditions, including diabetes, heart disease, dementia, substance abuse, mental health, and weight gain and loss.⁸ Availability and monitoring of physiological and subjective data on a frequent basis provides valuable information about patients' health trends and lifestyles and improves quality of care.⁹ Health trends based on RPM data may provide a more accurate and holistic picture of the patient's health, compared to one-time results administered at a provider's office.¹⁰ Access to real-time data also assists in more timely and effective interventions as providers understand what may be abnormal for a particular patient and quickly decide if clinical support is needed.¹¹

Access and Care Continuity

Patients enrolled in an RPM program receive regular guidance about their medical condition without the burden of transportation, taking time off work or taking children out of school, or spending time waiting in provider offices or hospital waiting rooms.¹² Patient-generated data is shared at a pre-determined frequency that is convenient for the patient's schedule and appropriate for their condition and care plan.¹³ Data sharing supports care coordination and management for patients in between office visits with their primary care provider or after being discharged home from a hospital or nursing home.^{14,15} Patients report that regular provider check-ins are valuable to support healthy lifestyles and behavioral changes and improve their health.¹⁶ About 53 percent of patients are more likely to choose a primary care provider who uses RPM.¹⁷

⁶ Forbes, *Remote Patient Monitoring Brings Healthcare To Your Home*, September 2019. Available at: www.forbes.com/sites/forbestechcouncil/2019/11/27/remote-patient-monitoring-brings-healthcare-to-your-home/#5cbfe8c74378.

⁷ EpLab Digest, *Increasing Patient Compliance with Remote Patient Monitoring*, September 2019. Available at: www.eplabdigest.com/increasing-patient-compliance-remote-patient-monitoring.

⁸ See n. 5, *Supra*.

⁹ Care Innovations, *What Are the Benefits of Remote Patient Monitoring (RPM) for Patients?* Available at: news.careinnovations.com/blog/benefits-of-remote-patient-monitoring-rpm-for-patients.

¹⁰ American Heart Association, *Using Remote Patient Monitoring Technologies for Better Cardiovascular Disease Outcomes Guidance*. Available at: www.heart.org/-/media/files/about-us/policy-research/policy-positions/clinical-care/remote-patient-monitoring-guidance-2019.pdf?la=en&hash=A98793D5A043AB9940424B8FB91D2E8D5A5B6BEB.

¹¹ Intel, *Making Remote Patient Monitoring Simple and Cost-Effective*. Available at: media.zones.com/images/pdf/making-remote-patient-monitoring-simple-effective-brief.pdf.

¹² Trapollo, *Benefits of Remote Patient Monitoring: Part 1 Patients*. Available at: www.trapollo.com/the-benefits-of-remote-patient-monitoring-part-one-patients/.

¹³ Medical Economics, *What's New in Remote Patient Monitoring?* January 2020. Available at: www.medicaleconomics.com/news/whats-new-remote-patient-monitoring.

¹⁴ mHealth Intelligence, *Telehealth, RPM Help Visiting Nurses Fill Care Management Needs*, March 2018. Available at: mhealthintelligence.com/news/telehealth-rpm-help-visiting-nurses-fill-care-management-needs.

¹⁵ Conduct Science, *What Adoption of Remote Patient Monitoring will Mean for Healthcare Delivery*. Available at: conductscience.com/adoption-remote-patient-monitoring-will-mean-healthcare-delivery/.

¹⁶ West, *Strengthening Chronic Care: Patient Engagement Strategies for Better Management of Chronic Conditions*. Available at: www.televox.com/downloads/west_chronic_disease_report.pdf.

¹⁷ The Accenture 2019 Digital Health Consumer Survey assessed the attitudes toward traditional (e.g., doctors and other professionals in hospitals, clinics, and doctors' offices) and non-traditional (e.g., telehealth, RPM) health care services delivery of 7,993 consumers. More information is available at: www.accenture.com/us-en/insights/health/todays-consumers-reveal-future-healthcare.

Patient Engagement

Frequent communication (e.g., receiving reminders and encouragement) and self-monitoring (e.g., reporting blood pressure readings, weight tracking, etc.) help elicit positive healthy behaviors¹⁸ and reduce severity of symptoms among patients.¹⁹ Regularly connecting with a provider improves patient education, support, and feedback on their condition and treatment progress.²⁰ Improved self-management skills increase patients' likelihood to set goals and monitor their progress. Nearly half of patients using RPM report taking increased ownership over their health.²¹ Insight into patients' motivations (e.g., spending more time with grandchildren, training for a marathon, etc.) allows providers to tailor encouragement to patients' unique needs and goals, making them feel more supported.²²

RPM in a Public Health Emergency

RPM facilitates emergency preparedness and disaster response²³ during a public health crisis. For example, RPM provides a means to support patient communication and engagement through push notifications during times that may cause higher levels of stress and anxiety for patients. Notifications can provide education on the public health crisis and share resources for assistance.²⁴ During a disease outbreak, RPM technology may be used to communicate best practices for disease prevention, warning signs of potential symptoms, and other guidelines.²⁵

Case study: RPM Deployment During COVID-19

The rapid spread of the coronavirus disease (COVID-19) necessitates greater need for virtual care.²⁶ Many health care systems locally and nationally have launched or expanded RPM programs in preparation for a surge in COVID-19 positive or presumptive positive patients. Patients receive education and are screened by calling 24-hour hotlines. Testing or a hospital visit may be arranged based on a remote assessment, preventing those with mild symptoms from coming in-person to urgent care clinics and hospital emergency departments. Monitoring kits are delivered to homes of patients who are positive for COVID-19²⁷ allowing them to securely share data on their health status, including temperature and pulse oxygenation. Providers track patient data to assess symptoms

¹⁸ *Ibid.*

¹⁹ Vegesna, A., Tran, M., Angelaccio, M., & Arcona, S. Remote Patient Monitoring via Non-Invasive Digital Technologies: A Systematic Review. *Mary Ann Liebert, Inc.*, 23, 3-18 (2017). Available at: doi.org/10.1089/tmj.2016.0051.

²⁰ See n. 9, *Supra*.

²¹ Consumer Technology Association, *CTA Survey Finds High Demand for Remote Patient Monitoring Devices*, April 2019. Available at: cta.tech/News/Press-Releases/2019/April/CTA-Survey-Finds-High-Demand-for-Remote-Patient-Mo.aspx.

²² See n. 16, *Supra*.

²³ Involves a coordinated, collaborative process of preparing to match urgent needs with available resources and how to respond to reduce vulnerability and impact of a natural disaster or public health emergency, including but not limited to making care available and information sharing.

²⁴ Relatient, *How to Communicate with Patients During COVID-19 Pandemic*, March 2020. Available at: www2.relatient.net/covid-19-ebook-download/?submissionGuid=e0fc3b9b-54a0-471d-8940-d9d3ed5ca1eb.

²⁵ Patient Engagement HIT, *Best Practices for Health System Emergency Preparedness*, March 2020. Available at: patientengagementhit.com/news/best-practices-for-health-system-emergency-preparedness.

²⁶ Fierce BioTech, *Companies Roll Out Remote COVID-19 Monitoring Tools to Free Up Hospital Space*, April 2020. Available at: www.fiercebiotech.com/medtech/companies-roll-out-remote-covid-19-monitoring-tools-to-free-up-hospital-space.

²⁷ Biz Journals, *Charlotte's Atrium Health Launches Virtual Hospital*, March 2020. Available at: www.bizjournals.com/charlotte/news/2020/03/24/charlottes-atrium-health-launches-virtual-hospital.html.

progression; patients whose condition appears to be deteriorating are flagged and contacted by phone or video.

Use of RPM increases health system capacity for triage and response.²⁸ Some states with a large influx of COVID-19 cases (Maryland, New York, Delaware, Pennsylvania, Washington, and Ohio, among others) have assembled emergency mobile tents to triage and provide specialized care for patients who exhibit symptoms.²⁹ Nurses are equipped with tablets and other smart devices to conduct face-to-face encounters with patients and connect them to providers at a nearby hospital using audio and visual technology.³⁰ Remote examination, diagnosis, and treatment referrals are provided in shorter turnaround times.³¹ This also allows health systems to isolate patients with COVID-19 symptoms, minimizing the risk of transmission to other patients or providers within hospitals.

Additional Resources

Maryland Health Care Commission (MHCC), Telehealth Virtual Resource Center

mhcc.maryland.gov/mhcc/Pages/hit/hit_telemedicine/hit_telemedicine_virtual_resource.aspx

American Medical Association Digital Health Implementation Playbook

www.ama-assn.org/amaone/ama-digital-health-implementation-playbook

National Rural Health Resource Center Remote Patient Monitoring Toolkit

www.ruralcenter.org/resource-library/remote-patient-monitoring-toolkit

²⁸ See n. 26, *Supra*.

²⁹ Duke Today, *Duke Health Triage Tents Provide Covid-19 Care*, April 2020. Available at: today.duke.edu/2020/04/duke-health-triage-tents-provide-covid-19-care.

³⁰ Healthcare Finance, *COVID-19 may permanently alter the telehealth landscape from reimbursement to utilization*, April 2020. Available at: www.healthcarefinancenews.com/node/140009.

³¹ Healthcare IT News, *Telemedicine during COVID-19: Benefits, limitations, burdens, adaption*, March 2020. Available at: www.healthcareitnews.com/news/telemedicine-during-covid-19-benefits-limitations-burdens-adaptation.