How Patient-Friendly Technology
is Transforming Healthcare:

A Comprehensive Guide to Remote Patient Monitoring

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Contents

It is undeniable that the healthcare industry has seen some explosive growth over the last few years as exciting, patient-centric, technology-enabled solutions have been adopted by its providers and patients alike. With a renewed focus on the patient experience and ease of accessibility to quality care, patients are now behaving more like consumers of healthcare than the typical, passive patients of yesteryear. As a result, they are demanding things like improved pricing transparency, and the ability to "shop" for services, as they would, say, a pair of shoes, or new car. This trend of "patients as consumers", coupled with recent advancements in healthcare legislation, technology, and infrastructure, have resulted in a tidal wave effect that is forcing healthcare to rapidly adapt to the environment around it. Add in a global pandemic, and it has become a full-blown tsunami of change. And it's this state that we find ourselves in today that lends itself to the wide-spread adoption of Remote Patient Monitoring (RPM), but what exactly is RPM?

What is RPM?

RPM is a healthcare delivery system that utilizes a combination of specific FDA-regulated devices and data management platforms to collect, transmit and analyze patient data, with the goal of connecting a patient with their provider while they remain at home or their normal care facility, and work towards specific health goals.

Let's look at a real-world example of what this might look like. Margaret is a 70-year-old woman with Type 2 Diabetes. Her doctor has prescribed her a Glucose Monitoring device and instructed her to test her blood sugar level four times a day. With an RPM program, Margaret simply tests her blood sugar, as directed, and those results are collected, stored, and automatically transmitted to her physician or care team. Margaret's care team will then review her glucose readings and determine if any clinical interventions need to be made as a result of those readings.
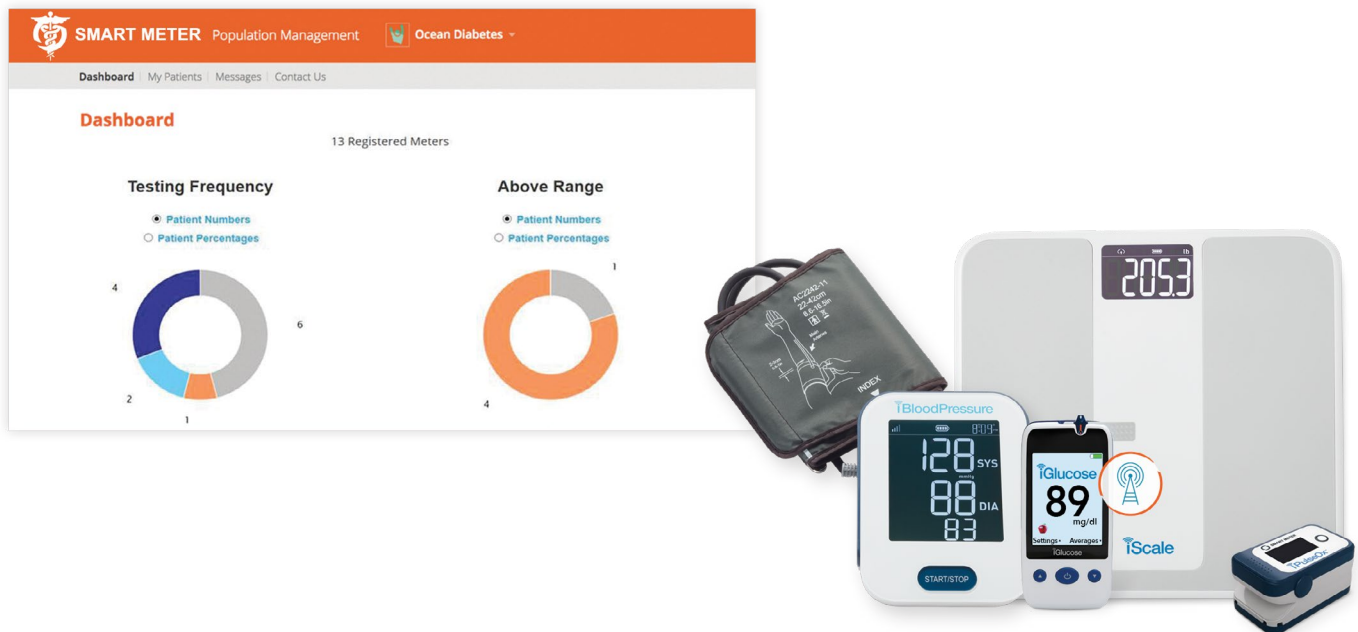
In a traditional delivery model, Margaret would have to record her blood sugar levels and wait until her next in-person appointment to review them with her doctor. If Margaret received a reading that was significantly out of range compared to her typical readings, or exceeded the threshold established by her doctor, Margaret would have to call her doctor's office to report her numbers and wait for further instruction from her physician; however, most patients are unlikely to self-report an out-of-range-reading at all. With real-time reporting via RPM, her doctor has the ability to provide advice and care right then.

While the concept of RPM may seem straightforward and easy to understand, it is often confused with other healthcare delivery models, such as Chronic Care Management (CCM), Telemedicine, and Telehealth. This is likely because each of these terms are interrelated and often overlap but do in fact have distinct differences. Understanding the ways in which they are both alike and different will give you a more comprehensive understanding of Remote Patient Monitoring.

The Connected Health Hierarchy: Telehealth, Telemedicine, Chronic Care Management, and Remote Patient Monitoring

By now we have learned that RPM is a healthcare delivery system that uses medical-grade devices and data management practices to transmit data back to a qualified healthcare provider. As you begin to think about how it relates to other healthcare delivery models or concepts, it's helpful to think of it in terms of a hierarchy.

At the top of the hierarchy is the term "Telehealth". This is a broad, all-encompassing type of healthcare that includes many different types of technologies and methodologies utilized to connect a provider with a patient. This could include telephone consultations, video visits, electronic prescriptions, patient portals and so on.

The next level down is Telemedicine. While Telehealth includes the entire digitized healthcare continuum, Telemedicine is a subset of Telehealth that is more specific to clinical care. In order to qualify as Telemedicine, it must include a clinical provider examining and or treating a patient. This is quite literally healthcare from a distance.

The third tier down is where both RPM and Chronic Care Management sit, so what makes them different? In order for CMS to designate a care model as Chronic Care Management, it must involve the care and monitoring of at least two chronic conditions, and it must include a minimum of 20 minutes of clinical care per patient per calendar month. RPM, on the other hand, only requires one condition. Also of note, the definition of CCM does not dictate the technology or methodology in which the model must be delivered meaning, you can leverage a Remote Patient Monitoring program for CCM patients.

To simplify further: RPM and CCM are both types of Telemedicine, and Telemedicine is a subset of Telehealth. As the industry continues to evolve and embrace innovation and technology, we can expect to see even more iterations of these concepts and delivery methods, but before we speculate on what the future of healthcare is going to look like, let's take a look at how we got to where we are today with Remote Patient Monitoring.

TELEHEALTH
connects providers and patients, could include telephone consultations, video visits, electronic prescriptions, patient portals, etc.

TELEMEDICINE
must include clinical provider examining and/or treating patient

CHRONIC CARE MANAGEMENT
must include 2 conditions + 20 minutes care/patient/month

REMOTE PATIENT MONITORING
must include 1 condition

The History of Remote Patient Monitoring

While the technology has been available to deliver early forms of connected healthcare since the 1960s, due to a myriad of technological and regulatory challenges with effects on reimbursement, progress was slow and wide-spread growth was inhibited. It wasn't until 2010 when the government passed a series of healthcare reform bills that momentum started to pick up again for Telehealth and Remote Patient Monitoring. With improved infrastructure, better access to broadband internet in rural parts of the country, and more supportive regulatory and financial policies, it became possible to implement digital healthcare delivery models, like Remote Patient Monitoring. And once CMS introduced CPT reimbursement codes for RPM in 2019, providers and patients began to rapidly embrace the many virtual care solutions.

Fast forward to March of 2020 when the COVID-19 pandemic first came to light, CMS and the federal government eased regulations and accelerated reimbursement, which in turn ignited the Remote Patient Monitoring industry. With far fewer restrictions and more federal dollars going towards reimbursement, we have seen unprecedented and exponential growth in the last two years. And given the reprieve RPM programs offer our already taxed healthcare workers, and the improved health outcomes we have seen as a result, these new supportive government programs are likely here to stay with private insurers following closely behind.

The Evolution of RPM Technology: Bluetooth vs Cellular

Another important aspect in understanding both the history and value of Remote Patient Monitoring is the evolution of the technology that makes it possible.

The precursor to RPM really began only with the devices themselves. These devices, such as Glucose Meters, were prescribed to the patients, who would conduct their readings and record them on a piece of paper. They would then provide their physician with months' worth of readings at their next quarterly check-up appointment. This model relies heavily on patient adherence and self-reporting, which we know is not always reliable.

From there, the model transitioned to one that enabled providers to download patients' vital readings; however, this still required patients to bring their devices to their office visits. At their appointments, their doctor would take their device and connect it to their computers using a cable to download all of their readings since their last appointment. This required time being spent during the appointment to download the patient data. This also required the device and computer software to be compatible, and still resulted in a reactive care model.

Following cables, Bluetooth technology was adopted and is still widely used today. With the Bluetooth model, patients are able to take readings and transmit them electronically to their providers, making it the first real Remote Patient Monitoring model; however, Bluetooth still requires additional software, such as compatible apps, where results have to be uploaded and synced before they are sent to providers, making it a multi-step, less patient-friendly process.

Today, we have cellular-enabled devices and protocols, which are the pinnacle for a patient-centric Remote Patient Monitoring program. Cellular CAT-M IoT technology allows patients to instantly transmit their biometric data back to their care team in one seamless step, helping to improve adherence and enabling providers to act on their health data in real time. This results in a much more proactive approach to care, which in turn leads to better health outcomes.

The RPM Ecosystem

Regardless of the type of healthcare delivery model, one thing remains the same: the patient needs to be at the center of everything you do, and from which everything else stems. This is especially true in today's day and age when there is so much emphasis on the patient experience, and HCAP scores are tied to survey results, which in turn may have a direct effect on a provider's bottom line.

When looking specifically at the Remote Patient Monitoring landscape, a patient-centric approach is not just an aspirational goal; it's critical to the success of the program and likely the patient's health outcomes. So how exactly is a RPM program setup? Who are the key players? And what does it take for it to be successful?

While there might be some slight variations in how a RPM program is structured, the ecosystem is structured fundamentally the same way across the industry:

1 **Patient** — As discussed above, it starts with the patient and his/her unique needs and health goals.

2 **Provider** — A physician, other clinician, and sometimes non-clinical caretakers are responsible for analyzing the patient-generated data and analyzing it, in real time, to promote better health outcomes.

3 **RPM Distributor** — This is who services the provider. This could be a company or organization that provides the data management software or patient portal, a reseller/distributor of the devices, a monitoring service that helps to triage patients and their health data, or a combination of those services.

4 **Data & Device Suppliers, Innovators, and Manufacturers** — These are the companies that create and innovate the medical devices responsible for capturing and transmitting patient vitals and other health data. In some instances, as is the case with Smart Meter, they may also provide data management platforms and portals that service everyone from the RPM distributor, the providers, and the patients.

5 **Patient** — While the model starts with the patient, it also ends with the patient. The patient is the end user for which the products are designed. Without their engagement and adherence, there is no RPM program, despite having all the other pieces in place. It is absolutely critical when setting up a RPM program, you have a patient-centric plan in place to help bolster engagement. This also means the devices and software platforms you utilize must be easy-to-use and patient friendly.

While there are several different components of a Remote Patient Monitoring program (**you can learn more about how to implement your own RPM program here**), there are even more benefits in doing so for everyone involved.

The Benefits of Remote Patient Monitoring

It's not often you find yourself in a win-win scenario in life, even less so within the realm of healthcare; however, when talking about Remote Patient Monitoring, it's actually a Win-Win-Win for the patients, providers, and payers.

Patients

- **Increased access to care** — With real-time transmission of vitals readings, and a triage system in place to analyze patient data, patients have a two-way communication channel with their providers and other members of their care team.
- **Clinical Care from home** — Unlike traditional healthcare delivery models, patients can receive clinical care from the comfort of their own home, or in other care facilities within their communities, which can be especially beneficial to those residing in more rural communities, or those who do not have access to reliable transportation.
- **Improved Health Equity** — For some of the reasons already mentioned, such as better access to care for those living in more rural parts of the country, Remote Patient Monitoring can help stem the gap for those patients who are underserved or more vulnerable due to socioeconomic factors.
- **Improved Health Outcomes** — Studies have shown that Remote Patient Monitoring programs can help improve health outcomes, such as marked improvements in A1C levels for people with diabetes.

Providers

- **Better Patient Engagement** — With easy-to-use devices, patients can follow their care plans more easily and from the comfort of their own home, which can help bolster adherence.
- **Improved Efficiency** — A RPM program helps streamline workflows, aggregate and organize data, and provide insightful analytics at both the individual and population levels, helping to save time and cut down on non-clinical tasks.
- **Reduced Burnout** — With improved operational efficiency, Remote Patient Monitoring can provide a much-needed reprieve for healthcare providers.
- **Additional Revenue Opportunities** — With several CPT codes that provide reimbursement for RPM-related activities, healthcare providers can often increase profits with less tax on providers.
- **Fewer Avoidable Readmissions** — The real-time, holistic view that RPM provides physicians enables them to make better care decisions sooner for their most critical patients, helping to keep patients out of the ER and in their own homes.

Payers

- **Lower Healthcare Costs** — While this is a benefit that can be realized by all parties involved, it is especially true for healthcare carriers. More data-driven and actionable healthcare insights lead to better clinical outcomes, which in turn helps curb the cost for payers.
- **Data Centralization** — As the RPM industry continues to grow and evolve, we can expect a shift in how programs are implemented, with payers playing a crucial role in the expansion. Whereas RPM monitoring companies and healthcare providers are responsible for the data aggregation and storage today, payers may eventually take on that role, and the ability to organize and transmit patient health data to healthcare providers easily will be even more important and attainable.
- **Patient Satisfaction** — As the healthcare industry begins to embrace innovation and technology, patients are coming to expect technology-enabled healthcare services. The payers' ability to provide these services will have a direct and significant impact on patient satisfaction scores.
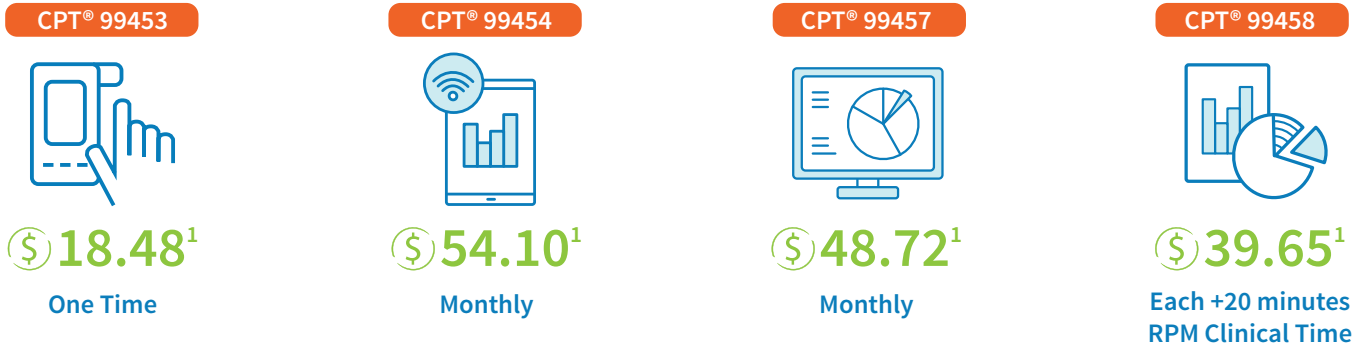
Remote Patient Monitoring is still in its infancy within the healthcare landscape, and there are already several significant benefits that it offers all of its key stakeholders. As adoption of RPM technology increases and evolves, we can expect to see even more of a positive impact on the industry. In order for RPM to scale effectively, however, providers need to have confidence in it as a revenue stream and understand what is and isn't reimbursable.

Reimbursement

Currently, CMS has designated four CMS codes for RPM-related services. Each of the codes has specific criteria that needs to be met in order to bill for those codes, such as amount of time a clinician spends with a patient in a calendar month, who within the practice can bill (a qualified health professional vs an employee under indirect supervision), and how often the code can be billed per patient. CPT codes are subject to change every year; for more details and the most up-to-date information, always refer to the **CMS website**.

Remote Patient Monitoring for Chronic Care Patients is Reimbursable at:

$1,728[1] Per Patient, Per Year

CPT® 99453	CPT® 99454	CPT® 99457	CPT® 99458
$18.48[1]	$54.10[1]	$48.72[1]	$39.65[1]
One Time	Monthly	Monthly	Each +20 minutes RPM Clinical Time

Clinical Outcomes

By now, you should have a good understanding of what Remote Patient Monitoring is and its many benefits, but let's take a closer look at what is arguably its most important benefit: improved clinical outcomes.

At Smart Meter, we have partnered with several of our customers, third-party testing facilities, educational institutions, and other industry stakeholders to really understand how Remote Patient Monitoring affects the health and well-being of patients. To date, all of these studies have identified a significant and positive impact. Below is a summary of how different Smart Meter products performed when used as part of a RPM program:

Product Used	Population/ Participants	Study Conducted By	Outcomes	Resources for Additional Information
iGlucose	High-risk patients with a baseline HbA1c of greater than 9%	Howard University	• Lowered average HbA1c by 2.8% • Reduction in emergency room	https://www.prnewswire.com/news-releases/smart-meters-iglucose-cellular-diabetes-care-solution-demonstrated-to-help-high-risk-patients-lower-hba1c-levels-in-howard-university-clinical-study-300798022.html
iGlucose	High-risk patients with HbA1c greater than 9%	Provider practice and Smart Meter customer	84% of patients lowered their HbA1c below 9%	https://rimidi.com/news/leon-medical-centers-partners-with-health-tech-company-rimidi-reducing-a1cs-in-high-risk-cohort-of-patients-with-type-2-diabetes
iBloodPressure	iBloodPressure users who had tested a minimum of 2x/week for 14 weeks, chosen at random	Smart Meter	71% of overall patients saw a reduction **Stage I:** • 71% saw a reduction in BP • 50% stepped down 1 or more stages **Stage II:** • 88% saw a reduction in BP • 75% stepped down by one or more stage	Contact us for more information on this analysis

[1]National Average from the Medicare Physician Fee Schedule (MPFS)

As the chart on previous page shows, in 2019, Smart Meter partnered with Howard University to understand the efficacy of the iGlucose meter in lowering hemoglobin A1C (HbA1c) levels in high-risk patients. At the end of the three-month study, clinicians cited a 2.8% reduction in HbA1c in patients with a baseline of 9% or higher. The study also concluded that 70% of the population required and received medical intervention during the trial, resulting in fewer admissions to the Emergency Department.

In 2020, one of Smart Meter's partners conducted another study that focused on a high-risk population of people with HbA1C levels greater than 9%. After being administered an iGlucose device, and participating in their Remote Patient Monitoring program, 84% of participants saw an improvement in their HbA1C levels to below 9%.

An iGlucose Remote Patient Monitoring study was also recently conducted in a Long Term Care setting and saw similar success. The study included 1456 participants across 45 physical locations. The goal of the study was to assess whether iGlucose, coupled with a Remote Patient Monitoring program, would have a positive impact on glucose levels – specifically helping patients to maintain or improve upon a glucose level of 180 mg/dl. The study found that 93% of participants who started with a glucose level of 180 mg/dl were able to maintain or lower their levels. In the population of patients whose starting levels were greater than 180 mg/dl, 74% were able to decrease glucose levels to 180 mg/dl or below.

The wider industry has also seen significant improvement in outcome because of Remote Patient Monitoring. Here is just a small sample of use cases and outcomes:

Product Used	Population/ Participants	Study Conducted By	Outcomes	Resources for Additional Information
Pulse Oximeter	COVID-19 Patients	Kaiser Permanente Southern California	• Only 10% of patients required hospitalization	https://www.thepermanentejournal.org/issues/2021/summer/7664
Blood Pressure Device	28,000 patients with Stage I or Stage II Hypertension	Hello Heart Published in Journal of the American Medical Association (JAMA)	**Stage I patients:** • 69.9% saw a reduction in BP **Stage II patients:** • 84.4% saw a reduction in BP	https://jamanetwork.com/journals/jama-networkopen/fullarticle/2785012

Kaiser Permanente Southern California recently released the results of an 11-month study that documents the value of monitoring patients at home. The study showed that of 13,000 COVID-19 patients monitored remotely at home from April 2020 through February 2021, only 10% needed to be admitted to the hospital. By monitoring patients' oxygen saturation levels, providers were able to make treatment plan adjustments when a patient's level ran low, thus avoiding hospitalization.

And in 2018, the Journal of the American Medical Association (JAMA) studied the effects of Remote Patient Monitoring for Hypertension. The study found that at 12 weeks, 69.9% of users with stage I hypertension, and 84.8% of users with stage II hypertension, reduced their blood pressure. At the end of year one, those with stage II hypertension who reduced their blood pressure increased to 85.7%, and by year three, it remained high at 84.4%. The average reduction of blood pressure for participants with stage II hypertension was 19.2 mmHg systolic at year one and increased to 20.9 mmHg systolic by year three.

The results of all these studies are clear and consistent: Remote Patient Monitoring has a proven and positive impact on health and wellness outcomes for those patients who participate in a program. From marked improvements in their biometric markers, to fewer hospitalizations, we are just beginning to scratch the surface of what Remote Patient Monitoring means for the long-term health of those suffering from a myriad of chronic diseases. And as the industry matures, and the technology and software continue to improve, we will see increased patient engagement and healthier communities.

Looking to the Future

There's no crystal ball that can predict exactly how the next several years will impact the healthcare industry, but it's a pretty safe bet that Remote Patient Monitoring will not just continue on its current trajectory but see even more explosive growth. In fact, RPM and connected health in general are expected to grow from an estimated $2 billion in 2020 to more than $200 billion in 2025! By adopting and implementing a comprehensive, well-designed Remote Patient Monitoring program, providers and payers can gain a competitive advantage, while improving patient satisfaction, increasing patient engagement, and achieving better clinical outcomes. There's that win-win-win scenario again.

For more information on how to setup a Remote Patient Monitoring program for your patients, or a recommendation on a RPM distribution partner, contact the Customer Success team at Smart Meter.

About Smart Meter

Smart Meter is the leading supplier of cellular-enabled virtual care technologies including the iGlucose®, iBloodPressure™, iScale™, iPulseOx™, and the SmartRPM™ cloud platform. Smart Meter's remote patient monitoring solutions are recognized as the standard for the RPM industry and are regarded for their high patient retention and satisfaction. The unique combination of reliable health data, patient-friendly devices, and platform integrations enable and enhance RPM, Chronic Care Management, Employee Wellness, Population Health, and Telehealth programs for more than 300 RPM distribution partners across the United States. For more information, visit SmartMeterRPM.com.

Contact Smart Meter today to learn more.

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