Trends in Remote Patient Monitoring Use in Traditional Medicare

Remote patient monitoring (RPM), the collection by patients of physiological measurements that are automatically sent to their health care practitioners, has been touted as a promising tool for improving chronic disease management. Interest in RPM has grown because of technological advancements, pandemic-related increases in virtual care, and expanded reimbursement. In 2019, Medicare expanded RPM coverage through new billing codes facilitating monthly payment for monitoring physiological data of any kind (termed *general RPM*).[1] However, given a lack of robust evidence on the clinical benefits of RPM and which patients benefit from RPM, some have raised concerns about potential overuse.[2] This cross-sectional study quantified trends in general RPM use in traditional Medicare.

Invited Commentary
page 1007

Supplemental content

Methods | Using 100% of traditional Medicare claims from January 1, 2018, through September 30, 2021, we identified general RPM use with *Common Procedural Terminology* (*CPT*) codes, including the codes introduced in 2019 (eTable 1 in the Supplement). General RPM use was measured as monthly claims volume per 100 000 enrollees. Enrollee counts included all beneficiaries enrolled in Medicare Parts A and B in a given month. General RPM was compared with continuous glucose monitoring (CGM), a more specific RPM use case with its own previously established *CPT* codes. This study was approved by the Harvard Medical School institutional review board. Informed consent was not required because this was secondary use of administrative data.

To understand how general RPM was used during the pandemic, general RPM services provided from March 1, 2020, through September 30, 2021, were grouped based on practitioner specialty and the first 3 characters of the service's primary *ICD-10* diagnosis code (primary diagnosis). Specialties and diagnoses were aggregated into broader categories to improve interpretability (eTable 2 in the Supplement). For each specialty-primary diagnosis combination, we calculated service volume as a percent of total volume. R, version 4.1.1 and SAS, version 9.4M7 were used for analysis.

Results | From February 2020 to September 2021, general RPM use per month increased from 91 to 594 claims per 100 000 enrollees (increase, 555%) and CGM use increased by 42% (**Figure 1**).

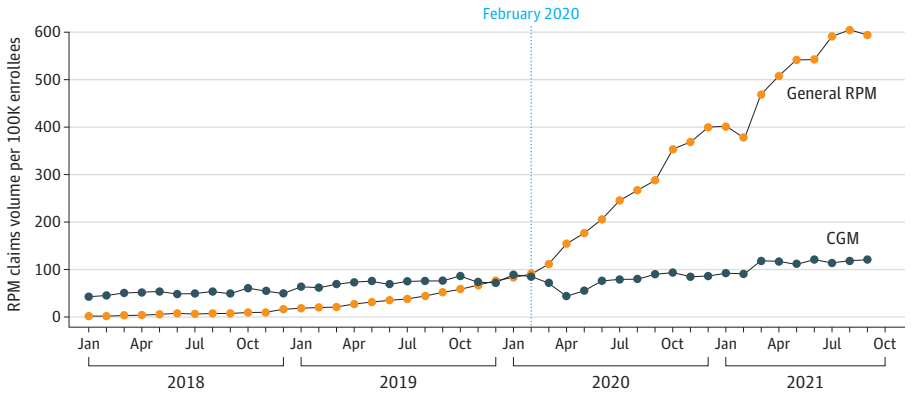
During the pandemic, 63.1% of general RPM services were provided by primary care practitioners (**Figure 2**). The next most common specialties were cardiology (19.7%) and pulmonology (4.1%). The dominant primary diagnosis for general RPM services was hypertension (62.5%). The next most common were diabetes (8.3%), sleep disorders (3.9%), hyperlipidemia (3.5%), and heart disease (3.2%). No other primary diagnosis accounted for more than 3% of services.

Within specialties, primary diagnoses varied. For pulmonologists, sleep disorders and respiratory disorders accounted for 76.4% of general RPM services. Across all specialty-primary diagnosis combinations, hypertension monitoring by primary care practitioners accounted for 42.7% of services.

Discussion | General RPM use in traditional Medicare increased substantially during the COVID-19 pandemic, reaching more than 6 times the prepandemic levels by September 2021. Most general RPM services were for hypertension or diabetes. Although general RPM use was relatively small, if its trajectory continues, the cost implications could be substantial. In 2019, more than 20 million traditional Medicare enrollees had diagnoses for hypertension or diabetes,[3] and a patient can accrue $2270 in general RPM costs annually.[4]

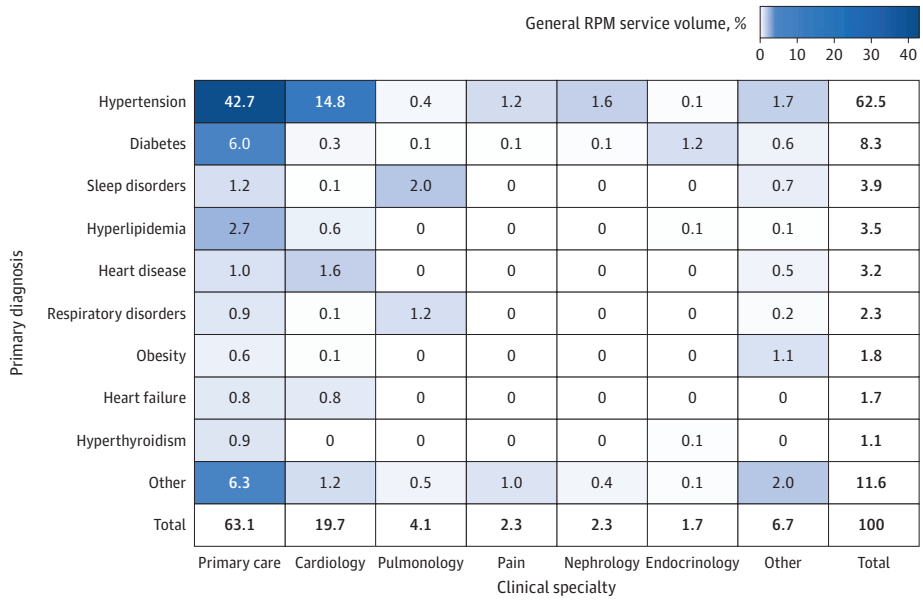
Costs must be balanced with RPM's potential benefits, such as reducing hospital admissions. Randomized clinical trials of RPM showed mixed results overall, but some targeted use cases showed promise.[5] Further research is necessary to identify clinical scenarios in which RPM is most beneficial and to understand which patients are using it and whether there are groups facing access issues.

Figure 1. Monthly Claims for General Remote Patient Monitoring (RPM) and Continuous Glucose Monitoring (CGM)



General RPM claims include any claim with at least 1 general RPM service; CGM claims include any claim with at least 1 CGM service. Volumes were aggregated by month and normalized by enrollee counts. Enrollee counts included all beneficiaries enrolled in Medicare Parts A and B in a given month. Vertical dashed line indicates February 2020 as the last prepandemic calendar month.

Figure 2. General Remote Patient Monitoring (RPM) Use Across Specialty–Primary Diagnosis Combinations During the COVID-19 Pandemic



General RPM services provided from March 2020 through September 2021 were categorized according to the practitioner specialty and primary diagnosis code. Each cell in the heatmap represents a unique specialty–primary diagnosis combination. Rows reflect the top 9 diagnoses by volume, with all remaining diagnoses included as "other." Columns reflect the top 6 practitioner specialties by volume, with all remaining specialties included as "other." Values in each cell reflect the general RPM service volume within that combination as a percent of total general RPM service volume. The cells in the "total" row reflect the total volume for each specialty group, summing across all other rows in the corresponding column. Similarly, the cells in the "total" column reflect the total volume for each diagnosis, summing across all other columns in the corresponding row.

A study limitation is that we categorized RPM use by diagnosis codes but could not observe which physiological measures were transferred. We believe our study provides valuable insights into how RPM use has increased and is used.

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Author Contributions: Mr Tang and Mx Nakamoto had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Tang, Stern, Mehrotra.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Tang, Stern.
Critical revision of the manuscript for important intellectual content: All authors.
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Invited Commentary

Remote Patient Monitoring—Will More Data Lead to More Health?

Technology can transform health care to be more patient-centered and cost-efficient. This idea is the basis for increasing enthusiasm about remote patient monitoring (RPM), technology interventions that enable automated transmission of patients' physiological measurements to their clinicians. The goal of RPM is better longitudinal disease management. To enable RPM adoption, Medicare implemented billing codes in January 2018 that pay clinicians to monitor and manage care based on patient-collected physiological data.[1]

Related article page 1005

Have these changes in reimbursement policy resulted in adoption of RPM services? Tang and colleagues[2] help address this issue by providing an early description of remote monitoring billing code use in the traditional Medicare program. The authors found a rapid 555% increase in RPM use between the COVID-19 prepandemic (February 2020) and pandemic (September 2021) periods. Remote patient monitoring services were most commonly delivered by primary care physicians (63%) and cardiologists (20%), and nearly two-thirds of services focused on transmitting blood pressure data for the management of hypertension.

Study limitations included a descriptive design and inability to provide granular insight about types of data monitored or management steps taken. The study also focused exclusively on RPM, not other forms of telehealth such as virtual visits that underwent staggering increases up to 60- to 80-fold higher than prepandemic levels. the findings by Tang et al[2] highlight 3 steps that policy and practice leaders should take to guide future RPM use.

First, it is paramount to continue conducting robust evaluations of the effect of RPM on patient health outcomes. This is important because unlike flexibilities that Medicare put in place during the pandemic for the use of telehealth generally, the new RPM codes were instituted prior to the pandemic and as such will be retained going forward.

Conceptually, RPM is appealing because it could overcome limitations of traditional management of chronic conditions such as diabetes and hypertension. For instance, blood pressure readings obtained in office settings provide incomplete measures of hypertension control given expected temporal blood pressure variation. Remotely monitored values may also be more convenient for patients. Indeed, multiple at-home readings offer an attractive way to monitor blood pressure, titrate medications, and control hypertension.

Unfortunately, the evidence does not uniformly suggest that RPM improves patient outcomes. Remote monitoring may create benefits for certain populations, such as 1 study[3] that showed modest improvements in glucose control among patients with diabetes. However, RPM has not been consistently associated with greater reductions in blood pressure compared with traditional disease management.[4] The clinical importance of improvements when observed (ie, reductions of 7 mm Hg to 9 mm Hg in systolic blood pressure[5]) remains unclear. Evidence also varies for RPM in subspecialty care, such as for patients with heart failure or cancer. Additional research is needed to refine RPM-based approaches to yield consistently better patient outcomes.

Second, there should be greater prioritization of how RPM can fit in care delivery models, rather than as a stand-alone intervention. Currently, there are separate Medicare billing codes for either monitoring or management of physiological data, incentivizing these activities in stand-alone fashion. However, evidence suggests that remote monitoring may be more effective in conjunction with remote physician care and that it may be ineffective without other elements such as self-care support. Remote patient monitoring technologies may also prove more promising in combination with or as enablers of other novel services, such as hospital-at-home care.

Optimizing care delivery strategies is particularly important because no interventions are immune to unintended consequences. Perhaps surprisingly, RPM may worsen comorbid chronic diseases and other patient outcomes. For example, blood pressure RPM among patients with diabetes was associated with worsened depression and quality of life.[5] Remote monitoring is a tool that can have intended and unintended effects and whose clinical efficacy hinges on care delivery strategies.

Third, as policymakers gain insights about clinical evidence and care delivery strategies, reimbursement for RPM should shift toward value-based payment. Because the evidence for remote monitoring varies by clinical situation and the fact that RPM use could increase spending, these technologies are likely suitable for a long-term payment approach that places cost and quality accountability on care delivery organizations.

Similar to telehealth services more broadly,[6] value-based models can serve as a mechanism to promote RPM in ways that create clinical benefits while curbing overuse. One way to promote this would be to expand flexibilities to bill for RPM for clinicians participating in value-based payment models.[7]

Remote patient monitoring technologies may be game-changers in longitudinal disease management. To reach that destination, however, steps must be taken to generate evidence of clinical benefit, optimize care delivery models, and promote value-based payments for RPM. If data from the study by Tang et al[2] foreshadow a longer trend in rising RPM use, these steps are urgently needed.

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Disclaimer: This article does not necessarily represent the views of the US government or the Department of Veterans Affairs or the State of Pennsylvania.

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COMMENT & RESPONSE

Prostate Cancer Screening at US Cancer Centers

To the Editor In a recent research letter, Dr Koh and colleagues recently reported on prostate-specific antigen (PSA) recommendations on the public websites of 607 US cancer centers.[1] The authors reported that there were differences in screening recommendations based on age, and that discussion of shared decision-making and the potential harms of screening were not acknowledged by many centers on their websites. We have several critiques of their methods and results.

First, PSA screening and other cancer screenings are generally done in the primary care setting as opposed to cancer centers. Websites for cancer centers may have implicit biases given their higher rates of cancer presentation with metastatic disease. Therefore, we would propose evaluating PSA screening recommendations on the websites of primary care centers, although obtaining an adequate number of centers for such a study would likely be challenging.

Second, the authors chose to focus on whether screening risks were discussed on centers' websites.[1] Discussion of the risks and benefits of cancer screening are multifaceted and involve multiple factors, including health literacy, health insurance status, and physician-patient communication.[2] Moreover, diagnosis and management of suspected prostate cancer have become more complicated with the advent of biomarkers and gene panels, as well as new image-guided biopsy procedures.[3,4] We agree with the authors that a website is not the appropriate avenue for discussing the increasingly complex risks or benefits of cancer screening, especially given the complexity behind PSA screening.

Third, the authors chose to focus on whether the cancer centers' websites recommended shared decision-making.[1] Although we agree with the American Cancer Society and the American Urological Association recommendations in favor of shared decision-making, the US Preventive Services Task Force emphasized that "screening for prostate cancer should be an individual one."[5] Given the discrepancy between the 3 PSA screening recommendations regarding shared decision-making, it is not indisputable that centers should emphasize shared decision-making on their websites.

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In Reply We thank Drs Benjamin and Rezazadeh Kalebasty for responding to our Research Letter.[1] With this study, we call attention to the vast differences among US cancer centers in how they advise the public on their websites about