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DATAWATCH

Remote Physiologic Monitoring Use Among Medicaid Population Increased, 2019–21

Remote physiologic monitoring use increased more than 1,300 percent from 2019 to 2021, and use varied by state. This increase was driven by a small number of (predominantly internal medicine) providers. Female beneficiaries, residents of metropolitan areas, and people diagnosed with diabetes or hypertension had the highest rates of use.

Remote physiologic monitoring facilitates the use of technologies, including wearable devices and mobile applications, to transmit health data such as heart rate, blood pressure, and blood oxygen levels directly to providers. Asynchronous remote monitoring may be particularly beneficial to patients who are at high risk for complex medical problems, who have significant barriers to accessing in-person care, or who have greater disease burden. A recent systematic review and meta-analysis, for

example, found that populations experiencing health disparities that received remote monitoring for hypertension saw greater reductions in blood pressure relative to control groups.¹

Remote physiologic monitoring use increased rapidly in the Medicare and commercial markets during the COVID-19 public health emergency. Previous studies have not examined its uptake by Medicaid beneficiaries or variability in use by state.^{2,3} Exhibits 1 and 2 present our analysis of Medicaid claims data from all US states; Washington, D.C.; Puerto Rico; and the US Vir-

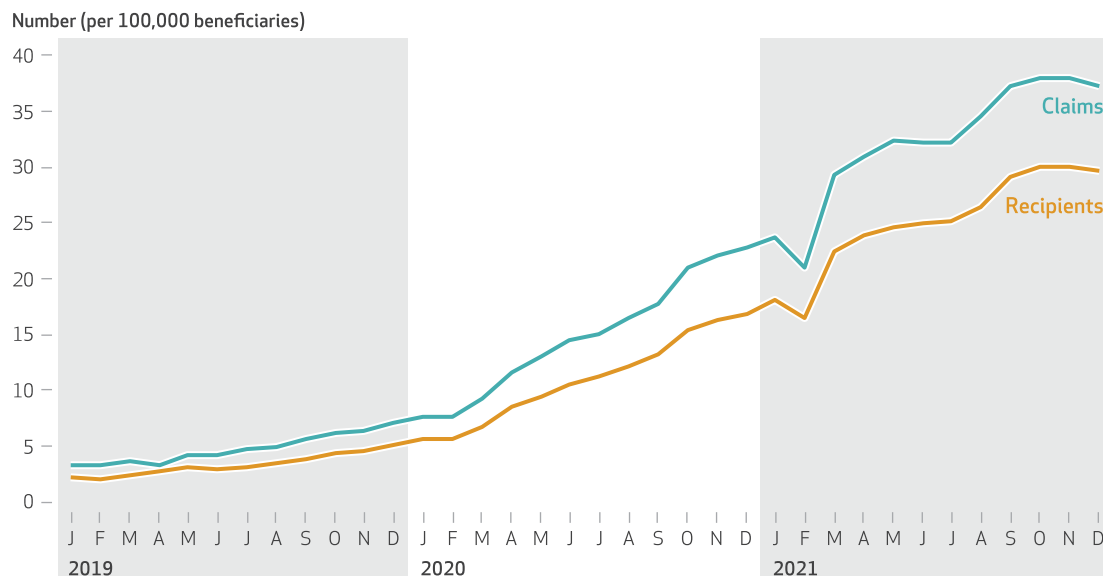
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EXHIBIT 1

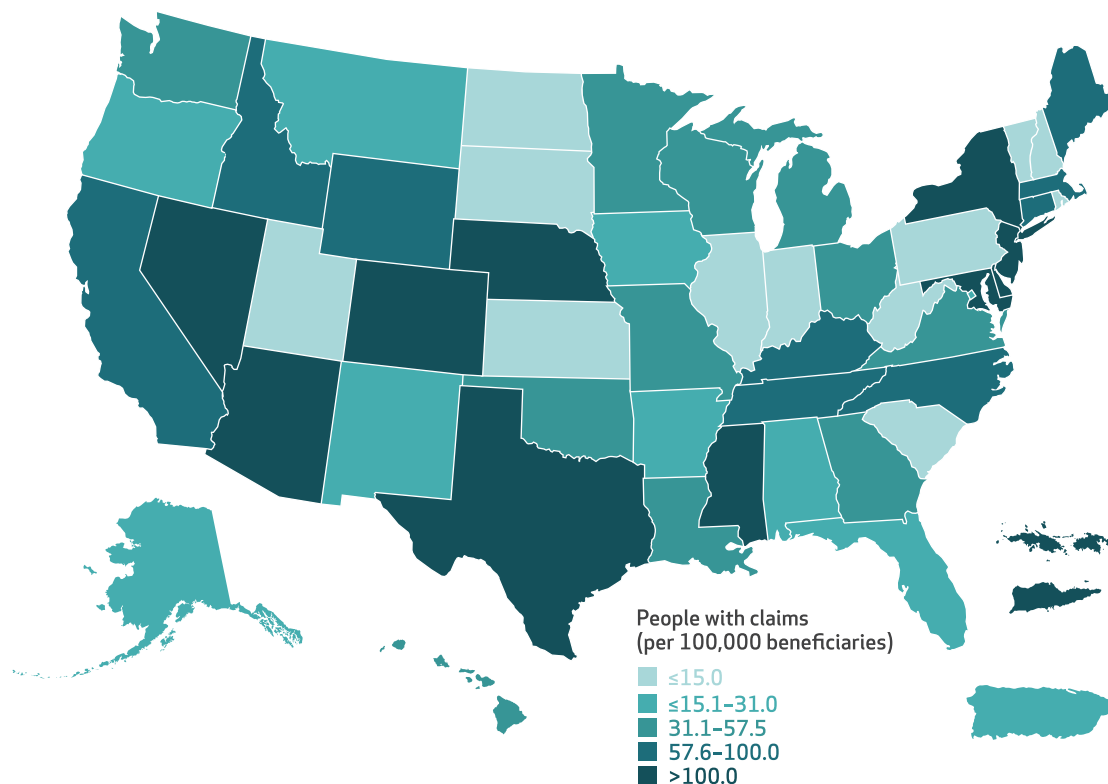
Rate of remote physiologic monitoring (RPM) use per 100,000 Medicaid beneficiaries, January 2019–December 2021



SOURCE Transformed Medicaid Statistical Information System Analytic Files (TAF) data from January 1, 2019, to December 31, 2021.
NOTES Medicaid beneficiaries were classified as RPM recipients if they had at least one claim with an RPM procedure code in 2021. Monthly rates of RPM use at the national level were calculated as the number of distinct RPM recipients per 100,000 total Medicaid beneficiaries enrolled in a given month. The number of RPM claims per month was calculated by summing the number of distinct claim identifiers per 100,000 total Medicaid beneficiaries enrolled in a given month.

EXHIBIT 2

Rate of remote physiologic monitoring (RPM) use per 100,000 Medicaid beneficiaries, by state, 2021



SOURCE Transformed Medicaid Statistical Information System Analytic Files (TAF) data from January 1 to December 31, 2021. **NOTES** "States" include Washington, D.C.; Puerto Rico; and the US Virgin Islands. Medicaid beneficiaries were classified as RPM recipients if they had at least one claim with an RPM procedure code in 2021. Annual rates of RPM use by state were calculated as the number of distinct RPM recipients in 2021 per 100,000 total Medicaid beneficiaries residing in a state in 2021.

gin Islands from 2019 to 2021 (in this article, we refer to all of these as "states" for brevity). We found that the monthly rate of remote physiologic monitoring use among Medicaid beneficiaries increased by more than 1,300 percent from January 2019 to December 2021; we also found wide variability in use across states. Medicaid beneficiaries, specifically, are disproportionately likely to suffer from many conditions that lend themselves to remote physiologic monitoring, including hypertension, diabetes, and heart disease,⁴ and variability in use by state may be driven by heterogeneity in Medicaid coverage policies, disease burden, broadband access, or other factors.

In 2019, the Centers for Medicare and Medicaid Services adopted new billing codes to support Medicare reimbursement for remote physiologic monitoring services, and public and private payers expanded coverage and reimbursement for it during the COVID-19 public health emergency.⁵⁻⁷ Payers are now considering reimbursement policies for remote physiologic monitoring moving forward and, in some cases,

are starting to restrict coverage for remote physiologic monitoring services that were covered during the public health emergency.⁸ Assessing trends in Medicaid remote physiologic monitoring use, variability in uptake by state, and characteristics of providers and recipients will help policy makers as they determine how to pay for these services.

Study Data And Methods

We used Transformed Medicaid Statistical Information System Analytic Files (TAF) data to investigate remote physiologic monitoring use among Medicaid beneficiaries from January 1, 2019, to December 31, 2021. TAF data contain beneficiary-level Medicaid data including claims, encounters, and enrollment information from all state Medicaid programs. These data include comprehensive information on inpatient, outpatient, long-term care, and pharmacy claims and encounters.

We identified remote physiologic monitoring claims using Current Procedural Terminology

We found dramatic variability in use at the state level, implying that some states may benefit from greater adoption and use.

codes leveraged in previous analyses of remote physiologic monitoring use (99091, 99453, 99454, 99457, and 99458).^{2,3} People were classified as recipients if they had at least one claim with a remote physiologic monitoring procedure code during the period 2019–21. Monthly rates of use at the national level were calculated as the number of distinct recipients per 100,000 total Medicaid beneficiaries enrolled in a given month. Annual rates of remote physiologic monitoring use by state were calculated as the number of distinct recipients per 100,000 total Medicaid beneficiaries residing in a state at any point in a given year. We identified whether states had Medicaid remote physiologic monitoring coverage policies in place in March 2023 (the most recent data available when this study was conducted), based on information from the Center for Connected Health Policy, and we classified states as having a policy if they had any policy documented by the Center for Connected Health Policy, regardless of the specific aspects of the remote physiologic monitoring coverage.⁹ Remote physiologic monitoring providers were identified using National Provider Identifiers. Analyses examining the characteristics of providers excluded claims that were billed using organizational National Provider Identifiers.

We acknowledge several limitations. The TAF data only include information necessary for claims adjudication and may contain potential errors or inaccuracies in coding or have missing data. These data also fail to capture information on service use that is not billed to Medicaid. TAF data also are subject to state-specific data quality issues that are documented in the Transformed Medicaid Statistical Information System Data Quality Atlas. This analysis largely relied on procedure codes recorded on outpatient medical claims; the Data Quality Atlas only documents three states (North Dakota, Utah, and Washing-

ton) that had issues with this data field during the period 2019–21, and observed rates in these states were within the range observed in other states, suggesting that the results observed here were not driven by variations in the quality and completeness of data across states.¹⁰ Given that this study only included Medicaid beneficiaries, results might not be generalizable to other patient populations.

Study Results

MONTHLY CLAIMS VOLUME The number of remote physiologic monitoring recipients per 100,000 Medicaid beneficiaries increased more than 1,300 percent during the study period, from 2.1 recipients per 100,000 in January 2019 to 29.6 recipients per 100,000 in December 2021 (exhibit 1).

STATE-BY-STATE ANALYSIS Across US states, remote physiologic monitoring use in 2021 ranged dramatically from 0 recipients per 100,000 beneficiaries in Vermont to 217.7 recipients per 100,000 beneficiaries in New Jersey (see exhibit 2 and online appendix exhibit A1).¹¹

As of March 2023, only thirty-four states had documented policies regarding Medicaid reimbursement for remote physiologic monitoring.⁹ However, we found that all states except Vermont billed remote physiologic monitoring claims in 2021, despite the lack of documented policies in some states. We found that the rate of remote physiologic monitoring use in 2021 was more than 30 percent higher among states that had documented reimbursement policies relative to states that did not (69.9 recipients per 100,000 Medicaid beneficiaries in states with policies versus 53.7 recipients per 100,000 in states without policies; data not shown).

We also observed dramatic variability across states in the rate of change in remote physiologic monitoring use from 2019 to 2021 (see appendix exhibit A1).¹¹ All states that had nonzero rates of remote physiologic monitoring use in 2019 had higher use rates in 2021, with the exception of Puerto Rico, which experienced a 61 percent decrease in the number of remote physiologic monitoring recipients per 100,000 from 2019 to 2021. Minnesota had the greatest rate of increase among states with nonzero rates in 2019, going from 0.3 recipients per 100,000 in 2019 to 48.1 recipients per 100,000 in 2021.

CHARACTERISTICS OF PROVIDERS We identified more than 5,600 distinct providers who billed remote physiologic monitoring claims for Medicaid beneficiaries in 2021, but more than half of all such claims that year were attributable to 5 percent of providers, representing 283 individual providers (exhibit 3). Physicians specializing

EXHIBIT 3

Concentration of remote physiologic monitoring (RPM) claims and patient volume among Medicaid beneficiaries, by provider percentile of RPM claims billed, 2021

Provider RPM claim volume percentile	Providers	RPM claims		RPM patients	
		Number	Percent	Number	Percent
96–100%	283	162,765	57	27,894	45
76–95%	1,142	93,067	33	21,716	35
0–75%	4,216	28,058	10	11,816	19
Total	5,641	283,890	100	61,426	100

SOURCE Transformed Medicaid Statistical Information System Analytic Files (TAF) data from January 1 to December 31, 2021. **NOTES** This table describes the concentration of RPM claims and RPM patients among a small number of RPM providers, and it only includes providers who billed at least one claim with an RPM procedure code in 2021. Providers were assigned percentiles according to the number of RPM claims billed in 2021. For example, the provider who billed the most RPM claims in 2021 was assigned to the 100th percentile. RPM claims that listed organizational National Provider Identifiers were excluded from this portion of the analysis.

in internal medicine, general practice, and family practice were the most common types of providers billing remote physiologic monitoring claims (exhibit 4).

CHARACTERISTICS OF RECIPIENTS Of the approximately 98.5 million Medicaid beneficiaries captured in the TAF data in 2021, nearly 67,000 had a remote physiologic monitoring claim.

Rates of use were highest among older beneficiaries, those who identified as female, people residing in metropolitan areas, enrollees in limited benefit managed care plans, and people diagnosed with diabetes or hypertension (exhibit 5). The most common primary diagnoses recorded on remote physiologic monitoring claims included hypertension, diabetes, obesity, and sleep disorders (exhibit 4).

Discussion

We found that remote physiologic monitoring use increased dramatically from 2019 to 2021 and accelerated after the COVID-19 public health emergency began in March 2020. Previous analyses examining the use of other telehealth services also found that use rapidly increased after the COVID-19 public health emergency but decreased to near prepandemic levels in late 2021.^{12–14} Although remote physiologic monitoring use rates among Medicaid beneficiaries appear to have plateaued in late 2021, rates in December 2021 were still far higher than they were in early 2020.

Despite the nationwide increase in remote physiologic monitoring use, we found dramatic

EXHIBIT 4

Most common provider types and primary diagnoses associated with remote physiologic monitoring claims among Medicaid beneficiaries, 2021

	Patient count	Claim count
PROVIDER TYPE		
Physician, internal medicine	17,704	104,593
Physician, general practice	14,382	69,950
Physician, family practice	11,681	60,646
Nurse practitioner	7,923	37,151
Physician, cardiology	3,958	25,450
Clinic or group practice	1,877	24,590
All other providers	1,770	6,891
Physician, pulmonary disease	1,748	5,383
Physician assistant	1,460	4,750
Physician, anesthesiology	1,369	8,770
DIAGNOSIS		
Essential hypertension	35,244	198,505
Diabetes mellitus with complication	5,452	20,874
Hypertension with complications and secondary hypertension	3,794	17,982
Diabetes mellitus without complication	3,874	14,351
Obesity	1,921	7,331
Disorders of lipid metabolism	1,858	6,725
Sleep wake disorders	3,005	6,184
Chronic obstructive pulmonary disease and bronchiectasis	1,399	5,023
Heart failure	1,365	4,858
Exposure, encounters, screening, or contact with infectious disease	2,242	3,545

SOURCE Transformed Medicaid Statistical Information System Analytic Files (TAF) data from January 1 to December 31, 2021. **NOTES** Provider types were identified using classifications recorded in the TAF data, and providers missing specialty classifications were excluded. Diagnoses were categorized using Clinical Classifications Software Refined from the Agency for Healthcare Research and Quality, which categorizes International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, diagnosis codes into higher-level, clinically relevant categories to support reporting.

variability in use at the state level, implying that some states may benefit from greater adoption and use, at least for certain conditions. Rates of use observed in this study were particularly high among people diagnosed with diabetes or hypertension. Previous research has found that remote physiologic monitoring may be a cost-effective treatment for hypertension, but evidence supporting its use for diabetes is mixed.¹⁵ Rates of use were also higher among older people, potentially because these people are more likely to have health conditions amenable to remote physiologic monitoring support, and among people in urban areas, which may reflect better access to internet infrastructure among these people.

Our finding that states with documented remote physiologic monitoring coverage policies had higher rates of use suggests that providers may be more willing and able to provide remote physiologic monitoring services to Medicaid beneficiaries in states with clear coverage policies or that states adopted coverage policies in response to high rates of use. However, we also identified high rates of use in some states without documented coverage policies; providers in these states may be responding to informal guidance from Medicaid agencies or to increasing commercial coverage of remote physiologic monitoring. Notably, remote physiologic monitoring coverage policies may vary considerably, and this analysis did not seek to assess whether specific components of coverage affect use. Future research should examine associations between specific remote physiologic monitoring coverage policies and trends in use at the state level.

State-level variation in remote physiologic monitoring use may also be attributable to variation in rates of chronic conditions such as diabetes or hypertension or to variation in the severity of these conditions. However, the state-level rates of use observed in this study varied to a much greater degree than state-level rates of chronic conditions. For example, the state-level rate of remote physiologic monitoring use observed in this study ranged from 1.6 recipients to 217.7 recipients per 100,000 Medicaid beneficiaries—a greater than 100-fold difference. Meanwhile, state-level rates of diabetes mortality in 2021 ranged from 15.9 to 47.6 per 100,000 deaths, representing only a threefold difference.¹⁶ Future research should seek to increase understanding of factors driving variation in rates of remote physiologic monitoring use at the state level and may consider other factors including income and age distribution, access to broadband internet, and variations in social drivers of health.

EXHIBIT 5

Characteristics of Medicaid beneficiaries receiving remote physiologic monitoring (RPM) services, 2021

Characteristics	RPM recipients (%) ^a	Rate of RPM use per 100,000 beneficiaries ^b
Age group (years)		
Younger than 18	39.1	5.3
19–25	10.1	11.7
26–35	13.6	24.0
36–45	10.3	50.9
46–65	16.2	138.4
Older than 65	8.8	381.4
Missing	2.0	9.1
Sex		
Female	54.6	77.6
Male	44.9	56.9
Missing	0.6	7.8
Metropolitan Statistical Area status		
Metropolitan	83.6	72.2
Micropolitan	8.6	49.2
Rural	7.8	42.2
Managed care versus fee-for-service enrollment		
Fee-for-service	20.2	77.5
Limited managed care	9.6	118.6
Comprehensive managed care	70.2	58.2
Diagnoses		
Diabetes	44.0	545.2
Hypertension	73.1	715.7

SOURCE Transformed Medicaid Statistical Information System Analytic Files (TAF) data from January 1 to December 31, 2021. **NOTE** Medicaid beneficiaries were classified as RPM recipients if they had at least one claim with an RPM procedure code in 2021. ^aCalculated by dividing the number of RPM recipients in a given category by the total number of RPM recipients in 2021 (that is, 39.1 percent of all RPM recipients in 2021 were younger than age 18). ^bCalculated as the number of RPM recipients in a given category divided by the total number of Medicaid beneficiaries in that category captured in the TAF data in 2021 (that is, 2,036 of 38,514,456 total Medicaid beneficiaries younger than age 18 received RPM in 2021, giving a rate of RPM use of 5.3 per 100,000 enrollees younger than age 18).

State Medicaid agencies may consider using multiple levers to increase appropriate remote physiologic monitoring use, such as ensuring adequate coverage and reimbursement for remote physiologic monitoring, disseminating updated coverage policies to providers likely to bill these services, developing technical assistance resources for providers, and working with commercial payers to encourage benefit alignment. At the same time, previous research has found mixed evidence regarding the cost-effectiveness of remote physiologic monitoring.¹⁵ Remote physiologic monitoring services have also been the subject of fraudulent billing schemes.¹⁷ Medicaid agencies seeking to promote the use of these services should seek to strike a balance between promoting remote physiologic monitoring use for cost-effective indications and mitigating the risks for fraud, waste, and abuse associated with these services.

The growing interest in and increasing re-

imbursement for remote physiologic monitoring services offer promising opportunities for improving chronic disease management and patient outcomes, particularly among the Medicaid population, which comprises the most vulnerable and underserved populations in the United States. With continued advancements in technol-

ogy and increasing acceptance of virtual care, remote physiologic monitoring services have the potential to play an increasingly important role in shaping the future of health care and ensuring that all patients have access to high-quality care. ■

To access the authors' disclosures, click on the Details tab of the article online.

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