



Trends in Remote Patient Monitoring Before and After the COVID-19 Pandemic in the United States: A Rural/Urban and Racial/Ethnic Group Comparison

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BACKGROUND

- Remote patient monitoring (RPM) electronically collects and transmits health data from one location to the patient's health care provider(s) in a different location.
- Changing CMS reimbursement policies in 2017 led approximately 88% of health systems to invest in RPM technology by 2019.
- During the COVID-19 public health emergency (PHE), new and existing patients could use RPM for acute/chronic conditions, allowing virtual consent.
- Despite these changes, systems have struggled in RPM adoption, and little is known about RPM utilization by Medicare Fee-for-service (FFS) beneficiaries, a population most likely to use RPM.

METHODS

Data Sources:

- A 20% random sample of Medicare FFS beneficiaries capped at 12.8 million random beneficiaries was obtained from the Research Data Assistance Center (ResDAC)

Study Population:

- RPM beneficiaries enrolled in Parts A and B were identified using 2018-2020 outpatient claims.
- RPM was defined as a procedure code of 99091, 99453, 99454, 99457, 99458, 99473, or 99474; additional procedure codes included with modifier code 95 were 93229, 93268, 93270, 93271, 93272.
- Beneficiaries were stratified by:
 - Rural/urban status: Rural-Urban Commuting Area (RUCA) codes were linked to beneficiary zip code of residence; beneficiaries residing in RUCA 1 to 3 were classified as urban residents.
 - Race/ethnicity: Using the Medicare enrollment file, beneficiaries were classified as Hispanic, Non-Hispanic White (NHW), Non-Hispanic Black (NHB), and Non-Hispanic Asian/Pacific Islander/American Indian/other (Other).

RESULTS

- Monthly rates of RPM users per 100,000 enrolled Medicare beneficiaries were calculated, stratified by rural/urban status and by race/ethnicity.
- RPM users increased from 2 to 240 Medicare beneficiaries from Jan 2018 to Dec 2020.
- The year-dependent study sample fluctuated between 48-54% female, 71-73% NHW, 83-86% rural residents, 77-80% Medicare and Medicaid dual eligibles, and 46-53% beneficiaries from the South. (Supplemental Table A)
- After the PHE, urban vs. rural beneficiaries experienced a level change of 24.20 RPM users per month ($p=0.0243$).
- The difference in trend for urban vs. rural beneficiaries significantly increased by 7.85 RPM users per month from before to after the declaration of the PHE ($p<0.0001$).
- The difference in trend for NHB vs. NHW beneficiaries significantly increased by 12.43 RPM users per month from before to after the declaration of the PHE ($p<0.0001$).
- The difference in trend for Hispanic and beneficiaries of other races, as compared to NHW beneficiaries, significantly increased by 7.48 and 16.93 RPM users per month respectively from before to after the declaration of the PHE ($p<0.0001$ for both).
- Models fitted on the data as stratified by rural/urban status showed similar results. (Supplemental Table B; Supplemental Figures A and B)

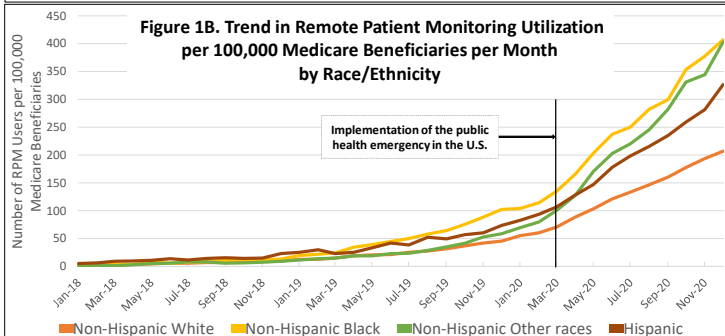
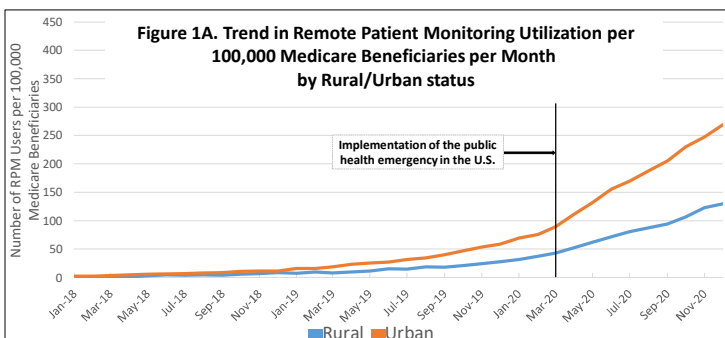


Table 1. Interrupted Time Series Model Coefficients for Models Testing Rural/Urban Status and Race/Ethnicity Differences

	Rural status		Race/ethnicity							
	Rural vs. Urban		NHB vs. NHW		Hispanic vs. NHW		Other vs. NHW			
	estimate	p-value	estimate	p-value	estimate	p-value	estimate	p-value		
Intercept	-17.0591	0.0445	-10.6570	0.0412	-10.657	0.0412	-10.657	0.0412		
C pre-trend	3.1871	<.0001	2.2446	<.0001	2.2446	<.0001	2.2446	<.0001		
C post-level change	40.7241	<.0001	24.1503	<.0001	24.1503	<.0001	24.1503	<.0001		
C post-trend change	16.0514	<.0001	12.5016	<.0001	12.5016	<.0001	12.5016	<.0001		
T vs. C pre-level diff	9.5322	0.3130	-14.9544	0.2319	-0.5997	0.9475	-6.0255	0.5492		
T vs. C pre-trend diff	-1.6983	0.0095	2.3945	0.0047	1.0427	0.1016	0.6669	0.3495		
T vs. C post-level diff	-24.2018	0.0243	14.4894	0.2499	0.6625	0.9458	10.6757	0.3430		
T vs. C slope diff-in-diff	-7.8472	<.0001	12.4288	<.0001	7.4770	<.0001	16.9311	<.0001		

T= Treatment group; C=Control group; NHW=Non-Hispanic White; NHB=Non-Hispanic Black; Other=Non-Hispanic Other Races, including Asian, Pacific Islander, Alaskan Native, American Indian, or other

CONCLUSION

Slower rates of RPM use were observed among rural residents. With benefits of RPM having been established, this slower rate may result in worse health outcomes among rural residents. Targeted interventions are needed to increase RPM utilization overall, but particularly among rural residents.

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