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## Utilization of Telemedicine Among Rural Medicare Beneficiaries

**Ateev Mehrotra, MD,**

Harvard Medical School, Boston, Massachusetts

**Anupam B. Jena, MD, PhD,**

Harvard Medical School, Boston, Massachusetts

**Alisa B. Busch, MD,**

McLean Hospital, Belmont, Massachusetts

**Jeffrey Souza, MA,**

Harvard Medical School, Boston, Massachusetts

**Lori Uscher-Pines, PhD, and**

RAND Corporation, Arlington, Virginia

**Bruce E. Landon, MD**

Harvard Medical School, Boston, Massachusetts

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Telemedicine may increase access and improve quality, particularly in rural areas.<sup>1</sup> Because inadequate reimbursement may limit telemedicine use, 29 states have passed telemedicine parity laws mandating that commercial insurers reimburse telemedicine visits.<sup>2</sup> In contrast, Medicare limits telemedicine reimbursement to select live video encounters with the patient at a clinic or facility in a rural area.<sup>3</sup> Federal legislation has been proposed to expand Medicare telemedicine coverage. To inform the debate regarding telemedicine expansion, we describe trends in telemedicine utilization in Medicare from 2004–2013.

### Methods

Using claims from a 20% random sample of traditional Medicare beneficiaries, we defined telemedicine visits as all encounters with a GT (via interactive audio and video telecommunications system) or GQ (via asynchronous telecommunications system) modifier

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**Corresponding Author:** Ateev Mehrotra, MD, Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave, Boston, MA 02115. (mehrotra@hcp.med.harvard.edu).

**Author Contributions:** Dr Mehrotra had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

*Study concept and design:* Mehrotra, Busch, Landon.

*Acquisition, analysis, or interpretation of data:* Mehrotra, Jena, Souza, Uscher-Pines, Landon.

*Drafting of the manuscript:* Mehrotra, Busch.

Critical revision of the manuscript for important intellectual content: Jena, Souza, Uscher-Pines, Landon.

*Statistical analysis:* Mehrotra, Busch, Souza.

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*Study supervision:* Jena, Landon.

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on the Current Procedural Terminology code or a telemedicine-specific code (G0425-7, G0406-8, G0459) to a rural beneficiary (29% of all beneficiaries) using Medicare's definition of rural.<sup>3</sup>

We categorized the visit reason using the first diagnosis code and the location (eg, facility or outpatient clinic). We characterized visits by beneficiary Medicare eligibility category (age, disability, end-stage renal disease), number of chronic illnesses, and the median family income of the beneficiary's zip code. Although parity laws focus on the commercially insured, they may encourage overall interest in telemedicine and drive higher utilization within Medicare.<sup>4</sup> We assessed this by comparing 2013 Medicare telemedicine utilization (using a 2-tailed  $\chi^2$  test) and rate of utilization growth from 2004-2013 (estimating a linear regression with interaction between year and state parity law status) in the 12 states with and 38 without parity laws as of 2011 (states listed in Figure footnote). A *P* value less than .05 was considered significant; SAS (SAS Institute), version 9.4, was used. The Harvard institutional review board determined the study was exempt.

## Results

Telemedicine visits among rural Medicare beneficiaries increased from 7015 in 2004 to 107 955 in 2013 (annual visit growth rate, 28.0% [95% CI, 27.5%-28.5%]). Among the 41 070 (0.7%) of rural beneficiaries who received a telemedicine visit in 2013, the mean number of visits was 2.6 (SD, 3.0). Most visits occurred in outpatient clinics; 12.5% occurred in a hospital or skilled nursing facility. Mental health conditions were responsible for 78.9% of visits (International Classification of Diseases, Ninth Revision code: 291-292, 295-316 [except 310], and 305.1).

Rural beneficiaries who received a 2013 telemedicine visit were more likely to be younger than 65 years, have entered Medicare due to disability, have more comorbidities, and live in a poorer community compared with those who did not receive a telemedicine visit (Table).

Telemedicine utilization in 2013 was higher in the 12 states with parity laws as of 2011 (visits per 1000 beneficiaries, 8.5 in states with parity laws vs 6.2 in states without parity laws, *P* < .01), although 2004-2013 growth in visits per capita was not different between the 2 sets of states (difference in growth per 1000 beneficiaries, 0.17 visits per year [95% CI, -0.25-0.59], *P* = .43) (Figure).

## Discussion

Although the number of Medicare telemedicine visits increased more than 25% a year for the past decade, in 2013, less than 1% of rural Medicare beneficiaries received a telemedicine visit, a lower proportion than in the Veterans Administration, in which 12% of beneficiaries receive some form of telehealth in a given year.<sup>6</sup>

Disabled rural beneficiaries with mental illness who were relatively sicker and poorer were most likely to have received telemedicine services. Although telemedicine appeared to serve those with poor access, whether this increased access translates into better outcomes is unknown.

Proposed federal legislation would encourage greater use of telemedicine through expanded reimbursement. In contrast to others,<sup>4</sup> we found that state laws that mandate commercial insurance reimbursement of telemedicine were not associated with faster growth in Medicare telemedicine use. Our results emphasize that nonreimbursement factors may be limiting growth of telemedicine including state licensure laws and restrictions that a patient must be hosted at a clinic or facility.

Limitations of this analysis include defining the reason for a visit based on the first-listed diagnosis rather than secondary or later diagnoses. Also, because data limitations did not allow us to determine whether the visit occurred in a rural community, we excluded visits for beneficiaries who lived in urban areas.

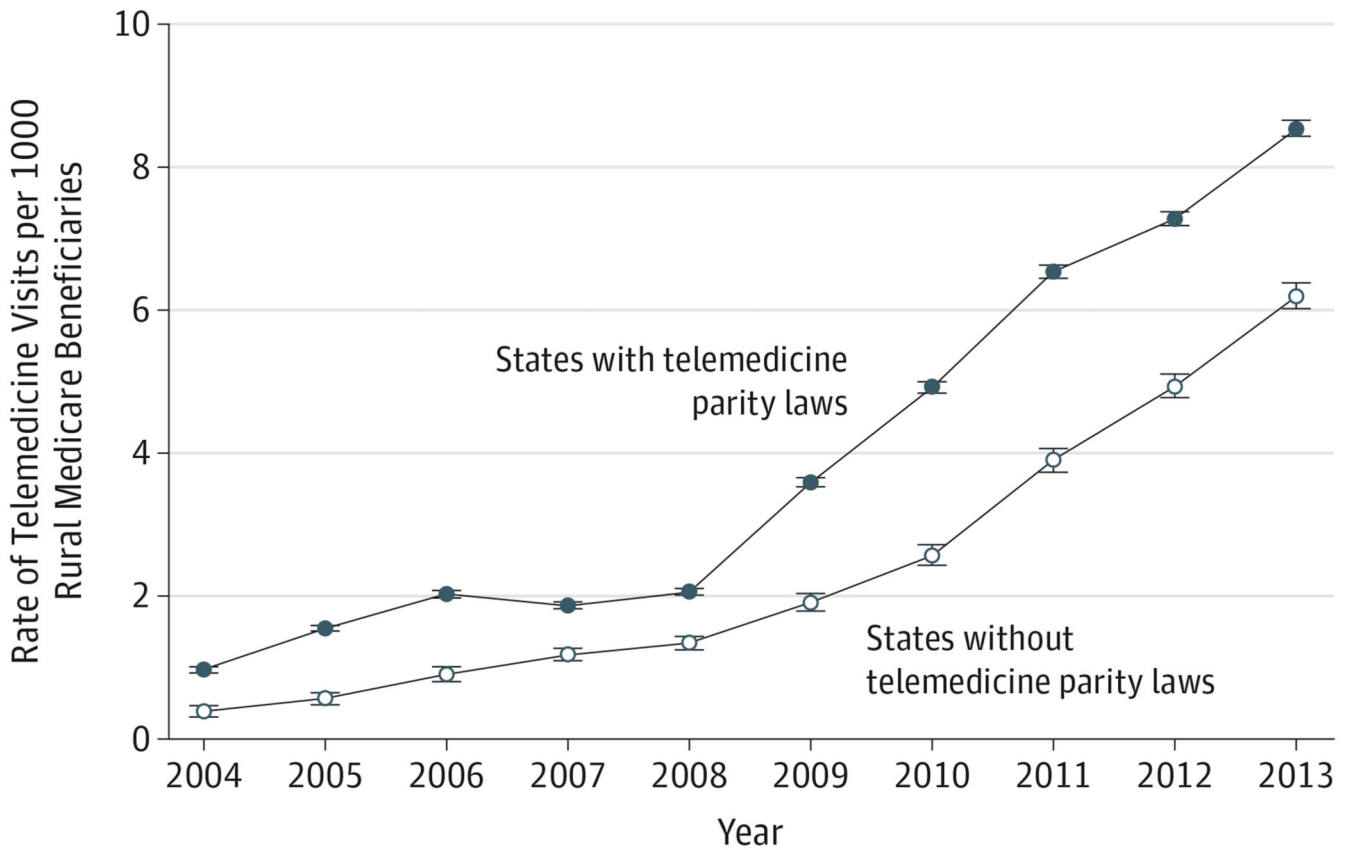
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**Figure. Rates of Telemedicine Visits per 1000 Rural Medicare Beneficiaries in States With and Without Telemedicine Parity Laws in 2011, 2004-2013<sup>a</sup>**

Error bars indicate 95% CIs.

<sup>a</sup> The 12 states with a telemedicine parity law enacted by 2011 were included in the parity law cohort regardless of when the law was enacted. The states are Louisiana (enacted 1995), California (1996), Oklahoma (1997), Texas (1997), Hawaii (1999), Kentucky (2000), Colorado (2001), Georgia (2006), Maine (2009), New Hampshire (2009), Oregon (2009), and Virginia (2010).<sup>5</sup>

**Table**  
**Patient Characteristics of Rural Medicare Beneficiaries With and Without a Telemedicine Visit in 2013<sup>a</sup>**

	No. of Patients (%)	
	Received a Telemedicine Visit (n = 41 070)	Did Not Receive Telemedicine Visit (n = 15 749 605)
Age, y		
<65	21 575 (52.5)	2 839 170 (18.0)
65-74	8440 (20.6)	7 228 665 (45.9)
75-84	6600 (16.1)	3 922 080 (24.9)
85	4455 (10.8)	1 759 690 (11.2)
Women	23 790 (57.9)	8 448 535 (53.6)
Race		
White non-Hispanic	35 590 (86.7)	14 065 790 (89.3)
Black non-Hispanic	3000 (7.3)	1 066 845 (6.8)
Other	2480 (6.0)	616 970 (3.9)
Original reason for Medicare entitlement		
Disability	25 885 (63.0)	4 210 065 (26.7)
Age	14 820 (36.1)	11 457 050 (72.7)
End-stage renal disease <sup>b</sup>	365 (0.9)	82 490 (0.5)
No. of comorbidities		
0	6160 (15.0)	8 276 890 (52.6)
1-2	17 050 (41.5)	4 420 275 (28.1)
3	17 860 (43.5)	3 052 440 (19.4)
Family income <sup>c</sup>		
<2 × poverty	715 (1.7)	170 610 (1.1)
2-<4 × poverty	33 735 (82.1)	11 174 165 (70.9)
4-<6 × poverty	4945 (12.0)	3 530 230 (22.4)
6 × poverty	125 (0.3)	298 945 (1.9)
Missing	1550 (3.8)	575 655 (3.7)

<sup>a</sup>Our analyses were based on a 20% random sample of beneficiaries with traditional Medicare. We weighted our analyses by 5 to provide estimates representative of the rural Medicare population. Differences between 2 groups of patients on each set of characteristics were significantly different with a *P* value of less than .001.

<sup>b</sup>If beneficiary had both end-stage renal disease and disability, they were included in end-stage renal disease category.

<sup>c</sup>Income based on median family income within zip code of beneficiary's residence from US Census data. Not all zip codes could not be matched to US Census data.