**State-level variations of telehealth use among Medicare fee-for-service beneficiaries, 2016-2017**

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**Abstract**

Delivery of health care through telehealth services have increased spurred by advancement in telecommunication technologies, changes in policies and regulations, expansions of coverages, and adoptions by providers and patients. With the rapid change and growth in telemedicine, an evaluation of the patterns of telehealth use among older Americans is needed.

We found significant geographic variations in the patterns of telehealth services utilization and availability across the US states between 2016 and 2017. Exhibit 1 shows that most states experienced a decrease in telehealth services utilized per 1000 Medicare FFS beneficiaries (median and interquartile range (IQR) = -90 (-175, 0), with the largest decrease seen in Alabama, followed by Rohde Island (RI), and New Jersey (NJ), while the largest increase seen in the District of Columbia (DC) and Wyoming (WY). A similarly decreasing pattern was seen in the telehealth services utilized per provider (median (IQR) =11.07 (-18.49, -6.27)). In contrast, there was a increase in the providers with telehealth services per 1000 Medicare FFS beneficiaries (median (IQR) = 0.1 (0.03, 0.21)), with the highest increase seen in DC followed by Mississippi (MS), while the largest decrease in WY followed by New Mexico (NM).

Using the most publicly available Medicare data, we provided national and state-level estimates of the telehealth service utilization and ranked the service types and provider specialty types. Knowing how telehealth services were used among older adults before the current pandemic is critical for developing informed policy and capacity building for future telehealth use.

**Study data and methods**

We used two most recent (2016-2017) public use files (PUF) from the CMS. The Medicare Provider Utilization and Payment Data: Physician and Other Supplier PUF and the Medicare FFS enrollment PUF. The provider-PUF included summaries of service and procedures at the provider level, and information about the provider such as unique national provider identifier (NPI), address, and specialty type. Only services utilized by Medicare FFS beneficiaries were aggregated by individual providers, and providers with fewer than ten services were suppressed for privacy concerns. The total number of FFS beneficiaries at the state-level were from the enrollment-PUF.

The outcomes were indicators of telehealth service availability and utilization expressed by three ratios: telehealth services utilized per Medicare FFS beneficiaries, providers with telehealth services per 1000 Medicare FFS beneficiaries, and telehealth services utilized per provider. We extracted from the provider-PUF records with the healthcare common procedure coding system (HCPCS) codes indicative of telehealth services covered by the CMS, and aggregated the sum of telehealth services and providers, respectively, at the state level. We summarized telehealth service utilization by year and by provider specialties, calculated the differences between 2016 and 2017, ranked the top 30 services utilized by provider specialty types and by HCPCS codes, and mapped the state-level data. We also tested the spatial autocorrelation of the three ratios across the contiguous US using Moran’s *I* statistics.

The limitations of the study included the reliance on HCPCS codes to define telehealth services, which lacked detailed information of the content or quality of the services. Data were based on utilization from Medicare FFS beneficiaries and their physicians, which may not be representative for those enrolled in Medicare Advantage or other insurance types, younger population, nor representative of the physicians’ entire practice. Due to lag in data reporting, the latest available data were for 2017.

**Study results**

Exhibit 2 showed that, in 2017, most Mountain and Pacific states had below national median level of 6.8 telehealth services utilized per Medicare FFS beneficiaries; (b) most Southern states, as well as California, Nevada, and New Jersey had above national median level of 535 telehealth services utilized per provider; and (c) most West North Central states, as well as Alaska and Massachusetts had above national median level of 12.3 providers with telehealth services per 1000 Medicare FFS beneficiaries. These spatial patterns appeared to be non-random (p-value for the Moran’s *I* statistic <0.0001).

From 2016 to 2017, there was an increase in the absolute numbers at the state level for FFS beneficiaries (median (IQR) = 17644 (7810, 32619), telehealth services (median (IQR) = 28556 (-236, 109681)), and providers who furnished telehealth services (median (IQR) = 305 (136, 532)), respectively (Exhibit 3). However, after adjusting for the total number of beneficiaries, the relative telehealth use reduced for the majority of the states, with only seven states experienced an increase (Kentucky, Oklahoma, Colorado, North Dakota (ND), MS, Arkansas, and DC), and seven states remained unchanged (WY, Washington, Arizona, Nebraska, Hawaii, Montana, and North Carolina). The contrast between the largest decrease and the largest increase was striking. For example, the changes was -1010 and 490 telehealth services per 1000 Medicare FFS beneficiaries in Alabama and DC, respectively. Similarly, after adjusting for the state level total number of providers, most states saw a decrease in telehealth services per provider, and the two extreme changes were -121 and 13.6 telehealth services per provider in AL and DC, respectively (Exhibit 2 and Exhibit 3). On the other hand, there was an increase in the providers per 1000 FFS beneficiaries, with only nine states experienced a decrease (WY, NM, RI, Maine, New Hampshire, Vermont, Delaware, ND, and Oregon). These spatial patterns in telehealth services per 1000 FFS beneficiaries and per provider were not random (p-value = 0.044 and 0.003, respectively), but appeared to be random for providers per 1000 FFS beneficiaries (p-value = 0.11).

The relative ranking of telehealth services use patterns by provider specialty type and by HCPCS codes were similar between 2016 and 2017 (Exhibit 4 and Exhibit 5). Internal medicine, family medicine, and nurse practitioner were the top three provider specialty types that furnished the telehealth services, representing approximately 41% of all telehealth services used (Exhibit 4). The top three most utilized telehealth service types had HCPCS code 99214, 99213, and 99232, representing approximately 65% of all telehealth services used (Exhibit 5). The former two codes belong to a family of codes (99211-99215) for office or other outpatient services with established patients, while 99213 code belong to a family of codes (99231-99233) for subsequent hospital care with new or established patients.

**Discussion**

2016-2017 changes by …

Levels at state level

Levels by provider

Implications:

In the largest safety-Net System, the NYC Health + Hospitals, the use of telehealth increased from 500 visits per month to 83,000 billable televisits and more than 30,000 behavioral health encounters via telephone and video between March and April. (Lau et al., 2020)

Report: <http://www.medpac.gov/docs/default-source/reports/chapter-8-telehealth-services-and-the-medicare-program-june-2016-report-.pdf?sfvrsn=0>

**Conclusion**

Utilization of telehealth services among Medicare FFS beneficiaries experienced varied changing patterns between 2016 and 2017. With the on-going COVID-19 pandemic, there has been a rapid change in … The expansion of telehealth is … . Howe and to what scale telehealth uses are expanding for the older population in the US is still unclear, but this analysis of the most up-to-date publicly available data can help inform the assessment of the current telehealth use and future policy.

**Exhibit 1.** State-level variations in Medicare covered telehealth service utilization in 2017, as indicated by three ratios: (a) telehealth services utilized per Medicare FFS beneficiaries, (b) telehealth services utilized per provider, and (c) providers with telehealth services per 1000 Medicare FFS beneficiaries. The color scale shows the 10th, 25th, 50th, 75th, 90th, and 95th percentiles.



**Exhibit 2.** Changes in Medicare covered telehealth service utilization by state from 2016 to 2017, as indicated by increase (warmer color) or decrease (colder color) in three ratios: (a) telehealth services utilized per 1000 Medicare FFS beneficiaries, (b) telehealth services utilized per provider, and (c) providers with telehealth services per 1000 Medicare FFS beneficiaries. The color scale shows the 1st, 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles.



**Exhibit 3.** Summary statistics of the utilizations of Medicare covered telehealth services, 2016-2017.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | | **Mean (SD)** | **Median (IQR)** | **Min (state) – Max (state)** |
| **2016** | Telehealth services per state | 7,347,169 (7,942,885) | 5,019,948 (1,759,580 **–** 9,805,007) | 448,172 (AK) **–** 33,477,504 (FL) |
| Medicare FFS beneficiaries per state | 1,033,114 (1,073,560) | 761,400 (302,172 **–**1,190,729) | 74,097 (DC) **–** 5,338,224 (CA) |
| Telehealth services per Medicare FFS beneficiaries | 7 (2) | 7 (6 **–** 8) | 3 (MN) **–** 12 (DC) |
| Providers with telehealth service per state | 12,468 (11,989) | 8,682 (4,008 **–** 15,214) | 1,120 (WY) **–** 49,987 (CA) |
| Providers with telehealth service per 1000 Medicare FFS beneficiaries | 13 (3) | 12 (11 **–** 14) | 9 (AL) **–** 28(DC) |
| Telehealth services per provider | 534.7 (146.3568) | 531.3 (407.5 **–** 638.2) | 208.5 (MN) **–** 815.8 (MS) |
| **2017** | Telehealth services per state | 7,372,401 (7,954,465) | 5,048,504 (1,794,121 **–** 9,967,211) | 468,479 (AK) **–** 33,290,068 (FL) |
| Medicare FFS beneficiaries per state | 5,338,224 (1,101,445) | 789,379 (309,536 **–** 1,222,558) | 76,084 (DC) **–** 5,478,663 (CA) |
| Telehealth services per Medicare FFS beneficiaries | 7 (2) | 12 (6 **–** 8) | 3 (MN) **–** 12 (DC) |
| Providers with telehealth service per state | 12,898 (12,388) | 8,932 (4,122 **–** 15,695) | 1,130 (WY) **–** 51,721 (CA) |
| Providers with telehealth service per 1000 Medicare FFS beneficiaries | 13 (3) | 12 (11 **–** 14) | 9 (AL) **–** 28 (DC) |
| Telehealth services per provider | 535 (146) | 531 (408 **–** 638) | 209 (MN) **–** 816 (MS) |
| **Changes**  **from**  **2016**  **to**  **2017** | Telehealth services per state | 25,232 (208,384) | 28,556 (-236 **–** 109,681) | -846,136(AL) **–** 525,233(CA) |
| Medicare FFS beneficiaries per state | 26,108 (28874) | 17,644 (7,810 **–** 32,618) | 1,987(DC) **–** 140,439(CA) |
| Telehealth services per 1000 Medicare FFS beneficiaries | -121 (223) | -94 (-179**–** -4) | -1,008(AL) **–** 491(DC) |
| Providers with telehealth service per state | 429 (415) | 305 (136 **–** 532) | 7(NM, RI) **–** 1,734(CA) |
| Providers with telehealth service per 1000 Medicare FFS beneficiaries | 0.09 (0.17) | 0.1 (0.03 **–**0.21) | -0.34(WY) **–** 0.59(DC) |
| Telehealth services per provider | 3 (19) | 8 (-0.93 **–** 12.80) | -97(AL) **–** 28(DC) |

**Note:** The summary statistics were based on data from the Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use File (PUF) file and the Medicare Fee-For-Service Enrollment PUF data for calendar years 2016-2017. We aggregated data at the state level. The provider PUF includes summaries of service and procedures provided by physicians and other healthcare professionals to FFS Medicare beneficiaries, thus the data are at individual provider level instead of individual patient level. Only providers with more than 11 services were available from the provider PUF data. Data were based on claims for fee-for-service (FFS) Medicare enrollees only.

**Exhibit 4.** Top 30 Medicare covered telehealth services by provider specialty type in 2016 and 2017.



**Exhibit 5.** Top 30 Medicare covered telehealth services by HCPCS codes in 2016 and 2017.

