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Legislation Increased Medicare Telestroke Billing, But Underbilling And Erroneous Billing Remain Common

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ABSTRACT In the Furthering Access to Stroke Telemedicine (FAST) Act, passed as part of a budget omnibus in 2018, Congress permanently expanded Medicare payment for telemedicine consultations for acute stroke (“telestroke”) from delivery only in rural areas to delivery in both urban and rural areas, effective January 1, 2019. Using a controlled time-series analysis, we found that one year after FAST Act implementation, billing for Medicare telestroke increased substantially in emergency departments at both directly affected urban hospitals and indirectly affected rural hospitals. However, at that time only a minority of hospitals with known telestroke capacity had ever billed Medicare for that service, and there was substantial billing inconsistent with Medicare requirements. As Congress considers options for Medicare telemedicine payment after the COVID-19 pandemic, our findings, which are consistent with confusion among providers regarding telemedicine billing requirements, suggest that simplified payment rules would help ensure that expanded reimbursement achieves its intended impact.

Before the COVID-19 pandemic, Medicare telemedicine reimbursement was largely limited to services provided for rural residents.¹ In response to the pandemic, Medicare and other payers temporarily expanded reimbursement for telemedicine to all beneficiaries, both rural and urban.² Which telemedicine services should be reimbursed post-pandemic is being debated in Congress, in state legislatures, and among private insurers.³ Both patients and clinicians appreciate telemedicine’s convenience and its ability to improve access.^{4–6} However, the Congressional Budget Office and Medicare Payment Advisory Commission are concerned that broad Medicare telemedicine reimbursement expansions may increase spending without commensurate improvements in outcomes.^{7,8}

One potential compromise is to wait and see:

continue the temporary expansions for one to two more years while collecting relevant data, then reassess telemedicine’s impact on spending and quality.⁹ Another strategy is to maintain Medicare telemedicine reimbursement in urban areas, but only for selected conditions. For other conditions, reimbursement would revert to pre-pandemic restrictions, which provide for ongoing selection of additional conditions for permanent expansion.

Indeed, Congress has already invoked that provision to permanently expand Medicare telemedicine reimbursement for selected conditions. Telemedicine consultation for acute stroke (“telestroke”) was the first such expansion. Under the Furthering Access to Stroke Telemedicine (FAST) Act, passed as part of a budget omnibus in 2018, Congress expanded Medicare telestroke payment effective January 1, 2019.¹⁰ Subsequently, Congress applied the same condition-specific,

permanent expansion strategy to telemedicine for substance abuse disorder treatment in the Substance Use-Disorder Prevention That Promotes Opioid Recovery and Treatment for Patients and Communities (SUPPORT) Act of 2018,¹¹ and to telemedicine for mental illness conditions in the Consolidated Appropriations Act, 2021.¹² Condition-specific selective expansions are not unique to Medicare; several states have followed a similar strategy for non-Medicare services.¹³

The impact of such selective expansions has not been examined. In this article we examine the selective expansion of telestroke, given that it was the first Medicare telemedicine payment to apply to both urban and rural residents and was implemented more than a year before the COVID-19 pandemic. However, it is important to acknowledge several unique aspects of the telestroke expansion that may limit its generalizability. The evidence base demonstrating telestroke's effectiveness in improving treatment and reducing mortality is particularly robust.^{14–16} Furthermore, telestroke is a service initiated by an emergency department (ED) provider, not the patient. In addition, survey and other data collected directly from hospitals before the start of the COVID-19 pandemic indicate that telestroke was already used by roughly one-third of all US hospitals, including many urban hospitals.^{17,18} Medicare reimbursement might not have been critical for sustaining these programs.¹⁹

In this study we used Medicare data to compare billing trends for hospital ED visits for telestroke and a control condition, behavioral health (“telepsychiatry”). For urban EDs, the FAST Act expanded reimbursement for telestroke but did not expand reimbursement for telepsychiatry. This telestroke-telepsychiatry comparison accounts for secular changes in telehealth use that may have occurred during the study period. We also examined the impact of Medicare's temporary expansion of telemedicine reimbursement for all conditions that began in March 2020 at the start of the COVID-19 pandemic. This allowed us to examine the evidence of spillover effects from broadening access to telemedicine in general even though telestroke reimbursement had already been expanded before that point.

Study Data And Methods

OVERVIEW We studied Medicare fee-for-service claims for the five-year period between January 2016 and March 2021. That time span covered three billing periods for Medicare telestroke: pre-FAST Act (2016–18), FAST Act (January 1, 2019–February 29, 2020), and COVID-19 pan-

demic (March 1, 2020–March 31, 2021). We contrasted billing trends for two forms of telemedicine that Medicare enrollees commonly receive in EDs: telestroke (for those presenting with acute stroke) and a control service, telepsychiatry (for those presenting with acute mental illness). Telepsychiatry reimbursement was limited to rural hospitals until the COVID-19 pandemic period.

TELESTROKE AND TELEPSYCHIATRY Telestroke for acute stroke was introduced in the early 2000s.²⁰ An ED telestroke consultation is a real-time videoconference involving the patient, a remote stroke specialist, and a bedside ED provider. In a typical encounter, the stroke specialist interviews and examines the patient, reviews any brain imaging, determines likely diagnosis and eligibility for a treatment to restore brain blood flow, assesses the need for hospital transfer, and recommends other treatments. Stroke specialists typically work for large regional stroke centers or private telestroke companies.¹⁷ Telepsychiatry in the ED also involves three parties: the ED provider, the patient, and a behavioral health specialist. The specialist, typically a psychiatrist, evaluates the patient via videoconference and then gives the ED provider recommendations for appropriate treatment and management. Hospitals with telestroke or telepsychiatry services typically pay a monthly subscription fee for the specialty care, although some pay a per consultation fee.^{21,22}

EVOLVING PAYMENT COVERAGE Reimbursement for telestroke and telepsychiatry is paid to the outside specialist or “distant provider” who provides the consultation. Distant providers commonly submit a separate professional bill for the consultation, as they would if the service were delivered in person. The facility hosting the telemedicine service can also submit a separate bill for hosting the telemedicine service using Current Procedural Terminology (CPT) code Q3014. There are arrangements where a hospital can bill on behalf of the consulting physician.

In the pre-FAST Act period, Medicare paid for telestroke and telepsychiatry services only at rural EDs. Consulting providers could use telemedicine-specific CPT codes, modifier codes, or place-of-service codes to submit their professional bills. In the FAST Act period, telestroke became eligible for reimbursement across all EDs (rural and urban), whereas telepsychiatry remained reimbursable in rural EDs only. In its guidance to providers, the Centers for Medicare and Medicaid Services (CMS) stated that the G0 modifier should “be appended on claims for telehealth services that are furnished on or after January 1, 2019, for purposes of diagnosis, eval-

uation, or treatment of symptoms of an acute stroke. Make certain your billing staff is aware of this new code.”¹⁰

In the COVID-19 pandemic period, Medicare temporarily eliminated the “rural only” telemedicine payment restriction for all conditions. Therefore, during this period of our study, both telestroke and telepsychiatry were eligible for reimbursement across rural and urban EDs alike. As noted above, in the Consolidated Appropriations Act, 2021, Congress permanently extended coverage of telepsychiatry even after the pandemic-related public health emergency has ended.

IDENTIFYING ‘EPISODES’ OF ACUTE TREATMENT

We used inpatient and outpatient claims from acute care and critical access hospitals to identify care episodes by the primary diagnosis for the ED visit, observation stay, or hospital admission: ischemic stroke and transient ischemic attacks (International Statistical Classification of Diseases and Related Health Problems, Tenth Revision [ICD-10], codes I63–I66, I67.89, and G45) and mental illness conditions (ICD-10 codes F10–F69 and F80–F99). We rolled contiguous inpatient, ED, and observation stay claims into an episode. The episode ends at the point of discharge from the hospital, ED, or observation stay. For example, if a patient with a stroke went to hospital A’s ED, transferred to hospital B’s ED, and then was hospitalized at hospital B, the sequence of claims would be rolled up into a single episode. We categorized each episode according to the first hospital that cared for the patient. We limited our analyses to beneficiaries enrolled in traditional Medicare (Parts A and B) during the month their episode started.

IDENTIFYING EPISODES BY CONSULTATION

TYPE We employed a two-step process to identify telestroke and telepsychiatry consultations. First, we identified telemedicine consultations using Medicare’s list of telemedicine-specific Healthcare Common Procedure Coding System (HCPCS)/CPT codes (G0406–8, G0425–7, and G0508–9), modifier codes (GT, 95, and G0), and place-of-service code (02) in the Carrier (“professional”) line file.

Second, we defined telestroke and telepsychiatry consultations as telemedicine consultations on claims billed within one day (plus or minus one day) of the start of a beneficiary’s episode of care and that met the following criteria: For acute stroke episodes, a telemedicine consultation was telestroke if it was submitted by a neurologist (provider specialty code 13), had the G0 modifier code (telestroke-specific modifier code), had a diagnosis code for stroke or transient ischemic attack, or was submitted on the same claim as the ED visit. For mental illness episodes, we identi-

There is active debate on whether and how Medicare and other payers should permanently expand coverage of telemedicine use.

fied telepsychiatry if the consultation was submitted by a psychiatrist (provider specialty code 26), had a diagnosis code for mental illness, or was submitted on the same claim as the ED visit. It is rare (1.5 percent of all consultations), but some facilities will submit telemedicine consultations on the same claim as the ED visit.

HOSPITAL CHARACTERISTICS Using the hospital’s physical address, we categorized each hospital as rural or urban, using Medicare’s rural definition. Hospital address information was obtained from the American Hospital Association Annual Survey database.

EXTERNAL DATABASE OF TELESTROKE CAPACITY Medicare data capture only telemedicine consultations submitted for reimbursement. Clinicians might not submit telestroke and telepsychiatry claims for several reasons. For example, volume may be too low to justify the effort needed to set up the administrative structure in a setting where the specialist’s time is already supported by other means (for example, the hospital is already paying a monthly fee). To understand how frequently hospitals with telestroke capacity billed for telestroke, we used a previously created database of 1,300 hospitals with known telestroke capacity.¹⁷ The database was compiled from both academic and nonacademic networks, as well as private telemedicine companies, which directly provided our research team with a list of the hospitals for which they conducted telestroke consults and the date those services were first introduced. For a subset of hospitals, we also received the number of telestroke consultations per month across all payers (Medicare and non-Medicare).

Among these hospitals in this database, we focused on the 1,166 hospitals—both rural and urban—that had telestroke capacity as of January 2018, twelve months before the implementation of the FAST Act. In each of the hospitals we quan-

Our analyses highlight critical nuances in the response to the selective expansion of telestroke.

tified whether there were any stroke episodes with a Medicare telestroke consultation from the start of our study period (January 2016) through the end of 2018, 2019, and 2020. This analysis measured the extent of underbilling of telemedicine by clinicians and hospitals.

ANALYSES We calculated and plotted the percentage of stroke and mental health episodes in a given month with an associated telemedicine consultation. To measure the impact of the FAST Act on telestroke billing, we conducted an interrupted time-series analysis to estimate changes in telemedicine claims among stroke and mental illness episodes across the study period. We used a segmented linear regression model^{23,24} with splines to assess changes from the pre-FAST Act period to the FAST Act period and the COVID-19 pandemic period (see the online appendix for more details).²⁵ This model allowed us to characterize each period by how much the intercept changed (that is, the level change) and by how much the monthly rate of growth changed from the prior period (that is, the incremental rate of growth). We report both the absolute change and the relative change in use of telemedicine, which we report in percentages alongside the model estimates (95% confidence intervals for the estimates and relative changes are in the appendix).²⁵ To assess differences in trends between rural and urban hospital episodes, we estimated an analogous segmented regression model that included interactions with an indicator for rural (versus urban) hospitals.

We ran all models in Stata, version 17. The Harvard Medical School Institutional Review Board granted approval for this study. Patient informed consent was not required, given that the data were deidentified.

LIMITATIONS This study had several limitations. First, we did not study patients with primary diagnoses other than acute stroke/transient ischemic attack or mental illness, nor did we study patients cared for in facilities other than hospital EDs. This strategy helped us maintain cleaner definitions of *telestroke* and *telepsychia-*

try, but it may have also excluded some relevant episodes. For example, we would exclude a patient who presented with weakness who received a telemedicine consultation for concern of acute stroke but is ultimately diagnosed with another condition. Second, to identify telestroke and telepsychiatry consultations, we identified professional telemedicine claims that took place during the episode of care. Although we implemented a number of checks, as described above, it is possible that some of the telemedicine consultations identified were not actually instances of telestroke or telepsychiatry.

Third, it is important to emphasize that we were capturing telemedicine billing and not the actual use of telemedicine consultations. Our analysis of billing at hospitals with known telestroke capacity highlights that many Medicare telestroke consultations likely did not result in a telemedicine bill. Fourth, our analyses focused on only two applications of hospital-based telemedicine: acute treatment of stroke and mental illness. The generalizability of these patterns to other applications, and in particular clinic consultations outside the ED, is unknown. Finally, we examined the selective expansion of Medicare telemedicine before the COVID-19 pandemic. It is unclear whether the findings of this selective expansion generalize to the situation in early 2022, where telemedicine is reimbursed widely and there is policy debate on whether to restrict telemedicine to select conditions after the COVID-19 health emergency ends; moreover, even if a policy of selective expansion is pursued moving forward, it will be under much-changed circumstances.

Study Results

From January 1, 2016, through March 31, 2021, there were 1,832,094 stroke and 3,694,397 mental illness episodes in 4,420 and 4,751 hospitals, respectively.

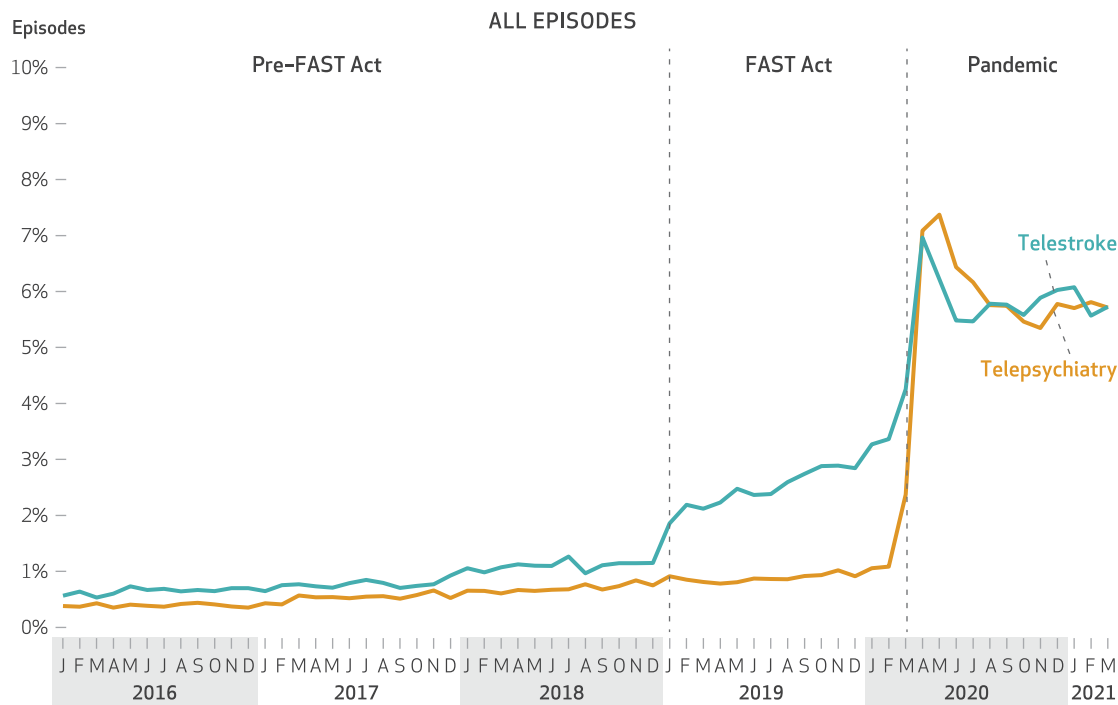
DIFFERENTIAL CHANGES IN TELEMEDICINE

CLAIMS The FAST Act went into effect January 1, 2019. The fraction of all stroke episodes with a telestroke claim more than doubled (from 1.1 percent in December 2018, or 347 of 30,210 strokes, to 2.8 percent in December 2019, or 835 of 29,358 strokes; exhibit 1). In our model, relative to the yearly rate of growth pre-FAST Act and relative to growth of telepsychiatry, telestroke grew by 448 percent during the FAST Act period ($p < 0.001$; exhibit 2).

The implementation of the FAST Act expanded reimbursement for telestroke to urban hospitals; rural hospitals were already eligible for reimbursement. Even so, we observed similar increases in telestroke claims in both urban and

EXHIBIT 1

Percent of hospital episodes for acute stroke (telestroke) and acute mental illness (telepsychiatry) associated with a billed emergency department Medicare telemedicine consultation, January 2016–March 2021



SOURCE Authors' analysis of a 100 percent sample of fee-for-service Medicare claim records, January 2016–March 2021. **NOTES** During the period before the Furthering Access to Stroke Telemedicine Act of 2018 (pre-FAST Act), only care in rural communities was eligible for Medicare telemedicine reimbursement. During the FAST Act period, Medicare telestroke was eligible in both rural and urban communities, but Medicare telepsychiatry remained eligible only in rural communities. During the pandemic period, all Medicare telemedicine visits were eligible for reimbursement.

EXHIBIT 2

Estimated changes in Medicare emergency department telestroke and telepsychiatry billing after payment expansions, January 2016–March 2021

	Telestroke claims ^a		Telepsychiatry claims ^b		Difference between telestroke and telepsychiatry	
	Episodes with telemedicine consultation ^c	Change relative to prior period	Episodes with telemedicine consultation ^c	Change relative to prior period	Episodes with telemedicine consultation ^c	Change relative to prior period
Pre-FAST Act period						
Baseline telemedicine billing rate	0.51%	— ^d	0.31%	— ^d	0.19%	— ^d
Yearly rate of growth during period	0.21	— ^d	0.15	— ^d	0.07	— ^d
FAST Act period						
Period change in billing rate	0.67	131%	0.02	6%	0.65	127%
Yearly rate of growth during period	1.00	476	0.06	40	0.94	448
Pandemic period						
Period change in billing rate	2.30	194	4.53	1,349	−2.24	−193
Yearly rate of growth during period	−0.89	−72	0.12	57	−1.00	−83

SOURCE Authors' analysis of a 100 percent sample of fee-for-service Medicare claim records, January 2016–March 2021. **NOTES** During the period before the Furthering Access to Stroke Telemedicine Act of 2018 (pre-FAST Act, January 2016–December 2018), only care in rural communities was eligible for Medicare telemedicine reimbursement. During the FAST Act period (January 1, 2019–February 29, 2020), Medicare telestroke was eligible in both rural and urban communities, whereas Medicare telepsychiatry remained eligible only in rural communities. During the pandemic period (March 1, 2020–March 31, 2021), all Medicare telemedicine visits were eligible for reimbursement. 95% confidence intervals for the estimates are in the appendix (see note 25 in text). ^a1,832,094 acute stroke episodes. ^b3,694,397 acute mental illness episodes. ^cPercentage points. ^dNot applicable.

rural hospitals during the FAST Act period (exhibit 3). There was no significant difference in the period change or the yearly rate of growth between rural and urban hospitals (level shift, $p = 0.88$; growth rate, $p = 0.16$; see the appendix for full model details).²⁵

CHANGES IN TELESTROKE AND TELEPSYCHIATRY CLAIMS After the COVID-19 pandemic began in the US in March 2020, the fractions of stroke and acute mental illness episodes with an associated Medicare telemedicine claim increased dramatically (exhibit 1). Between February 2020 and April 2020, episodes with telestroke claims increased 3.6 percentage points (more than a 100 percent increase), and episodes with telepsychiatry claims increased 6.0 percentage points (more than a 500 percent increase). After this initial peak in telemedicine claims per episode, the upward trend for both telestroke and telepsychiatry decreased. Similar patterns were observed among episodes starting in rural and urban hospitals (exhibit 2).

ACCURACY OF BILLING By statute in the pre-FAST Act period, telemedicine reimbursement was limited to rural hospitals. However, we still

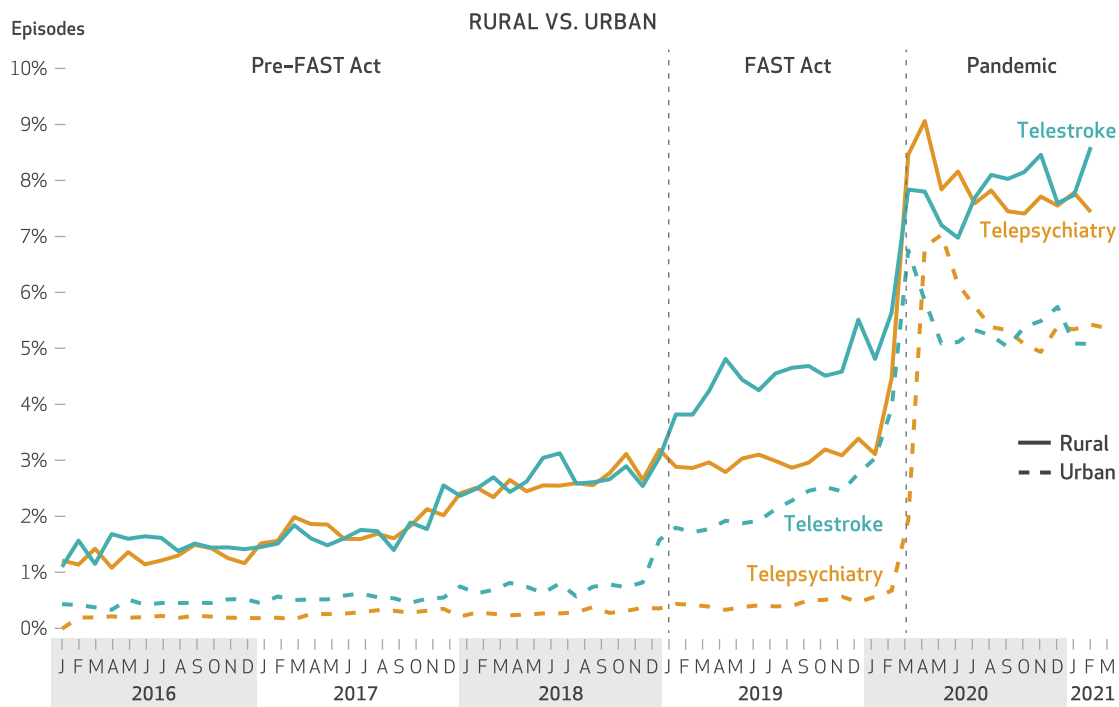
observed substantial telestroke and telepsychiatry use at urban hospitals during this period (exhibit 2). We linked 55 percent of all telestroke claims (5,111/9,249) and 41 percent of all telepsychiatry claims (8,028/19,676) to an urban hospital in the pre-FAST Act period (exhibit 3).

We also observed considerable variety in the telemedicine codes used to bill for telestroke (exhibit 4). After the FAST Act was implemented in January 2019, per Medicare's guidance,¹⁰ telestroke consultations were supposed to use the new G0 modifier code, which was introduced as part of the legislation to specify that the consultation was for telestroke. Yet only about half of telestroke claims in the pandemic period used the G0 modifier code (exhibit 4). The telestroke consults that did not use the G0 code used various combinations of inpatient telemedicine HCPCS/CPT codes; the GT modifier code; the place-of-service code for telehealth; and the 95 modifier code, which was recommended by Medicare for telemedicine services during the COVID-19 pandemic period.²⁶

FRACTION OF HOSPITALS THAT SUBMITTED A BILL FOR TELESTROKE Among the 1,166 hospitals

EXHIBIT 3

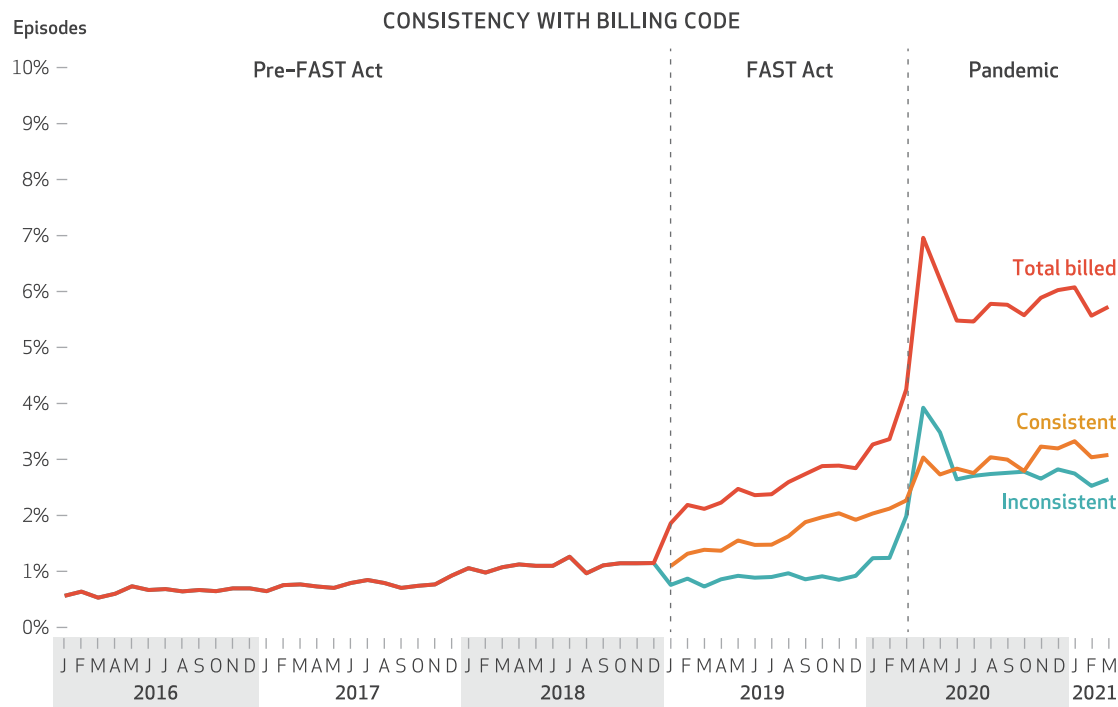
Percent of rural and urban hospital episodes for acute stroke (telestroke) and acute mental illness (telepsychiatry) associated with a billed emergency department Medicare telemedicine consultation, January 2016–March 2021



SOURCE Authors' analysis of a 100 percent sample of fee-for-service Medicare claim records, January 2016–March 2021. **NOTES** During the period before the Furthering Access to Stroke Telemedicine Act of 2018 (pre-FAST Act), only care in rural communities was eligible for Medicare telemedicine reimbursement. During the FAST Act period, Medicare telestroke was eligible in both rural and urban communities, but Medicare telepsychiatry remained eligible only in rural communities. During the pandemic period, all Medicare telemedicine visits were eligible for reimbursement.

EXHIBIT 4

Acute stroke episodes with a billed emergency department Medicare telestroke consultation, by consistency with Medicare billing code regulations, January 2016–March 2021



SOURCE Authors' analysis of a 100 percent sample of fee-for-service Medicare claim records, January 2016–March 2021. **NOTES** As part of the Furthering Access to Stroke Telemedicine Act of 2018 (FAST Act), the Healthcare Common Procedure Coding System (HCPCS) modifier code G0 was introduced for use, beginning in January 2019, to indicate or verify that the professional consultation billed was for Medicare telestroke (that is, was a telemedicine consultation for acute stroke and was reimbursable under current regulations). Required use of the modifier was therefore in continuous effect during both the FAST Act and pandemic periods. “Consistent” Medicare telestroke claims during those periods included the G0 modifier. “Inconsistent” telestroke claims during those periods did not include the G0 modifier, instead providing another telemedicine code in its place (HCPCS/Current Procedural Terminology codes G0406–8, G0425–7, and G0508–9; modifier codes GT and 95; or place-of-service code 02).

with known telestroke capacity before 2018, 27 percent had any Medicare telestroke claims by the end of 2018 (before and gearing up for FAST Act implementation), and 39 percent had any Medicare telestroke claims by the end of 2019 (within one year of FAST Act implementation). By the end of 2020, seven months into the COVID-19 pandemic period, 60 percent of these hospitals had any Medicare telestroke claims (data not shown).

Discussion

There is active debate on whether and how Medicare and other payers should permanently expand coverage of telemedicine use after the COVID-19 pandemic. For Medicare, one option being considered is to permanently continue telemedicine reimbursement for services delivered at both rural and urban locations, but only for selected conditions. That is, the approach to payment before the COVID-19 emergency would

largely resume with the expectation that the number of conditions covered in urban areas would slowly expand.

This study advances the literature by examining billing trends in Medicare telestroke, the first condition for which Medicare payment in urban areas was selectively expanded. In the first year after implementation, the FAST Act was associated with a more than doubling in Medicare telestroke billing. This should be viewed as a success of the legislation, as it demonstrates that clinicians and telestroke organizations responded quickly to recognize its potential to improve care for acute stroke.

At the same time, our analyses highlight critical nuances in the response to the selective expansion of telestroke. The FAST Act applied directly only to urban hospitals; reimbursement for Medicare telestroke at rural hospitals had already existed for many years. Nevertheless, we found that even before FAST Act implementation, the majority of Medicare telestroke bill-

Our results highlight that selective Medicare telehealth reimbursement expansions alone may have a limited impact.

ing came from urban hospitals, and after implementation, similar billing increases were seen at rural and urban sites.

We hypothesize that these patterns were due in part to telemedicine billing rules. For example, before the FAST Act, the remote specialist had to know whether the ED at which the patient was located was in a Medicare-designated rural area. After the FAST Act, reimbursement rules were much more straightforward: The act eliminated the need to establish whether the delivery site was rural. It is also possible that with broader reimbursement, telestroke networks saw greater value in setting up their infrastructure to submit claims.

Our results also highlight substantial under-billing. A third of US hospitals had telestroke capacity as of 2019.¹⁷ According to external data, telestroke consultations were occurring at these hospitals, but in both the year before and the year after the FAST Act was implemented, the majority of hospitals with capacity never had an associated Medicare telestroke claim. For many hospitals, lack of Medicare reimbursement is not a critical barrier to implementation. Our findings indicate that, at least for Medicare, claims data likely substantially underestimate the actual number of telestroke consultations.

Why were more clinicians not submitting bills for reimbursement of telestroke? We believe that this was largely because of the complexity of telemedicine billing for hospital-based services, including administrative and contractual barriers. To submit a claim, the remote specialist would need demographic information on a patient, including their insurance plan, and would typically need registration with the health plan for the hospital in which the patient is located. Before the FAST Act, as noted above, a stroke specialist providing telestroke services would also have to know whether the patient was at a rural or urban hospital (as defined by Medicare) before submitting a claim. Clinicians can reas-

sign the rights to bill to the organization that operates the originating site ED, but this requires agreements with each of the hospitals at which they provide telestroke consultations. And if the consulting hospital has relatively few Medicare telestroke consultations per year, it might not be worth the effort to build the administrative system needed to effectively submit claims for them. Moreover, our finding that fewer than half of Medicare telestroke consultations submitted for reimbursement included the appropriate modifier code required for payment (G0) raises concerns regarding the impact of billing complexity on accuracy.

We believe that the dramatic growth in billing for both telestroke and telepsychiatry during the first months of the COVID-19 pandemic, when all Medicare telemedicine was reimbursed regardless of rural or urban delivery, speaks to the potential negative impacts of high complexity and administrative barriers on Medicare telemedicine billing. Although increased clinical need for telemedicine certainly played an important role in this growth, we hypothesize that it was also facilitated by the removal of many administrative barriers, such as condition-specific telemedicine rules, state licensure requirements, and waiving of privacy requirements for technology. Together these changes created a simpler landscape for clinicians and revenue-cycle staff—one in which all forms of telemedicine were covered.

Policy Implications

Our results highlight that selective Medicare telehealth reimbursement expansions alone may have a limited impact, given the many other regulatory and structural barriers to submitting bills that would not be addressed.

In the Medicare claims, we observed a substantial number of telemedicine consultations that did not follow Medicare billing criteria. Among these were claims that did not follow CMS guidance to use a G0 modifier code to indicate that a telestroke consultation was delivered, as well as submission of Medicare telestroke claims by urban hospitals before reimbursement in that setting took effect. Although Medicare could develop processes to reject these claims to save money, we believe that this is the wrong strategy. We hypothesize that the erroneous billing was largely a result of confusion among clinicians and revenue-cycle staff, and the more appropriate strategy would be to simplify how telemedicine consultations are billed.

Greater complexity is one down side of selective reimbursement of telemedicine to specific conditions. In contrast to universal coverage, in

an environment with selective reimbursement, clinicians will have to remember which conditions and diagnoses are reimbursable. Moreover, that information will be subject to change as evidence concerning cost-effectiveness accumulates. This layer of complexity could discourage Medicare telemedicine uptake by clinicians. However, as noted above, one consequence of universal telehealth reimbursement may be more low-value care—increases in use and spending without commensurate improvements in health.

Medicare does not need to pay for telestroke and other telemedicine services via fee-for-service payment. A simpler and potentially more successful strategy for Medicare might be to provide smaller, rural hospitals (whose patients would benefit most from telestroke capacity) with a monthly or yearly payment to have this capacity in place.

Finally, our results emphasize the importance of spillovers, which could have access implications for rural residents. Specifically, excluding urban areas from telemedicine reimbursement may dampen the provision of telemedicine—and thereby access to those services—in rural areas, much as it appeared to do in this study.

Conclusion

The FAST Act selectively expanded Medicare reimbursement of telestroke for stroke patients starting in January 2019. We found that this legislation was associated with a substantial initial response and continued growth of billing for Medicare telestroke in the urban hospitals directly targeted by the reform, as well as with increased billing for the service in rural hospitals where reimbursement was already allowed. Our results highlight that selective expansion of Medicare telemedicine reimbursement for a specific condition, such as the expansion of telestroke payment under the FAST Act, can be successful in expanding beneficial health services and may spill over in the form of increased use of already reimbursable telemedicine services. However, we found substantial underbilling and erroneous billing associated with telestroke expansion, which we believe is secondary to the complexity of current telemedicine reimbursement policies. Our findings suggest that in shaping the future of Medicare telemedicine payment, simplifying payment rules would help ensure that expanded reimbursement improves access to timely, effective care. ■

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Stroke (Grant No. P50NS051343; MR WITNESS, NCT01282242); principal investigator for StrokeNet Network for the National Institute of Neurological Disorders and Stroke (New England Regional Coordinating Center, Grant No. U24NS107243, CURENT); and coinvestigator for the REACH-PC tele-palliative care trial for the Patient-Centered Outcomes Research Institute (NCT03375489). Jennifer Majersik is principal investigator for Utah StrokeNet (Grant No. NIH/NINDS U24NS107228).

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