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Abstract

Background: The COVID-19 pandemic necessitated the replacement of in-person physician consultations with telemedicine. During the pandemic, Medicaid covered the cost of telemedicine visits.

Objectives: The aim was to **measure** the adoption of telemedicine during the pandemic. We focus on key patient subgroups including those with chronic conditions, those living in urban versus rural areas, and different age groups.

Methods: This study examined the universe of claims made by Florida Medicaid beneficiaries (n = 2.4 million) between January 2019 and July 2020. Outpatient visits were identified as in-person or telemedicine. Telemedicine visits were classified into audio-visual or audio-only visits.

Results: We find that telemedicine offsets much of the decline in in-person outpatient visits among Florida's Medicaid enrollees, however uptake differs by enrollee type. High utilizers of care and beneficiaries with chronic conditions were significantly more likely to use telemedicine, while enrollees living in rural areas and health professional shortage areas were moderately less likely to use telemedicine. Elderly Medicaid recipients (dual-eligibles) used audio-only telemedicine visits at higher rates than other age groups, and the demand for these consultations is more persistent.

Conclusions: **Telemedicine offset the decline in health care utilization among Florida's Medicaid-enrolled population during the novel coronavirus pandemic, with particularly high uptake among those with prior histories of high utilization. Audio-only visits are a potentially important method of delivery for the oldest Medicaid beneficiaries.**

Key Words: Telemedicine, COVID-19, Medicaid

Introduction

The ongoing COVID-19 pandemic necessitated restrictions on contact between individuals to slow the spread of the virus. One consequence was that medical consultations that would have previously taken place in-person were conducted remotely through telemedicine. This resulted in a dramatic decline in in-person outpatient visits early in the pandemic, with a corresponding surge in telemedicine visits (1-4). The use and uptake of telemedicine for particular specialties has been studied (5-8). However, only a few recent studies have focused on telemedicine adoption across all outpatient specializations and conditions (1, 9-12). **Even fewer studies have examined variation in telemedicine use within state Medicaid programs. These programs collectively comprise the largest public insurance program in the US and insure diverse groups of patients, for whom the demand for care and ability to substitute to telemedicine visits varies widely, underscoring the importance of characterizing changes within Medicaid.** **Prior research** on the uptake of telemedicine among low-income Medicaid populations has been limited and is often focused on mental health (13, 14).

Importantly, lower telemedicine utilization rates by Medicaid enrollees may widen existing disparities in care. Medicaid patients have generally had lower access to healthcare providers as compared to other insured patients (15), largely due to lower Medicaid reimbursement rates for medical services (15-17). Urban-rural disparities can exist even within Medicaid programs: one study found that asthmatic children enrolled in Medicaid filled fewer prescriptions for their medications if they lived in rural areas (18), while another found that median per-child expenditure in Colorado's Medicaid program was \$99 more in urban areas relative to rural areas (19).

Early evidence from the COVID-19 pandemic documents that telemedicine adoption rates differed across populations. Data from Medicaid and the Children’s Health Insurance Program (CHIP) show that rates of services delivered through telemedicine were highest amongst beneficiaries between the ages of 19 and 64 across nearly all 50 states (20). Other evidence suggests that poor familiarity with technology – even for households with an Internet connection – drives low take up of telemedicine among the elderly (21). However, there is little research on differential uptake of telemedicine services by location **or mode of delivery**, though there are concerns that telemedicine has the potential to exacerbate disparities in healthcare if a lack of broadband access (i.e. the “digital divide”) makes it difficult for those in rural areas to access telemedicine services (22, 23).

This study uses administrative data comprising the universe of Medicaid claims for the State of Florida over the period January-July 2020 to examine variation over time in claims for different services before and after the expanded reimbursement and utilization of telemedicine during the COVID-19 pandemic. We investigate how the substitution towards telemedicine visits (overall and by mode of visit) varied across subgroups of Medicaid beneficiaries, including age, health status, prior health care use, and geography.

Methods

Data

We use administrative data from Florida’s Medicaid program between January 2019 and July 2020. **July 2020 is the most recent month of claims data that was provided by Florida’s Agency for Health Care Administration.** The data include medical claims and enrollment

information for the universe of Florida’s Medicaid enrollees. The claims data are granular, containing information on patient diagnoses, location of service, each procedure or drug that was billed, along with the billing physician and amount billed. **Claims for dual-eligible Medicare-Medicaid enrollees are sent to Medicaid directly from Medicare, and are included in our dataset even if health plan adjudication determines that there is no Medicaid liability. We define a “claim” as a unique internal control number (ICN) which is a unique 13-digit number assigned to each claim.** The enrollee data include all enrollees in the Medicaid system regardless of whether they submit a claim during the analysis period. The enrollee data include information on the enrollee’s county of residence, age range, and months of Medicaid enrollment.

Approach

Study Cohort: We analyze the universe of claims made by Florida Medicaid beneficiaries in 2019 and 2020. We restrict our sample to Medicaid recipients that were continuously enrolled in Medicaid between January 2019 and July 2020 to allow for identification of patients with chronic conditions. Our sample construction is summarized in Supplemental Digital Content Figure A1. From an original sample of 4.4 million enrollees, we are left with 2.4 million after imposing our sample restrictions with the majority (1.5 million) of the sample decrease due to dropping individuals that were not enrolled in Medicaid for all 19 months of the sample period.

Nearly 90% of Medicaid beneficiaries in Florida are enrolled in Medicaid Managed Care programs (24). Approximately 0.5 million Medicaid beneficiaries who were not enrolled in Medicaid Managed Care were excluded from our analysis, as Medicaid only covers select services for many of these beneficiaries (see Appendix Section A1 for details). Florida did not

expand Medicaid eligibility under the Affordable Care Act. To qualify for Medicaid in this time period, enrollees must be young (21 and under), elderly (65 and over), pregnant, blind, have a disability or a family member with a disability, or be responsible for a child 18 years or younger, **as well as a resident of the state of Florida, a United States national, citizen, permanent resident or legal alien.** Income eligibility standards depend on the reason for qualification but range from 27% of the federal poverty line (FPL) for adults with dependent children to 206% of the FPL for children under 1 year of age. Non-disabled, non-elderly adults without children are ineligible for Medicaid regardless of income.

Identifying Telemedicine Visits: Though telemedicine was utilized prior to the COVID-19 pandemic, reimbursement was limited to Community Behavioral Health settings (25) and therefore, pre-pandemic telemedicine claims were small. Because telemedicine billing was rapidly rolled out and adopted by a broader set of providers during the COVID-19 pandemic, we use a variety of approaches to identify telemedicine visits. Specifically, we define a visit as telemedicine if its place of service code, procedure code, or procedure modifier code indicate that care was provided via telemedicine. We further break this down into codes which identify audio-visual services, versus those that identify audio-only services. Supplemental Digital Content Section A2 provides the list of codes used to identify telemedicine claims, including audio-visual, audio-only, and unclassified visits. For our analysis regarding the method of telemedicine service delivery, we exclude approximately 20% of visits which we are unable to classify as audio or audio-visual. A large portion of unclassified visits are for psychiatry and speech, occupational, and physical therapy; thus we also exclude visits for these specialties

from this analysis. Alternative versions of the analysis including unclassified visits are shown in the Online Supplemental Digital Content.

We validate our methodology in two ways. First, as we show in **Supplemental Digital Content Figure A2**, telemedicine visits (the gap between in-person and total visits) sharply increase starting in March 2020, suggesting that we are appropriately capturing telemedicine visits.

Second, Supplemental Digital Content Figure A2 shows that telemedicine visits are clustered almost entirely in the outpatient setting. These patterns agree with the expected time when **access to telemedicine is expanded** as well as the settings where telemedicine is used.

Identifying Enrollee Subgroups: We construct a sample of Medicaid enrollees with chronic conditions, including diabetes, psychiatric conditions (depression and anxiety), heart disease, addiction disorders, **and respiratory conditions (asthma, chronic obstructive pulmonary disorder, chronic bronchitis, emphysema, bronchiectasis)**. We use a one-year lookback period to determine whether individuals have each condition. If an individual had a diagnosis code for any of these conditions in 2019, we treat them as having that condition for the full sample period. Supplemental Digital Content Section A2 includes the ICD-10 diagnosis codes used to define each condition. We identify heavy users of healthcare services, or “super-utilizers” as any individual that has 12 or more emergency department visits in 2019, **following the definition employed by Florida’s Agency for Health Care Administration (26)**.

We use enrollee county of residence to determine whether the enrollee lives in a Health Professional Shortage Area (HPSA) or a rural or urban county. Counties are defined as urban or rural using the U.S. Department of Agriculture’s Economic Research Service 2013 Rural-Urban

Continuum codes **(27)**. Counties are considered an HPSA if they are identified as a primary care geographic HPSA by the U.S. Health Resources and Services Administration **(28)**.

Outcome Measures: Our primary variables of interest are (1) a dichotomous variable indicating whether an enrollee utilizes any medical care or telemedicine services during our time period of interest, (2) the number of outpatient visits made by enrollees, and (3) the mode of outpatient visits – telemedicine or in-person. We also separate telemedicine visits into audio-only and audio-visual.

Measures

We first calculate the percentage of Medicaid enrollees with any telemedicine utilization in our time frame. We do this calculation separately for all Medicaid enrollees for the subset of Medicaid enrollees who have any medical claims in the March-July 2020 timeframe (we refer to this group as “claimants”). **We define the group of claimants separately from all enrollees to account for the fact that many enrollees did not access any health services during the early months of the pandemic.** We stratify telemedicine utilization rates by patient age group (0-18, 19-64, and 65+), gender, **super-utilizer status**, chronic medical conditions, geographic location (urban/rural), and whether an enrollee’s county of residence is an HPSA. We measure whether differences in telemedicine utilization between different subgroups of patients are statistically different using Chi-square tests of independence.

Next, we calculate the total number of outpatient visits on a monthly basis. For expository purposes, we index these values to the average monthly visits in 2019 separately for all visits (telemedicine and in-person) and for in-person visits only. We calculate this for all enrollees and separately for the subset of enrollees with chronic medical conditions and super-utilizers. While

the COVID-19 pandemic led to a steep initial decrease in outpatient visits, we find that much of the decrease was mitigated by use of telemedicine services.

Last, we subset telemedicine visits into audio-only and audio-visual visits. **Excluding claims that cannot be classified as audio-only, we calculate the percentage of telemedicine visits that were audio-only or audio-visual for all** enrollees, and separately by age group and by urban/rural and HPSA status.

Results

Telemedicine Utilization

Supplemental Digital Content Figure A2 graphs telemedicine usage over time, documenting a dramatic decrease in in-person visits and corresponding increase in telemedicine visits beginning in March 2020. **Outpatient and ED utilization (as well as some inpatient utilization) declined dramatically between March and April and then started to bounce back in May through July.** We restrict our analysis to outpatient visits, but Supplemental Digital Content Figure A2 shows that other claim types (emergency department visits, inpatient stays, and pharmacy fills) also dropped dramatically at the start of the pandemic, though telemedicine was not (or could not be) adopted in those areas.

Table 1 shows the utilization of telemedicine services between March and July of 2020. Only 13.52% of all enrollees, or 23.37% of claimants utilized any telemedicine services. Consistent with past studies, non-elderly adults were most likely to utilize telemedicine (20.06% of all enrollees or 35.26% of claimants). While only 6.01% of all elderly enrollees utilized telemedicine during this time frame, 22.69% of elderly claimants utilized telemedicine – suggesting that the

elderly were significantly more likely to forego medical care during this timeframe. Gender differences in telemedicine utilization were minor.

Super-utilizers and enrollees with chronic conditions were significantly more likely than the average patient to utilize telemedicine services. Amongst super-utilizers, 36.90% of enrollees, or 41.66% of claimants, accessed telemedicine services as compared to 12.83% of enrollees, or 23.55% of claimants, amongst non-super-utilizers. Rates of telemedicine utilization for patients with chronic conditions were similarly high, with particularly high utilization amongst patients with psychiatric conditions, where 43.26% of all enrollees, or 48.60% of claimants, accessed telemedicine services.

Telemedicine utilization rates were moderately different by location. Enrollees living in urban counties were somewhat more likely to access telemedicine services as compared to those living in rural counties (13.60% versus 11.57% of all enrollees and 24.62% versus 19.27% of claimants in urban and rural counties, respectively). Enrollees living in HPSA counties were less likely than those living in non-HPSA counties to utilize telemedicine (10.70% versus 13.58% of all enrollees and 17.71% versus 24.53% of claimants in HPSA and non-HPSA counties, respectively).

Telemedicine Usage by Chronic Condition

Figure 1 graphs the number of total outpatient visits by month in 2020 relative to the average monthly visits for 2019 (**indexed to 100**) and shows markedly different relative declines in usage. In-person outpatient visits fell by 61% between February and April 2020, though telemedicine offset much of the decline in in-person visits, with total visits falling by a lower, but still substantial, 38% during the same time period. Though large, this decline is in line with

prior estimates using other data sources of the overall decline in in-person outpatient visits during the COVID-19 pandemic (4, 9, 29). While there were dramatic declines in overall Medicaid visits, these patterns were more muted for patients with chronic conditions. For these patients, visits almost recovered to their pre-pandemic levels in June 2020, with telemedicine services helping to offset much of the decline in in-person visits, particularly for patients with psychiatric conditions.

Audio-Only Telehealth Services by Age and Location

Figure 2 shows a strong age gradient in the take-up of audio-only telemedicine. Most telemedicine visits include both audio and video. For elderly Medicaid beneficiaries, audio-only visits make up a larger share of telemedicine visits than among younger Medicaid enrollees (21% versus 14% of telemedicine visits in July 2020 for elderly and non-elderly adult enrollees, respectively). Audio-only telemedicine visits were uncommon for children, making up only 5% of telemedicine visits in July 2020.

The top panel of Figure 3 displays audio-only telemedicine usage for enrollees in rural and urban counties, while the bottom panel displays audio-only telemedicine usage for enrollees in HPSA and non-HPSA counties. Across urban-rural settings, there is little difference in take-up of video versus audio-only telemedicine. At the beginning of the pandemic, audio-only telemedicine visits were more common in non-HPSA counties (13% versus 6% of telemedicine visits in March 2020 for non-HPSA and HPSA counties, respectively), however there was little difference in audio-only telemedicine utilization rates by July 2020.

Discussion

Our findings shed new light on the differential value of telemedicine depending on both the method of delivery and the subgroup of Medicaid enrollees. While there is an overall decline in outpatient visits during the beginning of the COVID-19 pandemic, vulnerable subgroups with chronic conditions and super-utilizers appear to be more likely than the average Medicaid enrollee to utilize telemedicine; they were therefore less likely to defer contact with the healthcare system **even in the absence of in-person consultations. Patients receiving psychiatric outpatient care were highly likely to use telemedicine. This suggests that access to telemedicine may be particularly beneficial for this high-needs group of patients, who regularly interact with the health care system. At least one large psychiatric care hospital system has found it is possible to provide almost all of their services via telemedicine (6). However, it is still unknown whether the quality of care or patient outcomes were impacted by the switch from in-person to telemedicine visits.**

Medicaid enrollees living in rural and HPSA counties face a particularly stark lack of access to local health care providers **(18, 19, 30, 31)**, and might benefit from telemedicine services through the ability to more easily access providers. Despite this, Medicaid enrollees living in these counties were slightly less likely to utilize telemedicine services. One **potential** explanation for this is the digital divide: access to broadband internet is less common in rural areas. **Other studies have found that households outside of metropolitan areas are nearly twice as likely to have neither a personal computer nor a smartphone than households that reside within a metropolitan area (23).** However, **in our results**, audio-only telemedicine consultations accounted for a similar proportion of visits in rural and HPSA counties to urban and non-HPSA counties **in Florida**, suggesting additional barriers to telemedicine access **than**

mere lack of access to a device with an Internet connection. This is in line with results from at least one prior study (32), which found that nearly two-thirds of those who are offered audio-only telemedicine consultations have access to either a smartphone or a computer with Internet access.

Our findings **highlight** the importance of audio-only telemedicine, particularly for the elderly. For appropriate services, **potentially** lower-cost phone consultations can expand access to low-income populations. This may involve less infrastructure investment than video-based telemedicine, which is also more difficult to access for older Medicaid beneficiaries **(32), though other underserved populations may benefit as well (33-38)**. While we do not examine its effects on outcomes, a recent study found that pregnant women consuming audio-only prenatal care during 2020 had similar outcomes to pregnant women consuming in-person prenatal care in 2019 (39). Creating best practices for audio-only telemedicine consultations could improve quality of care for elderly patients who may struggle with the technology required for an audio-visual telemedicine appointment.

Policy Implications

We find that telemedicine can be an effective method of maintaining access to outpatient services for Medicaid enrollees, especially for enrollees with chronic conditions or high utilization of health care services. We posit that improved infrastructure and continued reimbursement for telemedicine consultations can expand access for Medicaid recipients beyond the COVID-19 pandemic. Our findings can be reconciled with previous studies that recommended against the use of telemedicine due to the extent of the digital divide (5) because we use a broader definition of telemedicine that includes audio-only consultations

which do not require broadband access. One size does not fit all; older enrollees are more likely to benefit from phone-based delivery of telemedicine, and more intensive users of health care are more likely to take up telemedicine services more generally. Prior to the COVID-19 pandemic, telemedicine services were used for Medicare beneficiaries in rural areas (12). We find that there is significant uptake of telemedicine among Florida's Medicaid beneficiaries in urban areas as well as rural areas, suggesting scope for benefits regardless of location. Further research is needed to determine the extent to which the persistent use of telemedicine expanded overall access or represents a substitution away from in-person visits.

Limitations: We acknowledge several limitations of our analysis. First, our analysis of telemedicine is solely descriptive, and cannot speak to the causal impact of telemedicine on health outcomes. Second, we cannot distinguish temporary changes in outpatient visits from permanent changes that last beyond the pandemic, given that the research has been conducted prior to the end of the COVID-19 pandemic. This is particularly important for elderly and chronically ill patients, who are at higher risk for severe cases of COVID-19 and might otherwise have different utilization of telemedicine services. Third, we limit our analysis to the subset of beneficiaries who are continuously enrolled in Medicaid between January 2019 and July 2020, thus we do not analyze subgroups with short-term Medicaid enrollment, including women who qualify for Medicaid solely due to pregnancy. Fourth, our data is limited to Medicaid enrollees in the state of Florida and we are unable to assess broader regional trends or compare Medicaid enrollees to patients with other forms of insurance. While our study is limited to Florida, Florida has some of the most restrictive Medicaid eligibility requirements, so we view our estimates as a lower bound on the

potential adoption of telemedicine because other states are more likely to allow higher income applicants to enroll in Medicaid. There is limited research that explicitly compares telemedicine adoption among Medicaid enrollees relative to non-Medicaid populations, though at least one study finds between 1.5 and 2 times as much adoption among higher-income households relative to lower-income households (22). Fifth, since we do not have data beyond the end of July of 2020, we are unable to make statements regarding the trajectory of telemedicine usage between that month and the time of writing. Sixth, while our analysis will capture the majority of claims for dual-eligible enrollees, we may miss a small percentage of claims that were not sent to Medicaid for adjudication.

Conclusion

Telemedicine use in a low-income population appeared to buffer an overall decline in the use of outpatient services during the novel coronavirus pandemic. Patients with higher health care needs – such as super-utilizers or those with chronic conditions – were significantly more likely to access telemedicine services, while enrollees living in rural areas and HPSAs were moderately less likely to access these services. We find that the digital divide previously noted in the literature (5, 8) can be mitigated by audio-only telemedicine services, which the elderly use at higher rates than younger enrollees.

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Figure/Table Legends

Table 1: Summary Statistics of Telemedicine Usage

Source: Author's own calculations using Florida's Medicaid Managed Care administrative records, **January 2019- July 2020.**

Notes Patients are inferred to have a chronic condition if they were diagnosed or treated for the condition in 2019. **"HPSA" stands for "Health Professional Shortage Area" (27). Super-utilizers are defined as patients that make 12 or more emergency department visits in a year (25). Percentages in the final two columns are calculated as follows: Column 4 is Column 1 divided by Columns 1-3 expressed as a percentage, and Column 5 is Column 1 divided by Column 1 + Column 3, expressed as a percentage. Chi-square tests were conducted to test for statistically significant differences in telehealth utilization between groups of enrollees. As each of these tests were statistically significant at the <0.01 level, we do not note significance in the table.**

Figure 1: Deviations of Visits, In-Person and Total, from 2019 Average

Source: Authors' own calculations using Florida's Medicaid Managed Care administrative records, **January 2019-July 2020.**

Notes: Graph shows the indexed number of visits made by patients with chronic conditions or super-users relative to the average for the year 2019, equal to 100 on the y-axis. Patients are inferred to have a chronic condition if they were diagnosed or treated for the condition in 2019. Super-utilizers are defined as patients that make 12 or more emergency department visits in a year. "Psychological Services" comprise consultations for depression and anxiety only.

"Respiratory conditions" include asthma, chronic obstructive pulmonary disorder, chronic

bronchitis, emphysema, bronchiectasis. Shaded regions correspond to periods in which the United States was in a recession as dated by the National Bureau of Economic Research.

Figure 2: Share of Audio-Only Telemedicine Visits by Age Group

Source: Authors' own calculations using Florida's Medicaid Managed Care administrative records, **January 2020- July 2020.**

Notes: Graph shows the percentage of audio-only telemedicine visits split by age group made by patients enrolled in Florida's Medicaid program between January and July 2020, excluding claims for psychological services, occupational therapy, speech therapy, and physical therapy. Shaded regions correspond to periods in which the United States was in a recession as dated by the National Bureau of Economic Research.

Figure 3: Share of Audio-Only Telemedicine Visits by Geographical Indicator

Source: Authors' own calculations using Florida's Medicaid Managed Care administrative records for **January 2020-July 2020.**

Notes: Graph shows the percentage of audio-only telemedicine visits split by urban-rural status and HPSA (Health Professional Shortage Area) status made by patients enrolled in Florida's Medicaid program between January and July 2020, excluding claims excluding claims for psychological services, occupational therapy, speech therapy, and physical therapy. Panel (a) shows differences in the share of audio-only telemedicine visits out of known claims between urban and rural counties, while Panel (b) shows differences in the share of audio-only telemedicine visits out of known claims between HPSA and non-HPSA counties. Shaded regions correspond to periods in which the United States was in a recession as dated by the National Bureau of Economic Research.

SDC List

SDC figure 1.pdf

SDC figure 2.pdf

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