

The Virtual Impact: An Analysis of Telemedicine and Its Relationship With Other Health Care Services, Enrollee Health, and Costs

By Jake Spiegel, Employee Benefit Research Institute

AT A GLANCE

COVID-19 significantly altered the delivery of health care in the United States in 2020. Telemedicine was uniquely positioned to help patients get the care they needed if their doctors' offices were closed or they preferred not to risk exposure. The Employee Benefit Research Institute (EBRI) analyzed a database of commercial claims to examine the role telemedicine played during the COVID-19 pandemic. We observe a significant decline in face-to-face services and a significant increase in telemedicine visits at the onset of the pandemic. Key findings include:

- Telemedicine may act as a bridge for patients seeking care for their health needs while their doctor's offices were closed. In examining patients who had been diagnosed with diabetes, depression, or asthma, we find that patients who had used telemedicine tended to have more of their prescribed drugs on hand (69 percent coverage ratio) compared with patients who did not use telemedicine (61 percent coverage ratio).
- Patients who used telemedicine at least once in 2020 used more in-person services (56) than patients who did not use telemedicine at all in 2020 (34).
- We find that patients who used telemedicine tended to spend more on both inpatient and outpatient services as well as prescription drugs. Patients who used telemedicine spent an average of \$2,346 in 2020, compared with \$1,310 for patients who did not use telemedicine.
- However, telemedicine does not necessarily induce patients to spend more. Our analysis finds that patients who used telemedicine also used in-person services more frequently compared with patients who did not use telemedicine, and the successful management of chronic conditions can help prevent the onset of more serious illnesses and more costly care in the future.

Jake Spiegel is a Health and Wealth Research Associate at the Employee Benefit Research Institute (EBRI). This *Issue Brief* was written with assistance from the Institute’s research and editorial staffs. Any views expressed in this report are those of the author and should not be ascribed to the officers, trustees, or other sponsors of EBRI, Employee Benefit Research Institute-Education and Research Fund (EBRI-ERF), or their staffs. Neither EBRI nor EBRI-ERF lobbies or takes positions on specific policy proposals. EBRI invites comment on this research.

Suggested Citation: Spiegel, Jake, “The Virtual Impact: An Analysis of Telemedicine and Its Relationship With Other Health Care Services, Enrollee Health, and Costs,” *EBRI Issue Brief*, no. 577 (Employee Benefit Research Institute, December 8, 2022).

Copyright Information: This report is copyrighted by the Employee Benefit Research Institute (EBRI). You may copy, print, or download this report solely for personal and noncommercial use, provided that all hard copies retain any and all copyright and other applicable notices contained therein, and you may cite or quote small portions of the report provided that you do so verbatim and with proper citation. Any use beyond the scope of the foregoing requires EBRI’s prior express permission. For permissions, please contact EBRI at permissions@ebri.org.

Report Availability: This report is available on the internet at www.ebri.org

Table of Contents

Introduction	3
Data and Methodology	3
Telemedicine Visits	4
Telemedicine’s Relationship With In-Person Visits	5
Prescription Drug Fills	6
Spending	7
Conclusion	10
References.....	10
Endnotes	11

Figures

Figure 1, Selected Summary Statistics of Analytical Dataset	4
Figure 2, Telemedicine Visits per 1,000 Enrollees in 2020	5
Figure 3, In-Person Services per 1,000 Enrollees in 2020.....	6
Figure 4, Average Coverage Ratios, by Telemedicine Usage	7
Figure 5, Average Inpatient Spending by Condition and Telemedicine Usage, 2020	8
Figure 6, Average Prescription Drug Spending by Condition and Telemedicine Usage, 2020	9
Figure 7, Average Outpatient Services Spending by Condition and Telemedicine Usage, 2020	9

The Virtual Impact: An Analysis of Telemedicine and Its Relationship With Other Health Care Services, Enrollee Health, and Costs

By Jake Spiegel, Employee Benefit Research Institute

Introduction

The COVID-19 pandemic significantly altered many aspects of the daily lives of Americans, including seeking health care. After states and cities issued stay-at-home orders, all but the most urgent in-person care was canceled or postponed. As a result, in-person visits declined dramatically. One study estimated that visits for outpatient services declined 60 percent in April 2020 relative to a typical prepandemic year (Mehrota et al. 2020). While in-person visits recovered after mayors and governors lifted stay-at-home orders, some in-person care went unaddressed, creating a gap in the provision of health care in 2020 relative to typical prior years.

Telemedicine helped plug some of that gap. Government agencies, such as the Centers for Medicare and Medicaid Services (CMS), promulgated rules that lowered barriers to seeking care via telemedicine, while many insurers lowered or waived cost-sharing requirements for care sought via telemedicine (Spiegel 2021). Similarly, doctors' offices quickly pivoted to offering their services virtually. In-person outpatient services decreased by roughly 60 percent in early 2020, but health care services delivered via telemedicine increased eightfold. The increase in telemedicine visits during the pandemic did not plug the gap entirely; even including telemedicine visits, total health care engagements were still 11 percent lower by summer 2020 than in a typical prepandemic year (Mehrota et al. 2020). However, telemedicine services proved particularly popular among patients seeking care for mental health conditions and respiratory conditions (Spiegel 2021). Patients' experiences during the pandemic have demonstrated that telemedicine is a compelling alternative to in-person visits to doctors' offices, at least for certain types of care.

While previous work has documented the role telemedicine played at the onset of the COVID-19 pandemic and the types of care most commonly sought via telemedicine, little is known about how the usage of telemedicine services has impacted patients' behavior and spending. In this paper, we seek to contribute to this literature by analyzing prescription drug fills and spending for patients who sought care during the pandemic via telemedicine compared with those who did not.

We specifically focus on patients with chronic conditions that can be managed through medications but may present deleterious and expensive complications if left unchecked — namely diabetes, depression, and asthma — for this analysis. Telemedicine may be well-positioned to help patients address these chronic issues. In particular, telemedicine may benefit patients who need prescription drugs to manage chronic conditions but experienced an interruption in their in-person care (e.g., their doctors' offices had closed on account of the pandemic, or they were concerned about contracting COVID-19 and preferred not to seek care in person).

Data and Methodology

For this analysis, we relied on the Merative™ MarketScan® Database of commercial claims and health care encounters. The MarketScan Database is a convenience sample of workers with employer-sponsored insurance and contains person-level data on inpatient services, outpatient services, and prescription drug fills. We examine workers who were continually enrolled in 2020. Patients are considered diagnosed with diabetes, depression, or asthma if they were observed with two outpatient visits or one inpatient visit treating that particular condition. Telemedicine visits are defined as care that is received via a dedicated third-party platform, such as MDlive or Teladoc, or as care that is received via videoconferencing technology, and may also be known as virtual care. Descriptive statistics are reported below, in Figure 1.

Figure 1
Selected Summary Statistics of Analytical Dataset

Number of Patients Diagnosed With Diabetes, Depression, or Asthma	2,427,840
Total In-Person Services (inpatient, outpatient, and pharmacy visits)	34,840,000
Total Telemedicine Visits	1,580,000
Number of Patients Using Telemedicine at Least Once	190,000
Average Age	41.3
Share Female	57%

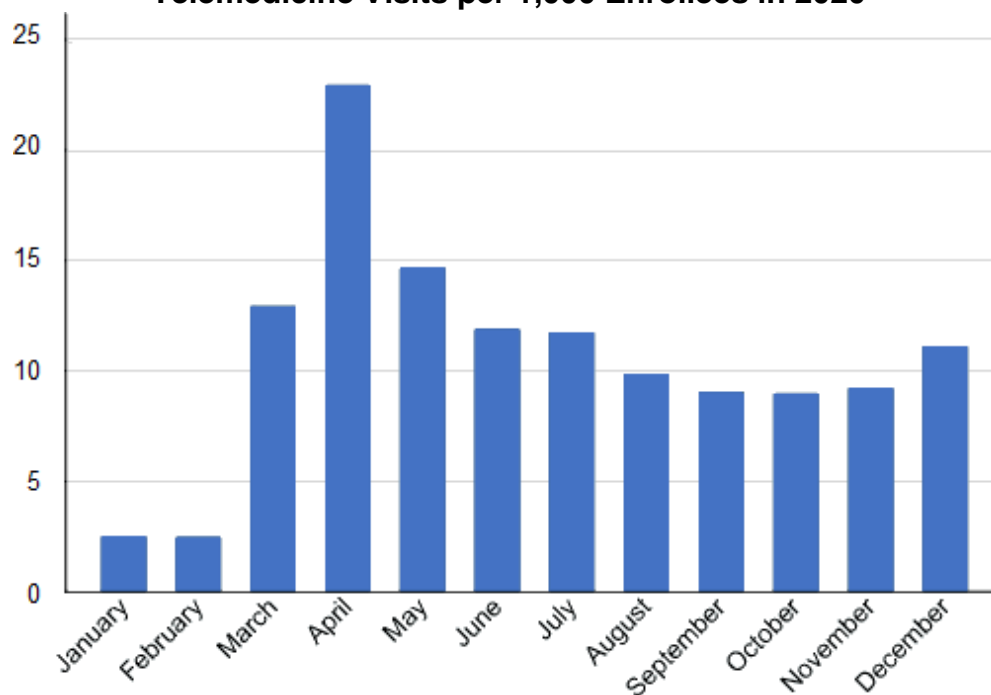
Source: Author's analysis of Merative MarketScan administrative enrollment and claims data.

To measure the extent to which telemedicine helped patients manage their chronic conditions, we examine medication adherence. One commonly used metric for examining patients' medication adherence in health care research is *coverage*. We define medication coverage as the total number of days' supply the patient has received a prescription for throughout the year, divided by 365. We focus on long-term maintenance drugs, as defined in the MarketScan Database, for patients with depression, diabetes, and asthma.¹ This enables us to examine the extent to which telemedicine services helped patients bridge a gap in the provision of health care when their doctors' offices were closed, or if patients were hesitant to seek care and thus did not adhere to their prescribed drug regimen.

Telemedicine Visits

Expectedly, patients in the analytical database dramatically increased their usage of telemedicine services following the onset of the COVID-19 pandemic and the issuance of stay-at-home orders. As observed in other literature, relatively few patients used telemedicine in January and February 2020; there were only about 2.5 telemedicine visits per 1,000 patients in our analytical dataset. Telemedicine visits increased in March as COVID began spreading through the United States. Telemedicine usage spiked in April, as shown below in Figure 2, with nearly 23 visits per 1,000 patients. Usage decreased substantially from April to May and continued a slight downward trend until November, when COVID-19 cases in the United States began spiking once again. Notably, while telemedicine visits did fall precipitously from their peak in April, usage in the third and fourth quarters of 2020 remained considerably higher than the prepandemic trend and increased once again in December 2020, when COVID-19 infections surged again in the United States after a lull in the late summer and fall.

Figure 2
Telemedicine Visits per 1,000 Enrollees in 2020



Source: Author's analysis of Merative MarketScan administrative enrollment and claims data.

Patients diagnosed with diabetes, depression, or asthma who used telemedicine tended to be slightly different demographically than their counterparts who did not use telemedicine in 2020. The average patient who used telemedicine was slightly older than the average patient who did not; 43.4 years old vs. 41.1 years old (Spiegel 2021). The average patient who used telemedicine was also slightly more likely to be female compared with patients who did not; 61 percent vs. 57 percent. Patients who used telemedicine in 2020 were also slightly less healthy, as measured by the Charlson Comorbidity Index (CCI), a commonly used measure in medical research that is a predictor of short-term mortality and is often used as a proxy for health (Deyo et al. 1992). Patients who used telemedicine had an average CCI of 1.56, compared with patients who did not use telemedicine, who had an average CCI of 1.16. Although we use a different dataset than other analyses, these results directionally align with previous research into the demographics of telemedicine users (Spiegel 2021).

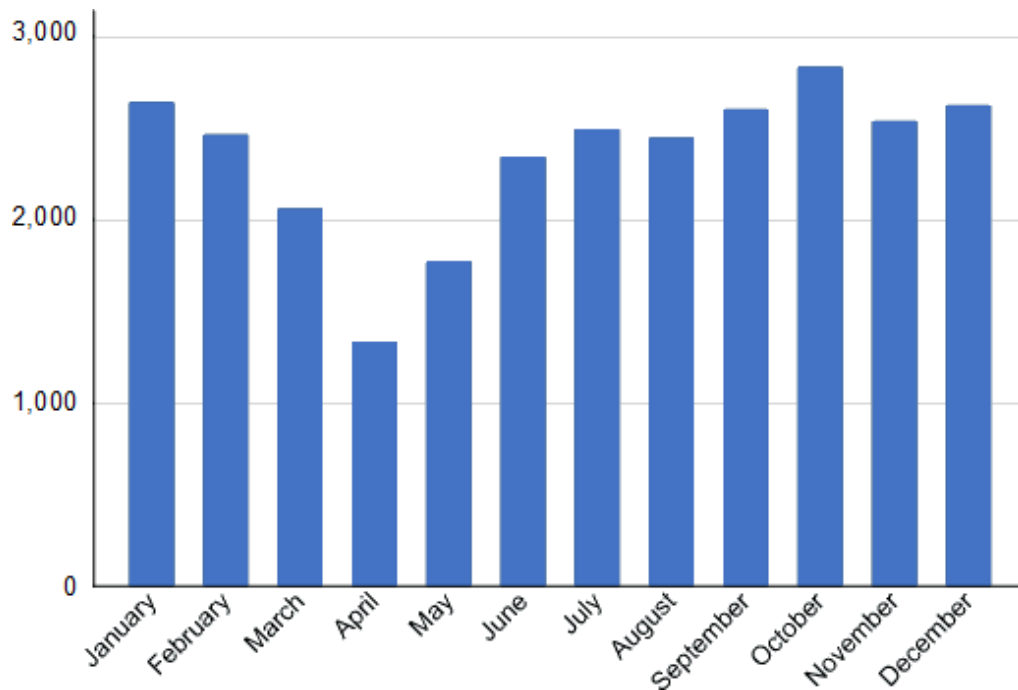
Telemedicine's Relationship With In-Person Visits

Previous research has indicated that telemedicine may act as a complement to in-person care rather than a substitute. Rather than a one-to-one substitute for in-person care, patients frequently seek care via telemedicine regarding issues for which they otherwise may not have sought in-person care. For instance, a patient may be more likely to use a telemedicine platform to ask a doctor about a slight cough for which they would otherwise not bother going to see a doctor in person. One paper found that only 12 percent of telemedicine visits were direct substitutes for in-person care (Ashwood et al. 2017). However, since many doctors' offices closed for in-person visits and some patients chose to forgo in-person care, the pandemic may have altered the relationship between telemedicine and in-person care, at least temporarily. Patients may have seen telemedicine as their only avenue to receive the care they needed to manage their health conditions.

Aligning with previous research, patients diagnosed with diabetes, depression, or asthma in our analytical dataset avoided in-person services after the onset of the COVID-19 pandemic in the United States. Indeed, the uptick in telemedicine visits was mirrored by a similarly large fall in in-person services, shown below in Figure 3, falling from

2,641 in-person services per 1,000 enrollees in January 2020 to 1,333 in-person services per 1,000 enrollees in April 2020.

Figure 3
In-Person Services per 1,000 Enrollees in 2020



Source: Author's analysis of Merative MarketScan administrative enrollment and claims data.

Unfortunately, we cannot identify telemedicine visits that would not have existed but for telemedicine. Given previous findings that 12 percent of telemedicine visits are for issues for which the patient would not have sought in-person care, we might expect, then, that telemedicine users have significantly more total encounters than non-users of telemedicine. However, there appears to be a quality unique to telemedicine users that nudges them to use in-person services more frequently as well; previous research suggests that telemedicine users may be higher educated and have higher incomes than patients who do not use telemedicine, for instance (Karimi et al. 2022). The average number of encounters with a medical provider — including in-person services, telemedicine, and pharmacy claims — for patients diagnosed with diabetes, depression, or asthma who used telemedicine was 56. Meanwhile, the average patient who did not use telemedicine only had 34 encounters with medical providers. However, the gap between these two figures is not explained solely by telemedicine visits, as patients conducted three visits on average via telemedicine. Therefore, patients who used telemedicine used in-person services more frequently as well.

Prescription Drug Fills

Adherence to prescribed drug regimens is an important part of managing chronic conditions. Previous research has found significant value in patients following the regimens their doctors prescribe. Patients who adhere to their medications are in better overall health than patients who do not adhere to their medications (DiMatteo et al. 2002). And patients who closely follow their prescription drug regimens tend to use fewer costly inpatient and urgent care services compared with patients who do not closely follow their prescriptions (Sokol et al. 2005).

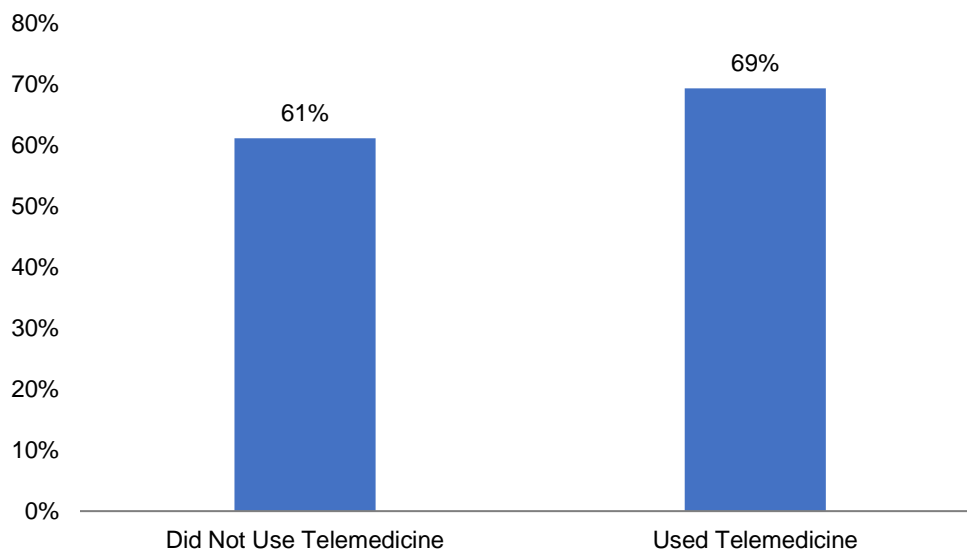
Yet patients and plan sponsors may not necessarily realize cost savings in the short term. More rigorous adherence to a prescription drug regimen necessarily implies higher pharmacy spending, whether by the patient, insurer, or both. However, successfully managing chronic conditions via prescription drugs may prevent the occurrence of costly acute health problems that can arise from suboptimal medication adherence. Indeed, research suggests that more rigorous

medication adherence can lead to lower utilization of inpatient and emergency department services (Roebuck et al. 2014).

One of the benefits of telemedicine is that patients can receive care and prescriptions for drugs without an in-person interaction with their health care provider. Thus, telemedicine may have served as a bridge for patients seeking care for chronic conditions, including seeking prescription drug refills, while their doctors' offices were closed or while they were concerned about contracting COVID-19. If telemedicine indeed served as a bridge for patients unable or unwilling to seek face-to-face care, then we may observe telemedicine users having a greater coverage ratio than non-users of telemedicine. A patient who did not use telemedicine and who also did not utilize in-person services may have filled their pre-pandemic prescriptions but may not have had enough drugs on hand to be adherent to their prescribed drug regimen. In contrast, by reducing barriers and making it easier to access care during a pandemic, telemedicine may have helped patients better stay on top of their prescription drug needs.

Focusing our analysis on patients who were diagnosed with depression, diabetes, and asthma, we find evidence that the patients who sought care via telemedicine more rigorously followed their prescribed drug regimens. A common method of measuring medication adherence is examining the patient's coverage ratio, or the share of the year in which the patient has the prescribed dosage of medication on hand.² Among those who used at least one telemedicine service in 2020, patients had an average coverage ratio of 69 percent, compared with 61 percent for patients who did not use any telemedicine services in 2020, shown below in Figure 4.

Figure 4
Average Coverage Ratios, by Telemedicine Usage



Source: Author's analysis of Merative MarketScan administrative enrollment and claims data.

This analysis suggests that telemedicine played a role in helping patients stay on top of their prescribed drug regimens during the pandemic. While patients who sought care via telemedicine may have been inherently more motivated to stay current with their prescriptions, the presence and availability of health care via telemedicine undoubtedly lowered the barriers for them to do so, which is reflected in their higher prescription drug coverage ratios.

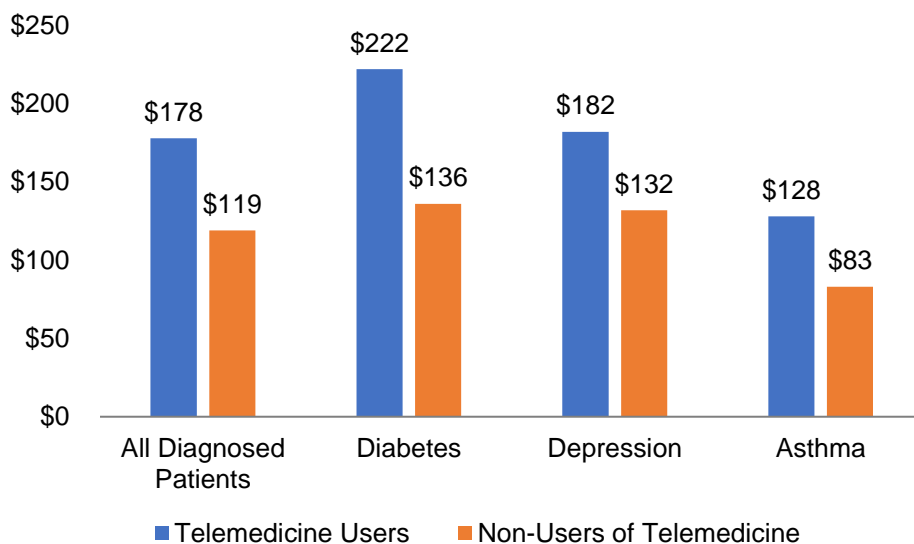
Spending

To the extent that telemedicine visits substitute for in-person visits and help patients receive care to treat their conditions, telemedicine may help patients avoid more costly inpatient and urgent care. Additionally, previous research has found that some patients who exhibit greater medication adherence spend more on prescription drugs but spend

less on costly inpatient and urgent care services (Roebuck et al. 2014). Since patients seeking care via telemedicine exhibited better medication adherence than non-users of telemedicine, we may expect to observe a similar dynamic here. However, the pandemic may have upended both the propensity to use telemedicine as a substitute for in-person visits as well as the likelihood of increased medication adherence reducing spending on inpatient and emergency care services.

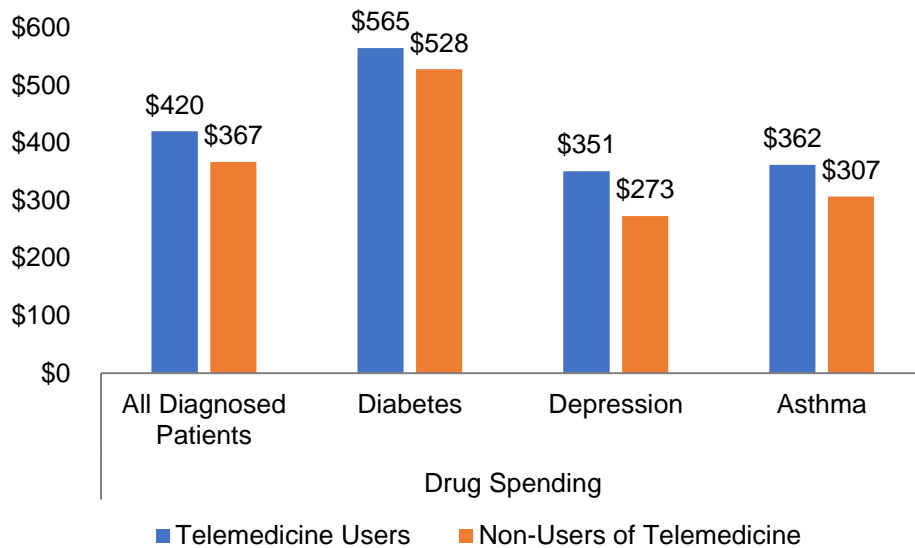
Our analysis finds that patients diagnosed with depression, diabetes, or asthma who used telemedicine services tended to spend more than similarly diagnosed patients who did not use any telemedicine services in 2020. Spending on inpatient services among both groups was relatively similar; telemedicine users spent on average \$178, compared with the average non-user of telemedicine, who spent \$119 in 2020, shown below in Figure 5.³

Figure 5
Average Inpatient Spending by Condition and Telemedicine Usage, 2020



Telemedicine users diagnosed with diabetes, depression, or asthma spent more on prescription drugs as well. This is reflected in the fact that they had higher coverage ratios than patients who did not use telemedicine. Patients who used telemedicine in 2020 spent an average of \$420 on prescription drugs, compared with \$367 for patients who did not use telemedicine, shown below in Figure 6. As previous research has indicated, skipping out on maintenance drugs may save money in the present but could introduce more costly health care requirements in the future if patients' chronic conditions worsen.

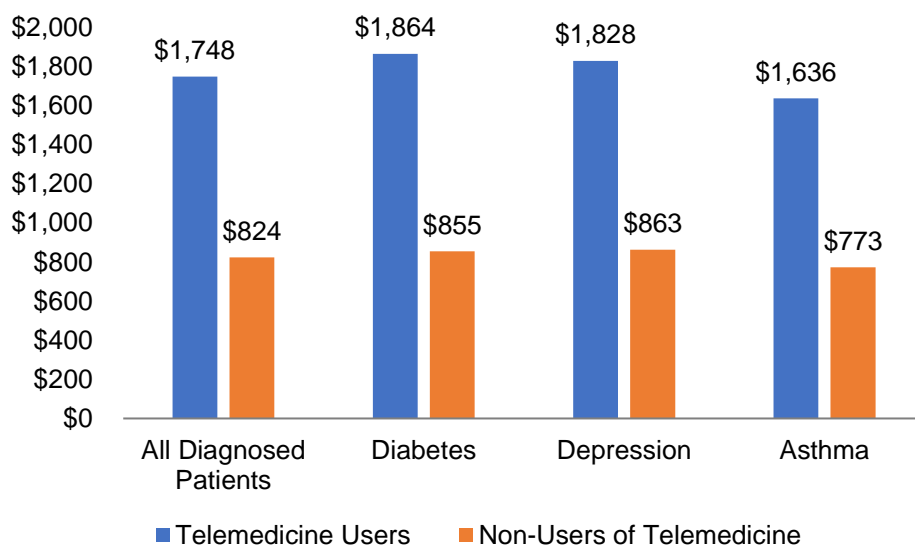
Figure 6
Average Prescription Drug Spending by Condition and Telemedicine Usage, 2020



Source: Author’s analysis of Merative MarketScan administrative enrollment and claims data.

Finally, patients diagnosed with diabetes, depression, or asthma who used telemedicine also spent more on outpatient services. This higher spending reflects their increased usage of health care services in 2020, as previously outlined. These patients spent an average of \$1,748 on outpatient services in 2020, compared with patients with similar diagnoses who did not use telemedicine, who spent an average of \$824 on outpatient services, as shown below in Figure 7.

Figure 7
Average Outpatient Services Spending by Condition and Telemedicine Usage, 2020



Source: Author’s analysis of Merative MarketScan administrative enrollment and claims data.

This is not to say, however, that the presence of telemedicine as a means to deliver health care necessarily induces patients to spend more. After all, patients who sought care via telemedicine sought more in-person care as well, and patients who used telemedicine were slightly less healthy than patients who did not use telemedicine in 2020, with an average CCI of 1.56 compared with 1.16. Also, there may be a quality endogenous to patients seeking care via telemedicine that predisposes them to being more engaged in their health care and, thus, to seeking out more in-person care, resulting in higher outpatient spending.

Conclusion

The COVID-19 pandemic profoundly disrupted the provision of health care services. Some patients may have found it difficult to continue seeing their doctors to help manage their conditions, perhaps due to stay-at-home orders or a desire to avoid contact with the public to minimize exposure to COVID-19. Accordingly, face-to-face visits dropped precipitously as the COVID-19 pandemic spread across the United States in April 2020. In stark contrast, telemedicine visits skyrocketed, helping patients conveniently and safely interact with health care providers from home.

Our analysis is primarily concerned with patients who were diagnosed with asthma, depression, or diabetes. We focus on these conditions because they are commonly managed through prescription drugs, and telemedicine may have been uniquely positioned to help these patients manage their conditions during a time when they were unable or unwilling to seek care in person. Our analysis finds that patients who used telemedicine tended to have higher coverage ratios (69 percent vs. 61 percent) and spent more on prescription drugs (\$420 vs. \$367) than patients who did not use telemedicine in 2020. Adhering to a prescribed drug regimen tends to result in better health outcomes and can potentially lead to lower future spending on expensive inpatient and emergency care. While we did not find that to be the case in 2020, that may be too short a time horizon to realize the benefits of increased medication adherence.

We find evidence that patients who used telemedicine services used more in-person services as well. The average patient who used telemedicine used 56 in-person services in 2020, compared with 34 in-person services for patients who did not use telemedicine. Furthermore, patients seeking care via telemedicine may be more engaged with their health care and thus seek more in-person care than patients who did not seek care via telemedicine. Alternatively, the average patient who used telemedicine had a slightly higher average CCI than the average patient who did not use telemedicine, so they may have needed more care either way.

We also find that patients who used telemedicine spent more overall over the course of the year. However, this is not entirely unexpected. Patients who used telemedicine as a bridge in the gap of face-to-face care that COVID-19 caused may have been more engaged with their health care than patients who did not, as illustrated by their higher utilization of in-person services. And while patients who used telemedicine may not necessarily realize significant savings in the short term, successful management of chronic conditions can help prevent the onset of more serious illnesses and the occurrences of more costly care in the future.

References

- Ashwood, J Scott, Ateev Mehrota, David Cowling, and Lori Uscher-Pines. "Direct-to-Consumer Telehealth May Increase Access to Care, But Does Not Decrease Spending." *Health Affairs*. March 2017.
- Deyo, RA, DC Cherkin, and MA Choi. "Adapting a Clinical Comorbidity Index for Use with ICD-9-CM Administrative Databases." *Journal of Clinical Epidemiology*. June 1992.
- DiMatteo, M Robin, Patrick J Giordani, Heidi S Lepper, and Thomas W Croghan. "Patient Adherence and Medical Treatment Outcomes: A Meta-Analysis." *Medical Care*, September 2002.
- Karimi, Madjid, Euny C Lee, Sara J Couture, Aldren B Gonzales, Violanda Grigorescu, Scott R Smith, Nancy De Lew, and Benajmin D Sommers. "National Trends in Telehealth Use in 2021: Disparities in Utilization and Audio vs Video

Services." *Research Report No. HP-2022-04, Office of the Assistant Secretary for Planning and Evaluation, US Department of Health and Human Services.* February 2022.

Kim, Jennifer, Kelsy Combs, Jonathan Downs, and Frank Tillman III. "Medication Adherence: The Elephant in the Room." *Medication Management*, January 2018.

Mehrota, Ateev, Michael Chernew, David Linetsky, Hilary Hatch, David Cutler, and Eric C Schneider. "The Impact of COVID-19 on Outpatient Visits in 2020: Visits Remained Stable, Despite a Late Surge in Cases." Commonwealth Fund. 2021.

Sokol, Michael C, Kimberly A McGuigan, Robert R Verbrugge, Robert S Epstein. *Impact of Medication Adherence on Hospitalization Risk and Healthcare Cost.* Medical Care, June 2005.

Spiegel, Jake, "The Webcam Will See You Now: A Review of Telemedicine During the COVID-19 Era," *EBRI Issue Brief*, no. 528 (April 2021).

Spiegel, Jake, "Who, What, When, Where, and Why: Trends in Telemedicine Usage From 2016–2020," *EBRI Issue Brief*, no 534 (August 2021).

Roebuck, M Christopher, Joshua N Lieberman, Marin Gemmill-Toyama, Troyen A Brennan. "Medication Adherence Leads to Lower Health Care Use And Costs Despite Increased Drug Spending." *Health Affairs*, May 2014.

Endnotes

¹ The MarketScan Database defines maintenance drugs as fulfilling three criteria: "(a) low probability for dosage or therapy changes; (b) commonly used to treat chronic disease states; and (c) usually administered continuously rather than intermittently."

² For example, if a patient has a prescription for a once-daily medication and has filled prescriptions for 300 doses over the course of the year, then that patient has a coverage ratio of 82 percent ($300 / 365 = 0.822$)

³ Average inpatient spending was low because the incidence of inpatient services was relatively small. Conditional on receiving an inpatient service, telemedicine users spent an average of \$2,021, compared with \$2,133 for patients who exclusively used in-person services throughout 2020.

EBRI Issue Brief is registered in the U.S. Patent and Trademark Office. ISSN: 0887-137X/90 0887-137X/90 \$.50+.50

© 2022, Employee Benefit Research Institute—Education and Research Fund. All rights reserved