The Impact of the COVID-19 Pandemic on Health Care Utilization Among Insured Individuals With Common Chronic Conditions

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**Objective:** The COVID pandemic has had a significant impact on the US health care system. Our primary objective was to understand the impact of the COVID pandemic on non–COVID-related health care utilization among insured individuals with chronic conditions. Our secondary objective was to examine the differential impact by individual characteristics.

**Main Data Source:** Medical and pharmacy claims data for individuals enrolled in a large insurer across the United States.

**Research Design:** A retrospective and repeated cross-sectional study. Overall and conditional-specific health care utilization and cost metrics in (1) March 1 to June 15 and (2) June 16 to September 30, 2020 were compared with the same months during 2016–2019.

**Subjects:** Members of all ages with a diagnosis of diabetes, cardiovascular disease, or chronic kidney disease with commercial or Medicare Advantage insurance.

**Results:** Most non–COVID-related health care utilization decreased drastically on March 1 to June 15, 2020 (odds ratio (OR) range across condition-specific tests: 0.55–0.69; incidence rate ratio (IRR) range for hospitalization/emergency department (ED) visit/outpatient visit: 0.65–0.77) but returned to closer to pre-COVID levels by June 16 to September 30, 2020 [OR range across condition-specific tests: 0.93–1.08; IRR range for hospitalization/ED visit/outpatient visit: 0.77–0.97]. Our study found an enormous increase in telehealth use on March 1 to June 15, 2020 (90–170 times prepandemic levels). A differential impact was observed by age, sex, region of residence, and insurance type.

**Implications:** Further investigation is needed to assess the impact of these changes in health care utilization on long-term health outcomes.

**Key Words:** COVID-19, health care utilization, chronic conditions, commercial and Medicare Advantage plans

(Med Care 2022;60: 673–679)

During the early period of the coronavirus disease (COVID-19) pandemic, state mandatory stay-at-home orders were in place and many elective health services were paused because of the shortages of health care resources or to reduce the risk of infection.1–5 This resulted in disruptions in access to routine and nonemergency medical care, a decrease in referrals, and reduced inpatient admissions across the United States among patients without COVID.4,6 With in-person visits discouraged or unavailable during the early months of the COVID pandemic, individuals with chronic health conditions experienced changes in and/or postponement of their routine health care services. As a result, such changes in routine care could increase the risk of exacerbation of their health conditions and may result in the need for more emergent health services over time.

Prior research reported significant reductions in non–COVID-related health care utilization during the early period of the pandemic.2,4,7 However, the existing literature is based on the data from individual health care systems, particularly at the beginning of the epidemic.2,7,8 Evidence on health care utilization and outcomes among individuals with noncancer chronic conditions during the pandemic is limited.9 There is currently little data about whether patients with common chronic conditions were able to catch up the care in the summer of 2020 that they missed during the initial months of the pandemic. We are also unaware of studies that analyze the effect of the COVID pandemic on the care for individuals with chronic conditions by demographic and other patient characteristics.

This study’s primary objective was to understand the impact of the COVID pandemic on condition-specific tests, non–COVID-related health care utilization, total medical and pharmacy costs, and gaps in medication refills among individuals with conditions requiring routine management during the spring (March 1 to June 15) and the summer (June 16 to September 30) of 2020. We analyzed several common chronic conditions, particularly diabetes, cardiovascular disease, and chronic kidney disease. Individuals with these conditions are at higher risk for poor outcomes after COVID-19 infection,10 so they may have been more concerned about contracting COVID-19 in health care settings and therefore more likely to skip or delay care. Our secondary objective was to examine the differential impact by member characteristics such as region of residence, age, sex, and insurance type (Commercial vs. Medicare Advantage). It is important to understand how these different groups changed their health care utilization as a result of the pandemic.
METHODS

Study Design

Overall and condition-specific health care utilization and cost metrics in (1) March 1 to June 15 ("spring") and (2) June 16 to September 30 ("summer"), 2020 were compared with the same months during the prior 4 years. Splitting the outcomes period into 2 time frames enabled us to detect differences in utilization at different stages of the pandemic. Also, most states had ended strict lockdowns by mid-June, and doctor’s office and hospitals had reopened for elective care.11,12 Outcomes were measured among individuals with prevalent conditions (ie, diagnosed before the outcome measurement period). We analyzed repeated cross-sectional cohorts, and we analyzed outcomes separately by chronic condition.

| TABLE 1. Baseline Characteristics for Insured Individuals With Common Chronic Conditions During Pre-/Post-COVID Pandemic |
|---------------------------------------------------------------|
| **Cardiovascular Disease (n = 2,427,800)**                   |
| **Pre-COVID Period**                                        |
| **n=1,932,572**                                              |
| **COVID period**                                            |
| **n=495,228**                                               |
| **Kidney Disease (n = 1,528,287)**                          |
| **Pre-COVID Period**                                        |
| **n=1,181,545**                                             |
| **COVID period**                                            |
| **n=346,742**                                               |
| **Diabetes (n = 3,404,673)**                                |
| **Pre-COVID Period**                                        |
| **n=2,734,218**                                             |
| **COVID period**                                            |
| **n=670,455**                                               |
| **Baseline Patient Characteristics**                        |
| **Male**                                                     |
| **Female**                                                   |
| **Race/ethnicity, n (%)**                                   |
| **White**                                                    |
| **Black**                                                    |
| **Asian**                                                    |
| **Other/missing**                                            |
| **Region, n (%)**                                           |
| **New England**                                             |
| **Middle Atlantic**                                         |
| **East North Central**                                      |
| **West North Central**                                      |
| **South Atlantic**                                          |
| **East South Central**                                      |
| **West South Central**                                      |
| **Mountain**                                                 |
| **Pacific**                                                  |
| **Missing**                                                  |
| **SES index quartile, n (%)**                               |
| **Quartile 1**                                               |
| **Quartile 2**                                               |
| **Quartile 3**                                               |
| **Quartile 4**                                               |
| **Insurance type, n (%)**                                   |
| **Commercial**                                              |
| **HDH**                                                      |
| **PPO**                                                      |
| **Other**                                                    |
| **Medicare**                                                 |
| **Medicaid**                                                 |
| **Urban/rural, n (%)**                                      |
| **Urban**                                                    |
| **Rural**                                                    |
| **Missing**                                                  |
| **Elixhauser**                                               |
| **Comorbidity index, mean (SD)**                            |

*Other race includes multiracial, Native American, Pacific Islander, and undisclosed race.
CDHP indicates consumer-driven health plan; HMO, health maintenance organization; PPO, preferred provider organization; SES, socioeconomic status.
Source: Authors’ analysis of claims and enrollment data.
Additional analyses were performed to identify differences in outcomes by factors such as geographic region of residence, age group, sex, and insurance type.

Data and Study Population
We used medical and pharmacy claims data from the HealthCore Integrated Research Environment (HIRE). The HIRE is a repository of fully adjudicated claims for members enrolled in commercial, Medicare, and Medicaid plans managed by a large insurer across the United States.

Members of all ages with a diagnosis (at least 1 inpatient or 2 outpatient claims) of diabetes, cardiovascular disease (congestive heart failure or coronary artery disease), or chronic kidney disease with commercial or Medicare Advantage insurance were included in this study. We excluded members diagnosed with COVID-19 from the study population because they might have received other care that was separate from routine chronic condition care. A random sample of members meeting the study criteria was included.

Outcomes
The primary outcomes of interest included condition-specific tests and utilization, all-cause utilization, total medical and pharmacy costs, and gaps in medication refills. Diabetes-specific tests included hemoglobin A1C tests, low-density lipoprotein cholesterol tests, and diabetes-specific screenings (ie,
neuropathy, foot exam, or eye exam). Cardiovascular-specific tests included low-density lipoprotein cholesterol/full lipid tests and creatinine/potassium labs performed for angiotensin receptor blocker/angiotensin-converting enzyme users. Kidney disease–specific tests and utilization included glomerular filtration rate/creatinine tests, urinary albumin tests, and dialysis. All-cause utilization included inpatient admissions, ED visits, outpatient evaluation and management (E&M) visits, and telehealth visits. Medical and pharmacy costs were defined as total allowed costs. Gaps in medication refills were defined as the proportion of medication refills where the days supply from the prior fill ended > 5 days before the date of the refill.

**Statistical Analysis**

For binary outcomes (eg, the presence of certain lab tests), we used a logistic regression model, resulting in odds ratios (ORs); for counts of utilization, we used a generalized linear model with a negative binomial distribution, resulting in incidence rate ratios (IRRs).

**FIGURE 2.** The impact of the COVID pandemic on non–COVID-related health service utilization during the spring and summer of 2020.
in IRRs; for costs and gaps between prescription refills, we used a linear regression model, resulting in absolute differences. All models adjusted for a set of patient demographic characteristics, as described in Table 1. In addition, we controlled for any secular time-trends in outcomes by adjusting for the year as a continuous variable.

In testing for the impact of the COVID-19 epidemic on non–COVID-related health service utilization and costs, the key independent variable was a binary indicator for the COVID period. In testing for the different effects of the pandemic on outcomes of interest by member characteristics, the key independent variables were a binary indicator for the COVID period, an indicator for age category, an indicator for sex, an indicator for insurance type, and an indicator for region of residence. The interaction terms between the binary indicator for the COVID period and the indicators for age category, sex, insurance type, or region of residence were of primary interest.

RESULTS

Table 1 presents the sample size and descriptive statistics for patient characteristics by clinical conditions of interest in the pre-COVID and COVID periods. In all cohorts, a plurality of members were aged 65 or older, were male, lived in East North Central, South Atlantic, and Pacific states, and lived in urban areas.

Figure 1 shows that condition-specific testing dropped substantially in the spring right after the pandemic started (OR range across tests: 0.55–0.69) but returned closer to pre-COVID levels by the following summer (OR range across tests: 0.93–1.08). Dialysis, which is life-preserving and not discretionary, was not affected by the pandemic [OR: 1.00 (spring and summer)].

Figure 2 shows that most non–COVID-related health care utilization for individuals with chronic conditions decreased drastically in the spring. In the cardiovascular disease cohort, all-cause inpatient admissions decreased 31%, all-cause ED visits decreased 33%, and all-cause outpatient E&M visits decreased 25%. However, health care utilization started to return to closer to pre-COVID levels by the summer, although it was still lower than pre-COVID levels. Similar patterns were observed in the kidney disease and diabetes cohorts.

Our study found an enormous increase in telehealth use in the spring (90–170 times prepandemic levels), but telehealth decreased by about one third over the summer compared with the spring (Table 2). Across the 3 study cohorts, both medical and pharmacy costs decreased in the spring but increased in the summer. We observed a decrease in gaps between prescription fills and their refills during the pandemic (–2.30% to –1.92% absolute decline in the percentage of refills after a gap).

Table 3 shows the results of the differential impact by region of residence, age, sex, and insurance type on non–COVID-related health services utilization. In the spring, the mid-Atlantic was hit hardest by COVID (highest number of cases/hospitalizations per population),13,14 and we observed that this region experienced the largest decreases in most non–COVID-related utilization. The mid-Atlantic had by far the largest relative increase in telehealth visits (Table S1, Supplemental Digital Content 1, http://links.lww.com/MLR/C480). Children (0–17) had the largest relative reduction in ED visits in both spring and summer compared with middle-aged adults (45–64). Seniors (65+) had sharper reductions than middle-aged adults in most types of care (for details on these analyses, see Table S1, Supplemental Digital Content 1, http://links.lww.com/MLR/C480).

### TABLE 2. The Impact of the COVID Pandemic on Telehealth Visits, Total Medical Costs, and Pharmacy-Related Outcomes

|                          | Spring IRR/Difference | 95% CI      | Summer IRR/Difference | 95% CI       |
|--------------------------|-----------------------|-------------|-----------------------|--------------|
| Cardiovascular disease   |                       |             |                       |              |
| Telehealth visit (E&M)¹  | 156.2***              | 146.1–167.1 | 93.7***               | 87.8–99.9    |
| Total medical cost²      | −618***               | −5667–−6570 | $283***               | $236–$330    |
| Total pharmacy cost²     | −45***                | −558–−32   | $35***                | $22–$48     |
| Refills with a gap² (%)  | −1.92***              | −2.11–−1.72 | −2.10***              | −2.30–−1.90  |
| Kidney disease           |                       |             |                       |              |
| Telehealth visit (E&M)³  | 170.1***              | 156.3–185.0 | 96.9***               | 89.6–104.7   |
| Total medical cost³      | −541***               | −5473–−348 | $403***               | $341–$465   |
| Total pharmacy cost³     | −54***                | −559–−23   | $48***                | $30–$66     |
| Refills with a gap³ (%)  | −2.04***              | −2.30–−1.78 | −1.94***              | −2.20–−1.68  |
| Diabetes                 |                       |             |                       |              |
| Telehealth visit (E&M)⁴  | 90.6***               | 86.3–95.1   | 52.6***               | 50.3–55.0    |
| Total medical cost⁴      | −716***               | −8752–−680 | $24                   | −813–$60    |
| Total pharmacy cost⁴     | −40***                | −852–−527  | $32***                | $20–$44     |
| Refills with a gap⁴ (%)  | −2.23***              | −2.41–−2.05 | −2.05***              | −2.23–−1.87  |

* Spring is March 1 to June 15. Summer is June 16 to September 30.

1 We used a generalized linear model with a negative binomial distribution, resulting in IRR.

2 We used a linear regression model, resulting in absolute differences.

3 CI indicates confidence interval; E&M, evaluation and management; IRR, incidence rate ratio.

***P<0.001.

4 Source: Authors’ analysis of claims and enrollment data.
Although most nonpharmaceutical health care for individuals with common chronic conditions decreased drastically in the early period of the pandemic, it started to return to closer to pre-COVID levels by the summer. Gaps between a fill and the subsequent refill decreased, indicating that access to medication was not hindered by the pandemic. Telehealth increased significantly in the spring, replacing a substantial amount of outpatient E&M visits, but telehealth decreased over the summer compared with the spring. Also, larger relative declines in care in the spring were observed for children, seniors, females, and mid-Atlantic residents.

### Table 3. Incidence Rate Ratios Comparing the Differential Impact of COVID on All-cause Utilization by Patient Characteristics

|                     | Cardiovascular Disease | Kidney Disease | Diabetes |
|---------------------|------------------------|----------------|----------|
|                     | Inpatient Admission    | Outpatient E&M | Inpatient Admission | Outpatient E&M | Inpatient Admission | Outpatient E&M |
| **Spring**          |                        |                |                        |                |                        |                |
| Insurance type      |                        |                |                        |                |                        |                |
| Medicare            | 1.00                   | 1.12***        | 1.04***                | 0.98           | 1.06**                 | 1.02***        | 1.05**        | 1.18***       | 1.06***       |
| Age                 |                        |                |                        |                |                        |                |              |              |              |
| Age 0–17            | 0.86                   | 0.48***        | 0.84***                | 0.91           | 0.66**                 | 0.79***        | 1.04          | 0.74**        | 0.88***       |
| Age 18–44           | 1.03                   | 0.96           | 1.03**                 | 1.14***        | 1.05                   | 1.05***        | 1.14***       | 1.01          | 1.06***       |
| Age 65+             | 0.86***                | 0.79***        | 0.86***                | 0.89***        | 0.85***                | 0.87***        | 0.87***       | 0.78***       | 0.85***       |
| Sex                 |                        |                |                        |                |                        |                |              |              |              |
| Female              | 0.93***                | 0.93***        | 0.99**                 | 0.94***        | 0.95***                | 0.98***        | 0.91***       | 0.91***       | 0.98***       |
| Male                | 0.98                   | 0.98           | 1.00                   | 1.01           | 0.98                   | 0.97***        | 0.93**        | 0.99          | 0.94***       |
| Region              |                        |                |                        |                |                        |                |              |              |              |
| New England         | 0.82***                | 0.88***        | 0.97***                | 0.85***        | 0.87***                | 0.94***        | 0.78***       | 0.91***       | 0.94***       |
| Middle Atlantic     | 1.05**                 | 1.13***        | 0.99                   | 1.08***        | 1.13***                | 0.98***        | 0.99          | 1.13***       | 0.97***       |
| East North Central  | 1.06*                  | 1.17***        | 1.03***                | 1.13**         | 1.17***                | 1.02*          | 1.08*         | 1.15***       | 1.04***       |
| West North Central  | 1.07***                | 1.07**         | 1.03***                | 1.09**         | 1.10**                 | 1.01           | 1.05*         | 1.11***       | 1.01          |
| East South Central  | 0.98                   | 1.10           | 1.08**                 | 1.07           | 1.05                   | 1.09***        | 1.02          | 1.11***       | 1.07***       |
| West South Central  | 1.00                   | 1.04           | 1.03**                 | 0.97           | 1.07*                  | 1.04***        | 0.96          | 1.07*         | 1.03***       |
| Mountain            | 1.04*                  | 1.06**         | 1.05**                 | 1.05*          | 1.07**                 | 1.05***        | 1.02          | 1.09***       | 1.03***       |
| Pacific             |                        |                |                        |                |                        |                |              |              |              |

| **Summer**          |                        |                |                        |                |                        |                |              |              |              |
| Insurance type      |                        |                |                        |                |                        |                |              |              |              |
| Medicare            | 1.04**                 | 1.16***        | 1.05***                | 1.00           | 1.09***                | 1.04***        | 1.08***       | 1.12***       | 1.07***       |
| Age                 |                        |                |                        |                |                        |                |              |              |              |
| Age 0–17            | 0.92                   | 0.64**         | 0.91*                  | 0.99           | 0.90                   | 0.92**         | 1.06          | 0.72***       | 0.91***       |
| Age 18–44           | 0.91**                 | 0.94*          | 1.02                   | 1.04           | 1.00                   | 1.04***        | 1.04          | 0.98          | 1.03***       |
| Age 65+             | 0.87***                | 0.82***        | 0.92***                | 0.95**         | 0.88***                | 0.93***        | 0.87***       | 0.81***       | 0.91***       |
| Sex                 |                        |                |                        |                |                        |                |              |              |              |
| Female              | 0.96**                 | 0.95***        | 1.00                   | 0.97*          | 0.98                   | 1.00           | 0.96***       | 0.93***       | 1.00          |
| Male                | 1.04                   | 1.05*          | 0.99                   | 1.05           | 1.04                   | 1.00           | 1.06*         | 1.02          | 0.97***       |
| Region              |                        |                |                        |                |                        |                |              |              |              |
| New England         | 1.06**                 | 0.99           | 1.05**                 | 1.07*          | 0.98                   | 1.03***        | 1.03          | 0.97          | 1.03***       |
| Middle Atlantic     | 1.05**                 | 1.11***        | 1.03***                | 1.05*          | 1.10                    | 1.03***        | 1.01          | 1.09***       | 1.02***       |
| East North Central  | 1.13***                | 1.16***        | 1.04***                | 1.10**         | 1.10**                 | 1.05***        | 1.08**        | 1.19***       | 1.04***       |
| West North Central  | 1.03                   | 1.07**         | 1.05**                 | 1.03           | 1.06*                  | 1.05***        | 1.03          | 1.05**        | 1.04***       |
| East South Central  | 0.91*                  | 1.01           | 1.02*                  | 0.89*          | 1.02                   | 1.05***        | 0.91*         | 1.01          | 1.02***       |
| West South Central  | 0.94*                  | 1.01           | 1.00                   | 0.95           | 1.05                   | 1.00           | 0.95          | 1.01          | 0.99          |
| Mountain            | 0.99                   | 0.99           | 1.01                   | 0.99           | 0.98                   | 1.01           | 0.96*         | 0.98          | 0.99          |

**P < 0.05.  
**P < 0.01.  
***P < 0.001.  

**Source:** Authors’ analysis of claims and enrollment data.
The COVID-19 pandemic has brought health inequity to the forefront of public health, as the pandemic has unequally affected different groups of patients. Our findings suggest that children, seniors, and females experienced the largest decreases in most types of utilization. These findings are consistent with literature showing that a higher share of women than men skipped recommended preventive services, and children had a larger decrease in care in response to the pandemic. Longer-term public health policy responses are needed to ensure that the COVID-19 pandemic does not increase health inequalities across different groups of patients.

The substantial increase in telehealth and the decrease in gaps between prescription fills and their associated refills during the pandemic are 2 areas that demonstrate responses to the pandemic by the health care system to increase safe access to care. During the pandemic, insurers changed rules to promote telehealth usage by reimbursing for telehealth visits at the same rate as in-person visits, as well as eliminating copays and coinsurance for telehealth. Furthermore, many people experienced increased flexibility regarding how to receive their medications during the pandemic, including mail orders and door-to-door drop-off by pharmacies, which may have made it easier for patients to receive their medications on time.

This study has some limitations. First, our study period was too short to observe downstream negative health outcomes, making it hard to estimate how much delayed and forgone care in the first several months of the pandemic-affected long-term health. Second, in this study, we only analyzed a population that was continually insured during each outcomes period. People who lost or changed insurance may have had an even greater reduction in care during the pandemic. Third, claims data used in this study have a large proportion of missing data in race/ethnicity. We created “other/missing” category in the race/ethnicity to be included in the regression models. Lastly, dual-eligible enrollees were not included in the study sample.

In conclusion, our findings show that most nonpharmaceutical health care for individuals with chronic conditions decreased in the early period of the COVID pandemic, but it started to return to closer to pre-COVID levels by the summer. This study also shows that a differential COVID impact was observed by member characteristics. Telehealth increased dramatically in the early months of the pandemic but decreased in the following summer. Thus, it will be important to further examine the trends in telehealth visits as the pandemic continues and once it ends. Lastly, further investigation will be needed to assess the impact of changes in health care utilization on long-term health outcomes among individuals with chronic conditions.

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