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Access to care by Medicare beneficiaries in the U.S. with diabetes and multiple chronic conditions during the COVID-19 pandemic

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ABSTRACT

Objective: Determine characteristics of Medicare beneficiaries with diabetes and multiple chronic conditions (MCC) associated with being unable to obtain medical services during COVID-19.

Research design and methods: Retrospective cohort study of data from COVID-19 Supplements of Medicare Current Beneficiary Surveys administered in Summer (N = 11,114, unweighted) and Fall (N = 9686, unweighted) 2020, and Winter 2021 (N = 11,107, unweighted). Binary logistic regression was used to model for adjusted odds of self-reports of being unable to access different types of care.

Results: In three time periods from March 2020 through March/April 2021 beneficiaries with diabetes plus MCC combinations reported being unable to get medical care, compared to beneficiaries with diabetes alone. Notably, patterns persisted at the 12-month mark with beneficiaries with diabetes plus cancer (OR = 1.24), and diabetes plus cancer/stroke (OR = 2.53) experiencing increased odds of being unable to get care because of COVID-19, compared to beneficiaries with diabetes plus stroke (OR = 1.08), diabetes plus stroke (OR = 1.49), and diabetes plus Alzheimer's (OR = 1.09) experienced increased odds of being unable to get treatment for ongoing conditions. Beneficiaries with diabetes plus Alzheimer's (OR = 1.40) also experienced increased odds of being unable to get a regular check-up 12 months into the pandemic. Finally, members of racial/ethnic minority groups experienced increased odds of being unable to obtain services at various times during the pandemic compared to non-Hispanic Whites, with increased odds persisting at 12 months for non-Hispanic Blacks and Hispanics.

Conclusions: Beneficiaries with MCC, and minorities, experienced increased odds of being unable to obtain some services during COVID-19, even when controlling for similar diabetes and MCC combinations. Work remains for providers and public health systems to dismantle and reimagine systems to provide equitable access to care.

1. Introduction

Patients with diabetes often have chronic conditions that require concurrent management.^{1,2} Disparities exist in access to healthcare services by racial and ethnic minorities with diabetes, compared to Whites, even when controlling for presence of multiple chronic conditions (MCC).^{3–6} Racial and ethnic minorities with diabetes have lower odds of using prevention and screening services,^{3,7} and hospital outpatient, acute inpatient, skilled nursing, hospice, and Part D Drug services,⁴ but when they do, levels of use are higher,³ and mean spending increases,⁴ suggesting higher acuity care once they ultimately access care.

During the COVID-19 pandemic, regions across the United States closed healthcare facilities for routine and elective services^{8,9} sparking concern among providers about missed opportunities to address chronic

issues. The goal of this research is to determine the characteristics that are associated with being unable to obtain certain healthcare services in a cohort of Medicare beneficiaries with diabetes and MCC during the first year of the COVID-19 pandemic.

2. Research design and methods

COVID-19 Summer 2020¹⁰ and Fall 2020,¹¹ and Winter 2021¹² COVID-19 Supplemental Public Use Files of the Medicare Current Beneficiary Survey (MCBS) were used for this study. Briefly, the MCBS samples Medicare beneficiaries "to serve as a unique source of information on beneficiaries' health and well-being that cannot be obtained through CMS administrative sources alone."¹⁰ Because the MCBS is a long-standing CMS effort, it was uniquely situated to implement a series of rapid surveys to determine beneficiaries' experiences during COVID-

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19. The COVID-19 Supplemental Surveys were administered as a 15-minute telephone survey to examine the impacts of COVID-19 on beneficiaries, and asked about topics including availability of telemedicine visits, deferred medical care, preventive health behaviors, COVID-19 testing, and social, emotional, and financial well-being. Each of the three Supplemental Surveys includes survey weights that allow for analyses that are nationally representative. The MCBS uses a rotating annual panel sample design for the survey year and each enrollee on the panel is interviewed up to three times per year over four consecutive years. One panel is retired at the conclusion of each winter round, and a new panel is selected to replace it each fall round.^{10–12} Each panel member ID for the COVID-19 supplements is randomly generated for each of the supplements, so it is not possible to link a beneficiary's data between surveys.^{11,12} While item non-response rates, and missing data are generally low for the MCBS surveys, the calculated overall response rate for Summer 2020 was 78.9%,¹⁰ Fall 2020 was 72.6%,¹¹ and Winter 2021 was 79.6%.¹²

The Summer and Fall 2020, and Winter 2021 Supplements include demographic information, as well as variables reflecting the presence of self-reported chronic conditions. In addition, beneficiaries were asked about their ability to access care because of COVID, and if they answered in the affirmative, they were asked about which types of care they were unable to access, including care for ongoing conditions, or a general check-up (the focus of this research), and also about being able to obtain a COVID-19 test, vision, hearing or dental care, diagnostic and screening testing, among others.

For each of the three separate surveys, participants of all races, sexes, geographic locations, and income levels were included. Because of the interest in beneficiaries with diabetes, all beneficiaries without a diabetes diagnosis were excluded, as were beneficiaries who were less than 65 years of age to address the potential confounder of early disability that being on Medicare before the age of 65 suggests. Each sample was refined as described below for the each of three survey time periods. The 2020 COVID-19 Summer Supplement was administered in June/July 2020 to 11,114 beneficiaries (weighted sample $n = 56,094,955$).¹⁰ After first excluding beneficiaries without diabetes ($n = 37,233,568$), another group of beneficiaries that were less than 65 years of age ($n = 3,273,706$) was also excluded, and the final weighted sample size was 15,587,681. The 2020 COVID-19 Fall Supplement was administered in October/November 2020 to 9686 beneficiaries (weighted sample $n = 55,327,472$).¹¹ After eliminating beneficiaries without diabetes ($n = 36,665,420$), and another group of beneficiaries that were less than 65 years of age ($n = 4,259,200$) or who had missing ages ($n = 87,909$), the final weighted sample size was 14,314,943. The 2021 COVID-19 Winter Supplement was administered in March/April 2021 to 11,107 beneficiaries (weighted sample $n = 57,387,274$).¹² After eliminating beneficiaries without diabetes ($n = 39,228,769$), and another group of beneficiaries that were less than 65 years of age ($n = 3,086,302$), or who had missing ages ($n = 680,963$), the final weighted sample size was 14,841,240. Based on the dates of administration of the MCBS Supplements and because these Supplements were only administered three times, all three time periods were included for this study. Time period 1 is covered by the Summer 2020 Supplement administered in June/July 2020 and asks questions about experiences from the beginning of the coronavirus outbreak in the U.S. (March 2020) through June/July 2020. Time period 2 is covered by the Fall 2020 Supplement administered in October/November 2020 and asks questions about experiences from July 1, 2020, through October/November 2020. Time period 3 is covered by the Winter 2021 Supplement administered in March/April 2021, and asks questions about experiences from November 1, 2020, through March/April 2021.

The following variables from the MCBS were used to create groups for comparison and as covariates in the analysis: female (reference: male), Race (non-Hispanic Black, Hispanic, and Other/Unknown, reference: non-Hispanic White), non-metropolitan location (reference: metropolitan), and Income over \$25,000/year (reference: <\$25,000/

year).

In addition to diabetes, various combinations of MCC were included to reflect self-reports of any previous diagnosis of congestive heart failure (CHF), any cancer, COPD/asthma/emphysema (COPD), stroke, and Alzheimer's disease as they are chronic leading causes of death in the United States¹³ that are not acute conditions. Because the goal was to determine if there are disparities in access to care based on race and combinations of diabetes and MCC, a new variable was created that identified beneficiaries as having diabetes alone (without any of the aforementioned chronic conditions), as well as any of 31 combinations of diabetes and MCC that exist. A cross-section of 10 of these 31 combinations was chosen to represent diabetes plus one or two additional MCC, based on highest prevalence. These include diabetes/CHF, diabetes/cancer, diabetes/COPD, diabetes/stroke, diabetes/Alzheimer's, diabetes/CHF/COPD, diabetes/cancer/COPD, diabetes/cancer/stroke, diabetes/COPD/stroke, and diabetes/all other MCC combinations, with diabetes alone as the reference category.

Finally, three dependent variables were modeled to determine the association between demographic variables and MCC combinations and being unable to get care because of COVID, being unable to get care for an ongoing condition, and being unable to get a regular check-up. In Summer 2020, administered June/July 2020, participants were asked: "At any time since the beginning of the coronavirus outbreak did you need medical care for something other than coronavirus, but did not get it because of the coronavirus outbreak?" In Fall 2020, administered October/November 2020, participants were asked: "At any time since July 1, 2020, did you need medical care for something other than coronavirus, but did not get it because of the coronavirus outbreak?" In Winter 2021, administered March/April 2021, participants were asked: "At any time since November 1, 2020, did you need medical care for something other than coronavirus, but did not get it because of the coronavirus outbreak?" After answering the cohort specific question, respondents who answered "yes" were then asked about specific types of care they were unable to receive including care for an ongoing condition, or a regular check-up, among others.

IBM SPSS 25.0¹⁴ was used to fit binary logistic regression models to determine the relationships of the independent variables with the odds of reporting being unable to obtain any of the three services (unable to get care because of COVID, unable to get care for an ongoing condition, and unable to get a regular check-up). A stepwise binary logistic regression model was first fitted without MCC combinations to determine if the addition of MCC combinations in a second step affected the associations between covariates and the dependent variables. However, these effects remained similar in magnitude and direction between steps, so only the saturated models are reported that include MCC combinations, and adjusted odds ratios are reported for each variable. An alpha value of 0.05 was used to determine statistical significance for p-value comparison. In addition, for each adjusted odds ratio, a 95% confidence interval is reported (Table 2) to assist with determining statistical significance.

3. Results

Table 1 contains a descriptive summary of each cohort from the three different time periods. Table 2 contains the results of saturated binary logistic regression models for each dependent variable for each of the three time periods. Figs. 1–3 show the changing odds of reporting being unable to get care because of COVID (Fig. 1), being unable to get care to treat an ongoing condition (Fig. 2), and being unable to get a regular checkup (Fig. 3) from time period 1 (Summer 2020), to time period 2 (Fall 2020), to time period 3 (Winter 2021), each labeled with numbers 1, 2, and 3, respectively. The location of each numerical marker on Figs. 1–3 represents the adjusted odds ratio (on the x-axis) associated with that variable for each of the three time periods. Numerical symbols were used for each time period on each figure for ease in interpreting how each odds ratio changed from time period 1 to time period 3.

Table 1
Descriptive summary of cohort from each time period (n, %).

	Summer 2020	Fall 2020	Winter 2021
	n =	n =	n =
	15,587,861	14,314,942	14,841,240
Female	8,218,852 (52.7)	7,485,371 (52.3)	7,234,644 (48.7)
Race			
Non-Hispanic White	10,693,232 (68.6)	9,860,853 (68.9)	10,032,066 (67.6)
Non-Hispanic Black	1,850,908 (11.9)	1,676,118 (11.7)	1,762,913 (11.9)
Hispanic	1,754,053 (11.3)	1,668,912 (11.7)	1,788,540 (12.1)
Other unknown	1,289,666 (8.3)	1,109,057 (7.7)	1,257,718 (8.5)
Non-metro location	2,829,405 (18.2)	2,532,546 (17.7)	2,733,627 (18.4)
Income \$25,000+/yr	10,542,741 (67.6)	9,798,999 (68.5)	10,225,538 (68.9)
Diabetes & MCC combinations			
Diabetes alone	8,366,215 (53.7)	7,699,032 (53.8)	8,188,879 (55.2)
Diabetes/CHF	489,060 (3.1)	467,635 (3.3)	383,875 (2.6)
Diabetes/cancer	1,890,546 (12.1)	1,754,821 (12.3)	1,821,323 (12.3)
Diabetes/COPD	1,722,793 (11.1)	1,600,423 (11.2)	1,612,967 (10.9)
Diabetes/stroke	808,903 (5.2)	753,208 (5.3)	645,014 (4.3)
Diabetes/Alzheimer's	184,884 (1.2)	174,040 (1.2)	175,597 (1.2)
Diabetes/CHF/COPD	304,625 (2.0)	273,349 (1.9)	325,383 (2.2)
Diabetes/cancer/COPD	490,404 (3.1)	418,801 (2.9)	497,008 (3.3)
Diabetes/cancer/stroke	210,256 (1.3)	161,111 (1.1)	155,418 (1.0)
Diabetes/COPD/stroke	199,722 (1.3)	181,776 (1.3)	192,609 (1.3)
Diabetes/other MCC combinations	828,896 (5.3)	750,379 (5.2)	843,161 (5.7)
Unable to get care because of COVID-19	3,411,614 (21.9)	1,325,112 (9.3)	1,013,308 (6.8)
Unable to get care to treat an ongoing condition	1,259,396 (8.1)	437,045 (3.1)	305,068 (2.1)
Unable to get a regular checkup	1,215,646 (7.8)	530,808 (3.7)	319,664 (2.2)

Because of the large sample sizes for each time period, confidence intervals are quite narrow, all associated odds ratios are statistically significant, and given the scale of the figures, these confidence intervals are not well represented on a typical forest plot, and so the confidence intervals are not included on the figures. Table 2 contains the adjusted odds ratios with confidence intervals for each regression. Next, the salient results are summarized for each binary logistic regression, first for diabetes and MCC combinations, and then for demographic variables.

3.1. Unable to get care because of COVID (Table 2 and Fig. 1)

At the beginning of the pandemic (time period 1, Summer 2020), results are mixed. The odds of reporting being unable to get care because of COVID were decreased for diabetes plus cancer (OR = 0.69), diabetes plus stroke (OR = 0.76), diabetes plus Alzheimer's (OR = 0.93), and diabetes plus cancer/stroke (OR = 0.86), compared to beneficiaries with diabetes alone. The odds of reporting being unable to get care because of COVID were increased for the other combinations, including diabetes plus CHF (OR = 1.17), diabetes plus COPD (OR = 1.08), diabetes plus CHF/COPD (OR = 1.53), diabetes plus cancer/COPD (OR = 1.32), diabetes plus COPD/stroke (1.23), and diabetes plus all other MCC combinations (OR = 1.48). By time period 2, the odds of reporting being unable to get care because of COVID increased for every MCC combination, but by time period 3 all MCC combination, with the exceptions of diabetes plus cancer and diabetes plus cancer/stroke, were associated with decreased odds of reporting being unable to get care. For example, compared to beneficiaries with diabetes alone, beneficiaries with

diabetes plus CHF/COPD, experienced increased odds of reporting being unable to get care because of COVID in time period 1 (OR = 1.53), slightly lower, but still increased odds in time period 2 (OR = 1.35), and much improved lower odds in time period 3 (OR = 0.73). Similar patterns are observed for the other diabetes plus MCC combinations with the exception of diabetes plus cancer (time period 1 OR = 0.69 to time period 3 OR = 1.23), and diabetes plus cancer/stroke (time period 1 OR = 0.86 to time period 3 OR = 2.61), which experienced increasing odds of being unable to get care from Summer 2020 to Winter 2021.

Demographic characteristics also show changes in odds during the pandemic. During time period 1 (Summer 2020), beneficiaries with incomes greater than \$25,000 per year (OR = 1.63), rural residents (OR = 1.07), and females (OR = 1.13) reported increased odds of being unable to get care because of COVID, compared to beneficiaries with income less than \$25,000, urban residents, and males, respectively. As the pandemic wore on, the odds of reporting being unable to get care changed. For instance, while those with higher incomes reported increased odds at time period 1 (OR = 1.63), by time period 2 there was a small improvement (OR = 1.41) and by time period 3 (OR = 0.91) people with higher incomes experienced lower odds of reporting being unable to get care. In addition, during time periods 1 and 2, rural residents had slightly higher (OR = 1.065, time period 1), and then lower (OR = 0.98, time period 2) odds, but by time period 3 rural residents had 22 % higher odds (OR = 1.22) of reporting being unable to get care compared to urban residents. Females had increased odds of reporting being unable to get care in time period 1 (OR = 1.13), while these odds improved by time period 3 (OR = 0.81). Finally, regarding race, compared to Whites, non-Hispanic Blacks (OR = 0.53), Hispanics (0.63), and people of unknown race/ethnicity (OR = 0.76) reported 47 %, 37 %, and 24 % decreased odds, respectively, of reporting being unable to get care because of COVID during time period 1. However, as the pandemic developed, the odds worsened for all three groups. Compared to Whites, non-Hispanic Blacks (OR = 0.53) reported 47 % decreased odds of reporting being unable to get care because of COVID in time period 1, and although the odds were still lower than those for Whites by time period 3, non-Hispanic Blacks (OR = 0.96) reported only 4 % decreased odds of being unable to get care. Hispanics (OR = 0.63, 37 % decreased odds, time period 1) experienced a similar increase in odds by time period 3 (OR = 0.93, 7 % decreased odds). Notably, beneficiaries with Other/Unknown race experienced even larger increases in odds of reporting being unable to get care because of COVID from time period 1 (OR = 0.76, 24 % decreased odds), to time period 3 (OR = 1.52, 52 % increased odds).

3.2. Unable to get care to treat on ongoing condition (Table 2 and Fig. 2)

With respect to MCC combinations, every MCC combination (except diabetes plus CHF/COPD) is associated with reporting increased odds, ranging from 13 % higher (OR = 1.13, for diabetes plus stroke) to 636 % higher (OR = 7.36, for diabetes plus CHF) of being unable to obtain care for an ongoing condition during time period 1. By time period 2, the odds of reporting being unable to get care to treat an ongoing condition worsened for most MCC combinations (with the exception of diabetes plus CHF, diabetes plus cancer, and diabetes plus cancer/COPD), ranging from 37 % higher (OR = 1.37, for diabetes plus Alzheimer's) to 1109 % higher (OR = 12.09, for diabetes plus COPD/stroke). Essentially, beneficiaries with other chronic conditions in addition to diabetes reported increased odds of being unable to get care for an ongoing condition from the beginning of the pandemic (early 2020) through at least November 2020, reflecting a time period of about 8–9 months where care for chronic conditions was not received by these beneficiaries. Finally, by time period 3, all odds of reporting being unable to get care for an ongoing condition for all MCC combinations were similar to or lower than beneficiaries with Diabetes alone, with the exception of Diabetes plus Stroke (which exhibited very little change in odds, albeit increased odds, over the entire time period).

Table 2

Multivariable binary logistic regressions: access to care measures in U.S. Medicare beneficiaries with diabetes and multiple chronic conditions from Summer 2020, Fall 2020, and Winter 2021 during the COVID-19 pandemic.

	Unable to get care because of COVID		
	Summer 2020	Fall 2020	Winter 2021
	n = 3,411,614	n = 1,325,112	n = 1,013,308
Independent variables	Odds ratios (95 % CI)		
Female sex (ref: male)	1.134 (1.131, 1.137)	1.042 (1.038, 1.046)	0.804 (0.800, 0.807)
Race (ref: non-Hispanic White)			
Non-Hispanic Black	0.527 (0.525, 0.530)	0.913 (0.908, 0.919)	0.955 (0.949, 0.961)
Hispanic	0.634 (0.631, 0.637)	0.963 (0.957, 0.969)	0.933 (0.927, 0.939)
Other unknown	0.758 (0.754, 0.762)	1.052 (1.045, 1.059)	1.516 (1.502, 1.529)
Non-metro location (ref: metro)	1.065 (1.062, 1.069)	0.983 (0.978, 0.988)	1.217 (1.210, 1.224)
Income \$25,000+/yr (ref: <\$25,000/yr)	1.632 (1.626, 1.637)	1.413 (1.407, 1.419)	0.906 (0.901, 0.910)
Diabetes & MCC (ref: diabetes alone)			
Diabetes/CHF	1.174 (1.166, 1.182)	2.433 (2.413, 2.454)	0.194 (0.193, 0.196)
Diabetes/cancer	0.689 (0.686, 0.692)	1.177 (1.170, 1.184)	1.232 (1.223, 1.242)
Diabetes/COPD	1.075 (1.071, 1.079)	1.760 (1.750, 1.770)	0.549 (0.546, 0.553)
Diabetes/stroke	0.757 (0.752, 0.762)	1.211 (1.201, 1.222)	0.699 (0.692, 0.706)
Diabetes/Alzheimer's	0.934 (0.923, 0.946)	1.335 (1.312, 1.358)	0.712 (0.699, 0.726)
Diabetes/CHF/COPD	1.525 (1.513, 1.538)	1.351 (1.333, 1.369)	0.727 (0.717, 0.737)
Diabetes/cancer/COPD	1.321 (1.312, 1.330)	3.489 (3.461, 3.517)	0.337 (0.334, 0.340)
Diabetes/cancer/stroke	0.863 (0.853, 0.874)	0.874 (0.856, 0.892)	2.614 (2.526, 2.705)
Diabetes/COPD/stroke	1.225 (1.213, 1.238)	1.645 (1.621, 1.669)	0.688 (0.677, 0.699)
Diabetes/other MCC combinations	1.483 (1.475, 1.491)	2.404 (2.387, 2.421)	0.810 (0.802, 0.818)

	Unable to get treatment for an ongoing condition		
	Summer 2020	Fall 2020	Winter 2021
	n = 1,259,396	n = 437,045	n = 305,068
Independent variables	Odds ratios (95 % CI)		
Female sex (ref: male)	0.936 (0.932, 0.941)	1.209 (1.199, 1.219)	0.979 (0.969, 0.990)
Race (ref: non-Hispanic White)			
Non-Hispanic Black	0.820 (0.812, 0.828)	0.669 (0.659, 0.679)	4.127 (4.037, 4.219)
Hispanic	1.051 (1.042, 1.061)	1.904 (1.879, 1.929)	0.743 (0.731, 0.756)
Other unknown	0.514 (0.509, 0.519)	0.232 (0.227, 0.238)	0.274 (0.268, 0.279)
Non-metro location (ref: metro)	1.666 (1.656, 1.676)	1.185 (1.172, 1.198)	0.834 (0.823, 0.844)
Income \$25,000+/yr (ref: <\$25,000/yr)	0.969 (0.963, 0.975)	1.068 (1.058, 1.079)	0.563 (0.556, 0.570)
Diabetes & MCC (ref: diabetes alone)			
Diabetes/CHF	7.364 (7.261, 7.470)	0.599 (0.587, 0.612)	0.164 (0.161, 0.167)
Diabetes/cancer	1.395 (1.383, 1.406)	0.341 (0.335, 0.346)	0.755 (0.742, 0.769)
Diabetes/COPD	1.645 (1.633, 1.657)	1.513 (1.495, 1.530)	1.076 (1.061, 1.092)
Diabetes/stroke	1.133 (1.119, 1.146)	1.634 (1.606, 1.663)	1.494 (1.453, 1.535)
Diabetes/Alzheimer's	1.738 (1.700, 1.778)	1.372 (1.324, 1.422)	1.085 (1.036, 1.137)
Diabetes/CHF/COPD	0.625 (0.614, 0.635)	2.242 (2.184, 2.300)	0.366 (0.354, 0.377)
Diabetes/cancer/COPD	3.279 (3.240, 3.318)	0.407 (0.398, 0.415)	0.655 (0.643, 0.668)
Diabetes/cancer/stroke	4.011 (3.922, 4.102)	4.755 (4.545, 4.975)	
Diabetes/COPD/stroke	1.693 (1.664, 1.723)	12.093 (11.641, 12.563)	0.316 (0.306, 0.326)
Diabetes/other MCC combinations	1.605 (1.590, 1.619)	2.235 (2.205, 2.265)	0.514 (0.504, 0.524)

	Unable to get a regular check-up		
	Summer 2020	Fall 2020	Winter 2021
	n = 1,215,646	n = 530,808	n = 319,664
Independent variables	Odds ratios (95 % CI)		
Female sex (ref: male)	0.765 (0.761, 0.769)	1.244 (1.235, 1.254)	1.669 (1.652, 1.686)
Race (ref: Non-Hispanic White)			
Non-Hispanic Black	1.885 (1.868, 1.902)	3.539 (3.492, 3.586)	0.619 (0.610, 0.628)
Hispanic	1.742 (1.727, 1.757)	5.929 (5.848, 6.012)	1.227 (1.207, 1.247)
Other unknown	1.427 (1.414, 1.440)	0.860 (0.847, 0.873)	0.732 (0.718, 0.746)
Non-metro location (ref: metro)	1.297 (1.289, 1.305)	1.792 (1.774, 1.810)	0.529 (0.522, 0.535)
Income \$25,000+/yr (ref: <\$25,000/yr)	0.809 (0.804, 0.814)	0.808 (0.800, 0.815)	1.998 (1.975, 2.022)
Diabetes & MCC (ref: diabetes alone)			
Diabetes/CHF	0.791 (0.781, 0.801)	3.727 (3.664, 3.790)	0.359 (0.353, 0.365)
Diabetes/cancer	1.198 (1.189, 1.208)	2.618 (2.586, 2.651)	0.892 (0.876, 0.908)
Diabetes/COPD	1.098 (1.090, 1.106)	1.067 (1.054, 1.080)	0.956 (0.943, 0.969)
Diabetes/stroke	1.098 (1.085, 1.111)	0.965 (0.947, 0.984)	0.539 (0.528, 0.551)
Diabetes/Alzheimer's	2.134 (2.087, 2.183)		1.400 (1.336, 1.466)
Diabetes/CHF/COPD	0.159 (0.155, 0.163)	3.154 (3.073, 3.238)	0.366 (0.355, 0.376)
Diabetes/cancer/COPD	1.873 (1.851, 1.895)	0.756 (0.744, 0.768)	0.419 (0.411, 0.426)
Diabetes/cancer/stroke		1.664 (1.591, 1.739)	
Diabetes/COPD/stroke	0.583 (0.570, 0.596)	3.561 (3.463, 3.662)	
Diabetes/other MCC combinations	0.792 (0.785, 0.800)	1.760 (1.736, 1.784)	0.903 (0.884, 0.922)

Source: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey, COVID-19 Summer 2020, Fall 2020, and Winter 2021 Supplement Public Use Files.

Sample sizes: Summer 2020 n = 15,587,861 (weighted), 3017 (unweighted); Fall 2020 n = 14,314,943 (weighted), 2436 (unweighted); Winter n = 14,841,240 (weighted), 2790 (unweighted).

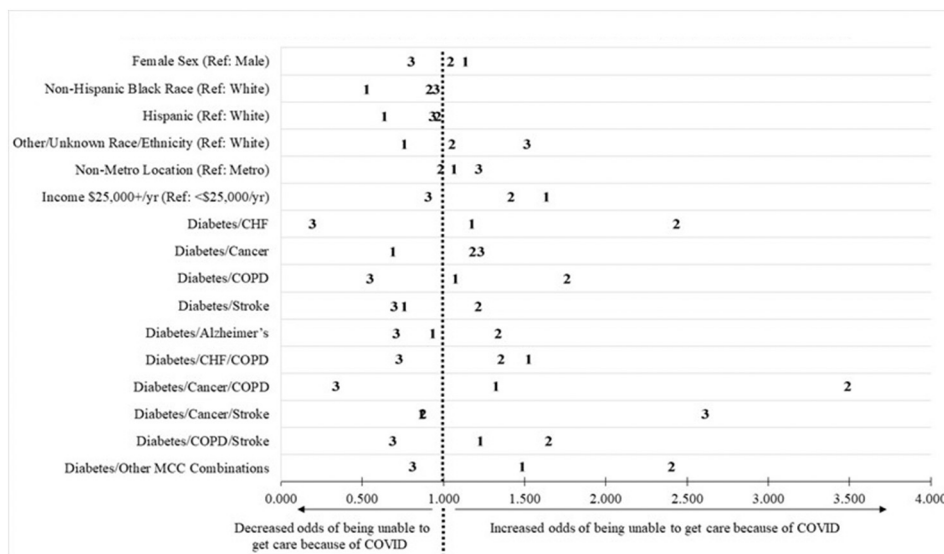


Fig. 1. Odds of reporting being unable to get care because of COVID-19 at three different time periods. Time Periods: 1 - Summer 2020 (MCBS administered June–July 2020), 2 - Fall 2020 (MCBS administered October–November 2020), 3 - Winter 2021 (MCBS administered March–April 2021). Numerical icons (1, 2, 3) indicate the time periods of the surveys, not the odds ratios. Use of the time period numbers allows the reader to see how the odds changed from the beginning of the pandemic (time period 1), to 4–5 months later (time period 2), and then about 11–12 months (time period 3) from the beginning. The reader is directed to [Table 1](#) for odds ratios, and confidence intervals at each time period.

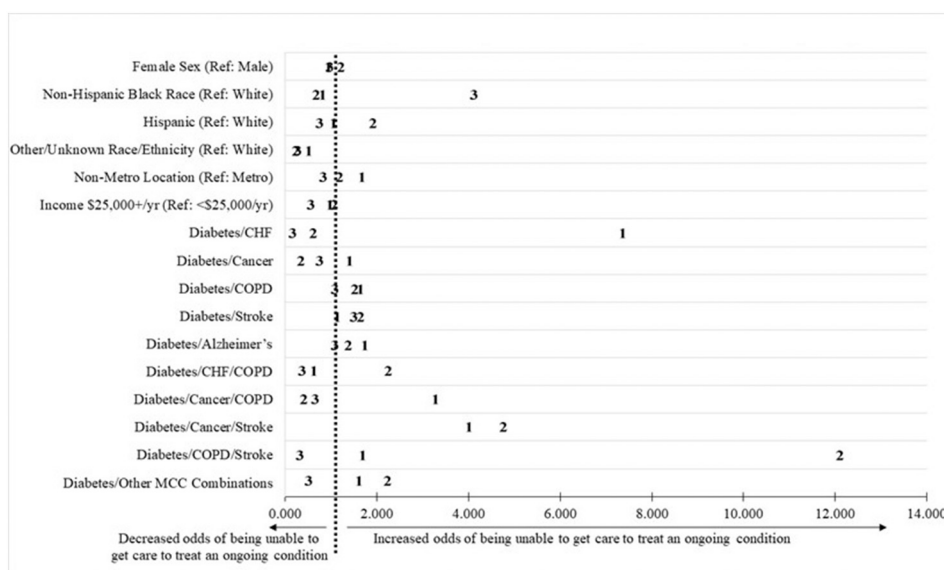


Fig. 2. Odds of reporting being unable to get care to treat an ongoing condition at three different time periods. Time Periods: 1 - Summer 2020 (MCBS administered June–July 2020), 2 - Fall 2020 (MCBS administered October–November 2020), 3 - Winter 2021 (MCBS administered March–April 2021). Numerical icons (1, 2, 3) indicate the time periods of the surveys, not the odds ratios. Use of the time period numbers allows the reader to see how the odds changed from the beginning of the pandemic (time period 1), to 4–5 months later (time period 2), and then about 11–12 months (time period 3) from the beginning. The reader is directed to [Table 1](#) for odds ratios, and confidence intervals at each time period.

Regarding associations of demographic characteristics with reporting being unable to get care to treat an ongoing condition, odds ratios for most characteristics did not change much from time period 1 to time period 3. The one notable exception is for non-Hispanic Blacks. Compared to Whites, in time period 1, non-Hispanic Blacks had 18 % (OR = 0.82) decreased odds of reporting being unable to get for an ongoing condition, improving by time period 2 (OR = 0.67, 33 % decreased odds). However, by time period 3, non-Hispanic Blacks had 313 % (OR = 4.13) increased odds of reporting being unable to get care for an ongoing condition, compared to Whites.

3.3. Unable to get a regular checkup (Table 2 and Fig. 3)

The association of diabetes and MCC combinations with reporting

being unable to get a regular checkup indicates mixed results. During the first time period, several MCC combinations were associated with increased odds of reporting being unable to get a regular checkup, including diabetes plus cancer/COPD (OR = 1.87), diabetes plus Alzheimer's (OR = 2.13), diabetes plus stroke (OR = 1.10), diabetes plus COPD (OR = 1.10), and diabetes plus cancer (OR = 1.20), while other MCC combinations were associated with decreased odds of reporting being unable to get a regular checkup, including diabetes plus CHF (OR = 0.79), diabetes plus CHF/COPD (OR = 0.16), diabetes plus COPD/stroke (OR = 0.58), and diabetes plus any other MCC combination (OR = 0.79). Except for diabetes plus cancer/COPD, and diabetes plus stroke, all MCC combinations experienced increased odds of reporting being unable to get a regular checkup in time period 2, with all MCC combinations improving in time period 3 (with the exception of diabetes plus

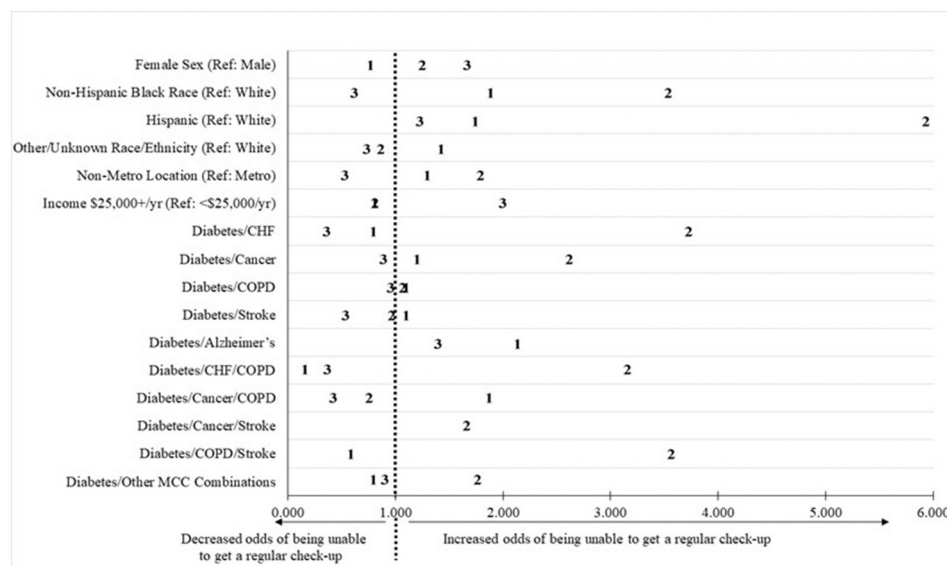


Fig. 3. Odds of reporting being unable to get a regular check-up at three different time periods. Time Periods: 1 - Summer 2020 (MCBS administered June–July 2020), 2 - Fall 2020 (MCBS administered October–November 2020), 3 - Winter 2021 (MCBS administered March–April 2021). Numerical icons (1, 2, 3) indicate the time periods of the surveys, not the odds ratios. Use of the time period numbers allows the reader to see how the odds changed from the beginning of the pandemic (time period 1), to 4–5 months later (time period 2), and then about 11–12 months (time period 3) from the beginning. The reader is directed to Table 1 for odds ratios, and confidence intervals at each time period.

Alzheimer's).

Finally, there are a few notable results regarding the association of some demographic characteristics with reporting being unable to get a regular checkup. Compared to males, females had 33 % (OR = 0.77) decreased odds of reporting being unable to get a regular checkup in time period 1, worsening to 24 % (1.24) increased odds in time period 2, and 67 % (OR = 1.67) increased odds in time period 3. Compared to Whites, in time period 1, non-Hispanic Blacks had 89 % (OR = 1.89) increased odds of reporting being unable to get a regular checkup, worsening to 254 % (OR = 3.54) increased odds in time period 2, and improving to 38 % (OR = 0.62) decreased odds in time period 3. Perhaps most notable are the results for Hispanics. Compared to Whites, in time period 1, Hispanics had 74 % (OR = 1.74) increased odds of reporting being unable to get a regular checkup, worsening to 493 % (5.93) increased odds in time period 2, and while improving by time period 3, still elevated at 23 % (OR = 1.23) increased odds in time period 3.

4. Discussion

From the 12 months from the start of the pandemic (March 2020) through Winter 2021 (March/April 2021) beneficiaries with diabetes plus several MCCs or MCC combinations reported being unable to get some types of care, compared to beneficiaries with diabetes alone. These results generally align with other studies that reported cancellations of appointments or delays in care in up to 40 % of patients¹⁵ perhaps reflecting closures of health care facilities across the country to routine and elective care.⁸ Chudasama et al.¹⁶ reported during March/April 2020, that diabetes (38 %) was the most reported condition impacted by closures or cancellations of healthcare services, and that patients with COPD (9 %), heart disease (7 %), and cancer (6 %), among other conditions, also experienced being unable to obtain needed care. The increased odds of being unable to get some healthcare services experienced by the MCBS cohorts included in this study aligns with the results of Chudasama et al.¹⁶ and highlights the troubling inability to obtain care by people with MCC, for sometimes up to an entire year after the COVID-19 pandemic started.

Members of racial/ethnic minority groups experienced increased odds of reporting being unable to obtain some services at various times during the COVID-19 pandemic compared to non-Hispanic Whites, aligning with previous evidence suggesting decreased use of prevention and screening services,^{3,7} ancillary health care services,⁴ and visits to physician offices,¹⁷ by members of minority groups. In the MCBS cohorts, early in the pandemic, members of minority race/ethnic groups

reported decreased odds of being unable to get care because of COVID-19, and being unable to get care to treat an ongoing condition, compared to Whites (i.e. they had better odds of receiving care), aligning with results of at least one other study that reported increased use of services by minorities with diabetes,¹⁸ however, as the pandemic wore on, at least some groups reported worsening (increased) odds of being unable to get some types of care. For instance, by time period 3 (1 year into the pandemic), beneficiaries of unknown/other race/ethnicity experienced increased odds of being unable to get care because of COVID, while the odds for all other race/ethnic groups had improved. The same pattern was observed for non-Hispanic Blacks who experienced increased odds of being unable to get care for an ongoing condition in time period 3, relative to Whites, while the odds for other groups improved. Finally, increased odds of being unable to get a regular check-up were observed across all three time periods for Hispanics.

The MCBS cohorts are well designed to represent a cross section of Medicare beneficiaries across the United States.^{10–12} Large sample sizes, and relative lack of missing data provide a valid and reliable set of data to make national estimates about use of services during the COVID-19 pandemic. The MCBS cohorts include some of the same participants from time period to time period, but the sampling design also includes new beneficiaries, while other respondents fall out from time period to time period. Therefore, conclusions cannot be made about the continuity of responses among a stable cohort over the three time periods. In addition, the overall total response rate for each of the surveys is in the low to mid 70%. Item-response rates are somewhat different, and in this case, there are very few items in the cohort (i.e. beneficiaries over the age of 65 with diabetes) that respondents ignored, skipped, or said they did not know the answer to. In any case, there is a concern that non-responders for a question may be different from responders. To determine differences, additional analyses were run to compare demographic information between groups based on response or non-response (or missing data) and found no significant differences in race, age, sex, income, or geographic location based on non-response. Large sample sizes, by their nature, provide very narrow confidence intervals, resulting in all odds ratios reported here being statistically significant, as are the differences in odds ratios between time periods for individual variables. Statistical significance does not imply clinical significance. However, as described earlier, odds ratios for many of the independent variables included here were elevated early in the pandemic, stayed elevated later in the pandemic, and mostly resolved by 12 months. The odds ratios indicate increases in odds of being unable to obtain some services ranging from 10 % to over 1000 % higher compared to reference

categories, for some demographic and MCC combinations, and these increases likely would have been observed even with smaller sample sizes. However, what matters most, is that there was a general inability by some groups based on MCC profile and demographic characteristics to obtain needed healthcare services over the first year of the COVID-19 pandemic. The increase in odds of being unable to obtain needed services even if only for the first two time periods (8–9 months) possibly reflects worse outcomes for patients with diabetes and MCC even after they were able to obtain healthcare services later in the first year of the pandemic.

Notably, the frequency counts and percent of people who report being unable to access care decreased between all time periods, suggesting perhaps that provider offices were opening their schedules to allow more visits. But the improvement over time might also reflect several conditions that might have been present at the beginning of the pandemic that reflect characteristics of the beneficiaries rather than of the health care system. For instance, patient self-reports of being unable to access care during this time might reflect the bias that is inherent in all self-reports; that is, participants may not accurately recall their use of services during each time period. In addition, there was great upheaval in how the health care system worked during the initial phase of the pandemic and scheduling an appointment might have been confusing or overly burdensome for some people. Finally, people who already had previous poor experiences in the health care system due to lack of trust, previous poor treatment, or an inability to pay, might have been reluctant to even engage with the system at a time when the focus on one disease overwhelmed the system. These data show that people generally had an easier time accessing care later in the pandemic, but aside from closing offices, there are other reasons people may have chosen not to engage with the system.

Future research about access to care during the pandemic should consider why people were unable to get the care they needed. For instance, some reasons may include that the provider's office was closed, that limited appointments prevented easy scheduling, that patients and/or providers were not comfortable with face-to-face meetings, and that virtual care was not offered or available. Although not the focus of this research, the MCBS does ask about these situations in various ways during each of the MCBS Supplements and future work could determine whether disparities exist in use of services because of these situations. In addition, while this research focused on a subset of respondents that indicated they had diabetes, other research could focus on the presence of other chronic conditions, or none at all.

5. Conclusions

Across all three dependent variables (unable to get care, unable to get treatment for an ongoing condition, and unable to get a regular check-up), many diabetes plus MCC combinations were associated with increased odds of being unable to obtain these types of services in time period 1, which generally worsened by time period 2, and mostly resolved by time period 3. There are a few notable exceptions. Beneficiaries with diabetes plus cancer, and diabetes plus cancer/stroke, still experienced increased odds of reporting being unable to get care because of COVID by Winter 2021, reflecting increasing odds over the three time periods. In addition, by time period 3, increased odds of being unable to get treatment for an ongoing condition were still observed for beneficiaries with diabetes plus COPD, diabetes plus stroke, and diabetes plus Alzheimer's. Finally, regarding being unable to get a regular check-up, beneficiaries with diabetes plus Alzheimer's still experienced increased odds by time period 3.

Disparities in health access and outcomes associated with groups based on race/ethnicity are well-described in the literature for diabetes^{3,4,17} and other chronic conditions.^{19–21} This research confirmed that during a global pandemic, minority Medicare beneficiaries in the U. S. with similar insurance access and diabetes plus MCC profiles had a more difficult time accessing routine care compared to non-Hispanic

Whites, and this persisted for some groups even a year later. During a time of a reckoning with the history of systemic and institutional racism in the U.S., these results provide further evidence that individual providers, health systems, and the public health infrastructure have further work to do to dismantle systems that prevent equitable distribution of access to care.²²

CRedit authorship contribution statement

J.C. obtained and analyzed data, wrote the manuscript, and is the guarantor of this work.

Declaration of competing interest

None.

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