Disparities in Eye Care Utilization During the COVID-19 Pandemic

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• PURPOSE: To assess the relationship between telemedicine utilization and sociodemographic factors among patients seeking eye care.
• DESIGN: Comparative utilization analysis.
• METHODS: We reviewed the eye care utilization patterns of a stratified random sample of 1720 patients who were seen at the University of Michigan Kellogg Eye Center during the height of the COVID-19 pandemic (April 30 to May 25, 2020) and their odds of having a video, phone, or in-person visit compared with having a deferred visit. Associations between independent variables and visit type were determined using a multinomial logistic regression model.
• RESULTS: Older patients had lower odds of having a video visit ($P = .007$) and higher odds of having an in-person visit ($P = .023$) compared with being deferred, and in the nonretina clinic sample, older patients still had lower odds of a video visit ($P = .02$). Non-White patients had lower odds of having an in-person visit ($P < .02$) in the overall sample compared with being deferred, with a similar trend seen in the retina clinic. The mean neighborhood median household income was \$76,200 (±\$33,500) and varied significantly ($P < .0001$) by race with Blacks having the lowest estimated mean income.
• CONCLUSION: Disparities exist in how patients accessed eye care during the COVID-19 pandemic with older patients—those for whom COVID-19 posed a higher risk of mortality—being more likely to be seen for in-person care. In our affluent participant sample, there was a trend toward non-White patients being less likely to access care. Reimbursing telemedicine solely through broadband internet connection may further exacerbate disparities in eye care. **(Am J Ophthalmol 2022;233: 163–170.**

THE WIDESPREAD IMPACT OF THE COVID-19 PANDEMIC significantly altered the availability and delivery of health care. Mortality from COVID-19 disproportionately affects older and racial/ethnic minority Americans.[1–3] The disparities that these groups, particularly Black Americans, face have been amplified by the pandemic,[4] including limited access to health care services[5] and housing or food insecurity.[6] The COVID-19 pandemic may be exacerbating these problems with access to health care, in part, as fear of contracting coronavirus while seeking health care has increased.[7]

Telemedicine utilization has slowly increased over the last decade, with a significant uptake in 2020 when the COVID-19 pandemic began.[8,9] Providing eye care via telemedicine is often perceived as challenging given the heavy reliance on physical examination and imaging for making ophthalmic diagnoses, though acceptance of telemedicine amongst ophthalmologists has increased during the pandemic.[9] Telemedicine was critical in maintaining access to eye care, as ophthalmology was the specialty most negatively impacted by a decline in in-person patient visits as of May 2020.[10,11]

As physical distancing has been a key strategy in mitigating the spread of COVID-19, telemedicine has been critical for providing necessary patient care during the pandemic. Yet substantial age, race, and socioeconomic digital divides exist in the use of telehealth technology, which may worsen already existing disparities in health and health care if health care delivery relies heavily on internet-based solutions for delivering telemedicine.[12–16]

In this study, we compared the utilization of telemedicine services for eye care by different sociodemographic groups during the initial wave of the COVID-19 pandemic. We assessed the impact of age, race/ethnicity, income, proximity to clinic, and availability of high-speed broadband connection on the use and access to telemedicine services. Without a deep understanding of the factors that play into telemedicine utilization, health care providers risk further amplifying the disparities that

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many Americans face, particularly those from vulnerable populations.

METHODS

• **CLINICAL SETTING:** The University of Michigan Kellogg Eye Center, located in Ann Arbor, Michigan, includes 108 faculty physicians who provided medical education and multispecialty care to approximately 206,000 outpatients in 2019. In the state of Michigan, the shelter-in-place order began on March 23, 2020. From March 23 to May 25, 2020, the University of Michigan instituted a policy to provide in-person care only for urgent patients and to defer care or to provide telemedicine-based eye care for all other patients. We conducted a telephone survey of Kellogg Eye Center patients during this period to understand patients' experiences with telemedicine compared with in-person or deferred care during the COVID-19 pandemic. This study was approved by the University of Michigan Institutional Review Board as exempt, quality improvement research and adhered to the tenets of the Declaration of Helsinki. Verbal consent was obtained from study participants over the phone.

• **PARTICIPANTS AND SAMPLE SELECTION:** A stratified random sample was selected from approximately 13,000 patients who had a scheduled visit at the Kellogg Eye Center between March 23 and May 8, 2020. Patients were called by the study team between April 30 and May 25, 2020. Recruitment was stratified by visit type to ensure sufficient responses for each visit type. Because the group sizes were not equal (eg, there were fewer video visits compared with deferred visits), 92% of patients who received video visits, 68% of patients who received phone visits, 38% of patients who received in-person visits, and 15% of patients whose visits were deferred were contacted to provide a reasonable sample size of patients who had experienced each visit type. Patients were stratified using the following algorithm: 1) anyone who received any in-person care at the eye center was classified as an in-person visit; 2) anyone who received a video visit, but no in-person visits, was classified as a video visit; 3) anyone who received a phone visit, but not a video or an in-person visit, was classified as a phone visit; 4) anyone whose care had all been deferred was classified as deferred. Duplicates entries were removed from call lists. A maximum of 3 attempts were made to call each patient.

• **SOCIODEMOGRAPHIC AND CLINICAL DATA:** Age, race, gender, and address were extracted from the electronic health record research data warehouse (EPIC Clarity). Participant addresses were used to compute the straight-line distance to the Kellogg Eye Center. Patient address was also used to determine US Census tract, which was then used to extract median household income from the American Community Survey 2014 to 2018, 5-year estimates.[17] Census tract data were used to assess whether high-speed broadband internet (downstream speed >500 Mbps from ≥ 1 residential provider) was available from the public FCC Fixed Broadband Deployment Data.[18]

• **SURVEY /INTERVIEW DATA COLLECTION AND ANALYSIS:** After obtaining verbal consent, the research team conducted telephone interviews that included 4 survey questions assessing perception of eye health and satisfaction with care and an open-ended interview question about how participants felt about their eye care or its deferral. Field notes were taken on the open-ended responses, the data were analyzed with a Grounded Theory approach,[19] and then a mixed methods lens was used to assess whether differences in themes were present between racial groups (see Supplemental Methods).

• **STATISTICAL ANALYSIS:** Participant data were summarized overall, by visit type, and by race with counts and percentages or with means and standard deviations accounting for the survey design (weighted by inverse of probability of selection by visit type). Rao-Scott adjustments to the Pearson χ^2 test and to the likelihood ratio test were used to assess the presence of an association between 2 categorical variables and for a continuous and a categorical variable, respectively. The association between type of visit (4 levels) and each covariate was quantified by generalized odds ratios (gORs) from a multinomial logistic regression model with "deferred" as the reference class. Multinomial logistic regression is a generalization of binary logistic regression that is applicable when the response variable has >2 possible outcomes. Univariate models are presented because the purpose of this study was to describe associations and not assess for possible causation. Models were fit to the entire sample, to patients from the retina clinic, and to patients not from the retina clinic, as the retina clinic provided the largest proportion of in-person care during this time. The linearity of associations between the gORs and continuous covariates were assessed. Statistical analysis was conducted using R software (version 3.6.3; R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

We identified a sample of 3274 participants of whom 1720 agreed to be interviewed (53% response rate). Participants were classified by visit type: 536 (31.2%) in-person visits, 320 (18.6%) phone visits, 95 (5.5%) video visits, and 769 (44.7%) deferred visits (Table 1). The patient population had a mean ± SD age of 64.9 ± 16.4 years, a mean ± SD neighborhood median household income of \$76,200 ± \$33,500, and a mean ± SD distance from the Kellogg Eye Center of 37.5 ± 101 miles. The participant population was

TABLE 1. Associations Between Visit Type and Demographics

	Overall[a] (N = 1720)	Cancelled (n = 769)	In-Person (n = 536)	Phone (n = 320)	Video (n = 95)	*P* value
Race, n (%)						
White	1396 (80.2)	604 (78.5)	468 (87.3)	249 (77.8)	75 (78.9)	.000
Asian	66 (4.5)	40 (5.2)	13 (2.4)	10 (3.1)	3 (3.2)	
Black	180 (10.7)	87 (11.3)	42 (7.8)	39 (12.2)	12 (12.6)	
Other	78 (4.6)	38 (4.9)	13 (2.4)	22 (6.9)	5 (5.3)	
Ethnicity, n (%)						
Hispanic	38 (2.2)	15 (2.1)	11 (2.1)	11 (3.7)	1 (1.1)	.463
Non-Hispanic	1593 (97.8)	713 (97.9)	502 (97.9)	290 (96.3)	88 (98.9)	
N-Miss	89	41	23	19	6	
Census tract available broadband speed, n (%)						
Low	179 (10.2)	67 (9.2)	68 (13.3)	37 (12.3)	7 (7.5)	.025
High	1455 (89.8)	664 (90.8)	442 (86.7)	263 (87.7)	86 (92.5)	
N-Miss	86	38	26	20	2	
Section, n (%)						
Adult strabismus	12 (1.1)	11 (1.4)	1 (0.2)	0 (0.0)	0 (0.0)	.000
Comprehensive and cataract surgery	345 (22.7)	205 (26.7)	43 (8.0)	79 (24.7)	18 (18.9)	
Cornea, external disease, and refractive surgery	327 (14.0)	87 (11.3)	65 (12.1)	137 (42.8)	38 (40.0)	
Glaucoma	243 (18.6)	180 (23.4)	27 (5.0)	33 (10.3)	3 (3.2)	
Neuro-ophthalmology	61 (2.5)	7 (0.9)	47 (8.8)	2 (0.6)	5 (5.3)	
Ocular oncology	31 (1.6)	10 (1.3)	17 (3.2)	1 (0.3)	3 (3.2)	
Optometry	144 (11.7)	115 (15.0)	22 (4.1)	5 (1.6)	2 (2.1)	
Plastics	56 (3.4)	31 (4.0)	5 (0.9)	5 (1.6)	15 (15.8)	
Retina and uveitis	485 (24.0)	123 (16.0)	308 (57.5)	50 (15.6)	4 (4.2)	
Rheumatology	16 (0.3)	0 (0.0)	1 (0.2)	8 (2.5)	7 (7.4)	
Age (y)						
Mean ± SD	64.9 ± 16.4	64.7 ± 16.1	66.8 ± 17.3	62.6 ± 17.8	59.8 ± 15.0	.002
Census tract MHHI ($, in thousands)						
Mean ± SD	76.2 ± 33.5	76.9 ± 34.4	74.7 ± 31.3	73.1 ± 29.6	74.5 ± 35.7	.195
N-Miss	79	34	25	18	2	
Distance from Kellogg Eye Center (miles)						
Mean ± SD	37.5 ± 101.0	36.7 ± 112.2	36.2 ± 35.9	50.1 ± 113.7	37.5 ± 37.6	.000
N-Miss	86	38	26	20	2	

SD = standard deviation.
[a]Percentages, means, and standard deviations adjusted for stratified sampling.

80.2% White, 4.5% Asian, 10.7% Black, 4.6% other race, and 2.2% Hispanic. Most (89.8%) had neighborhood access to high-speed broadband.

The mean neighborhood median household income varied significantly ($P < .0001$) by race with estimated means of $89,600, $78,400, and $54,500 for Asians, Whites, and Blacks, respectively (Table 2). The mean distance in miles from the Kellogg Eye Center was lower ($P = .007$) for Whites (34.6 miles) and Blacks (37.8 miles) and higher for Asians (72.1 miles) and those of other races (52.2 miles). Neighborhood access to high-speed broadband was nearly universal for all races ranging from 88.2% for Whites to 100% for Asians. The population mean age differed significantly ($P < .0001$) between races, with Whites having a higher mean age of 66.3 (95% confidence interval [CI] 65.4-67.2) years and Blacks with a lower mean age of 59.4 (95% CI 56.4-62.5) years. There was no significant difference between satisfaction with eye care ($P = .7$) or perception of eye care (see Supplemental Results and Supplemental Table 1) between different racial groups.

In the multinomial logistic regression analysis, older patients had lower odds of having a video visit versus a deferred visit compared with younger patients (gOR = 0.85 per 10 years [95% CI 0.75-0.96]; $P = .007$). Conversely, older patients had higher odds of having an in-person visit versus having their visit deferred compared with younger patients (gOR = 1.09 per 10 years [95% CI 1.01-1.16]; $P = .023$). Further distance from the Kellogg Eye Center conferred increased odds of having all types of visits—video, phone, and in-person—compared with having a deferred visit ($P \leq .054$ for each comparison, Table 3). Living in a community that has access to a broadband signal with faster download speeds compared with slower speeds conferred lower odds of an in-person visit compared with being deferred (gOR = 0.66 [95% CI 0.46-0.94]; $P = .022$). Compared with Whites, all minorities—Blacks, Asians,

TABLE 2. Associations Between Race and Other Demographics

	Total[a] (N = 1720)	Asian[a] (n = 66)	Black[a] (n = 180)	Other[a] (n = 78)	White[a] (n = 1396)	*P* value
Ethnicity, n (%)						
Hispanic	38 (2.2)	0 (0.0)	1 (0.4)	21 (28.7)	16 (1.2)	.000
Non-Hispanic	1593 (97.8)	61 (100.0)	176 (99.6)	40 (71.3)	1316 (98.8)	
N-Miss	89	5	3	17	64	
Census tract available broadband speed, n (%)						
Low	179 (10.2)	0 (0.0)	8 (4.8)	6 (4.4)	165 (11.8)	.000
High	1455 (89.8)	65 (100.0)	163 (95.2)	68 (95.6)	1159 (88.2)	
N-Miss	86	1	9	4	72	
Section, n (%)						
Adult strabismus	12 (1.1)	0 (0.0)	2 (1.2)	1 (2.0)	9 (1.1)	.000
Comprehensive and cataract surgery	345 (22.7)	15 (18.9)	44 (28.6)	24 (34.8)	262 (21.5)	
Cornea, external disease, and refractive surgery	327 (14.0)	7 (6.7)	30 (10.7)	12 (7.5)	278 (15.2)	
Glaucoma	243 (18.6)	22 (43.1)	32 (20.2)	14 (22.5)	175 (16.8)	
Neuro-ophthalmology	61 (2.5)	0 (0.0)	4 (1.4)	2 (1.1)	55 (2.9)	
Ocular oncology	31 (1.6)	0 (0.0)	3 (0.6)	2 (4.1)	26 (1.7)	
Optometry	144 (11.7)	7 (12.1)	21 (17.2)	3 (4.9)	113 (11.4)	
Plastics	56 (3.4)	1 (0.3)	6 (2.4)	3 (4.4)	46 (3.7)	
Retina and uveitis	485 (24.0)	14 (18.8)	35 (17.2)	17 (18.5)	419 (25.5)	
Rheumatology	16 (0.3)	0 (0.0)	3 (0.5)	0 (0.0)	13 (0.3)	
Age (y)						
Mean ± SD	64.9 ± 16.4	57.9 ± 20.3	59.4 ± 18.1	58.9 ± 16.6	66.3 ± 15.6	.000
Census tract MHHI ($, in thousands)						
Mean ± SD	76.2 ± 33.5	89.6 ± 41.0	54.5 ± 27.3	74.9 ± 32.1	78.4 ± 32.7	.000
N-Miss	79	1	9	3	66	
Distance from Kellogg Eye Center (miles)						
Mean ± SD	37.5 ± 101.0	72.1 ± 304.2	37.8 ± 80.8	52.2 ± 82.8	34.6 ± 78.3	.007
N-Miss	86	1	9	4	72	

CI = confidence interval; MHHI = median household income; SD = standard deviation.
[a]Percentages, means, standard deviations adjusted for stratified sampling.

and those of other races—had lower odds of having an in-person versus a deferred visit (gOR = 0.62, 0.42, and 0.44 [*P* < .02 for each comparison], Table 3). In the retina clinic only analysis, older patients were significantly more likely to have an in-person visit and less likely to have either a video or phone visit compared with being deferred (Table 4). In the retina clinic only analysis, Blacks had a near statistically significant lower odds of an in-person visit compared with whites (gOR = 0.45 [95% CI 0.20-1.02], *P* = .056). When the retina clinic population was omitted from the analysis, older age conferred a decreased odds of attending either a video visit or an in-person visit, and no effect of race was seen on visit type (Supplemental Table 2).

DISCUSSION

Older patients were more likely to have an in-person visit and less likely to have a video visit compared with being deferred in the overall sample. The retina clinic was driving the effect of older patients being more likely to have in-person visits compared with being deferred. As older patients are more likely to have age-related macular degeneration requiring intravitreal injections,[20] which cannot be delivered remotely, older patients were more likely to be seen in-person during the first surge of the COVID-19 pandemic. We also found a near statistically significant association (gOR = 0.45 [95% CI 0.20-1.02], *P* = .056) showing that Black patients in the retina clinic were less likely to be seen in-person compared with being deferred than Whites; the significance was likely limited here due to smaller sample sizes in the retina clinic only analysis. Black patients seen in the retina clinic should have similar levels of disease severity as White patients requiring a similar frequency of in-person care. Though macular degeneration was the most common diagnosis for those receiving in-person care, our retina service also cares for patients with other severe diseases requiring in-person care, such as diabetic macular edema and retinopathy, and “other retinal conditions” and “diabetic retinopathy” were the second and fourth most common reason for an in-person visit in this sample. Severe diabetic eye disease requiring anti–vascular endothelial growth factor injections is more preva-

TABLE 3. Generalized Odds Ratios From 6 Simple Multinomial Logistic Regressions

	Video Visit vs Deferred	Phone Visit vs Deferred	In-Person Visit vs Deferred
Age, per 10 years	0.85	0.93	1.09
95% CI	0.75-0.96	0.86-1.01	1.01-1.16
P value	.007	.07	.02
MHHI, per $10,000	0.98	0.97	0.98
95% CI	0.91-1.05	0.93-1.00	0.95-1.01
P value	.56	.08	.23
Distance, per 10-fold	1.56	1.62	1.58
95% CI	0.99-2.45	1.21-2.18	1.25-2.00
P value	.05	.001	.0001
Broadband, high vs low	1.24	0.72	0.66
95% CI	0.52-2.95	0.46-1.11	0.46-0.94
P value	.63	.14	.02
Sex, male vs female	0.94	1.02	0.98
95% CI	0.61-1.46	0.78-1.32	0.78-1.23
P value	.78	.90	.87
Race, Asian vs White	0.60	0.61	0.42
95% CI	0.14-2.51	0.29-1.27	0.22-0.81
P value	.49	.19	.0096
Race, Black vs White	1.11	1.09	0.62
95% CI	0.57-2.17	0.72-1.64	0.42-0.92
P value	.76	.69	.02
Race, other vs White	1.06	1.40	0.44
95% CI	0.37-3.05	0.81-2.45	0.23-0.86
P value	.91	.23	.02
Race, White	Reference	Reference	Reference

CI = confidence interval; MHHI = median household income.

lent among racial/ethnic minority patients compared with White patients.[21–23] Thus, we would expect that the relative rates of in-person care compared with deferred care within each racial group would not show any disparities in the retina clinic. Ensuring that systems are in place to maximize care for populations at higher risk of morbidity from eye disease—older and racial/ethnic minority patients[24]—is imperative.

Older patients outside the retina clinic were less likely to use video visits as a means to access eye care. In the whole sample, those who had an in-person visit were a mean of 64.7 years old, while those who had a video visit were a mean of 59.8 years old. Older patients are less likely to have access to an internet connection at home or use a smartphone that can connect to the internet to participate in a videoconference based telemedicine visit compared with younger patients.[25,26] Other barriers to videoconferencing may also exist for older adults, including a lack of comfort with technology.[27] Setting up a video visit requires having a smartphone or tablet, having a broadband internet connection, having a computer where you are accustomed to accessing the patient portal online, being comfortable navigating through various websites, logins, and passwords, and using a camera and microphone on the device. Only 59% of adults in the United States >65 years of age have internet access at home.[25] However, while 53% of adults >65 years of age have smartphones, 91% have a telephone.[26] Therefore, the telephone represents a mode of technology more accessible for the population over 65 years of age. Using telephone-based systems to deliver virtual care may mitigate some of these obstacles. Triage could be conducted over the phone and many issues could be solved; those issues that cannot be solved would result in an in-person visit. However, this triage strategy using a phone visit with a physician first would greatly reduce the volume of older people at higher risk of mortality from COVID-19 presenting for in-person care.

Relying on videoconferencing technology that requires high-speed broadband internet access could further amplify socioeconomic and racial disparities that already exist to accessing eye care.[12–16] Though our sample had a high mean median household income—$76,200 compared with a nationwide average of $68,703[28]—and high overall broadband access (90%), there were still disparities in income in our affluent population with Blacks having the lowest median household income. In the United States, those with lower income are less likely to have the type of broadband internet connection necessary to support a synchronous telemedicine encounter via videoconference.[25]

Reliable broadband access is an integral part of effective telemedicine and poor access to it hinders the use of current telehealth services by patients. Access to home

TABLE 4. Generalized Odds Ratios From 6 Simple Multinomial Logistic Regressions: Retina/Uveitis Section Patients Only

	Video Visit vs Deferred	Phone Visit vs Deferred	In-Person Visit vs Deferred
Age, per 10 years	0.34	0.58	1.38
95% CI	0.12-0.96	0.46-0.72	1.19-1.60
P value	.0418	.0000	.0000
MHHI, per $10,000	0.92	0.89	1.02
95% CI	0.45-1.85	0.79-1.00	0.94-1.09
P value	.8078	.0550	.6768
Distance, per 10-fold	0.85	2.76	1.19
95% CI	0.27-2.69	0.90-8.52	0.73-1.95
P value	.7871	.0764	.4745
Broadband, high vs low	0.22	0.31	0.53
95% CI	0.00-Inf	0.10-0.91	0.23-1.24
P value	.8500	.0334	.1412
Sex, male vs female	0.37	0.81	0.91
95% CI	0.00-Inf	0.41-1.60	0.60-1.39
P value	.8809	.5440	.6603
Race, Asian vs White	0.01	0.44	0.42
95% CI	0.00-Inf	0.00-Inf	0.13-1.40
P value	.8760	.9444	.1572
Race, Black vs White	2.78	1.54	0.45
95% CI	0.00-Inf	0.53-4.47	0.20-1.02
P value	.9275	.4300	.0562
Race, other vs White	0.01	2.10	0.58
95% CI	0.00-Inf	0.45-9.95	0.17-2.00
P value	.8712	.3464	.3839
Race, White	Reference	Reference	Reference

CI = confidence interval; MHHI = median household income.

broadband varies by race, with Black and Latino Americans in the United States having significantly less access than Whites.[25] Though companies were offering free broadband services during the pandemic, the offer was limited to 60 days, limited to students or those living below the poverty line, and was not sufficiently fast to enable a videoconference. Older age compounds these issues, and older racial/ethnic minorities are at significant risk of not receiving necessary health care during times when only telemedicine is available and is the safest option. However, 96% of Americans have a cellphone (not a smartphone) and that number is equal or higher for Black and Latinx Americans.[25] As health systems are designing their telemedicine delivery models, considering vulnerable populations is essential to avoid a paradoxical worsening of health disparities. The sociodemographic groups most significantly affected by disparate access to telemedicine are often the same groups who have been disenfranchised from traditional health care. Creating ways for marginalized groups to access health care in a way they find safe and comfortable amidst a pandemic is essential.

Black patients were less likely to be seen in person in the retina clinic compared with White patients despite no significant increase in phone or video visits, meaning that COVID-19 decreased access to care for Black patients with severe retina problems. This is particularly concerning because racial/ethnic minorities often present with more severe eye disease and worse outcomes from many eye diseases, including neovascular age-related macular degeneration and diabetic retinopathy.[20,21] Why were minority patients less likely to be seen by an eye care provider despite an often greater need to do so? As COVID-19 disproportionally led to significant morbidity and mortality in racial/ethnic minority Americans early in the pandemic, is it that racial/ethnic minority, particularly Black, patients were afraid to have in-person visits? A recent survey by the American Medical Association demonstrated that 1 in 4 American adults experiencing a heart attack would rather stay home than seek care and risk contracting COVID-19, and these concerns were higher in minority populations.[7] Black and Latinx Americans have been more likely to avoid medical care during the pandemic than White Americans.[26] We must also consider that there could have been physician bias in who was offered in-person evaluation, as implicit bias can affect the care that patients receive.[29] For example, Black patients and those of lower socioeconomic status are more likely to be viewed as less intelligent and medically nonadherent.[30] Black (and female) patients are also less likely to be offered cardiac catheterization than White (and male) patients even when controlling for physicians' assessment of the probability of coronary artery disease, age of the patient, the level of coronary risk, the type of chest pain, and the results of an exercise stress test.[31]

Given the ongoing pandemic, the changes in hospital infrastructure, and how health care now operates, it is vital that both public and private insurance continue their coverage expansion to include telehealth for the foreseeable future. The decision by insurance providers, including Medicare and Medicaid, to cover telemedicine visits during the pandemic has removed a significant barrier to implementing telemedicine for both the patient and the provider.[32] If this coverage is not renewed for telemedicine in all forms, including access to telemedicine visits via telephone, it will effectively further marginalize at-risk populations, decreasing their access to care and risking the potential positive impact telemedicine stands to have on improving health equity. There are new modalities of virtual care that combine ancillary testing—such as imaging or laboratory testing—alongside a phone or video visit. This approach will enable patients to spend as little time as possible in the clinic and thereby keep clinic volumes low to reduce patients' risk of exposure while objective data are gathered. The objective data then enable the conversation between the patient and physician to be carried out with equal effectiveness over the telephone or via videoconference.

We acknowledge several limitations. This is a descriptive study, so our goal was not to look for causation. As such, we did not conduct multivariate analyses. Ann Arbor is a relatively affluent, racially homogenous town in southeast Michigan. While our patients are not all from Ann Arbor, our sample was not sociodemographically representative of our region or the nation, so results may not be generalizable to different populations. Our sample included few patients living in rural areas where access both to specialty physician services and high-quality broadband internet connection are both limited.[33,34] The fact that racial disparities were still evident in access to in-person ophthalmology services even in this relatively affluent population speaks to the depth of the disparities in health care delivery in the United States as a whole.

Telemedicine has been a vital mode of health care delivery during the COVID-19 pandemic and will continue to be crucial for future local or global crises, and can also expand the reach of specialty eye care services to rural and urban areas who lack access to ophthalmic care.[35,36] To ensure that health disparities are not worsened by the heightened use of remote care, health care providers and insurance carriers must find ways to make telemedicine accessible, particularly for older Americans, racial and ethnic minority Americans, and those with lower socioeconomic status. This may require making new modalities of telemedicine available via telephone.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ajo.2021.07.024.

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