Comparison of Access to Eye Care Appointments Between Patients With Medicaid and Those With Private Health Care Insurance

Yoon H. Lee, BS; Andrew X. Chen, BS; Varshini Varadaraj, MBBS, MPH; Gloria H. Hong, BA; Yimin Chen, BS; David S. Friedman, MD, PhD; Joshua D. Stein, MD, MS; Nicholas Kourgialis, MA; Joshua R. Ehrlich, MD, MPH

IMPORTANCE Although low-income populations have more eye problems, whether they face greater difficulty obtaining eye care appointments is unknown.

OBJECTIVE To compare rates of obtaining eye care appointments and appointment wait times for those with Medicaid vs those with private insurance.

DESIGN, SETTING, AND PARTICIPANTS In this prospective, cohort study conducted from January 1, 2017, to July 1, 2017, researchers made telephone calls to a randomly selected sample of vision care professionals in Michigan and Maryland stratified by neighborhood (urban vs rural) and professional type (ophthalmologist vs optometrist) to request the first available appointment. Appointments were sought for an adult needing a diabetic eye examination and a child requesting a routine eye examination for a failed vision screening. Researchers called each practice twice, once requesting an appointment for a patient with Medicaid and the other time for a patient with Blue Cross Blue Shield (BCBS) insurance, and asked whether the insurance was accepted and, if so, when the earliest available appointment could be scheduled.

MAIN OUTCOMES AND MEASURES Rate of successfully made appointments and mean wait time for the first available appointment.

RESULTS A total of 603 telephone calls were made to 330 eye care professionals (414 calls [68.7%] to male and 189 calls [31.3%] to female eye care professionals). The sample consisted of ophthalmologists (303 [50.2%]) and optometrists (300 [49.8%]) located in Maryland (322 [53.4%]) and Michigan (281 [46.6%]). The rates of successfully obtaining appointments among callers were 61.5% (95% CI, 56.0%-67.0%) for adults with Medicaid and 79.3% (95% CI, 74.7%-83.9%) for adults with BCBS ($P$ < .001) and 45.4% (95% CI, 39.8%-51.0%) for children with Medicaid and 62.5% (95% CI, 57.1%-68.0%) for children with BCBS ($P$ < .001). Mean wait time did not vary significantly between the BCBS and Medicaid groups for both adults and children. Adults with Medicaid had significantly decreased odds of receiving an appointment compared with those with BCBS (odds ratio [OR], 0.41; 95% CI, 0.28-0.59; $P$ < .001) but had increased odds of obtaining an appointment if they were located in Michigan vs Maryland (OR, 2.40; 95% CI, 1.49-3.87; $P$ < .001) or with an optometrist vs an ophthalmologist (OR, 1.91; 95% CI, 1.31-2.79; $P$ < .001). Children with Medicaid had significantly decreased odds of receiving an appointment compared with those with BCBS (OR, 0.41; 95% CI, 0.28-0.60; $P$ < .001) but had increased odds of obtaining an appointment if they were located in Michigan vs Maryland (OR, 1.68; 95% CI, 1.04-2.73; $P$ = .03) or with an optometrist vs an ophthalmologist (OR, 8.00; 95% CI, 5.37-11.90; $P$ < .001).

CONCLUSIONS AND RELEVANCE Callers were less successful in trying to obtain eye care appointments with Medicaid than with BCBS, suggesting a disparity in access to eye care based on insurance status, although confounding factors may have contributed to this finding. Improving access to eye care professionals for those with Medicaid may improve health outcomes and decrease health care spending in the long term.

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Supplemental content

Author Affiliations: Department of Ophthalmology, Johns Hopkins Wilmer Eye Institute, Baltimore, Maryland (Lee, Varadaraj, Hong, Friedman); Center for Eye Policy and Innovation, Department of Ophthalmology and Visual Sciences, University of Michigan, Ann Arbor (A. X. Chen, Y. Chen, Stein, Ehrlich); Helen Keller International, New York, New York (Friedman, Kourgialis); Institute for Healthcare Policy and Innovation, University of Michigan, Ann Arbor (Stein, Ehrlich); Department of Health Management and Policy, University of Michigan, Ann Arbor (Stein).

Corresponding Author: Joshua R. Ehrlich, MD, MPH, Center for Eye Policy and Innovation, Department of Ophthalmology and Visual Sciences, University of Michigan, 1000 Wall St, Ann Arbor, MI 48105 (joshre@med.umich.edu).

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Poor eye health negatively affects quality of life, school performance, and work performance. However, vision care is not part of every Medicaid plan because coverage varies by state. Only 9 of the 50 states in the United States cover annual routine eye examinations for individuals with Medicaid. Most states provide routine eye examinations less frequently (once every 2-5 years) or only cover eye examinations for diagnosed eye conditions or injuries. In Maryland and Michigan, a routine eye examination is covered once every 24 months by Medicaid, whereas Blue Cross Blue Shield (BCBS) will pay for a routine examination annually.

Low-income and racial/ethnic minority populations access health services less frequently than higher-income and racial/ethnic majority populations. In a cross-sectional study based on data from the 2013 Medical Expenditure Panel Survey on adults with diabetes in the United States, minority groups had lower rates of glycosylated hemoglobin tests, eye examinations, and influenza vaccinations compared with white individuals. Similarly, an analysis of Medical Expenditure Panel Survey data from 2007 revealed that although 76.4% of those with private insurance had received eye care in the past year, only 17% of those with public insurance did so. Prior research found that implementation of adult vision insurance coverage is associated with a 10% increase in the proportion of Medicaid beneficiaries with appropriately corrected refractive error. However, only 20% of federally funded community health centers, which are mandated in underserved communities, have an onsite eye care professional. Furthermore, only 28% of community health centers reported performing dilated eye examinations for patients with diabetes. Barriers to providing eye care to low-income populations include an inequitable distribution of eye care professionals, equipment costs, and perceived financial disincentives (ie, inadequate reimbursement).

Medicaid patients also face difficulties obtaining appointments with physicians in other fields of medicine, and may be less able to obtain needed eye care appointments compared with other patients. Although studies have found that patients with Medicaid receive less eye care compared with those with private insurance, data are limited on the causes of this discrepancy. The objective of this study was to assess whether it is more difficult for patients with Medicaid to obtain eye care appointments. Understanding the degree of difficulty in making eye care appointments and wait times for Medicaid patients can guide policy makers seeking to improve eye care and health in the United States.

**Methods**

This prospective, multicenter study was conducted from January 1, 2017, to July 1, 2017. This study conformed to the standards set forth by the Declaration of Helsinki. The Johns Hopkins Institutional Review Board approved this study with a waiver of consent, and, on review, the University of Michigan Institutional Review Board deemed the study to be not regulated.

**Key Points**

**Question** Is there a difference in access to eye care appointments between patients with Medicaid and those with private health insurance?

**Findings** In this cohort study of 330 unique eye care professionals, the proportion of callers who successfully obtained eye care appointments for adults and children with Medicaid was less than that of those with private health insurance, but there was no difference identified in appointment wait times when an appointment was made.

**Meaning** Difficulty obtaining appointments may explain, in part, the lower rates of use of recommended eye care services among those with Medicaid.

**Study Procedures**

The list of ophthalmologists and optometrists in the state of Maryland was obtained from the Maryland Department of Health website. For Michigan, this information was obtained from websites for BCBS and the Michigan Medicaid Health Plan. The eye care professionals were divided into 8 groups by state (Maryland or Michigan), neighborhood type (urban or rural), and professional type (ophthalmologist or optometrist): (1) Maryland urban ophthalmologists, (2) Maryland rural ophthalmologists, (3) Maryland urban optometrists, (4) Maryland rural optometrists, (5) Michigan urban ophthalmologists, (6) Michigan rural ophthalmologists, (7) Michigan urban optometrists, and (8) Michigan rural optometrists. The designation of urban or rural county was based on a population threshold determined by the respective state department. The eTable in the Supplement lists further details about the characteristics of counties that were included.

From these groups, a random sample of eye care professionals was selected using a random number generator in Excel (Microsoft Office, version 2013). The required sample size was estimated as 252 professionals using an analysis of variance power analysis (G*Power 3.1.9.2, Universitat Kiel), with an effect size of 0.2, α = .05, and power of 80%. Thus, we aimed to select 35 eye care professionals from each group for a total of 280 professionals. However, there were not enough eye care professionals in rural Maryland; thus, more professionals were selected from urban Maryland to attain the target sample size.

Similar studies in primary care, orthopedics, endocrinology, and psychiatry have demonstrated significant findings in patient access by insurance type. Although similar findings using administrative and claims data have been reported, we sought to confirm these findings through a more direct means. Using a method similar to that used in prior studies in other fields of medicine, a trained researcher (Y.L., A.X.C., G.H., and Y.C.) contacted each office to determine ease of access for patients with different insurance types.

Trained researchers made telephone calls to each selected eye care professional a total of 2 times, seeking to obtain an appointment for themselves and their children by using a standard script (eMethods 1 in the Supplement) and having Medicaid or BCBS insurance. During the telephone call, researchers used a standardized online survey (Qualtrics Survey Software, Qualtrics, LLC) (eMethods 2 in the Supplement).
ment) to record responses to scripted questions. We collected the following data: sex of eye care professional, office location and telephone number, number of attempts to reach the eye care professional’s office, date of appointment (if successful), reason for inability to offer an appointment (if unsuccessful), and, if provided an appointment with another professional in the practice, the reason for this. Any appointment made was cancelled within 2 business days. An attempt to reach each eye care professional was made up to 3 times during regular business hours of 9 AM to 5 PM on Monday through Friday. If the eye care professional was unreachable after 3 attempts, no further attempts were made to contact the office and a substitute practice was randomly selected using the method described above. Data about the counties where practices were located, including the proportion of the population identified as a racial/ethnic minority and median household income, were obtained from the US Census Bureau.35 All eye care professionals who were contacted were eligible members of the Medicaid and BCBS insurance panels.

Statistical Analysis
Data analysis was performed using Stata software, version 15 (StataCorp). The rate of successful appointments and the wait time for the appointment were used as markers of eye care accessibility. A χ² analysis was performed for the rate of appointments successfully made by insurance type; 2-tailed, unpaired t tests were used to investigate differences in appointment wait times based on insurance status (Medicaid vs BCBS), eye care professional type (ophthalmologist vs optometrist), state (Maryland vs Michigan), neighborhood type (urban vs rural), and patient age (adult vs child). Multivariable logistic regression was performed to model the association between insurance type and the odds of obtaining an appointment and adjusting for eye care professional and practice characteristics. The following eye care professional and practice characteristics were entered into the model: eye care professional type (ophthalmologist vs optometrist), sex of eye care professional, state, neighborhood type (urban vs rural), and, for the county where practices were located, the median household income and the proportion of the population identifying as minority race/ethnicity.

Results
A total of 603 calls were made to 330 unique eye care professionals consisting of ophthalmologists (303 [50.2%]) and optometrists (300 [49.8%]) located in Maryland (322 [53.4%]) and Michigan (281 [46.6%]) (Table 1). The sampled eye care professionals were concentrated in specific locations throughout the state. In Maryland, 193 (60.0%) of the calls were in these 5 counties: Montgomery (58 [18.0%]), Baltimore City (52 [16.1%]), Baltimore County (45 [13.9%]), Anne Arundel (19 [5.9%]), and Howard (19 [5.9%]). In Michigan, the top 6 counties were Wayne (44 [15.7%]), Oakland (37 [13.2%]), Macomb (18 [6.4%]), Lapeer (10 [3.6%]), Washtenaw (8 [2.8%]), and Ingham (8 [2.8%]), comprising 44.5% of the eye care professionals in Michigan telephoned in the study. The eTable in the Supplement provides additional information on counties in Maryland and Michigan. Of the 603 telephone calls made, 452 (75.0%) were reachable at first attempt, 53 (8.8%) at second attempt, and 13 (2.2%) at third attempt; 21 (3.3%) were not reachable after 3 attempts; and an additional 64 (10.6%) were not reachable because the listed telephone number was incorrect and an alternative telephone number could not be located.

Insurance Type
Of 304 Medicaid patients, 117 adults (38.5%) and 166 children (54.6%) were not offered appointments. Of 299 BCBS patients, 62 adults (20.7%) and 112 children (37.5%) were not offered appointments. Reasons for not providing appointments are shown in Figure 1 and Figure 2.

The rates of successfully obtaining appointments were 61.5% (95% CI, 56.0%-67.0%) for adults with Medicaid and 79.3% (95% CI, 74.7%-83.9%) for adults with BCBS (P < .001) and 45.4% (95% CI, 39.8%-51.0%) for children with Medicaid and 62.5% (95% CI, 57.1%-68.0%) for children with BCBS (P < .001). For adults, the mean (SD) wait time until the appointment date was 16.2 (20.9) days (95% CI, 13.3-19.3 days) for Medicaid patients and 15.3 (21.4) days (95% CI, 12.6-18.1 days) for BCBS patients (P = .66); for children, the mean (SD) wait time was 14.0 (18.1) days (95% CI, 11.0-17.1 days) for Medicaid patients and 13.0 (18.4) days (95% CI, 10.6-16.9 days) for BCBS patients (P = .64) (Table 2).

Eye Care Professional Type
Overall, not accounting for insurance type, the rates of successfully obtaining appointments were 64.4% (95% CI, 59.0%-69.7%) with ophthalmologists and 76.3% (95% CI, 71.5%-81.1%) with optometrists (P = .001) for adult patients. Among children, 32.3% (95% CI, 27.1%-37.6%) successfully obtained appointments with ophthalmologists and 75.7% (95% CI, 70.8%-80.5%) with optometrists (P < .001). The mean (SD) wait times for adults were 23.6 (25.8) days (95% CI, 20.0-27.3 days) for ophthalmologist appointments and 9.0 (12.8) days (95% CI, 7.3-10.7 days) for optometrist appointments (P < .001). For children, mean (SD) wait times were 22.5 (24.1) days (95% CI, 17.7-27.4 days) for ophthalmologist appointments and 9.6 (13.2) days (95% CI, 7.9-11.3 days) for optometrist appointments (P < .001) (Table 2).

Table 1. Characteristics of Eye Care Practices Contacted

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%) of Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medicaid</td>
</tr>
<tr>
<td>Maryland</td>
<td>164 (53.9)</td>
</tr>
<tr>
<td>Michigan</td>
<td>140 (46.1)</td>
</tr>
<tr>
<td>Urban</td>
<td>211 (69.4)</td>
</tr>
<tr>
<td>Rural</td>
<td>93 (30.6)</td>
</tr>
<tr>
<td>Ophthalmologist</td>
<td>154 (50.7)</td>
</tr>
<tr>
<td>Optometrist</td>
<td>150 (49.3)</td>
</tr>
<tr>
<td>Total</td>
<td>304 (50.4)</td>
</tr>
</tbody>
</table>

Abbreviation: BCBS, Blue Cross Blue Shield.
For adults, the rates of successfully obtaining appointments in urban and rural practices were 66.3% (95% CI, 61.8%-70.9%) for urban practices and 78.9% (95% CI, 73.2%-84.7%) for rural practices (P = .002); for children, rates were 48.7% (95% CI, 43.8%-53.5%) for urban practices and 65.3% (95% CI, 58.5%-72.0%) for rural practices (P < .001). For adults, mean wait times were 14.9 (20.9) days (95% CI, 12.4-17.4 days) for urban and 17.2 (21.5) days (95% CI, 13.7-20.7 days) for rural (P = .28); for children, mean wait times were 12.4 (17.1) days (95% CI, 10.0-14.8 days) for urban and 15.2 (19.7) days (95% CI, 11.7-18.7) for rural (P = .17).

For adults, the rates of successfully obtaining appointments were 62.1% (95% CI, 56.8%-67.4%) in Maryland and 79.7% (95% CI, 75.0%-84.4%) in Michigan (P < .001); for children, the rates were 45.7% (95% CI, 40.2%-51.1%) in Maryland and 63.3% (95% CI, 57.7%-69.0%) in Michigan (P < .001). For adults, the mean (SD) wait times were 11.9 (14.1) days (95% CI, 9.9-13.8 days) in Maryland and 19.2 (25.4) days (95% CI, 15.8-22.5 days) in Michigan (P < .001); for children, the mean (SD) wait times were 10.7 (11.8) days (95% CI, 8.8-12.6 days) and 15.8 (21.8) days (95% CI, 12.5-19.0 days) (P = .01) (Table 2).

**Factors Associated With Odds of an Appointment**

Table 3 gives the results of multivariable models presenting the adjusted odds of receiving an appointment for patients with Medicaid and BCBS insurance. Adult patients with Medicaid had significantly decreased odds of receiving an appointment compared with those with BCBS (odds ratio [OR], 0.41; 95% CI, 0.28-0.59; P < .001), independent of other patient and eye care professional characteristics. Adults also had increased odds of obtaining an appointment with an optometrist (OR, 1.91; 95% CI, 1.31-2.79; P < .001) compared with an ophthalmologist and if they were located in Michigan (OR, 2.40; 95% CI, 1.49-3.87; P < .001) rather than Maryland. Other factors, including sex of the eye care professional, urban or rural location, median household income (all 3 groups of income brackets), and the proportion of minorities in the community, were not significantly associated with receipt of an appointment when adjusting for insurance type.

Child patients with Medicaid had significantly decreased odds of receiving an appointment compared with those with
BCBS (OR, 0.41; 95% CI, 0.28-0.60; \( P < .001 \)), independent of other patient and eye care professional characteristics. Children also had increased odds of obtaining an appointment with an optometrist (OR, 8.00; 95% CI, 5.37-11.90; \( P < .001 \)) compared with an ophthalmologist and if they were located in Michigan (OR, 1.68; 95% CI, 1.04-2.73; \( P = .04 \)) rather than Maryland. Children had decreased odds of receiving an appointment with eye care professionals in an urban location (OR, 0.59; 95% CI, 0.36-0.96; \( P = .03 \)). Other factors, including sex of the eye care professional, median household income, and the proportion of minorities in the community, were not significantly associated with receipt of an appointment when adjusting for insurance type.

### Discussion

This study found that adults and children with Medicaid were less successful in making eye care appointments than those with BCBS insurance. The most commonly provided reason for not offering appointments to patients with Medicaid was that the practice did not accept their insurance. However, there was no difference in wait times for appointments based on insurance type after an appointment was obtained.

In our analyses, the odds of receiving an appointment if an individual had Medicaid were approximately 60% lower for both adults and children, independent of eye care professional type, practice location, or community characteristics, such as urban or rural setting, median household income, and the proportion of minorities in the county. One potential explanation for this may be differences in reimbursement rates by Medicaid and other insurers. The 2017 Medicaid reimbursement rates for a new patient eye examination (Current Procedural Terminology code 92004) were $77.46 in Maryland and $56.06 in Michigan, whereas Medicare and private insurers often reimburse more than 2 to 3 times this amount. Some practices may opt to not see patients with Medicaid because of the administrative burden associated with the Medicaid program. Furthermore, among vulnerable populations, social challenges, such as poor access to transportation, securing childcare, and being able to take time off work, may contribute to a greater frequency of missed appointments, a finding that has been demonstrated among patients with Medicaid. Because missed appointments may represent a greater financial burden than low reimbursement, some eye care professionals may limit the number of patients with Medicaid they are willing to treat.

In a study from 2004, Kemper et al found that most eye care professionals in Michigan (59%) provided routine eye ex-
amientos for children and were willing to accept Medicaid for these services. In our study, we found that a somewhat smaller proportion of eye care professionals cared for children with Medicaid (45.4%; 95% CI, 39.8%-51.0%). This difference could be because of changes over time in the willingness of eye care professionals to accept Medicaid insurance or, more likely, may reflect key differences in study design. For example, callers in the study by Kemper et al\textsuperscript{44} did not randomly select practices from throughout the state and did not attempt to make appointments. However, if willingness to care for children with Medicaid has decreased since 2004, further work should be done to understand the reasons for this.

Wait times were longer with ophthalmologists, and independent of their insurance type, patients were more likely to receive an appointment with an optometrist. The reasons for this may include that optometrists are more likely than general ophthalmologists to treat children, there are fewer ophthalmologists than optometrists in the United States, and ophthalmologists generally care for patients with more complex conditions and spend a portion of their time away from the clinic performing surgery. In addition, the likelihood of obtaining an appointment varied by state, potentially reflecting variations in Medicaid programs between Maryland and Michigan, as well as the role of the state in promoting access to care for vulnerable populations.

The patterns identified in our study reflect similar findings in other medical fields, including primary care\textsuperscript{32} and specialties, such as orthopedics,\textsuperscript{32} endocrinology,\textsuperscript{13} and psychiatry,\textsuperscript{33} which have also demonstrated that patients with Medicaid are less successful in obtaining appointments. These studies\textsuperscript{13,31-33} had similar experimental designs to the present one, using simulated patient callers with a specific common clinical concern. However, not all these studies accounted for geographic location or eye care professional type, such as physician vs advanced practice professional (eg, physician assistant or nurse practitioner).

It is well known that lower socioeconomic status is associated with decreased health care use, including preventive disease screenings,\textsuperscript{42} and worse health outcomes.\textsuperscript{41,44} This disparity may be even starker for vision care, which is not mandated for adults in the Patient Protection and Affordable Care Act. Similarly, dental care is not required by the Patient Protection and Affordable Care Act for children or adults,\textsuperscript{45} and parents of publicly insured children were more likely to report that their child had a dental problem in the past year compared with parents of privately insured patients.\textsuperscript{46} Within ophthalmology, studies have found that patients with Medicaid have a low rate of annual diabetic eye examinations\textsuperscript{12} and receive less glaucoma care compared with those with commercial health insurance.\textsuperscript{34} The present study further demonstrated that Medicaid patients have more difficulty obtaining eye care appointments, suggesting that this may be an additional contributor to disparities in eye health. Of note, more than 20% of practices in rural areas of Maryland and Michigan did not provide an appointment to adults with Medicaid, and individuals with Medicaid in these areas may have to travel long distances to obtain care because of the small number of eye care professionals in their areas.
Limitations
This study has some limitations. This study may not be generalizable to the United States. Because private insurance coverage varies by state and Medicaid is state administered, we cannot be certain that accessibility would be similar in other parts of the country. Telephone calls were made between January and July, and the appointment schedules at practices may vary throughout the year. In addition, because patients were simulated, we could not provide offices with specific details, such as insurance plan numbers, which may have decreased the likelihood of obtaining an appointment. In addition, these data do not reflect other barriers that may exist, such as language barriers, transportation, and work schedules, which may further contribute to the difficulty of obtaining an appointment. There also may be confounders that contributed to the likelihood of successfully obtaining an appointment. For example, certain types of practices or eye care professionals may be more likely to accept different Medicaid managed care organization insurance, information that was not collected in this study. In some practices, certain patients may need a referral from a primary care physician or another eye care professional to be seen. In addition, not all eye care professionals care for the types of patients described in this study; specifically, many subspecialist ophthalmologists may not see patients for routine diabetic eye examinations and/or failed vision screenings.

Conclusions
This study suggests that lower eye care professional acceptance of Medicaid may be an important barrier to obtaining eye care for patients with Medicaid. Although unproven at this time, policy change to incentivize eye care professionals to care for patients with Medicaid could help to improve access for this population. For example, an increase in Medicaid reimbursement for primary care services resulted in greater appointment availability for new Medicaid patients, and the same might be true if Medicaid reimbursement for eye care were increased. In addition, although also not proven, other possible solutions to improve access to eye care include social workers or case managers at primary care offices to help coordinate appointments and the design of an easy to use centralized resource with information about the insurance plans that eye care professionals accept. Future work should examine the effectiveness of these kinds of interventions to improve access to eye care and outcomes among patients with Medicaid.
39. Long SK. Physicians may need more than higher reimbursements to expand Medicaid participation: findings from Washington State. Health Aff (Millwood). 2013;32(9):1560-1567.