Access to Care

There is no shortage of ophthalmologists in Vermont. Nearly 80% of Vermonters are within a 30 minute drive time to an ophthalmologist.

Laser survey results: see attached.

No reasonable person would jeopardize their vision to save a few miles. Vermonters in rural areas are not crying out to lower the standards of medical education or surgical care. Insurance companies are not complaining about uncovered patients. In fact, the only groups asking to lower the standards for medical and surgical training are organized optometrists.

Oklahoma enacted a surgical scope expansion in 1998, but provider maps show that optometrists have not flocked to set up practices in rural areas of that state. They remain concentrated in the same urban areas as physicians because that is where the highest concentrations of patients are.

In November of 2017, the *Journal of the American Medical Association Ophthalmology* (JAMA) published an analysis to determine the estimated travel time (ETT) to the nearest ophthalmologist office for persons residing in three states that have expanded the scope of practice for optometrists: Oklahoma, Kentucky, and New Mexico. The study sought to quantify the ETT to the nearest ophthalmologist for Medicare beneficiaries who received surgical care from optometrists in those states between the years of 2008 and 2014.

JAMA concluded that more than 40% of the residents in the three states lived within an ETT of 10 minutes to an ophthalmologist's office. Even amongst the small portion of the populations that resided in rural communities, most lived within an ETT of 1 hour of an ophthalmologist's office. Furthermore, most of the patients in the study who underwent surgeries by optometrists did not live in rural communities.

JAMA Ophthalmology | Original Investigation

Access to Ophthalmologists in States Where Optometrists Have Expanded Scope of Practice

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IMPORTANCE As the United States considers how to best structure its health care services, specialty care availability is receiving increased focus. This study assesses whether patients lack reasonable access to ophthalmologists in states where optometrists have been granted expanded scope of practice.

OBJECTIVE To determine the estimated travel time (ETT) to the nearest ophthalmologist office for persons residing in states that have expanded scope of practice for optometrists, and to quantify ETT to the nearest ophthalmologist for Medicare beneficiaries who received surgical care from optometrists in those states between 2008 and 2014.

DESIGN, SETTING, AND PARTICIPANTS This study used data from the 2010 US census, a 2016 American Academy of Ophthalmology member database, and a data set of claims data for a random sample of 20% of beneficiaries enrolled in Medicare nationwide from 2008 to 2014 (n=14 063 725). Combining these sources with geographic information systems analysis, the ETT to the nearest ophthalmologist office was calculated for every resident of Kentucky, Oklahoma, and New Mexico. This study also assessed ETT to the nearest ophthalmologist for Medicare beneficiaries in those states who had received surgery from an optometrist from 2008 to 2014. Data analyses were conducted from July 2016 to July 2017.

MAIN OUTCOMES AND MEASURES The proportion of residents of Kentucky, Oklahoma, and New Mexico who live within an ETT of 10, 30, 45, 60, or 90 minutes of the nearest ophthalmologist office.

RESULTS The study included 4 339 367 Kentucky residents, 3 751 351 Oklahoma residents, and 2 059 179 New Mexico residents. Of these, 5 140 547 (50.6%) were female. Racial/ethnic composition included 7 154 847 people (70.5%) who were white, 640 608 (6.3%) who were black, and 1 418 246 (14.0%) who were Hispanic. The mean (SD) age was 37.8 (22.8) years. More than 75% of residents in the 3 states lived within an ETT of 30 minutes to the nearest ophthalmology office, and 94% to 99% of residents lived within an ETT of 60 minutes to the nearest ophthalmology office. Among Medicare beneficiaries who received surgery by optometrists, 58.3%, 51.1%, and 46.9% in Kentucky, Oklahoma, and New Mexico, respectively, lived within an ETT of 30 minutes from the nearest ophthalmologist office.

CONCLUSIONS AND RELEVANCE In the states where optometrists have expanded scope of practice, most residents lived within an ETT of 30 minutes of the nearest ophthalmologist office, as do half of Medicare beneficiaries who received surgical care from optometrists. These results can help inform policy makers when weighing the pros and cons of scope of practice expansion for optometrists.

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In the past decade, there have been attempts to convince health policy makers to expand the scope of practice of optometrists.[1] Members of the optometric community have sought privileges to perform laser surgeries, minor eyelid procedures, and intraocular injections.[2,3] A key argument often cited is that many patients reside in communities with few ophthalmologists available to perform these interventions, and that access to care will be improved by permitting optometrists to perform these procedures.[2]

There are more practicing optometrists in the United States than ophthalmologists, so one would expect that patients have easier access to an optometrist than to an ophthalmologist.[1] In fact, Lee et al[4] demonstrated that, nationally, the median estimated travel time (ETT) to the nearest optometrist office is slightly less than the median ETT to the nearest ophthalmologist office, and most of the US population lives within an ETT of 14 minutes to the nearest optometrist office and 26 minutes to the nearest ophthalmologist office.[4] To our knowledge, however, it is unknown how accessible ophthalmologists are in the states where optometrists have expanded surgical scope of practice, and whether the optometrists who perform surgical procedures are practicing in communities with limited access to ophthalmologists in those states.

To fill in these gaps, this study analyzes the ETT to the nearest ophthalmologist office for residents of Kentucky,[2,3] where optometrists have had expanded scope of practice since 2011; Oklahoma,[5] where optometrist scope of practice expansion occurred in 1998; and New Mexico,[5] where expansion has been in place since 2006. In addition, the study explores the ETT to the nearest ophthalmologist for Medicare beneficiaries residing in these states who underwent surgical procedures by optometrists.

Key Points

Question What is the estimated travel time to the nearest ophthalmologist office for persons living in states that have expanded the scope of practice of optometrists?

Findings This population-based cohort study of 10 149 897 residents of Oklahoma, Kentucky, and New Mexico found that more than 75% live within 30 minutes' estimated travel time of the nearest ophthalmologist office, and 94% to 99% of residents live within 60 minutes of the nearest ophthalmologist office. Roughly half of Medicare beneficiaries in these states who received surgery from optometrists between 2008 and 2014 lived within 30 minutes of the nearest ophthalmologist.

Meaning These results may help inform policy makers when weighing the pros and cons of expanding optometrist scope of practice.

Methods

This study used data from the 2010 US census,[6] a 2016 American Academy of Ophthalmology (AAO) member database,[7] and a data set of claims data[8] for a random 20% sample of beneficiaries enrolled in Medicare from 2008 to 2014. These data sets were combined with geographic information systems analysis to determine ETTs.

Ethics

This study was approved by the University of Michigan Institutional Review Board. The study was exempt from requirements for informed consent procedures because it used deidentified data exclusively.

US Census Bureau Data

To estimate the populations of residents living within specific drive times to the nearest ophthalmologist, we accessed 2010 US census block-level data[6] for Kentucky, Oklahoma, and New Mexico. census blocks are polygonal features that serve as the base unit for all nested US census area units and are the smallest unit of measure used to report complete data about basic demographic characteristics (such as total population by age, sex, and race/ethnicity) per geographic location.[9,10] This source contains information on the number of persons living in a given census block and the demographic profiles of those residents.

Analyses of ETT were based on centroids, the geographic centers of census blocks. Zip code tabulation areas (ZCTAs), which aggregate multiple census blocks, were also used. These are simplified areal representations of US Postal Service zip code service areas, constructed such that their boundaries precisely align with those of census blocks. Both centroids and ZCTAs were used to calculate ETTs to ophthalmologist offices.

American Academy of Ophthalmology Member Database

The American Academy of Ophthalmology (AAO) is the largest professional ophthalmology specialty society in the world. It has more than 32 000 members, including more than 17 000 who practice in the United States.[11] An estimated 93% of ophthalmologists in the United States are AAO members (J. Aguirre, CAE, written communication, November 2016). The AAO conducts a biennial member survey that seeks the primary office address and additional practice addresses of all member physicians. In addition, members are contacted quarterly and encouraged to update their member profiles on the AAO website, which likewise allows a member to list a primary office address and addresses for other practice locations. The organization provided a snapshot of this dynamic database in August 2016.

Medicare Claims Data

Data on Medicare enrollees were obtained from the US Centers for Medicare and Medicaid Services.[8] This national database included a random sample of 20% of Medicare beneficiaries with Parts A, B, and D coverage from January 1, 2008, through December 31, 2014 (n = 14 063 725). Because the database had incomplete data on persons with noncontinuous enrollment and Medicare Advantage plan enrollees, these persons were excluded. From this data source, we identified all beneficiaries residing in Kentucky, Oklahoma, and New Mexico.

The database uses *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) codes[12] to identify all ocular and nonocular diagnoses and *Current Procedural Terminology* codes[13] to identify all diagnostic and therapeutic procedures performed on each beneficiary during the

period included in the data set. In addition, the database included information on demographic information on each Medicare beneficiary (eg, sex, age, and race/ethnicity) and the type of health care professional who provided care at each clinical encounter. This database has been used previously to study patients with ocular diseases.[14-16]

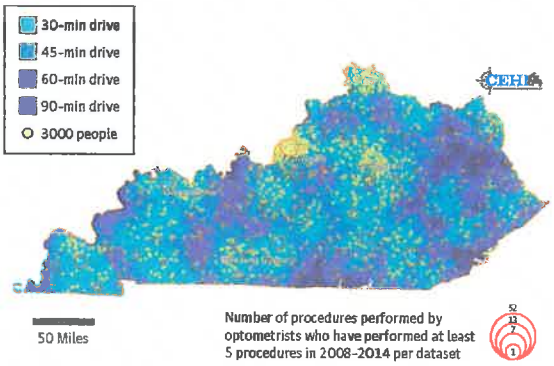
Analyses

All data analyses were conducted from July 2016 to July 2017. The AAO database was used to identify the primary and all secondary office addresses for every AAO member licensed to practice in Kentucky, Oklahoma, and New Mexico. Since some patients travel across state lines to neighboring states to receive eye care, the office addresses of all AAO members practicing in states adjacent to the states of interest were identified (for Kentucky: Indiana, Ohio, Illinois, West Virginia, Tennessee, and Virginia; for Oklahoma: Texas, Arkansas, Missouri, Kansas, New Mexico, and Colorado; for New Mexico: Texas, Oklahoma, Colorado, Arizona, and Utah; the nation of Mexico, although adjacent to New Mexico, was not included). All office addresses were geocoded to the street level using the ArcMap feature of ArcGIS version 10.3x (Environmental Systems Research Institute). The ETT from each 2010 US census block centroid within Kentucky, Oklahoma, and New Mexico to the nearest ophthalmologist office was calculated via ArcGIS Network Analyst Extension. The Streetmap Premium 2014 feature of ArcGIS was used as a reference database for geocoding and network calculation. Calculated ETTs were network-based, which means the study assumed travel by car on roads and adherence to specified speed limits. If the nearest ophthalmologist office was in a neighboring state, the model assumed that persons who resided in the states of interest would cross state lines.

The key outcome was the proportion of total persons residing in each state who lived within ETTs of 10, 30, 45, 60, and 90 minutes by car from the census block centroid to the nearest ophthalmologist office. In addition, we determined ETTs of 10, 30, 45, 60, and 90 minutes, stratified by age, race/ethnicity, and urban vs rural residential status. Designation of urbanicity was determined through the US Department of Agriculture's Rural-Urban Commuting Area Codes.[17] Vector maps created in ArcMap depict service areas in each state where the ETT to the nearest ophthalmologist office is within 10, 30, 45, 60, and 90 minutes.

Next, the model used the Medicare claims database to identify the office locations of all optometrists in the 3 states who had performed any of these procedures at least 5 times in the period between January 1, 2008, and December 31, 2014: laser trabeculoplasty, laser capsulotomy, laser peripheral iridotomy, intraocular injection, and eyelid lesion removal. The model determined what proportion of optometrist offices where these procedures were performed at that frequency were located in census blocks with population-weighted centroids within ETTs of 10, 30, 45, 60, and 90 minutes to the nearest ophthalmologist office. Finally, the number of Medicare beneficiaries in these 3 states who received 1 or more of the above-mentioned surgeries by an optometrist from 2008 through 2014 was determined, as was the proportion of these patients who were living in census blocks with a population-weighted centroid within ETTs of 10, 30, 45, 60, and 90 minute to the nearest ophthalmologist office.

Figure 1. Estimated Travel Time to the Nearest Ophthalmologist Office for Residents of Kentucky



Areas of Kentucky where the estimated travel time to the nearest ophthalmologist office is within 30, 45, 60, or 90 minutes. Gold dots indicate locations with more than 3000 residents. Circles reflect numbers of optometrist-performed procedures at that location from 2008 through 2014.

Results

Kentucky

Based on the 2010 US census, 4 339 367 persons lived in Kentucky in 2010.[6] In the AAO database, the number of office addresses of ophthalmologists practicing in Kentucky was 217, with another 887 offices of ophthalmologists within 90 minutes' drive time of the Kentucky border in surrounding states. The population in Kentucky within ETTs of 10, 30, 60, and 90 minutes to the nearest ophthalmologist office numbered 1 834 742 (42.3%), 3 385 205 (78.0%), 4 284 905 (98.7%), and 4 337 550 people (99.96%), respectively (**Figure 1**). **Table 1** shows the ETT from each 2010 US census block centroid to the nearest ophthalmologist office for residents of all states of interest, stratified by age and race/ethnicity. Among the 3 823 864 residents living in urban communities, 1 828 346 (47.8%) lived within an ETT of 10 minutes to the nearest ophthalmologist office; for the 515 503 residents who lived in rural parts of the state (12% of the state population), 482 536 (93.6%) lived within an ETT of 60 minutes to the nearest ophthalmologist office (**Table 2**).

Oklahoma

Based on the 2010 US census, 3 751 351 persons lived in Oklahoma.[6] The number of office addresses of ophthalmologists practicing in Oklahoma was 177, with another 523 ophthalmologist offices were within 90 minutes' drive time of the Oklahoma border in surrounding states. In Oklahoma, 1 907 332 (50.8%) of residents lived within 10 minutes (ETT) to the nearest ophthalmologist office; the corresponding numbers were 2 983 285 (79.5%), 3 590 860 (95.7%), and 3 687 215 (98.3%) for

Table 1. Estimated Travel Time to the Nearest Ophthalmologist in All 3 States, Stratified by Age and Race/Ethnicity

ETT to Nearest Ophthalmologist, minutes	No. (%)					
	Total Population	Non-Hispanic White	Non-Hispanic Black	Hispanic	Persons Younger Than 65 Years	Persons Older Than 65 Years
Kentucky						
10	1 834 742 (42.3)	1 431 802 (38.2)	249 317 (74.9)	74 511 (56.1)	1 592 659 (42.3)	242 083 (41.9)
30	3 385 205 (78.0)	2 837 169 (75.7)	314 207 (94.3)	119 007 (89.6)	2 943 065 (78.2)	442 140 (76.5)
45	4 003 794 (92.3)	3 423 597 (91.4)	327 286 (98.2)	129 166 (97.2)	3 473 359 (92.3)	530 435 (91.7)
60	4 284 905 (98.7)	3 692 687 (98.6)	332 459 (99.8)	132 484 (99.7)	3 714 673 (98.8)	570 232 (98.6)
90	4 337 550 (99.9)	3 743 878 (99.9)	333 061 (99.8)	132 828 (99.9)	3 759 593 (99.9)	577 957 (99.9)
Total (No.)	4 339 367	3 745 655	333 075	132 836	3 761 140	578 227
Oklahoma						
10	1 907 332 (50.8)	1 226 124 (47.6)	207 928 (76.4)	222 053 (66.9)	1 670 368 (51.5)	236 964 (46.8)
30	2 983 285 (79.5)	2 029 408 (78.8)	250 267 (92.0)	271 619 (81.8)	2 599 072 (80.1)	384 213 (75.8)
45	3 444 605 (91.8)	2 359 204 (91.6)	261 908 (96.3)	295 244 (88.9)	2 986 327 (92.0)	458 278 (90.4)
60	3 590 860 (95.7)	2 454 365 (95.3)	268 429 (98.7)	310 561 (93.5)	3 108 898 (95.8)	481 962 (95.1)
90	3 687 215 (98.3)	2 527 871 (98.2)	271 285 (99.7)	318 745 (96.0)	3 189 923 (98.3)	497 292 (98.1)
Total (No.)	3 751 351	2 575 381	272 071	332 007	3 244 637	506 714
New Mexico						
10	1 118 620 (54.3)	492 854 (59.1)	25 604 (72.2)	512 427 (53.7)	963 091 (53.9)	155 529 (57.1)
30	1 696 341 (82.4)	706 830 (84.8)	33 297 (93.9)	811 859 (85.2)	1 478 100 (82.7)	218 241 (80.2)
45	1 870 422 (90.8)	764 792 (91.7)	34 397 (97.0)	887 046 (93.0)	1 629 235 (91.2)	241 187 (88.6)
60	1 946 258 (94.5)	789 382 (94.7)	34 749 (98.0)	914 795 (96.0)	1 694 171 (94.8)	252 087 (92.6)
90	2 024 793 (98.3)	819 503 (98.3)	35 297 (99.5)	942 525 (98.9)	1 758 645 (98.4)	266 148 (97.8)
Total (No.)	2 059 179	833 810	35 462	953 403	1 786 924	272 255

Abbreviation: ETT, estimated travel time.

residents within ETTs of 30, 60, and 90 minutes, respectively (Figure 2). Among the 3 431 538 residents living in urban areas of Oklahoma, 1 902 789 (55.5%) lived within an ETT of 10 minutes of the nearest ophthalmologist office; for the 319 813 residents living in rural parts of the state (8.5% of the state population), 264 560 (82.7%) lived within an ETT of 60 minutes to the nearest ophthalmologist office (Table 2).

New Mexico

Based on the 2010 US census, New Mexico had 2 059 179 residents in 2010.[6] The total number of AAO-documented office addresses of ophthalmologists practicing in the state was 107; another 122 ophthalmologist offices in the surrounding states were within 90 minutes of the border. The New Mexicans living within ETTs of 10, 30, 60, and 90 minutes by car to the nearest ophthalmologist office were 1 118 620 (54.3%), 1 696 341 (82.4%), 1 946 258 (94.5%), and 2 024 793 (98.3%), respectively (Figure 3). Among the 1 928 316 New Mexico residents living in urban areas, 1 117 641 (58.0%) lived within 10 minutes' ETT to the nearest ophthalmologist office; among the 130 863 rural residents of the state (6.4% of the population), 87 010 (66.5%) lived within an ETT of 60 minutes to an ophthalmologist office (Table 2).

Locations of Surgery-Performing Optometrist Offices Relative to Ophthalmologist Offices

This study found that 34 optometrists had performed 5 or more surgeries each in the defined time period in Kentucky. Of their 368 procedures, 59 (16.0%) were performed at offices in ZCTAs with population-weighted centroids within 10 minutes' ETT to the nearest ophthalmologist office; 215 (58.4%) were within an ETT of 30 minutes of an ophthalmologist office, and 366 (99.5%) were within an ETT of 60 minutes. In Oklahoma, 64 optometrists performed at least 5 such surgeries. Of the 887 total surgeries performed, 148 (16.7%) were done at offices in ZCTAs with population-weighed centroids within an ETT of 10 minutes to an ophthalmologist office; 444 (50.1%) were within 30 minutes, and 779 (87.8%) were within 60 minutes. The 5 optometrists who performed at least 5 surgeries each in New Mexico performed 23 procedures in total; none occurred at offices in ZCTAs with population-weighted centroids within an ETT of 10 minutes of an ophthalmologist office; 5 (21.7%) and 15 (65.2%) of the procedures were performed within an ETT of 30 and 60 minutes, respectively, of an ophthalmologist office.

Residential Locations of Patients Receiving Optometrist-Performed Surgery Relative to Ophthalmologist Offices

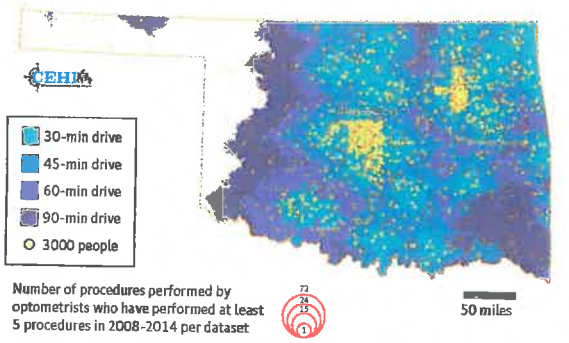
Among the 237 patients in Kentucky who underwent 1 or more surgeries performed by optometrists, 41 (17.3%) lived in ZCTAs with population-weighted centroids within an ETT of 10 minutes of the nearest ophthalmologist office, 138 (58.3%) were within 30 minutes' ETT, and 235 (99.2%) were within 60 minutes' ETT. Among the 519 patients in Oklahoma who underwent surgery by optometrists, 86 (16.6%) lived in ZCTAs with population-weighted centroids within 10 minutes of an ophthalmologist office, 265 (51.1%) were within 30 minutes, and 451 (86.9%) were within 60 minutes. Among the 32 persons

Table 2. Estimated Travel Time to the Nearest Ophthalmologist in All 3 States, Stratified by Urbanicity

ETT to Nearest Ophthalmologist, minutes	Residents, No. (%)	
	Urban	Rural
Kentucky		
10	1 828 346 (47.8)	6396 (1.2)
30	3 252 645 (85.1)	132 560 (25.7)
45	3 677 833 (96.2)	325 961 (63.2)
60	3 802 369 (99.4)	482 536 (93.6)
90	3 823 408 (99.9)	514 142 (99.7)
Total (No.)	3 823 864	515 503
Oklahoma		
10	1 902 789 (55.5)	4543 (1.4)
30	2 896 088 (84.4)	87 197 (27.3)
45	3 224 838 (94.0)	219 767 (68.7)
60	3 326 300 (96.9)	264 560 (82.7)
90	3 393 537 (98.9)	293 678 (91.8)
Total (No.)	3 431 538	319 813
New Mexico		
10	1 117 641 (58.0)	979 (0.8)
30	1 669 749 (86.6)	26 592 (20.3)
45	1 809 152 (93.8)	61 270 (46.8)
60	1 859 248 (96.4)	87 010 (66.5)
90	1 915 590 (99.3)	109 203 (83.4)
Total (No.)	1 928 316	130 863

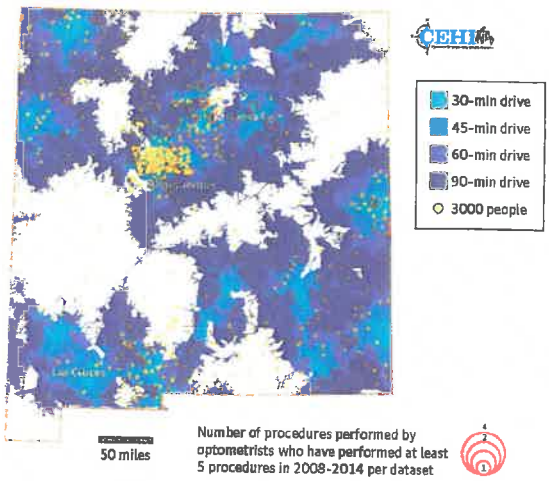
Abbreviation: ETT, estimated travel time.

Figure 2. Estimated Travel Time to the Nearest Ophthalmologist Office for Residents of Oklahoma



Areas of Oklahoma where the estimated travel time to the nearest ophthalmologist office is within 30, 45, 60, or 90 minutes. Gold dots indicate locations with more than 3000 residents. Circles reflect numbers of optometrist-performed procedures at that location from 2008 through 2014.

Figure 3. Estimated Travel Time to the Nearest Ophthalmologist Office for Residents of New Mexico



Areas of New Mexico where the estimated travel time to the nearest ophthalmologist office is within 30, 45, 60, or 90 minutes. Gold dots indicate locations with more than 3000 residents. Circles reflect numbers of optometrist-performed procedures at that location from 2008 through 2014.

in New Mexico who had optometrist-performed ocular surgeries, 1 (3%) lived in ZCTAs with population-weighted centroids within an ETT of 10 minutes to an ophthalmologist; 15 (46.9%) were within 30 minutes, and 23 (71.9%) were within an ETT of 60 minutes.

Discussion

Using data from the US Census Bureau, an AAO member database, and a Medicare database, we assessed ETT to the nearest ophthalmologist office for persons residing in 3 states where optometrists have a scope of practice expanded to include surgery. In all 3 states, more than 40% of the population live within an ETT of 10 minutes to the nearest ophthalmologist office; roughly three-quarters live within an ETT of 30 minutes, and more than 90% live within an ETT of 45 minutes.

This study also examined access to ophthalmologists for persons of different races/ethnicities, ages, and residential status (urban vs rural) in these 3 states. When analyses were stratified to assess access to ophthalmologist offices by race/ethnicity, we found that, in all 3 states, more than 75% of non-Hispanic white, non-Hispanic black, and Hispanic people live within an ETT of 30 minutes of the nearest ophthalmologist office, and greater than 94% of persons in these racial/ethnic groups live within an ETT of 60 minutes of an ophthalmologist office. Likewise, the proportions of people younger than 65 years and those 65 years or older in each of the 3 states residing within an ETT of 30 minutes of an ophthalmologist ranged from 75.8% to 82.7%, and the proportions within an ETT of 60 minutes ranged from 93% to 99%. The proportion of residents of rural communities who live within an ETT of 60 minutes of the nearest ophthalmologist office is 94% for Kentucky, 83% for Oklahoma, and 67% for New Mexico. For optometrists who performed 5 or more surgeries, 0.5%, 12.2%, and 34.8% for Kentucky, Oklahoma, and New Mexico, respectively, occurred in locations where the ETT to an ophthalmologist exceeded 1 hour. Similarly, 0.8%, 13.1%, and 28.1% of persons receiving surgical services from an optometrist in

Kentucky, Oklahoma, and New Mexico, respectively, lived in ZCTAs with population-weighted centroids exceeding an ETT of 60 minutes to the nearest ophthalmologist office.

In considering the expansion of optometrist scope of practice to include surgery, policy makers must weigh multiple factors. First, ophthalmologists have considerably more training, experience, and expertise in performing laser procedures, injections, and eyelid procedures compared with optometrists, which might translate into higher quality of care.[18,19] Prior research by our group identified that Medicare patients with glaucoma residing in Oklahoma who underwent laser trabeculoplasty by an optometrist had a 189% increased likelihood of requiring additional laser in the same eye compared with those who were treated with lasers by an ophthalmologist (35.9% vs 15.1%; hazard ratio, 2.89; 95% CI, 2.00-4.17; P<.001.).[16] While claims data alone cannot clarify why so many more patients who were treated by optometrists required additional laser procedures, 1 possibility is that the surgical care quality differs between optometrists and ophthalmologists.[16]

Second, what constitutes good access depends on drive time, the sorts of insurance that each practice accepts, the number of days per week when surgeries are performed, and the surgical procedure wait time. These quality-of-care and access factors must be assessed and subsequently balanced in deciding whether to expand optometrists' surgical scope of practice.

There are some similarities, but also a few key differences, between the present analysis and a related study by Lee et al.[4] Both studies used data from the US Census Bureau and Medicare claims data and geographic informations systems analysis to estimate network-based ETT from population centroids to ophthalmologist and optometrist offices. While Lee et al[4] identified eye care clinician office locations based on Medicare claims record data, we identified ophthalmologist office locations using AAO member data. Although many AAO members practicing in the states of interest accept Medicare and thus would be captured in both data sets, there might be some AAO members who do not routinely care for Medicare enrollees; there are also other ophthalmologists who care for Medicare beneficiaries but are not AAO members. The Medicare data that Lee et al[4] used also captured only the primary office location of each clinician who cared for Medicare enrollees, whereas the AAO member database used in this study can capture multiple locations where an ophthalmologist practices. Unlike the analysis by Lee et al, the calculations of the present study allowed for the possibility that patients can cross state lines to access the nearest ophthalmologist office. (The importance of this consideration to ETTs is exemplified by northern Kentucky, where residents can travel for care to Cincinnati, Ohio, which has many practicing ophthalmologists). Although the studies have some differences in their methods, both clearly demonstrate that most patients residing in the 3 states of interest live close to the office of at least 1 ophthalmologist.

The present study highlights how tapping into big data can be very useful to help answer questions on population health and guide decision making by health policy makers. Moreover, by identifying communities where a sizable number of persons reside (gold dots in Figures 1-3), yet access to ophthalmologists is limited (dark blue and white areas in Figures 1-3), researchers can assist local health care professionals in these communities to implement teleophthalmology[20] to screen patients for sight-threatening ocular diseases and identify those who would most benefit from traveling 60 to 90 minutes to an ophthalmologist office for care. Another option policy makers might explore to improve ophthalmologic care access would be to offer financial incentives to ophthalmologists to open offices in underserved locations, in a manner similar to the bonus payments that the US Centers for Medicare and Medicaid Services provides to primary care practitioners who choose to practice in geographic areas where a shortage in primary care health access exists.[21]

Limitations

This study has limitations. First, the AAO database lacks information on the types of health insurance each ophthalmologist accepts; thus, our analyses could not account for this. Ophthalmologists listed in the AAO member database might not see patients with certain health insurance types or those who lack health insurance. If some patients possess a form of health insurance that the nearest ophthalmologist office does not accept, they might need to drive further to receive care.

Second, the AAO database captures the primary office address of each ophthalmologist. Ophthalmologists can provide additional office addresses, but this is optional. For this reason, there might be additional office locations of ophthalmologists that were not considered, which would result in an overestimation of distance to the nearest ophthalmologist office.

Third, when calculating ETTs to the nearest ophthalmologist office, the present study assumed that patients traveled by car and not by public transportation or other means. Excluding these alternate means of transportation could result in travel time estimates that are higher or lower than reported here.

Fourth, the data sources used for this study can identify only the subset of clinicians who performed the procedures of interest. Optometrists without a record of performing any of these procedures might have opted not to participate in expanded scope of practice activities, lacked patients seeking such procedures, or lacked the necessary equipment to serve these patients. Likewise, some ophthalmologists practicing in these states may be subspecialists who do not routinely perform certain procedures, lack the equipment to perform these procedures, or do not care for Medicare enrollees. Although this study could not account for these factors, we recognize they can affect access to care.

Finally, this study uses the most recent census data available, as well as the most recent AAO member database and Medicare database; however, the data from these sources were not from the same years. However, since the population of residents and eye care providers in these 3 states did not change substantially from 2008 to 2016, it is doubtful that these differences in data sets substantially affected the findings of this study.

Conclusions

This study provides information about access to ophthalmologists in states with expanded scope of practice for optometrists. More than 40% of the residents in all 3 states live within an ETT of 10 minutes to an ophthalmologist office; even among the small segment of the population in these states who reside in rural communities, most live within an ETT of 1 hour to an ophthalmologist office. In addition, most patients who underwent surgeries by optometrists did not live in rural communities. These sorts of analyses provide researchers and health policy makers with a stronger basis for evaluating whether legislation expanding the scope of practice of optometrists in these states is achieving its stated purpose, which was to expand access. We encourage all states to perform similar analyses to help assess access to ophthalmologists, as these analyses can help health policy makers with making more informed decisions about whether the potential benefits of expanding scope of practice outweigh the potential tradeoffs in quality of care.

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Vermont Ophthalmology Survey on Access to Laser and Eyelid Surgery
October 2019

Central points:

21 of 28 respondents perform eye laser surgery.

For surgeons who perform YAG laser capsulotomies, 85% have a wait time less than 2 weeks, 100% within 4-8 weeks.

For surgeons who perform laser iridotomies, 85% have a wait time less than 2 weeks, 100% within 4-8 weeks.

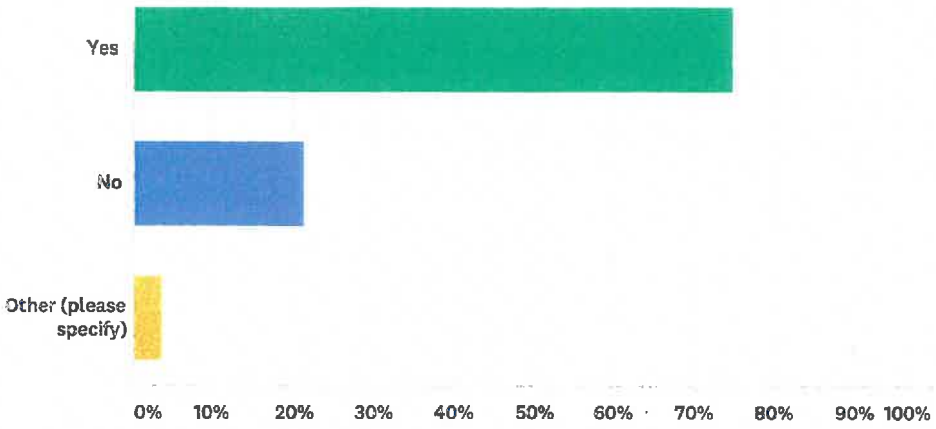
For surgeons who perform laser trabeculoplasty (ALT/SLT), 82% have a wait time less than 2 weeks, 100% within 4-8 weeks

14 of 18 respondents perform surgery on eyelid lesions. (excision/biopsy, chalazion incision/curettage treatment)
78% have a wait time of less than 2 weeks, 100% less than 4 weeks.

96% of ALL respondents can accommodate procedures within one week with a direct request from a referring provider.

Q1 Do you perform anterior segment laser procedures such as YAG capsulotomy, YAG PI, and SLT/ALT?

Answered: 28 Skipped: 0

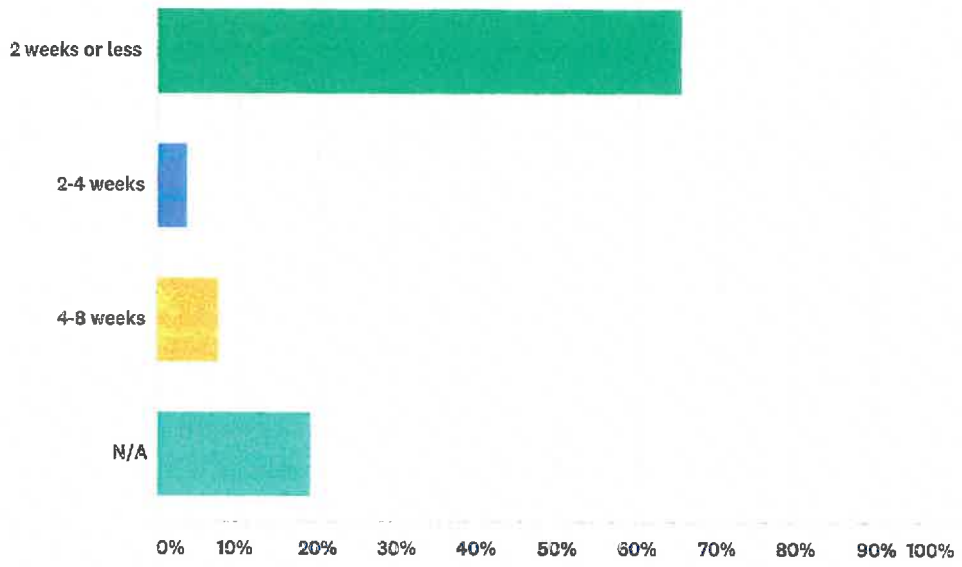


ANSWER CHOICES	RESPONSES	
Yes	75.00%	21
No	21.43%	6
Other (please specify)	3.57%	1
TOTAL		28

#	OTHER (PLEASE SPECIFY)	DATE
1	not regularly, but I am trained and competent to do so	7/22/2019 1:41 PM

Q2 What is your average wait time for YAG capsulotomy?

Answered: 26 Skipped: 2

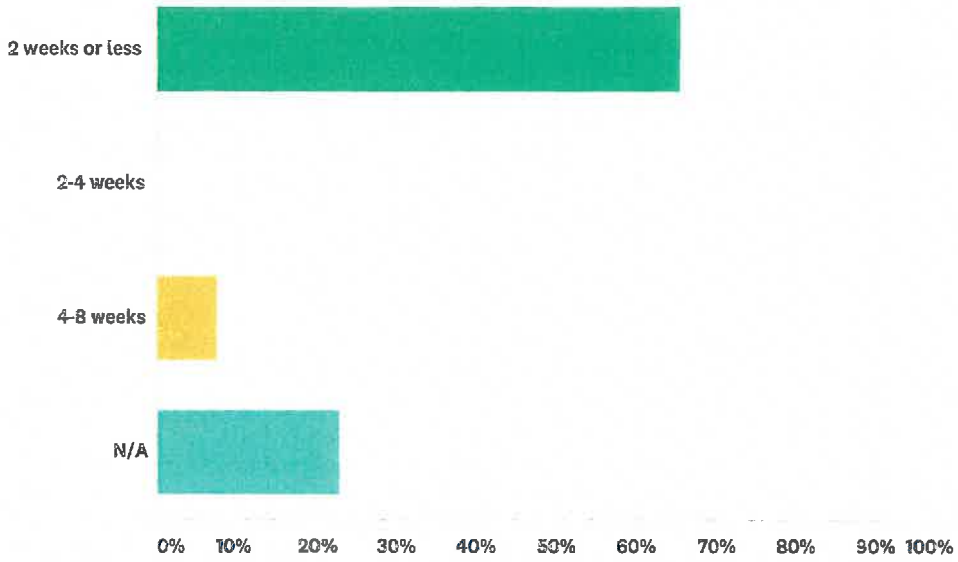


ANSWER CHOICES	RESPONSES	
2 weeks or less	65.38%	17
2-4 weeks	3.85%	1
4-8 weeks	7.69%	2
N/A	19.23%	5
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	1. If referred from another doctor, 2 weeks for appointment then 1-2 weeks for laser (done at hospital) 2. If my patient, 1-2 weeks for laser	10/18/2019 10:53 AM
2	Same day availability for all urgent cases.	10/18/2019 8:57 AM
3	for my own clinic (am a subspecialist in multi-specialty practice): no wait time, will accommodate schedule as needed	7/22/2019 1:41 PM
4	Usually done same day as exam to save patient additional visits	7/22/2019 1:00 PM

Q3 What is your average wait time for YAG PI?

Answered: 26 Skipped: 2

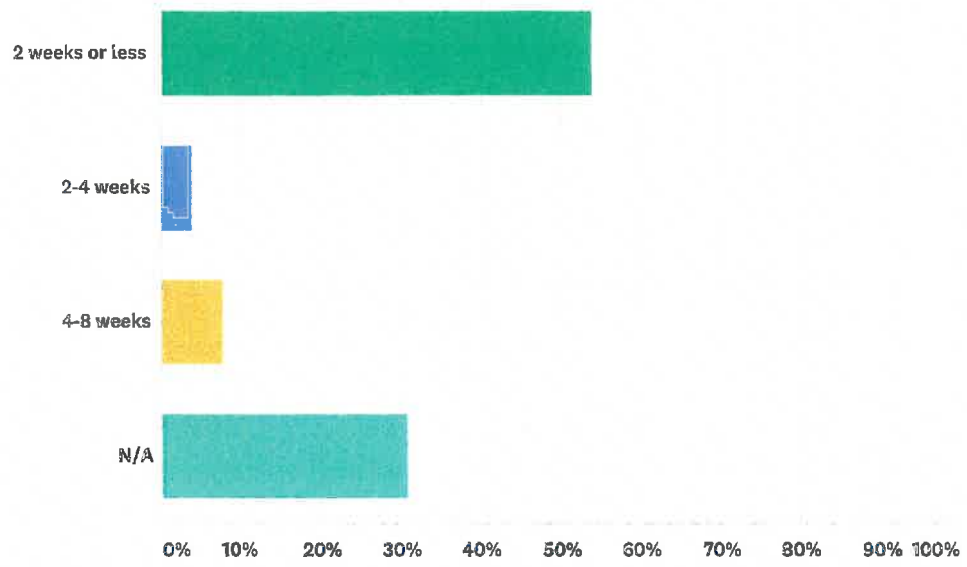


ANSWER CHOICES	RESPONSES	
2 weeks or less	65.38%	17
2-4 weeks	0.00%	0
4-8 weeks	7.69%	2
N/A	23.08%	6
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	1. If referred from another doctor, 2 weeks for appointment then 1-2 weeks for laser (done at hospital). More urgent cases are done within 24 hours depending on the clinical situation 2. If my patient, 1-2 weeks for laser	10/18/2019 10:53 AM
2	Same day availability for all urgent cases.	10/18/2019 8:57 AM
3	Unless noted for urgency. Emergent and urgent PIs scheduled accordingly to request.	10/17/2019 2:42 PM
4	for my own clinic (am a subspecialist in multi-specialty practice): no wait time, will accommodate schedule as needed	7/22/2019 1:41 PM

Q4 What is your average wait time for SLT/ALT

Answered: 26 Skipped: 2

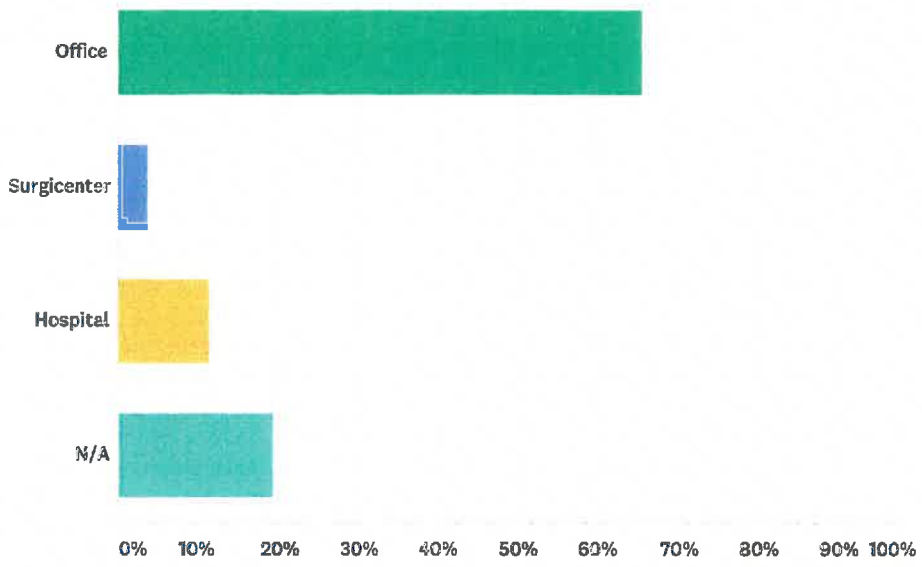


ANSWER CHOICES	RESPONSES	
2 weeks or less	53.85%	14
2-4 weeks	3.85%	1
4-8 weeks	7.69%	2
N/A	30.77%	8
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	1. If referred from another doctor, 2 weeks for appointment then 1-2 weeks for laser (done at hospital) 2. If my patient, 1-2 weeks for laser	10/18/2019 10:53 AM
2	Same day availability for all urgent cases.	10/18/2019 8:57 AM
3	for my own clinic (am a subspecialist in multi-specialty practice): no wait time, will accommodate schedule as needed	7/22/2019 1:41 PM

Q5 Where do you perform YAG capsulotomy, YAG PI, and SLT/ALT?

Answered: 26 Skipped: 2

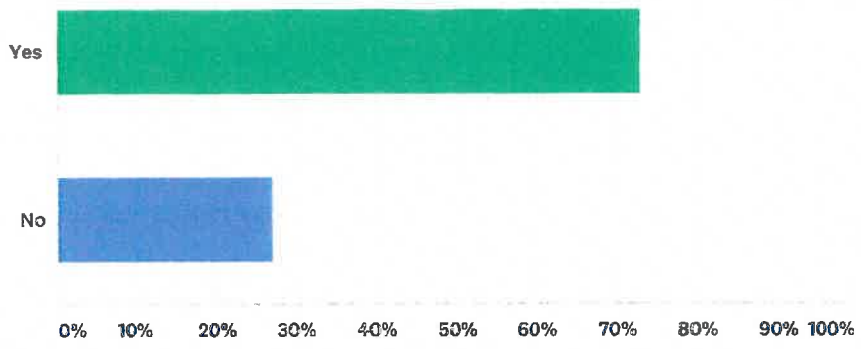


ANSWER CHOICES	RESPONSES	
Office	65.38%	17
Surgicenter	3.85%	1
Hospital	11.54%	3
N/A	19.23%	5
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q6 Do you perform eyelid surgeries such as chalazia I&D and lesion biopsies/excisions?

Answered: 26 Skipped: 2

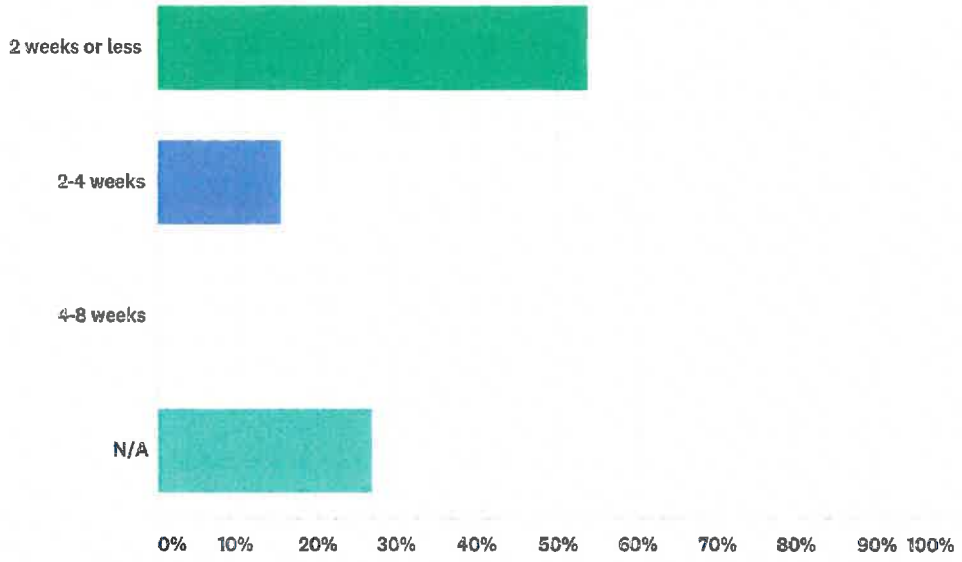


ANSWER CHOICES	RESPONSES	
Yes	73.08%	19
No	26.92%	7
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	All eye lid procedures	7/22/2019 3:25 PM

Q7 What is your average wait time for these eyelid surgeries?

Answered: 26 Skipped: 2

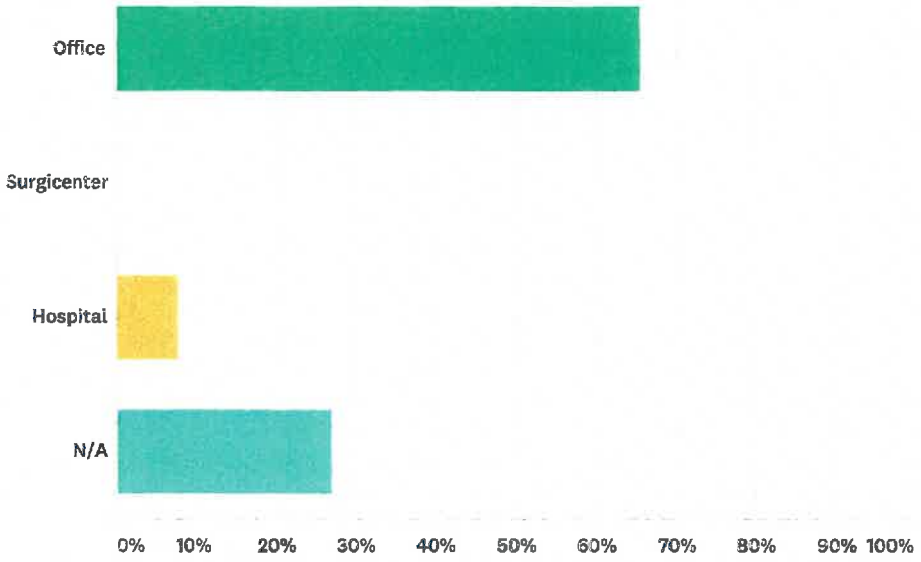


ANSWER CHOICES	RESPONSES	
2 weeks or less	53.85%	14
2-4 weeks	15.38%	4
4-8 weeks	0.00%	0
N/A	26.92%	7
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	dependent on access to UVM OR time and urgency of procedure; currently next available for routine procedure is 2-3 mo, but often find extra OR time in 2-4 weeks for more urgent cases	7/22/2019 1:41 PM
2	Same day if indicated	7/22/2019 1:00 PM

Q8 Where do you perform eyelid surgeries?

Answered: 26 Skipped: 2

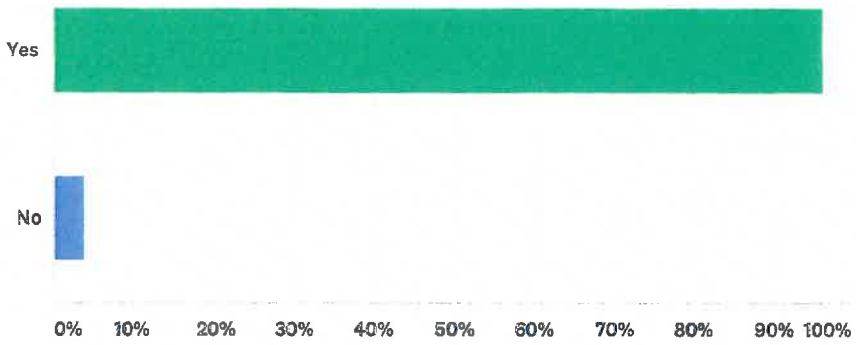


ANSWER CHOICES	RESPONSES	
Office	65.38%	17
Surgicenter	0.00%	0
Hospital	7.69%	2
N/A	26.92%	7
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	and hospital	10/14/2019 8:48 PM
2	All of the above	7/22/2019 3:25 PM
3	mostly perform chalazion I&D on children	7/22/2019 1:41 PM

Q9 Can your practice accommodate referrals for laser procedures or lid lesion treatment within one week if specifically requested by a referring eye care provider?

Answered: 26 Skipped: 2

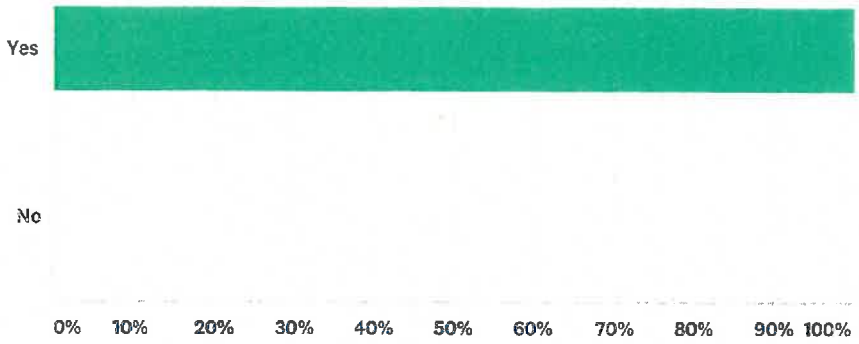


ANSWER CHOICES	RESPONSES	
Yes	96.15%	25
No	3.85%	1
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
1	We always make exceptions for emergencies, patients going out of town, etc. since many of our patients are snowbirds.	7/25/2019 5:10 PM
2	By other providers At UVM	7/23/2019 8:59 AM
3	No question	7/22/2019 3:25 PM

Q10 Do you accept Medicaid patients?

Answered: 26 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	100.00%	26
No	0.00%	0
TOTAL		26

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q11 Please enter the zip codes of all of your practice locations

Answered: 27 Skipped: 1

ANSWER CHOICES	RESPONSES	
1.	100.00%	27
2.	18.52%	5
3.	3.70%	1
4.	0.00%	0
5.	0.00%	0
6.	0.00%	0
7.	0.00%	0
8.	3.70%	1
9.	0.00%	0
10.	0.00%	0

#	1.	DATE
1	05201	10/18/2019 4:41 PM
2	05401	10/18/2019 12:56 PM
3	05602	10/18/2019 10:53 AM
4	05401	10/18/2019 8:57 AM
5	05403	10/17/2019 2:42 PM
6	05701	10/16/2019 2:49 PM
7	05401	10/16/2019 1:21 PM
8	05641	10/16/2019 12:53 PM
9	05641	10/14/2019 8:48 PM
10	05482	7/31/2019 6:45 PM
11	05478	7/25/2019 5:10 PM
12	05401	7/25/2019 11:13 AM
13	05060	7/24/2019 11:22 AM
14	05401	7/23/2019 8:59 AM
15	05401	7/23/2019 8:17 AM
16	05403	7/22/2019 9:17 PM
17	05819	7/22/2019 7:46 PM
18	05855	7/22/2019 7:02 PM
19	05701	7/22/2019 3:55 PM
20	05403	7/22/2019 3:25 PM
21	05401	7/22/2019 1:42 PM
22	05401	7/22/2019 1:41 PM

23	05753	7/22/2019 1:17 PM
24	05401	7/22/2019 1:00 PM
25	05201	7/22/2019 12:33 PM
26	05403	7/22/2019 12:22 PM
27	05403	7/22/2019 12:18 PM
#	**2.**	**DATE**
1	05255	10/18/2019 4:41 PM
2	05461	10/18/2019 12:56 PM
3	05641	7/22/2019 1:41 PM
4	01247	7/22/2019 12:33 PM
5	12901	7/22/2019 12:22 PM
#	**3.**	**DATE**
1	01247	10/18/2019 4:41 PM
#	**4.**	**DATE**
	There are no responses.	
#	**5.**	**DATE**
	There are no responses.	
#	**6.**	**DATE**
	There are no responses.	
#	**7.**	**DATE**
	There are no responses.	
#	**8.**	**DATE**
1	B	7/22/2019 12:33 PM
#	**9.**	**DATE**
	There are no responses.	
#	**10.**	**DATE**
	There are no responses.	

State Comparison

Procedure types by Optometrists and Ophthalmologists (Total numbers, 2008-2014)

	Oklahoma		Kentucky		New Mexico	
Procedure	**Optom**	**Ophthal**	**Optom**	**Ophthal**	**Optom**	**Ophthal**
Injection	59	32277	5	36897	9	14712
Punctal procedures	1178	2033	658	2258	616	859
Eyelash epilation	2211	1298	1672	2321	403	744
FB removal[e]	749	331	733	644	203	218
Chalazion	180	720	31	782	16	257
Eyelid abscess	87	48	13	113	6	13
Lid lesion	55	479	21	849	2	208

e FB = Foreign body

☐ *Denotes four of the expanded surgical procedures proposed by the Illinois Department of Financial and Professional Regulations (IDFPR) for the profession of optometry*

STUDY: ***A Comparison of Performance of Therapeutic Procedures by Ophthalmologists and Optometrist in States with Expanded Optometric Scope of Practice***

BACKGROUND

- Optometrists in the states of Oklahoma (OK), Kentucky (KY), and New Mexico (NM) are permitted to perform injections, minor surgical procedures (i.e. scalpel eyelid).
- They may obtain certificates to legally do so by attending abbreviated procedure courses.[1]
- The ACGME mandates that all graduating ophthalmology residents in the United States perform minimum numbers of these procedures.

SOURCE: Comparison of Performance of Therapeutic Procedures by Ophthalmologists and Optometrists in States with Expanded Scope of Practice. David S. Sanders, MD, MPH[1], Alan Sugar, MD[1], Chris Andrews, PhD[1-3], Joshua D. Stein, MD, MS[1-4] [1] W.K. Kellogg Eye Center, Department of Ophthalmology and Visual Sciences, University of Michigan, Ann Arbor, MI [2] Center for Healthcare Policy and Innovation; [3] Center for Eye Policy and Innovation, University of Michigan, Ann Arbor, MI [4] School of Public Health, Dept of Health Management and Policy, University of Michigan, Ann Arbor, MI

- One argument for expansion of scope of optometric practice is to **improve access to eye care for rural populations** that lack access to ophthalmologists (and may otherwise go without care).
- It is unclear how frequently optometrists and ophthalmologists are performing such procedures.
- This has important implications for **future policy decisions** regarding optometric scope of practice.

Key Findings:

1) Optometrists practicing in these states performed ***many fewer procedures*** than ophthalmologists practicing in those same states.

2) Factors associated with higher odds of receipt of procedures by optometrists rather than ophthalmologists include younger age, better overall health, and residence in rural parts of the state.

3) Ophthalmologists perform the large majority (76-94%) of procedures for patients residing in rural areas of these states.

4) Of all procedures performed by optometrists, many were performed in patients residing in ***urban areas***: OK (40%), KY (33%) and NM (29%).

5) A **small number of optometrists** are performing a **large proportion of the procedures** of interest.

- This is particularly notable for NM, where ***only the top 3 optometrists in the state performed 49%*** of all procedures done by optometrists throughout the entire state.

6) For some of the procedures of interest such as periocular and intraocular injections, **optometrists are performing *very few* procedures.**

Percentage of Procedures Done in RURAL Communities

State	Large Rural Communities	Small Rural Communities
Oklahoma	**Ophthalmologists** performed **80%** of the procedures	**Ophthalmologists** performed **76%** of the procedures
Kentucky	**Ophthalmologists** performed **94%** of the procedures	**Ophthalmologists** performed **91%** of the procedures
New Mexico	**Ophthalmologists** performed **90%** of the procedures	**Ophthalmologists** performed **89%** of the procedures

SOURCE: Comparison of Performance of Therapeutic Procedures by Ophthalmologists and Optometrists in States with Expanded Scope of Practice. David S. Sanders, MD, MPH[1], Alan Sugar, MD[1], Chris Andrews, PhD[1-3], Joshua D. Stein, MD, MS [1-4] *W.K. Kellogg Eye Center, Department of Ophthalmology and Visual Sciences, University of Michigan, Ann Arbor, MI [2] Center for Healthcare Policy and Innovation; [3] Center for Eye Policy and Innovation, University of Michigan, Ann Arbor, MI [4] School of Public Health, Dept of Health Management and Policy, University of Michigan, Ann Arbor, MI*

Further Discussions:

- Persons residing in rural communities in all 3 states had higher odds of receiving procedures by optometrists
    - **Yet, over three quarters of the procedures** done on persons in large and small rural communities in the 3 states were performed by ***ophthalmologists.***
    - Moreover, a large percentage of ***optometrists-performed*** procedures were done on patients residing in **urban areas** of these states.
- These findings raise questions as to whether legislation expanding scope of surgical practice for optometrists in these states is achieving its intended benefit of rural expansion of care.
- Surgeon volume has been strongly associated with improved patient outcomes in many surgical disciplines.
- If optometrists are performing **so few** of these more complex surgical procedures, (e.g. 73 injections in all 3 states over the study period (2008-2014) **it is unclear whether optometrists are doing these procedures frequently enough to maintain competency.**

Conclusions and Implications:

- **Based on these results, policy makers should reassess whether the purported benefits of expansion in surgical scope of practice outweigh the potential downsides.**
- **These results can help guide decision making regarding expansion of scope of practice in other states.**

SOURCE: Comparison of Performance of Therapeutic Procedures by Ophthalmologists and Optometrists in States with Expanded Scope of Practice. David S. Sanders, MD, MPH[1], Alan Sugar, MD[1], Chris Andrews, PhD[1-3], Joshua D. Stein, MD, MS[1-4] *W.K. Kellogg Eye Center, Department of Ophthalmology and Visual Sciences, University of Michigan, Ann Arbor, MI [2] Center for Healthcare Policy and Innovation; [3] Center for Eye Policy and Innovation, University of Michigan, Ann Arbor, MI [4] School of Public Health, Dept of Health Management and Policy, University of Michigan, Ann Arbor, MI*

Summary of laser usage in a 2 surgeon office in Berlin, VT with 13 referring community optometrists

Number of YAG capsulotomies (YAG cap), YAG Laser Peripheral Iridotomies (LPI), and Selective Laser Trabeculoplasties (SLT)
January 2019 through October 2019

*numbers also include patients from our own practice and from referring PCPs

January 2019
YAG cap 10
LPI 1
SLT 3

February 2019
YAG cap 10
LPI 2
SLT 1

March 2019
YAG cap 4
LPI 1
SLT 7

April 2019
YAG cap 6
LPI 1
SLT 1

May 2019
YAG cap 15
LPI 0
SLT 1

10/20/19

June 2019
YAG cap 11
LPI 2
SLT 2

July 2019
YAG cap 5
LPI 1
SLT 1

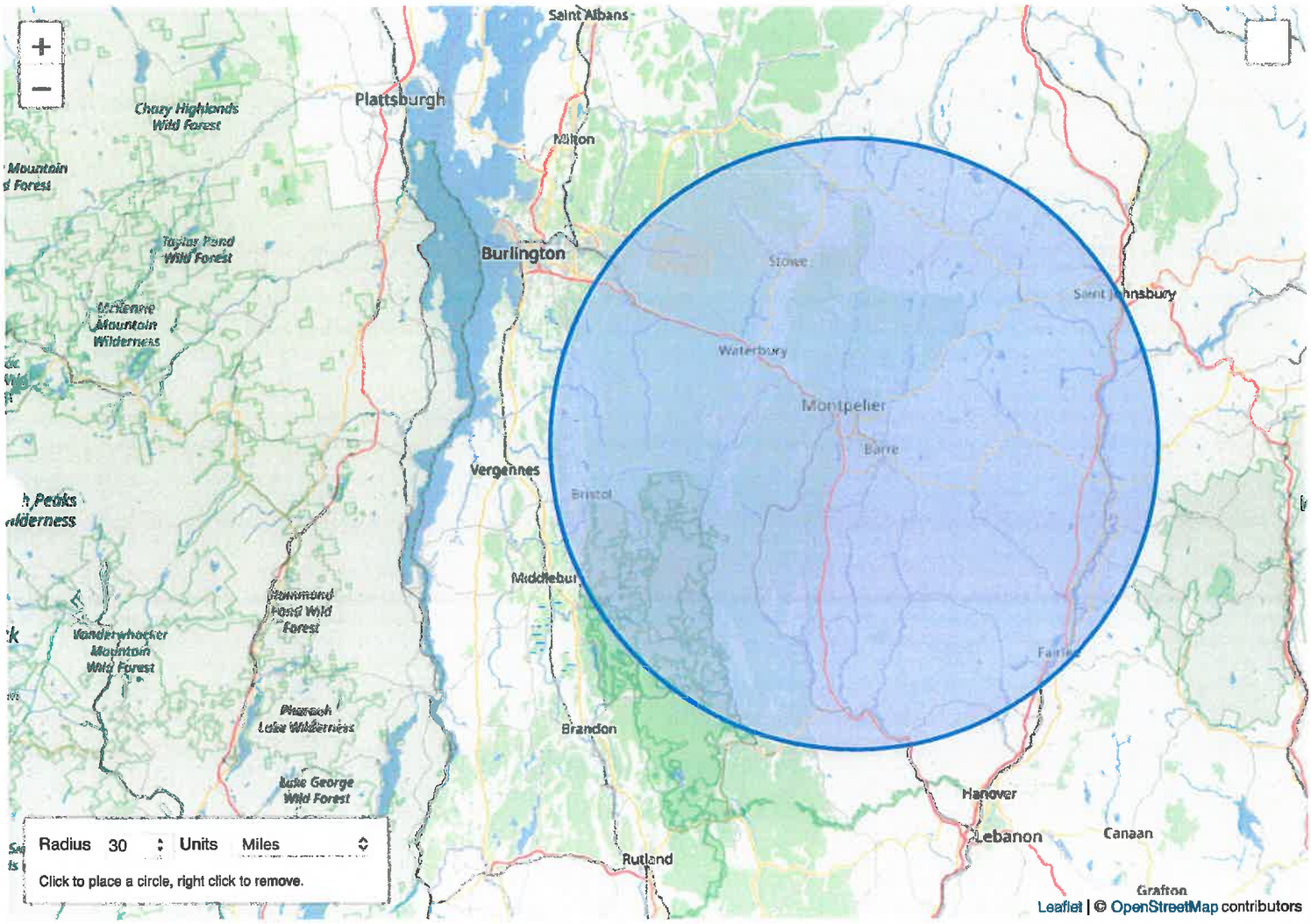
August 2019
YAG cap 11
LPI 1
SLT 1

September 2019
YAG cap 7
LPI 3
SLT 1

October 2019 (as of 10/17)
YAG cap 4
LPI 1
SLT 1

In summary, with 13 referring optometrists:

- **Average number of YAG caps: 4 per month per surgeon**
- **Average number of LPIs: 6-8 per year per surgeon**
- **Average number of SLTs: 12 per year per surgeon**


Saint Albans
Plattsburgh
Milton
Burlington
Stowe
Waterbury
Montpelier
Barre
Vergennes
Bristol
Middlebury
Brandon
Rutland
Hanover
Lebanon
Canaan
Grafton
Chazy Highlands Wild Forest
Taylor Pond Wild Forest
McKenzie Mountain Wilderness
Hammond Pond Wild Forest
Vanderwhacker Mountain Wild Forest
Pharaoh Lake Wilderness
Lake George Wild Forest
Radius 30
Units Miles
Click to place a circle, right click to remove.
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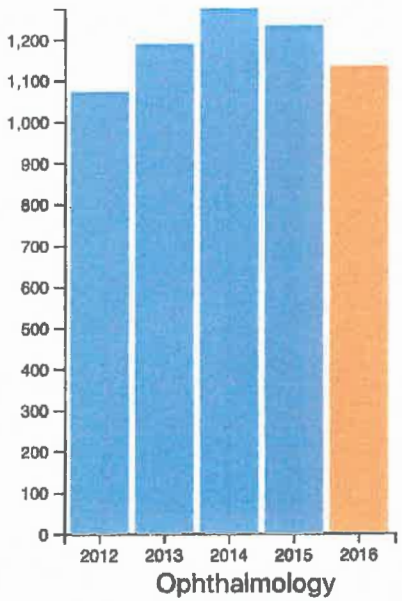

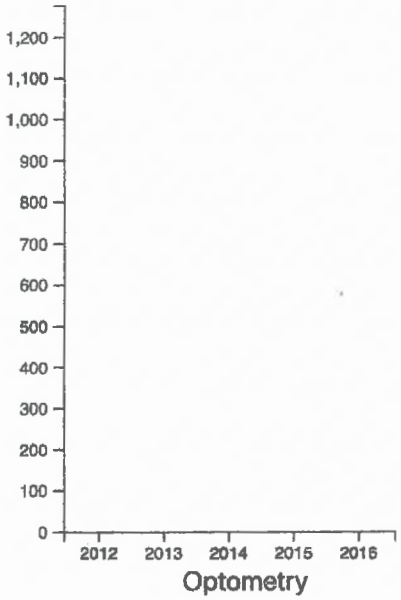

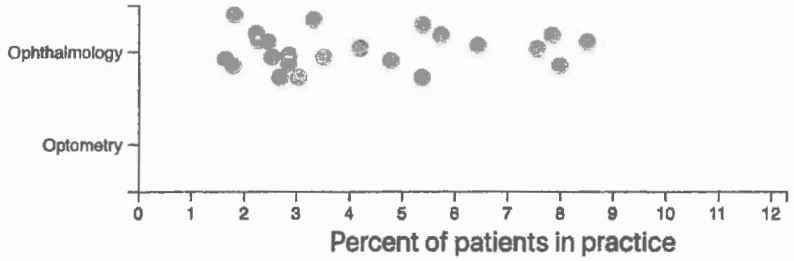

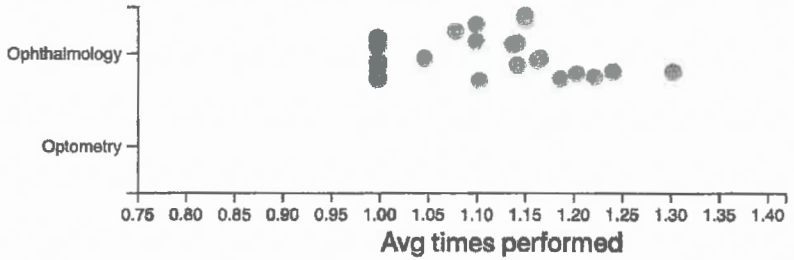

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