

Letters

RESEARCH LETTER

Distribution of Ophthalmologists and Optometrists in the US

In a previous communication using data from 2014, Kastl¹ disproved the assertion that rural optometrists (ODs) have difficulty referring patients to ophthalmologists (MDs) due to long travel distances. At that time, 3 US states (Oklahoma, Louisiana, and Kentucky) had expanded ODs' scope of practice to include ocular surgery, whether laser or incisional. Since then, more states—Alaska, Arkansas, Colorado, Mississippi, South Dakota, Virginia, and Wyoming²—have expanded ODs' scope of practice to include surgery. This has raised several concerns, including the risks associated with injecting periocular steroids and anesthetics.³

Here, we present an updated calculation of the distances patients must travel to reach an MD and discuss implications.

Methods | This comparative effectiveness study follows the Enhancing the Quality and Transparency of Health Research (EQUATOR) reporting guidelines.

Number of MDs and ODs. We used the Doctors and Clinicians National Downloadable File from June 2014 and June 2024, which contains data for all 50 US states, the District of Columbia, the Commonwealth of Puerto Rico, and the US territories of Guam, the US Virgin Islands, and the Northern Mariana Islands. All of these were included in our analysis.

We limited our dataset to clinicians with primary specialty listed as either ophthalmologist or optometrist.

Distribution of Isolated OD Practices. An isolated OD practice was defined as an OD practicing in a location in a zip code that does not contain any MD practice.

Distances Between Isolated OD Practices and Closest MD Practices. While the 2014 communication¹ only considered a central longitude and latitude set of coordinates for each zip code and computed the linear distance between OD and MD practices, we adopted a more complex approach to determine driving distances between each isolated OD practice and the closest MD practice exact location for 2014 and 2024.

First, we used the Google Maps Geocoding application programming interface to obtain exact latitude and longitude of each OD and MD practice location. Second, we identified the 10 closest MD practice locations for each isolated OD practice (direct distance). Finally, we computed the shortest driving distance from each isolated OD practice to its 10 closest MD practices via road networks using the routing service provided by Open Source Routing Machine.⁴

Results | While the number of ODs grew between 2014 and 2024, we observed a slight decrease in the number of MDs. Nevertheless, the number of MD practices significantly increased. This suggests that MDs are now practicing in a greater number of locations, which results in fewer zip

Table 1. Distribution of Optometrists' (ODs) and Ophthalmologists' (MDs) Office Locations

| Variable | No. | | |
|--|--------|--------|---------------|
| | 2014 | 2024 | Δ2014-2024, % |
| MD practices | 20 733 | 33 194 | 60.10 |
| MD NPIs | 17 648 | 17 456 | -1.09 |
| OD practices | 32 328 | 46 399 | 43.53 |
| OD NPIs | 29 413 | 33 033 | 12.31 |
| Zip codes with isolated OD practices | 5201 | 4857 | -6.61 |
| Isolated OD practices | 12 767 | 13 963 | 9.37 |
| Isolated OD NPIs | 12 185 | 12 150 | -0.29 |
| Zip codes with truly isolated OD practices | 3 | 8 | 166.67 |
| Truly isolated OD practices | 9 | 18 | 100.00 |
| Truly isolated OD NPIs | 9 | 14 | 55.56 |
| Population in zip codes with truly isolated OD practices | 15 845 | 20 303 | 28.14 |
| States with truly isolated ODs | AK, MA | AK, HI | NA |

Abbreviations: AK, Alaska; HI, Hawai'i; MA, Massachusetts; NA, not applicable; NPI, National Provider Identifier.

Table 2. Driving Distances to Nearest Ophthalmologist's (MD) Office Location for Isolated Optometrist (OD) Office Locations

| Distance | 2014 | 2024 | Δ2014-2024, % |
|--------------------------|---------------------------------|--------------------------------|-------------------------------|
| Mean (SD) [range], miles | 12.09 (22.23) [0.01 to 1051.74] | 10.87 (14.62) [0.01 to 336.97] | -10.09 (-34.23) [0 to -67.96] |
| Median (IQR), miles | 5.65 (2.75 to 15.33) | 5.1 (2.55 to 14.09) | -9.73 (-7.27 to -8.09) |

codes with isolated OD practices in 2024 relative to 2014 (Table 1).

We failed to compute driving distances for only 9 isolated OD practices in 2014, in Alaska and on Martha's Vineyard, Massachusetts, and for 18 practices in 2024, in Hawai'i and Alaska, making these practices *truly isolated*. We note that no such practice is located on any of the US territories. Overall, even when considering exact locations and actual driving distances, the mean distance from isolated OD practices to closest MD practices has slightly reduced from 12 to 11 miles. As shown in Table 2, all related statistics have improved between 2014 and 2024, which indicates better overall access to ophthalmologists.

Discussion | The expansion of optometrists' scope of practice may be based in part on an assertion that some patients must travel too far from an optometric office to an ophthalmology office, potentially endangering patients' ocular health. We calculated the exact driving distance from every isolated optometric practice to the closest ophthalmology practice and show that these distances are relatively small, which therefore does not support the assertion that some patients must travel too far from an optometric office to an ophthalmology office.

Our data do not support the premise that there is a need to extend optometrists' privileges based on traveling distance to ophthalmologists. These findings may be of interest to state legislatures that are considering expansion of optometric scopes of practice based on distance to an optometric office or an ophthalmology office.

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Accepted for Publication: August 31, 2025.

Published Online: November 13, 2025. doi:10.1001/jamaophthalmol.2025.4495

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Author Contributions: Dr Kastl had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Drafting of the manuscript: All authors.

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Statistical analysis: Senot, Hegde.

Administrative, technical, or material support: Kastl, Hegde.

Conflict of Interest Disclosures: None reported.

Data Sharing Statement: See Supplement 1.

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Contrast Sensitivity in Ultra-Thin DSAEK vs DMEK

The Descemet Endothelial Thickness Comparison Trial Therapeutic Exploratory Study (DETECT-TES) showed that Descemet membrane endothelial keratoplasty (DMEK) had better best spectacle-corrected visual acuity (BSCVA) compared with ultra-thin Descemet stripping automated endothelial keratoplasty (UT-DSAEK).¹ However, acuity alone does not capture all aspects of visual function. Contrast sensitivity (CS), the ability to distinguish subtle differences in shades or patterns, is perhaps even more important for daily visual functions. Corneal edema and guttae degrade CS,² and recent studies^{3,4} have analyzed CS between DMEK and UT-DSAEK. However, the DSAEK graft thickness in these studies was thicker than that in the DETECT-TES trial, and it is unknown how thinner DSAEK grafts perform. This study evaluates CS between DMEK and UT-DSAEK in the DETECT-TES trial.

Methods | The DETECT-TES study protocol is described elsewhere, including CONSORT diagram and statistical plan.¹ Six months after DMEK or UT-DSAEK, CS was measured with the Pelli-Robson test with illumination levels of 60 to 120 Cd/m² at 1 m. The log CS value is derived from the contrast sensitivity ratio, which is the ability to detect differences in luminance between an object and its background. Higher log CS values indicate better contrast sensitivity, whereas lower values indicate poorer sensitivity. The scale is logarithmic, meaning that each unit increase represents a tenfold increase in contrast sensitivity. Scores were converted into the area under the log CS function. Contrast sensitivity and correlations with surgery type, BSCVA, and age were prespecified secondary outcomes. Institutional review board approval was obtained through Stanford University, Oregon Health and Sciences University, and the University of California at San Francisco. Informed written consent was obtained, and the study adhered to the tenets of the Declaration of Helsinki.

Pearson correlation was used to examine the association between CS and BSCVA. Multivariate regression analysis adjusting for age, sex, and baseline BSCVA was performed.

Results | Visual acuity and Pelli-Robson data were available for 46 study participants (mean [SD] age, 68.8 [7.7] years; 27 female [58.7%]; 19 male [41.3%]), 22 randomized to DMEK and 24 to UT-DSAEK. DMEK had better mean (SD) CS (1.57 [0.17] Cd/m²) compared with UT-DSAEK (1.46 [0.22] Cd/m²) based on Mann-Whitney *U* test (Figure).

Better CS was correlated with improved acuity in UT-DSAEK, whereas an almost negligible correlation was observed for DMEK (Figure). In multivariate regression analysis,