

Comparing Driving Miles for Department of Veterans Affairs–delivered Versus Department of Veterans Affairs–purchased Cataract Surgery

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Background: The Veterans Choice Act of 2014 increased the number of Veterans eligible for Department of Veterans Affairs (VA)-purchased care delivered in non-VA community care (CC) facilities. Driving >40 miles from home to a VA facility is a key eligibility criterion for CC. It remains unclear whether this policy change improved geographical access by reducing drive distance for Veterans.

Objectives: Describe the driving distance for Veterans receiving cataract surgery in VA and CC facilities, and if they visited the closest-to-home facility or if they drove to farther facilities.

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Funding for this study was from VA Health Services Research & Development, SDR 18-318 (October 1, 2018–September 30, 2021) Make vs. Buy: Examining the Evidence on Access, Utilization and Cost: Are We Buying the Right Care for the Right Amount? M.E.V. is also supported by an HSR&D Career Development Award (CDA 15-259, Award Number 11K2HX00262). T.H.W. is also supported by an HSR&D Research Career Scientist award (RCS 17-154). A.K.R. is also supported by an HSR&D Senior Research Career Scientist award (RCS 97-401).

The authors express that all findings and conclusions in this paper are their own and do not necessarily represent the views of the United States Department of Veterans Affairs, the University of Utah, Stanford University, or Boston University.

The Veteran medical and utilization data accessed and analyzed during this study are not publicly available due to VA privacy and security rules.

The authors declare no conflict of interest.

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Supplemental Digital Content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's website, www.lww-medicalcare.com.

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ISSN: 0025-7079/21/5906-S307

Subjects: Veterans who had cataract surgery in federal fiscal year 2015.

Measures: We calculated driving miles to the Closest VA and CC facilities that performed cataract surgeries, and to the location where Veterans received care.

Results: A total of 61,746 Veterans received 83,875 cataract surgeries. More than 50% of CC surgeries occurred farther than the Closest CC facility providing cataract surgery (median Closest CC facility 8.7 miles vs. Actual CC facility, 19.7 miles). Most (57%) Veterans receiving cataract surgery at a VA facility used the Closest VA facility (median Closest VA facility 28.1 miles vs. Actual VA facility at 31.2 miles). In all, 26.1% of CC procedures occurred in facilities farther away than the Closest VA facility.

Conclusions: Although many Veterans drove farther than needed to get cataract surgery in CC, this was not true for obtaining care in the VA. Our findings suggest that there may be additional reasons, besides driving distance, that affect whether Veterans choose CC and, if they do, where they seek CC.

Key Words: Veterans, geographic information systems, access to health care, cataract surgery, travel burden

(*Med Care* 2021;59: S307–S313)

The Veterans Access, Choice and Accountability Act of 2014 (Choice) was passed in response to long waitlists and delays in care. Choice increased care access by allowing Veterans meeting certain eligibility criteria to receive care through Department of Veterans Affairs (VA)-purchased care in the community.¹ Two important eligibility criteria were: (1) having to wait more than 30 days for an appointment; and (2) having to drive more than 40 miles from a Veteran's home to the nearest VA facility. In federal fiscal years (FYs) 2015 and 2016, about 90% of 1.28 million Veterans with Choice appointments qualified under wait-time eligibility, and ~10% were eligible for community care (CC) based on this 40-mile rule.² There was no requirement that the CC facility be the Closest CC facility to the Veteran's home, or that it be closer than the nearest VA facility. Relatively little is known about whether the changes implemented through the Choice Act improved geographical access to care. As increasing numbers of Veterans are likely to use CC due to expanded eligibility criteria through the Maintaining Internal Systems and Strengthening Integrated Outside

Networks (MISSION) Act of 2018, examination of geographic access is critical.

In this paper, we examine the drive distance associated with receiving CC cataract surgery versus VA cataract surgery in FY2015 (October 1, 2014–September 30, 2015). We also describe how often Veterans drove farther than a closer VA or CC facility to receive cataract surgery.

Cataract surgery is the most common surgery for Americans aged 65 and older,³ and similarly, one of the most common surgical procedures in VA,⁴ requiring preoperative and postoperative visits.⁵ Where surgery is obtained depends upon factors such as whether acquaintances or family have had successful surgery⁶ and surgeons' reputations.⁷ Furthermore, previous research has established that distance to the nearest VA or other facility,^{3,5} and appointment availability,⁸ are important factors in selecting surgery location. VA enrollees over age 65 can use the VA or other health coverage, commonly Medicare, for cataract surgery. Although VA tends to have lower out-of-pocket expenses than Medicare, closer proximity to a VA facility is one of the strongest factors associated with the likelihood that Veterans receive cataract care at a VA versus through Medicare.^{3,5}

METHODS

We conducted a retrospective observational study using VA and CC datasets in the VA's Corporate Data Warehouse (CDW) for FY2015. Data management and analyses were executed within Veterans Informatics and Computing Infrastructure (VINCI)⁹ using geographic and statistical software [see Supplemental Digital Content 1 for a list of data sources and expanded explanation of data preparation, <http://links.lww.com/MLR/C159>]. Our study was deemed to be quality improvement and therefore exempt from Institutional Review Board review.

Our study cohort included all Veterans living in the continental US, Alaska, Hawaii, and all US territories (Puerto Rico, Guam, US Virgin Islands, American Samoa) who had cataract surgery as identified by Current Procedural Terminology (CPT) codes 66982 (complex cataract surgeries) and 66984 (routine cataract surgeries) in FY2015. Study Veterans were on average 78.7 years old, 96.5% male, 78.7% White, and 59.4% lived in urban areas. (Additional descriptive details of our study cohort have been published elsewhere.¹⁰) We included only one surgery per eye per Veteran in our cohort, and each surgery formed the unit of analysis (rather than the Veteran) as it was exceptionally rare for Veterans (103 total) to have surgery on both eyes during a single day; in the case of multiple surgeries per eye, we included only the first surgery in FY2015 for each eye (1 right and 1 left).

Generating drive distances in Geographic Information System (GIS) software requires origin points (for Veteran homes), destination points (for VA or CC cataract surgery), and a road network dataset. For travel origins, we used geocoded Veteran home addresses that were current during the fiscal quarter in which they had their surgeries. For destinations (surgical facilities), we used geocoded VA facilities and geocoded CC provider practice addresses. We selected *Streetmap North America* for our road network dataset.

We designated all CC facilities where VA paid for cataract surgeries in FY2015 as possible CC facility locations. To be consistent, we made the same designation for VA facilities, based on records that cataract surgeries had occurred at the facility in FY2015.

We used the Closest Facility and Route procedures provided with the Esri GIS software Network Analyst extension^{11–13} for calculating drive distances (in miles) from Veterans' home locations to four cataract surgery destinations: the Closest VA facility (Closest VA); the Closest CC facility (Closest CC); and the actual facility where a Veteran received care (either "Actual VA" or "Actual CC"). We placed no limits on where Veterans could travel, enabling them to cross state, national, and VA administrative boundaries (eg, Veterans from Alaska were able to drive to the lower 48 states using roads in Canada).

To visualize travel, we used inverse distance weighting to create heatmaps of miles for Closest VA, Closest CC, Actual VA, and Actual CC.¹⁴ We also created heatmaps for distance differences between Closest and Actual facilities.

RESULTS

Our study cohort included 61,746 Veterans who received 83,875 cataract surgeries in FY2015; of these, most Veterans (72.1%) sought cataract surgery in 123 VA facilities, while 27.9% received care in 2668 CC facilities (Table 1; see also Supplemental

TABLE 1. VA-purchased (Community Care) Versus VA-provided Cataract Surgeries in FY2015

Characteristics	VA, N (%)	CC, N (%)	Total, N (%)
Locations	123 (4.4)	2,668 (95.6)	2,791 (100)
Individual Veterans	44,544 (72.1)	17,202 (27.9)	61,746 (100)
Cataract procedures	58,050 (69.2)	25,825 (30.8)	83,875 (100)
Excess miles driven if not using the closest facility (by procedure count)			
≤ 1 mile	33,144 (57.1)	8,849 (34.3)	41,993 (50.1)
≤ 2 miles	40,933 (70.5)	9,500 (36.8)	50,433 (60.1)
≤ 3 miles	44,606 (76.8)	10,061 (39)	54,667 (65.2)
≤ 4 miles	46,827 (80.7)	10,583 (41)	57,410 (68.4)
≤ 5 miles	48,348 (83.3)	11,101 (43)	59,449 (70.9)
≤ 10 miles	51,484 (88.7)	13,191 (51.1)	64,675 (77.1)
Procedure complexity			
CPT: 66982 (complex)	10,162 (72.7)	3,808 (27.3)	13,970 (100)
CPT: 66984 (simple)	47,888 (68.5)	22,017 (31.5)	69,905 (100)
Eye side			
Left	28,646 (68.9)	12,932 (31.1)	41,578 (100)
Right	29,404 (69.5)	12,893 (31.1)	42,297 (100)
Fiscal 2015 quarter			
Q1	13,194 (70.6)	7,113 (29.4)	20,307 (100)
Q2	14,334 (68.3)	6,661 (31.7)	20,995 (100)
Q3	15,646 (69.9)	6,733 (30.1)	22,379 (100)
Q4	14,876 (73.7)	5,318 (26.3)	20,194 (100)
Total	58,050 (69.2)	25,825 (30.8)	83,875 (100)

Counts of Veterans, cataract procedures, and the frequency of procedures by excess miles are reported by facility type. *Excess mileage* for a cataract procedure is the number of additional miles required to drive to the actual surgical facility more than miles to the closest-to-home facility of the same kind (Actual VA miles minus Closest VA miles or Actual CC miles minus Closest CC miles). Frequency of cataract procedures by complexity, side (left or right), and Fiscal 2015 quarters is also reported by facility type.

CC indicates community care; CPT, Current Procedural Terminology; VA, Department of Veterans Affairs.

TABLE 2. Driving Miles for Veterans to Receive Cataract Surgery in FY2015 by State to VA and to CC Facilities
Drive Miles by State to VA and CC Facilities Mean, Median (SD)

State	Facility Count			For Veterans Who Visited a VA Facility to the			For Veterans Who Visited a CC Facility to the			For Veterans Who Visited a CC Facility to the		
	VA	CC	VA	Closest VA Facility	Closest CC Facility	Actual VA Facility	Closest CC Facility	Closest VA Facility	Closest CC Facility	Actual VA Facility	Actual CC Facility	
National	123	2668	58,050	40.9, 28.1 (39.2)	18.2, 11.2 (19.9)	52.8, 31.2 (110.9)	16.5, 8.7 (21.7)	74.9, 66.5 (57.5)	88.5, 19.7 (296.0)			
Alabama	2	54	643	51.4, 52.1 (34)	20.4, 15.7 (15.9)	66, 56 (128.5)	18.7, 14.8 (16.2)	59.5, 61.3 (34.4)	93, 21.4 (272)			
Alaska	1	10	62	58.3, 17.7 (126.9)	36.7, 6.5 (108.5)	328.2, 37.4 (861.9)	30.5, 8.7 (91.9)	125.1, 38.4 (167.1)	106, 25.2 (310.6)			
Arizona	1	75	765	44.1, 19.2 (49.4)	23.2, 11.2 (25.7)	66, 19.8 (171.9)	13.2, 5.2 (18.8)	142.8, 129.7 (43.8)	100.1, 19.3 (347.9)			
Arkansas	2	43	1130	54.5, 52.1 (38.1)	18.5, 13.2 (16.9)	63.2, 53.3 (76.4)	19.8, 14 (17.8)	56.2, 53.5 (37.2)	66.3, 21.5 (211.7)			
California	9	119	5244	32.9, 21.1 (34.6)	16.8, 12.4 (14.7)	42.9, 23.7 (104.6)	15.9, 7.2 (20.9)	78.3, 51.6 (66.3)	112.7, 18.9 (352.1)			
Colorado	2	62	814	30, 12.7 (36.4)	11.7, 4.3 (19.3)	43, 13.2 (106.6)	17.6, 6.9 (23.7)	89.8, 71.9 (53.4)	99.9, 20.8 (267.5)			
Connecticut	1	13	446	24.9, 22.4 (15.4)	10, 8.9 (6.3)	33.8, 25 (116.7)	11.5, 7 (15.7)	30.9, 32.3 (15.1)	129.9, 14 (313.3)			
Delaware	1	2	140	34.5, 14.7 (32.6)	24.6, 29.8 (12)	39.5, 16.6 (57.6)	10.3, 11 (3.1)	90, 91.6 (3.2)	12.3, 11 (2.5)			
District of Columbia	1	2	132	3.9, 3.1 (2.1)	5.9, 5.6 (3)	5, 3.3 (7.4)	*	*	*			
Florida	8	194	4852	35.1, 27.6 (30.3)	16.9, 8.9 (18.4)	53.2, 30 (143)	9.3, 5.7 (12.3)	45.6, 33.4 (39.9)	88.9, 16.1 (303.6)			
Georgia	2	74	1723	47.8, 33.9 (37.1)	20.5, 13.4 (18.7)	55.1, 36.3 (50.7)	13.8, 11.5 (11.1)	102.5, 101.1 (26.5)	106.1, 19.6 (326.5)			
Hawaii	0	29	2	*	6.1, 6.1 (4.6)	*	13.7, 9.1 (16.7)	*	143.4, 14.4 (479.3)			
Idaho	1	32	233	89.2, 66.4 (74.4)	22.9, 11.6 (24.3)	100.3, 72.7 (101.4)	16.6, 6.4 (21.8)	57.1, 26.9 (62.8)	81.3, 16.6 (292)			
Illinois	5	85	2084	35.3, 21.9 (34.7)	13.6, 9.7 (11.9)	45.2, 24.1 (93.4)	14.1, 9.6 (13.3)	57.6, 49.1 (41.2)	67.9, 22 (243.5)			
Indiana	2	67	1251	34.7, 28.2 (27.5)	16, 12.5 (12.8)	41.8, 29.3 (77.9)	14.8, 12.4 (12.9)	51, 51.8 (24.6)	63.7, 22.2 (218.4)			
Iowa	2	33	903	53.3, 52 (36.5)	21.5, 17.8 (19.2)	62.2, 53.6 (93.8)	20.4, 14.2 (19)	61.5, 61.2 (39.6)	75.3, 23.5 (184.9)			
Kansas	2	47	716	35.4, 15.8 (41.5)	15.2, 7.3 (17)	42.2, 24.6 (65.8)	18.8, 8.7 (22.7)	82, 65.6 (59.3)	60.6, 22.3 (209.2)			
Kentucky	2	31	1234	43.5, 36 (34)	22.7, 19.8 (17.4)	47.6, 37.5 (40.4)	16.4, 11 (14.9)	54.3, 58.1 (36.3)	87, 26.7 (220.9)			
Louisiana	3	37	1206	44.9, 38.8 (35.7)	18.6, 12.5 (15.9)	50.9, 40.4 (65.4)	17.1, 11.3 (16.4)	58.7, 67 (37.7)	143.7, 36.1 (372.4)			
Maine	1	15	427	49.7, 39.4 (27.2)	24.8, 24.9 (15.8)	59.9, 42.4 (68.8)	28.5, 20.5 (27.7)	159.5, 161.4 (84.8)	68.8, 14.5 (243.3)			
Maryland	1	12	834	19.6, 12.5 (21.1)	17.1, 12.1 (16)	31.9, 13.9 (116)	11, 4.7 (12.8)	14.6, 8.9 (17.9)	140.7, 19.4 (354.5)			
Massachusetts	1	19	840	28.2, 21.7 (21.4)	13.3, 10.1 (11.9)	47.2, 25.2 (195.1)	12.4, 8.6 (13.2)	59.1, 62.1 (17.9)	77.8, 17.7 (290.2)			
Michigan	3	104	1818	57.8, 30.3 (59.5)	11.2, 8.3 (9.7)	71.5, 36.6 (130.1)	17.5, 11.1 (18.5)	110.7, 106.7 (67.5)	69.5, 22.5 (241.1)			
Minnesota	2	103	1683	46, 26.8 (44.2)	18.4, 8.7 (21.5)	52.9, 30.4 (84.5)	18, 13 (18.2)	84, 72.7 (60.9)	113.1, 17.4 (409.3)			
Mississippi	2	30	587	53.4, 48.3 (37.5)	27.7, 23.2 (20.7)	59.9, 51 (50.3)	21.7, 14.7 (19.5)	54, 46.6 (41)	75.3, 20.9 (258.5)			
Missouri	3	114	1472	46.6, 37 (39.3)	18.2, 12.3 (16.5)	55.5, 39.8 (68.7)	18.3, 14.8 (17.7)	83.5, 87.5 (45.2)	95.1, 17.8 (244.4)			
Montana	2	37	181	81.8, 80.6 (63.1)	30.2, 15.4 (37.1)	176.4, 95.6 (279.1)	24.7, 9.9 (34.1)	117.9, 114.3 (77.9)	95.5, 31.2 (224.2)			
Nebraska	1	19	358	54.2, 19.5 (62.2)	21.6, 10.2 (24.4)	59.2, 22.4 (69.1)	34.4, 24.7 (33.1)	142.2, 147.5 (61.7)	78.2, 17.8 (279.8)			
Nevada	2	32	548	36.5, 15.9 (56.5)	28, 6.3 (45)	63, 18.7 (187.8)	14.4, 4.6 (21.7)	25, 15.2 (28.8)	44.3, 18.5 (157.2)			
New Hampshire	0	15	190	54.2, 55.5 (22.7)	13.3, 11.3 (10.5)	68.3, 58.7 (34)	15.8, 15.4 (10.8)	62.8, 61.1 (24.2)	41.7, 14 (61.7)			
New Jersey	1	3	401	25.4, 20.7 (17.7)	32.5, 33.3 (19.1)	42, 23 (184.3)	40.5, 45.4 (35.1)	29.9, 33.8 (21.7)	99.9, 23.1 (310.4)			
New Mexico	1	21	549	59.6, 24.4 (63.6)	26.6, 6.9 (34.4)	71.7, 25.2 (109.4)	25.5, 8.3 (32)	81.2, 61.6 (67.9)	69.4, 15.2 (280.1)			
New York	7	65	2052	25.6, 14.2 (26.9)	18, 12.1 (15.9)	35.9, 16.2 (108.9)	10.9, 7 (10.5)	63.5, 69 (30.9)	192.7, 22.3 (595)			
North Carolina	4	102	2738	45.2, 39.8 (30.9)	14.9, 11.4 (11.3)	53.5, 44.3 (47)	12.4, 8.8 (10.5)	58.7, 53.6 (31.4)	55.2, 21.2 (65)			
North Dakota	1	11	341	97.3, 74.4 (91.7)	35.3, 22.7 (35.7)	108.6, 76.3 (143.1)	62.1, 52.8 (40.5)	211.1, 205.1 (55.4)	44.7, 16.4 (163.1)			
Ohio	5	117	2762	33.1, 28.8 (23.8)	12.2, 9.4 (9.5)	40.8, 30.8 (64.6)	10, 6.4 (9.5)	35, 25.9 (24.8)	90.1, 26.9 (275.6)			
Oklahoma	1	52	958	53.1, 46.5 (41.4)	21.3, 11.5 (24.6)	69.7, 54.7 (114.7)	20.8, 14.4 (21.4)	96.6, 103.6 (36.2)	101.3, 22.6 (323.6)			
Oregon	2	66	1113	44.5, 26.6 (42.1)	12.6, 6.1 (14.6)	55.8, 28.3 (125.1)	16.5, 7.3 (22.7)	98.8, 89.4 (51.4)	80.5, 18.2 (319.6)			
Pennsylvania	4	102	1596	29.9, 24.1 (25.9)	13.7, 10.6 (10.5)	39.3, 25.3 (98.2)	12.2, 8.8 (13.7)	71.6, 78.5 (34.5)	106.8, 14.8 (332.3)			
Rhode Island	1	1	303	11.2, 10 (8.1)	10.8, 8.8 (7.3)	38.6, 11 (214.3)	*	*	174.2, 25.3 (143.5)			
South Carolina	2	37	1609	46.5, 45.2 (32.3)	19.3, 14 (15.6)	59.4, 48.1 (108)	13.2, 10.4 (10.8)	61.9, 64.3 (22.4)	74.4, 25.3 (143.5)			
South Dakota	2	22	438	57, 35.5 (53.8)	38.7, 30.7 (35.4)	77, 37.3 (149.9)	42.8, 34.3 (43.7)	79.4, 70.2 (64.4)	174.2, 21.6 (440.5)			
Tennessee	4	109	1269	45.1, 30.7 (38.8)	13.9, 10.4 (11.6)	54.4, 33.7 (110)	13.6, 10 (12.5)	70.5, 66.8 (48.9)	71.3, 18.7 (237.1)			
Texas	7	184	3518	49.5, 38.2 (42.9)	25.8, 15.4 (32)	58.7, 38.9 (96.1)	16.4, 8.3 (20.9)	70.3, 49.2 (59.7)	57.5, 15.6 (144.5)			
Utah	1	16	649	45.2, 28 (48.5)	20, 11.6 (25.8)	57.9, 29.2 (86.1)	25.8, 11 (36.8)	79, 51.6 (64.7)	147.5, 10.2 (391.4)			
Vermont	1	6	85	54.1, 48.1 (31.7)	22.9, 21.5 (13.4)	117.3, 75.7 (159.9)	4.8, 3.4 (5.2)	60.7, 63 (29.7)	96.2, 17.5 (269.9)			
Virginia	3	36	1480	37.4, 28.7 (29.1)	15.9, 10.6 (13)	42.1, 30.9 (57)	16.3, 9.7 (14.5)					

(Continued)

TABLE 2. Driving Miles for Veterans to Receive Cataract Surgery in FY2015 by State to VA and to CC Facilities (continued)

State	Facility Count		Procedure Count				For Veterans Who Visited a VA Facility to the				For Veterans Who Visited a CC Facility to the			
	VA	CC	VA	CC	VA	CC	Closest VA Facility	Closest CC Facility	Actual VA Facility	Closest VA Facility	Closest CC Facility	Actual VA Facility	Closest VA Facility	Actual CC Facility
Washington	3	83	1347	304	33.7, 18.1 (36.9)	304	11.1, 6.6 (13.3)	54.2, 32.7 (12.5)	16.6, 6.4 (33.4)	50.6, 39.2 (44.7)	96.8, 15.8 (316.5)	71.5, 73.8 (34.8)	45.5, 22.4 (134)	
West Virginia	3	29	690	589	41.9, 37.2 (32.3)	589	32.7, 32.9 (20.6)	48.6, 38.3 (48.1)	15.9, 12.5 (14.1)	75.2, 71 (47.4)	63.4, 22 (252.1)	75.2, 71 (47.4)	63.4, 22 (252.1)	
Wisconsin	3	87	958	526	37.2, 27.6 (34.1)	526	15.2, 11.9 (12.4)	50, 34.1 (56.4)	20.3, 15.9 (19.2)	124.6, 134.8 (68.8)	71.5, 28.6 (165.4)	124.6, 134.8 (68.8)	71.5, 28.6 (165.4)	
Wyoming	1	5	247	92	88.1, 76.5 (75.4)	92	52.3, 36.7 (52)	127.4, 84.1 (130.9)	39.1, 21.4 (42.9)	*	*	*	*	
US Territories	1	1	712	21	*	21	*	*	*	*	*	*	*	
Not Geocoded	0	4	217	53	†	53	†	†	†	†	†	†	†	

By US State, the mean, median, and SD for miles driven from home to the Closest VA facility, Closest CC facility, and to the actual facility where the Veteran received care.
 *We were not able to geocode or calculate this measure due to a lack of road data, where there were no cases, or where road segments were non-traversable.
 †Not applicable.
 CC indicates community care; VA, Department of Veterans Affairs.

Digital Content 1 for a more detailed report on geocoding, <http://links.lww.com/MLR/C159>). Just over one-third (22,129; 35.8%) of study Veterans received 2 cataract surgeries in FY2015, and of these, 13,429 (30.3%) had both surgeries in a VA facility, 8415 (19.2%) had both in a CC facility, and only 186 (0.4%) Veterans received a surgery in both a VA and CC facility.

At a national level (Table 2), Veterans receiving cataract surgery at VA facilities had a median driving distance to the Closest VA of 28.1 miles (mean 40.9; SD 39.2) while their median national drive to the Actual VA was higher: 31.2 miles (mean 52.8; SD 110.9). For Veterans who received care at a CC facility, the median national Closest CC distance was 8.7 miles (mean 16.5; SD 21.7), though the median national Actual CC distance was also higher: 19.7 miles (mean 88.6; SD 296.5).

For surgeries in CC facilities, 6741 (26.1%; excess miles: mean 252.5, median 52.77) procedures took place at a distance greater than the Closest VA facility. For those surgeries taking place in VA, the Closest VA facility was often farther away than the Closest CC facility (N=49,931; 86.0%), but not by much (excess miles: mean 13.7, median 0.92); in fact, excess travel was usually under 1 mile (N=25,775, 44.4%). Less than 43% of Veterans seeking CC used the nearest CC facility or one within 5 miles of the closest facility; only 51% used the nearest CC facility or one within 10 miles of their home (Table 1). By contrast, more than half (57%) of Veterans receiving cataract surgery at a VA facility had their surgeries at the Closest VA location; 83% used either the Closest VA facility or one within 5 miles of the Closest VA facility. (In addition, Supplemental Digital Content 2 provides excess mileage details for Veterans living either more-than-40 or 40-or-fewer miles, <http://links.lww.com/MLR/C160>.)

With the exceptions of New Jersey and Washington, DC, the median mileage to the Closest CC facility was less than the median mileage to the Closest VA facility. With the exceptions of Colorado and Maryland, the Actual CC facility was fewer median miles away from Veterans' homes than the Actual VA. Veterans using CC facilities in Maryland and Nevada had to drive a greater median drive than closer-to-home VA facilities.

The distributions of the distances to the Closest VA facility, Closest CC facility, and the likely actual distance driven are displayed as box plots (by Census Division) in Figure 1. For those receiving CC care in all regions, Closest VA mileage (box plot's lower hinge) was greater than the mileage to Closest CC (box plot's upper hinge); median actual CC travel either exceeded or nearly exceeded 75% of Closest CC drives. By contrast, median Actual VA and Closest VA drives were relatively similar for all regions.

As shown in the heatmaps (Fig. 2, left), areas with excess travel to a VA facility (closest facility mileage minus actual facility mileage) were concentrated in a few, mostly rural areas. By contrast, heatmaps for those who traveled excess miles to one of the 2,668 CC facilities (Fig. 2, right) revealed a greater number of areas representing excess travel, and these were more evenly distributed across rural and urban areas. As compared with the left map (surgery in VA facility) which mostly shows excess miles in relatively rural areas, the map on the right (surgery in CC facility) reveals many urban locations where Veterans drove farther than necessary to receive care in a CC facility.

As shown in the Figure 3 heatmaps, there were markedly different patterns for Veterans traveling to the Closest VA

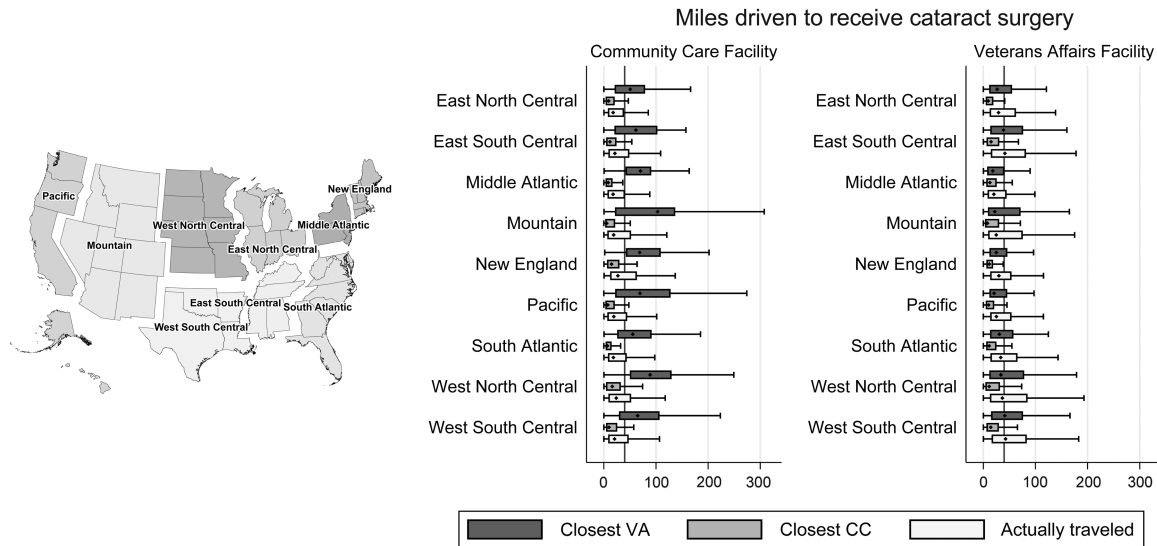


FIGURE 1. Miles driven to receive cataract surgery. Distributions of road miles from Veteran homes to the nearest VA and CC facilities as well as the shortest distance (Actually traveled) from their homes to the facilities where they received their surgeries. Box plots are broken down by Census Divisions. We illustrate the grouping of states within each Census Division in the inset map. Outside values have been removed. CC indicates community care; VA, Department of Veterans Affairs.

(upper left) and Closest CC facilities (lower left) as compared with the Actual VA (upper right) and Actual CC facilities (lower right). Routes in the closest facility analyses tended to have a hub-and-spoke pattern around each of the VA and CC facilities, whereas actual facility analyses generated driving routes that appeared relatively disordered. The larger number of facilities and greater geographic spread is also apparent in the Figure 3 panels. If all Veterans had driven the shortest necessary distance to receive cataract care, the maps on the left (closest facility) and right (actual facility) sides would be identical. While there are differences between closest and actual facility for those who received care at a VA facility (upper maps), those differences are not as marked as they are for Veterans who visited CC facilities (lower maps).

DISCUSSION

Our study is the first to compare relative drive distances between VA and CC for cataract surgery. Both Veterans who sought care in VA and CC facilities frequently drove farther than a closer-to-home facility capable of providing cataract care. As illustrated by patterns in Figure 2 maps, the Veterans seeking cataract care in CC facilities traveled farther than necessary more frequently than did Veterans receiving care at VA facilities.

There may be many explanations for why a Veteran might not go to the closest facility. Choice of location is likely to depend on factors such as wait times, surgeons' reputations, and perceptions of quality,¹⁵ factors that are often difficult to measure. There may be family caregivers who live

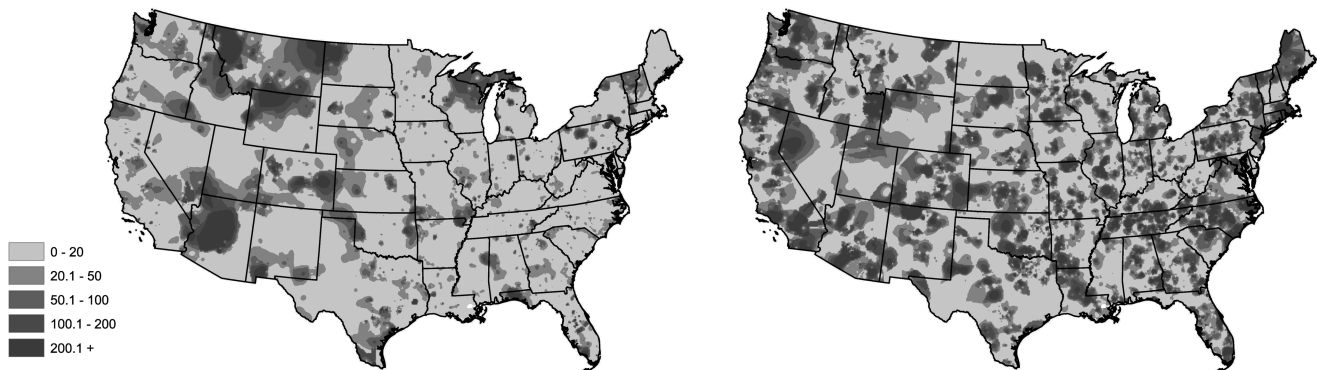


FIGURE 2. Excess driving miles to receive cataract care. Maps show miles driven farther than a closer Department of Veterans Affairs (VA) facility (left) or community care (CC) facility (right) based on where Veterans live. Shades of gray, as described in the legend, represent how many extra miles Veterans drove farther than the closest-to-home VA and CC facilities capable of providing cataract surgery. Relatively darker shades of gray represent a greater number of excess miles to receive cataract surgery, whereas Veterans living in locations marked with lighter shades of gray visited either the closest facility or a relatively closer-to-home facility.

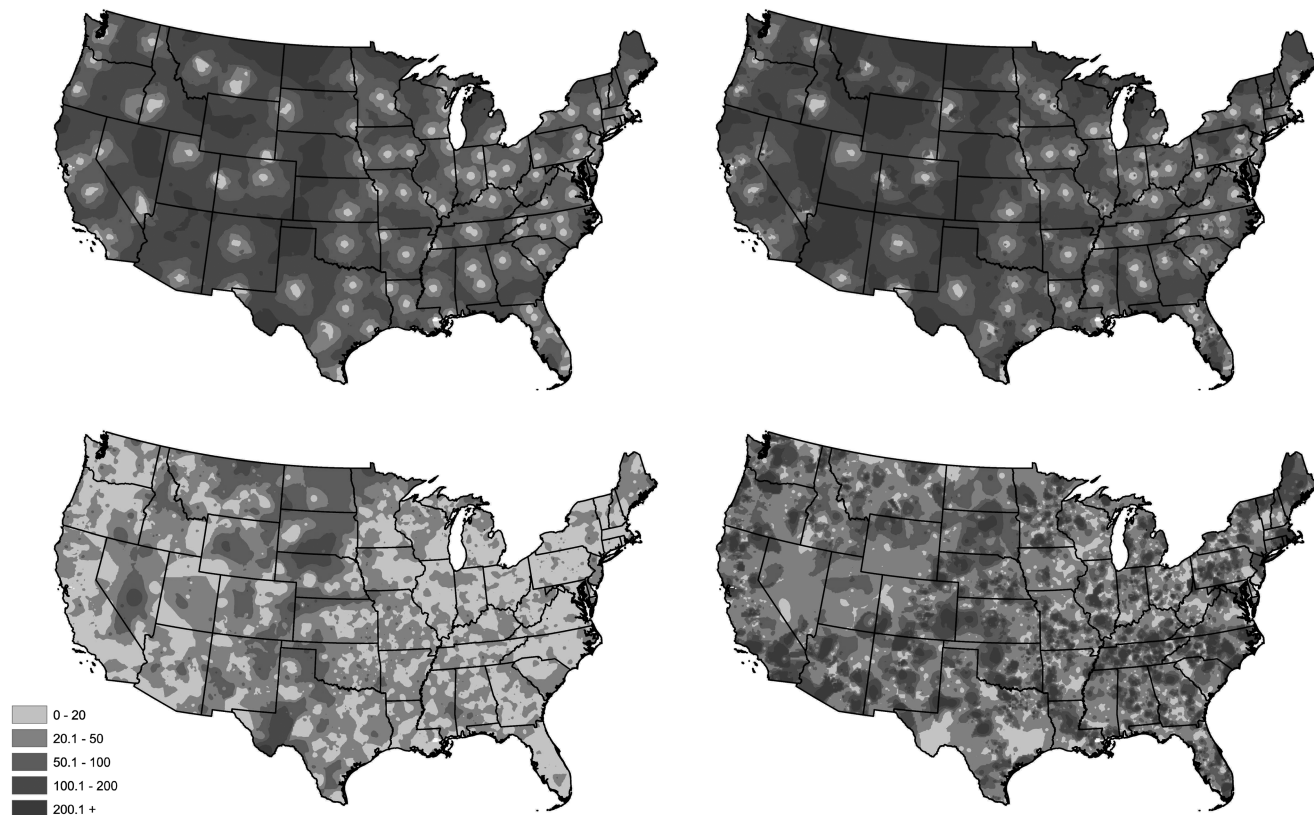


FIGURE 3. Miles to the Closest versus Actual Department of Veterans Affairs (VA) and community care (CC) facilities. Maps of driving miles from Veteran homes to the (clockwise from top left) Closest VA facility (top left), the Actual VA facility (top right), Actual CC facility (bottom right), and Closest CC facility (bottom left) for cataract surgeries in FY2015. As described in the legend, darker shades of gray represent relatively greater distances.

close to the more distant surgical facility. Survey-based or qualitative studies that query Veterans about the types of factors that influence where they are likely to go to obtain care, and why they may choose not to go to the closest facility, would be a very useful next step for researchers.

We acknowledge several limitations. Our analysis used a road network published in 2010. We do not know the actual route Veterans drove to receive care. While our analyses allowed Veterans to seek care across state lines, we tabulated travel distance by state (tables) and Census Division (box plots) to generate answers having familiar geographic units. These different methods for aggregating data may have artificially lowered or raised measurements for routes crossing these geopolitical boundaries. We had no information on whether Veterans qualified for Choice based on distance or some other criteria. If Veterans relocated to warmer areas of the southeastern United States as part of the annual “significant seasonal fluctuation” (so-called, “sunbirds” or “snowbirds”), our measurements could be out-of-date.¹⁶ Finally, cataract surgery may have unique requirements that make it difficult to generalize these findings to other non-cataract VA versus CC comparisons.

Changes to federal policies aimed to reduce the travel burden for Veterans seeking medical care. This paper describes the driving distance associated with VA-purchased care in CC versus

VA-delivered care for cataract surgeries in FY2015. Although many Veterans drove farther than needed to get cataract surgery in CC, this was not true for obtaining care in the VA. Our findings suggest the importance of studies that attempt to identify other reasons besides driving distance that affect where Veterans seek cataract surgery or other services in CC.

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