

Supplementary Material

Comorbid Depression and Anxiety Risk in Older Individuals With Geographic Atrophy: A US Claims Data Analysis

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Table S1. Categorization of GA Patients According to Eye Involved and Location of Lesion
(ICD-10 Diagnosis Codes)

Diagnosis code	Eye involved label	Location of lesion label
H35.3113	Single eye	Without subfoveal
H35.3114	Single eye	With subfoveal
H35.3123	Single eye	Without subfoveal
H35.3124	Single eye	With subfoveal
H35.3133	Bilateral	Without subfoveal
H35.3134	Bilateral	With subfoveal
H35.3193	Bilateral	Without subfoveal
H35.3194	Bilateral	With subfoveal

GA, geographic atrophy; ICD-10, *International Classification of Diseases, Tenth Revision*.

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Table S2. Medical Comorbidities Used as Covariates for Propensity Score Matching (ICD-9/ICD-10 Diagnosis Codes)

Indication	Diagnosis codes	Time period
Smoking history	ICD-9: 305.1, 649.x, V15.82 ICD-10: F17.2x, O99.3x, Z87.891	Any time before the index date (inclusive of the index date)
Myocardial infarction – CCI	ICD-9: 410.x, 412 ICD-10: I21.x, I22.x, I25.2	
Congestive heart failure – CCI	ICD-9: 398.91, 402.x, 404.x, 425.4-425.9, 428.x ICD-10: I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5-I42.9, I43, I50.x, P29.0	
Peripheral vascular disease – CCI	ICD-9: 093.0, 437.3, 440.x, 441.x, 443.x, 447.1, 557.1, 557.9, V43.4 ICD-10: I70.x, I71.x, I73.1-I73.9, I77.1, I79.0, K55.1, K55.8, K55.9, Z98.8x, Z95.9	
Cerebrovascular disease – CCI	ICD-9: 362.34, 430, 431, 432.x-435.x, 436, 437.x, 438.x ICD-10: G45.x, G46.x, H34.00, H34.01, H34.02, H34.03, I60.x-I69.x	
Dementia – CCI	ICD-9: 290.x, 294.1x, 331.2 ICD-10: F01.x-F03.x, G30.x, G31.1	

Chronic pulmonary disease – CCI	ICD-9: 416.8, 416.9, 490, 491.x-495.x, 496, 500-505, 506.4, 508.1, 508.8 ICD-10: I27.8x, I27.9, J40-J47.x, J60-J67.x, J68.4, J70.1, J70.3
Rheumatologic disease – CCI	ICD-9: 446.5, 710.0-710.4, 714.0-714.2, 714.81, 714.89, 725 ICD-10: M05.x, M06.x, M31.5, M32.x-M34.x, M35.1, M35.3, M36.0
Peptic ulcer disease – CCI	ICD-9: 531.x-534.x ICD-10: K25.x-K28.x
Mild liver disease – CCI	ICD-9: 070.22, 070.23, 070.32, 070.33, 070.44, 070.45, 070.6, 070.9, 570, 571.x, 573.3, 573.4, 573.8, 573.9, V42.7 ICD-10: B18.x, K70.x, K71.3-K71.7, K73.x, K74.x, K76.0, K76.2-K76.4, K76.8x, K76.9, Z94.4
Diabetes without chronic complications – CCI	ICD-9: 250.0x-250.3x, 250.8x, 250.9x ICD-10: E10.1x, E10.6x, E10.8, E10.9, E11.0x, E11.1x, E11.6x, E11.8, E11.9, E13.0x, E13.1x,

	E13.6x, E11.8, E11.9	
Diabetes with chronic complications – CCI	ICD-9: 250.4x-250.7x ICD-10: E10.2x-E10.5x, E11.2x-E11.5x, E13.2x-E13.5x	
Hemiplegia or paraplegia – CCI	ICD-9: 334.1, 342.x, 343.x, 344.0x-344.6x, 344.9 ICD-10: G04.1, G11.4, G80.1, G80.2, G81.x, G82.x, G83.0-G83.4, G83.9	
Renal disease – CCI	ICD-9: 403.x1, 404.x2, 404.x3, 582.x, 583.0-583.7, 585.x, 586, 588.0, V42.0, V45.1x, V56.x7 ICD-10: I12.0, I13.1x, N03.2-N03.7, N05.2-N05.7, N18.x, N19, N25.0, Z49.0x, Z94.0, Z99.2	
Any malignancy, including leukemia and lymphoma – CCI	ICD-9: 140.x-149.x, 150.x-159.x, 160.x-165.x, 170.x-172.x, 174.x-179.x, 180.x-189.x, 190.x-195.x, 200.x-208.x, 238.6 ICD-10: C00.x-C43.x, C45.x-C76.x, C7A.x-C7B.x, C81.x-C85.x, C88.x-C96.x	

Moderate or severe liver disease – CCI	ICD-9: 456.0-456.2x, 572.2-572.8 ICD-10: I85.0x, I86.4, K70.4x, K71.1x, K72.1x, K72.9x, K76.5-K76.7	
Metastatic solid tumor – CCI	ICD-9: 196.x-199.x ICD-10: C77.x-C80.x	
AIDS/HIV – CCI	ICD-9: 042 ICD-10: B20	
Glaucoma	ICD-9: 365.x ICD-10: H40.x	
Cataracts	ICD-9: 366.x ICD-10: H25.x, H26.x	
Diabetic retinopathy	ICD-9: 362.0x ICD-10: E08.31x-E08.35x, E09.31x-E09.35x, E10.31x-E10.35x, E11.31x-E11.35x, E13.31x-E13.35x	Within 5 years before the index date (inclusive of the index date)
Branch vein occlusion	ICD-9: 362.36 ICD-10: H34.83x	
Anxiety disorder	ICD-9: 300.xx ICD-10: F40.x-F42.x, F48.9	
Anxiety exclusion	ICD-9: 300.6, 300.7, 300.8 ICD-10: F44.x, F45.x	

Depression	ICD-9: 296.2x, 296.3x, 296.82, 300.4, 309.0, 309.1, 311 ICD-10: F32.x, F33.x, F34.1, F43.21	
Nursing home or assisted living facility admission	CPT-4: 99304-99316, 99341-99350 Provider code: <u>MarketScan</u>: “Convalescent Care Facility”, “Extended Care Facility”, “Geriatric Hospital”, “Intermediate Care Facility”, “Long Term Care Facility” <u>Clinformatics®</u>: “Assisted Care Living Facility – Center”, “Assisted Care Living Facility – Home”, “Extended Care Facility”, “Geriatric Medicine Specialist”, “Intermed Care Fac Indv Int Dis”, “Ltac - Long Term Acute Care Facility”, “Nursing Home”, “Rehabilitation Facility/ Nursing Home/Inpatient Hospice” <u>PharMetrics</u>: “Geriatric”, “SNF” Place of service code:	

	<u>MarketScan</u> : “Inpatient long term care”, “Skilled nursing facility”, “Nursing facility”, “Custodial care facility” <u>Clinformatics®</u> : “Inpatient long term care”, “Skilled nursing facility”, “Nursing facility”, “Custodial care facility” <u>PharMetrics</u> : “SNF”, “LONG_TERM_CARE”	
Anti-VEGF medication	National drug codes: 00024584001, 00024584101, 00069031501, 00069034201, 00078082760, 00078082761, 00780082761, 50242006001, 50242006002, 50242006010, 50242006101, 50242006110, 50242007812, 50242007855, 50242008001, 50242008002, 50242008003, 50242008201, 50242008202, 50242008203, 50242009601, 55513020601, 55513020701, 61755000501, 61755000502, 64406001901, 64406001907,	Within 5 years before the index date (inclusive of index date)

	70121175401, 70121175407, 70121175501, 70121175507 Health care common procedure coding system codes: C9093, C9097, C9142, C9214, C9233, C9257, C9291, C9296, J0178, J0179, J2777, J2778, J2779, J9035, J9400, Q2024, Q2046, Q5107, Q5118, Q5124, Q5126, S0116	
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AIDS, acquired immune deficiency syndrome; CCI, Charlson Comorbidity Index; Clinformatics[®], Optum's de-identified Clinformatics[®] Data Mart Database; HIV, human immunodeficiency virus; ICD-9, *International Classification of Diseases, Ninth Revision*; ICD-10, *International Classification of Diseases, Tenth Revision*; MarketScan, Merative[™] MarketScan[®] Commercial and Medicare Databases; PharMetrics, IQVIA US PharMetrics[®]; VEGF, vascular endothelial growth factor.

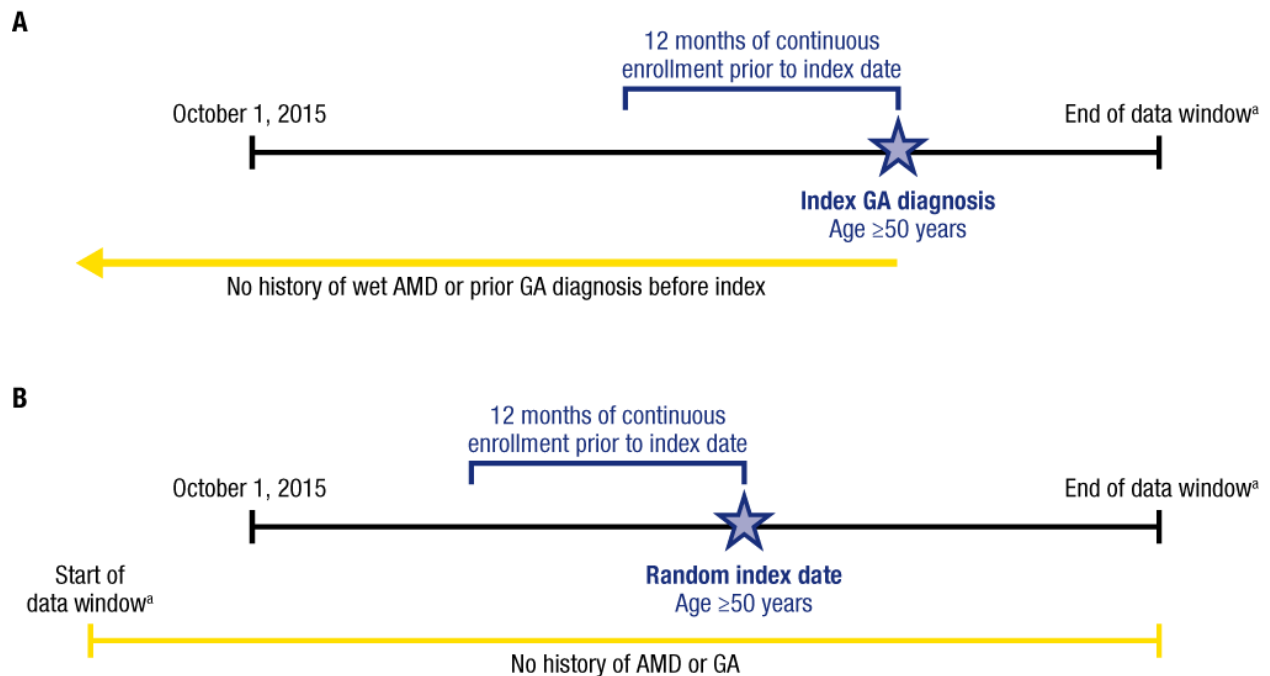
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Table S3. Index Year of Patients and Controls

	Clinformatics®		MarketScan		PharMetrics	
	GA	Controls	GA	Controls	GA	Controls
N	44,595	89,190	9468	18,936	27,427	54,854
Index year, n (%)						
2016	2619 (6)	5238 (6)	52 (1)	104 (1)	2286 (8)	4572 (8)
2017	8338 (19)	16,676 (19)	2051 (22)	4102 (22)	7514 (27)	15,028 (27)
2018	6841 (15)	13,682 (15)	2803 (30)	5606 (30)	4522 (16)	9044 (16)
2019	6332 (14)	12,664 (14)	1940 (20)	3880 (20)	3892 (14)	7784 (14)
2020	4932 (11)	9864 (11)	1136 (12)	2272 (12)	3254 (12)	6508 (12)
2021	6360 (14)	12,720 (14)	896 (9)	1792 (9)	4008 (15)	8016 (15)
2022	7177 (16)	14,354 (16)	590 (6)	1180 (6)	1951 (7)	3902 (7)
2023	1996 (4)	3992 (4)	NA	NA	NA	NA

Clinformatics®, Optum's de-identified Clinformatics® Data Mart Database; GA, geographic atrophy; MarketScan, Merative™ MarketScan® Commercial and Medicare Databases; NA, not applicable; PharMetrics, IQVIA US PharMetrics®.

Figure S1. Study schema for identifying (A) patients with GA/AMD and (B) those with no recorded diagnosis of GA or AMD.

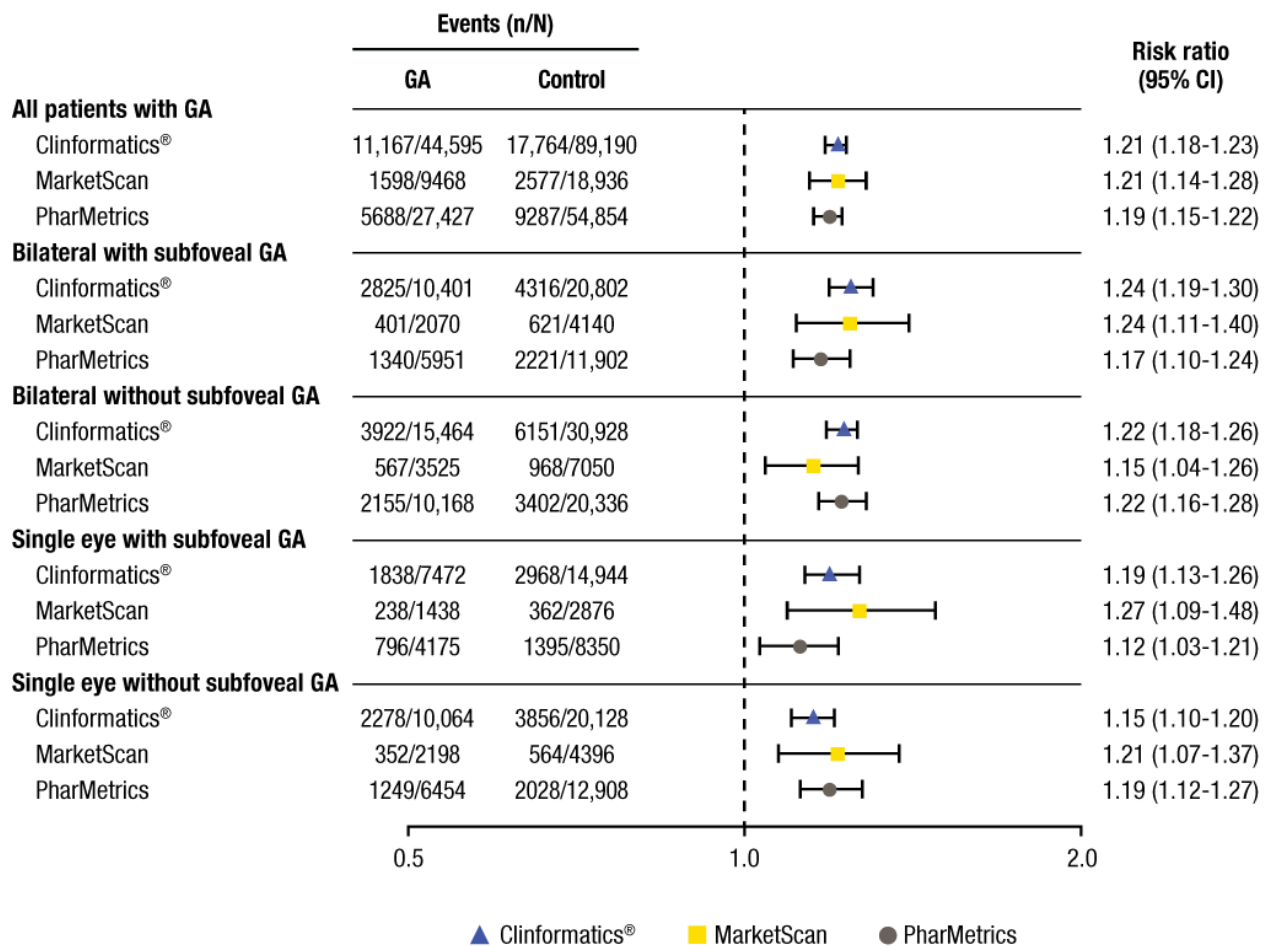


AMD, age-related macular degeneration; Clinformatics[®], Optum's de-identified Clinformatics[®] Data Mart Database; GA, geographic atrophy; MarketScan, Merative[™] MarketScan[®] Commercial and Medicare Databases; PharMetrics, IQVIA US PharMetrics[®].

^aStart of data window was January 1, 2000 for control patients in all 3 databases and end of data window for GA and control patients was December 31, 2022 for Clinformatics[®] and June 30, 2022 for PharMetrics and MarketScan.

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Figure S2. Risk of emergency department visits among patients with geographic atrophy and matched controls.^a

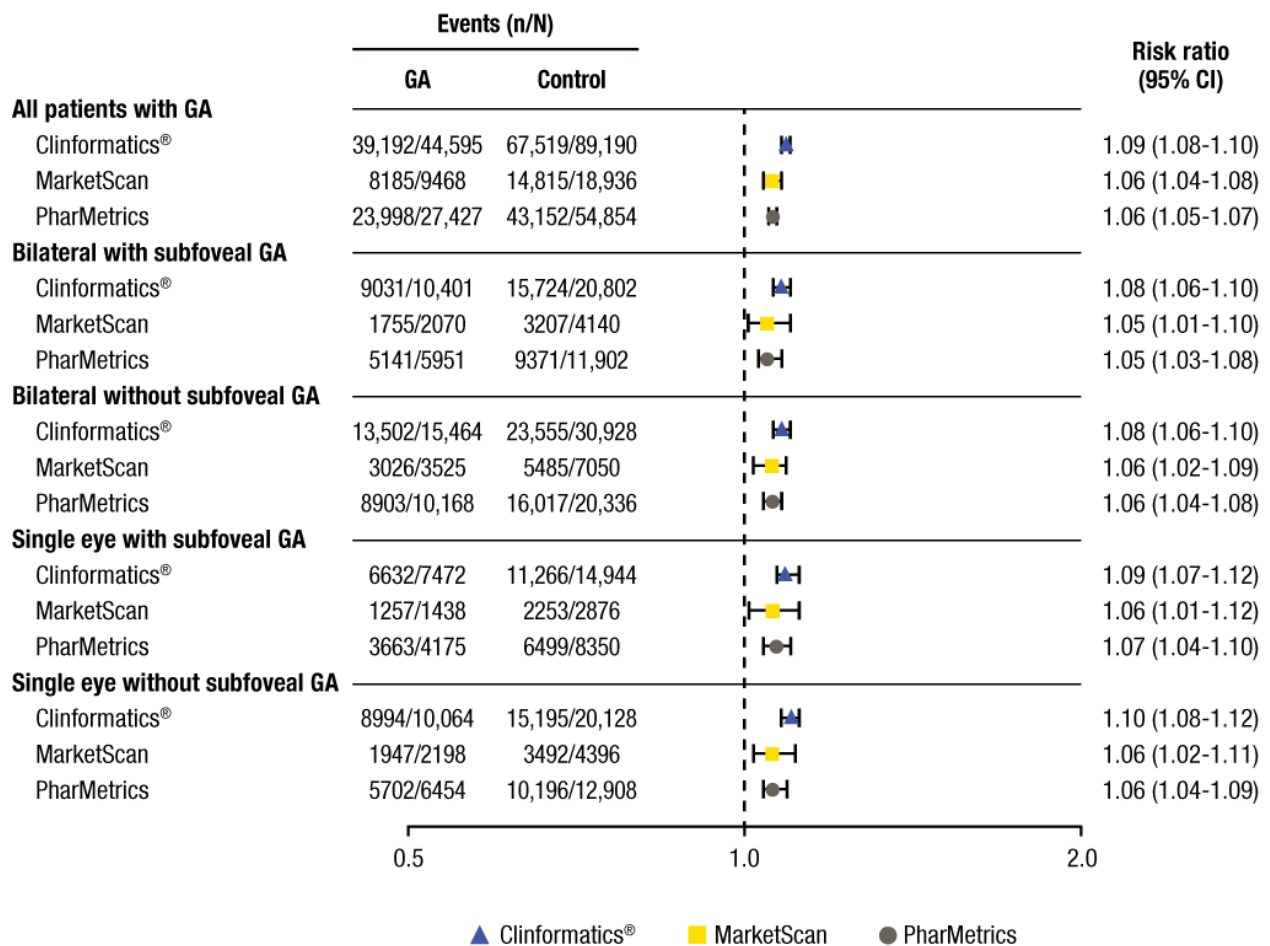


The subgroup of patients with bilateral GA with and without subfoveal involvement is not shown due to the small sample size.

CI, confidence interval; Clinformatics®, Optum's de-identified Clinformatics® Data Mart Database; GA, geographic atrophy; MarketScan, Merative™ MarketScan® Commercial and Medicare Databases; PharMetrics, IQVIA US PharMetrics®.

^aData are based on patients with ≥1 emergency department visit within 2 years of the index date.

Figure S3. Risk of outpatient visits among patients with geographic atrophy and matched controls.^a

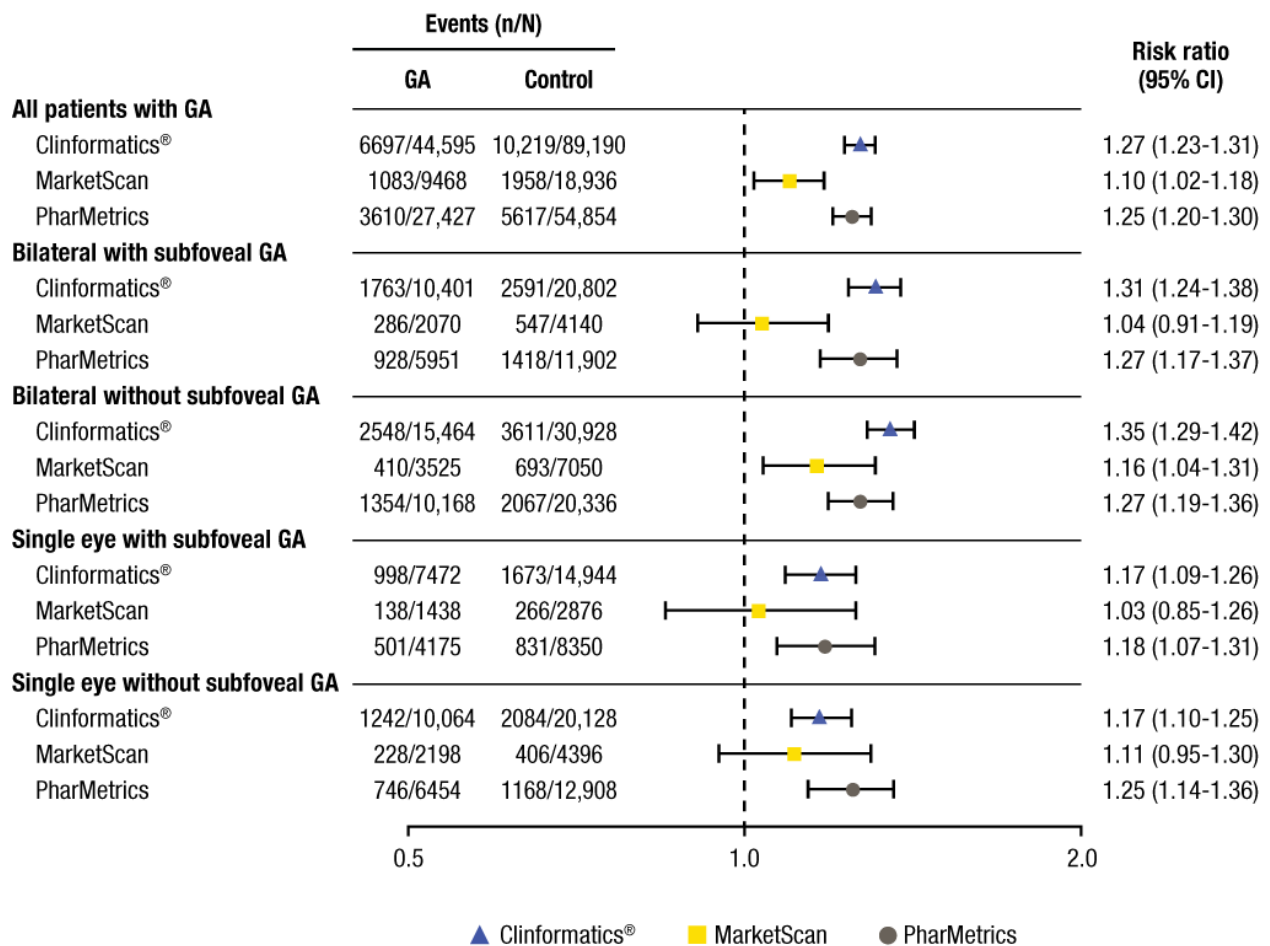


The subgroup of patients with bilateral GA with and without subfoveal involvement is not shown due to the small sample size.

CI, confidence interval; Clinformatics®, Optum's de-identified Clinformatics® Data Mart Database; GA, geographic atrophy; MarketScan, Merative™ MarketScan® Commercial and Medicare Databases; PharMetrics, IQVIA US PharMetrics®.

^aData are based on patients with ≥ 2 outpatient visits within 2 years of the index date.

Figure S4. Risk of nursing home encounters among patients with geographic atrophy and matched controls.^a



The subgroup of patients with bilateral GA with and without subfoveal involvement is not shown due to the small sample size.

CI, confidence interval; Clinformatics®, Optum's de-identified Clinformatics® Data Mart Database; GA, geographic atrophy; MarketScan, Merative™ MarketScan® Commercial and Medicare Databases; PharMetrics, IQVIA US PharMetrics®.

^aData are based on patients with ≥ 2 nursing home encounters within 2 years of the index date.