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| **Supplementary Table 1. Final POAG inclusion codes.** |
| Condition | **ICD Version** | **ICD Code** | **OMOP Concept ID** |
| POAG | ICD9CM | 365.1 | 44834658 |
| ICD9CM | 365.11 | 44830008 |
| ICD9CM | 365.9 | 44834661 |
| ICD10CM | H40.11 | 45596081 |
| POAG right eye | ICD10CM | H40.111X | 37200423 |
| POAG left eye | ICD10CM | H40.112X | 37200429 |
| POAG bilateral | ICD10CM | H40.113X | 37200435 |
| POAG unspecified | ICD10CM | H40.119X | 37200441 |
| NTG | ICD9CM | 365.12 | 44828911 |
| ICD10CM | H40.12 | 1568769 |
| NTG right eye | ICD10CM | H40.121X | 45591335 |
| NTG left eye | ICD10CM | H40.122X | 45533313 |
| NTG bilateral | ICD10CM | H40.123X | 45538276 |
| NTG Unspecified | ICD10CM | H40.129X | 45552684 |
| X: include subcodes for laterality, location, staging and/or severity; underlined text=included in initial algorithm |

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| **Supplementary Table 2. POAG case and control exclusion codes.** |
| Condition | ICD Version | ICD Code | Description | OMOP Concept ID |
| Glaucoma suspect\* | ICD10CM | H40.00 | Preglaucoma, unspecified | 1568762 |
| ICD10CM | H40.001 | Preglaucoma, unspecified, right eye | 45596080 |
| ICD10CM | H40.002 | Preglaucoma, unspecified, left eye | 45591332 |
| ICD10CM | H40.003 | Preglaucoma, unspecified, bilateral | 45552680 |
| ICD10CM | H40.009 | Preglaucoma, unspecified, unspecified eye | 45600916 |
| ICD10CM | H40.011 | Open angle with borderline findings, low risk, right eye | 45562235 |
| ICD10CM | H40.012 | Open angle with borderline findings, low risk, left eye | 45557409 |
| ICD10CM | H40.013 | Open angle with borderline findings, low risk, bilateral | 45538272 |
| ICD10CM | H40.019 | Open angle with borderline findings, low risk, unspecified eye | 45557410 |
| ICD10CM | H40.02 | Open angle with borderline findings, high risk | 1568764 |
| ICD10CM | H40.021 | Open angle with borderline findings, high risk, right eye | 45581657 |
| ICD10CM | H40.022 | Open angle with borderline findings, high risk, left eye | 45557411 |
| ICD10CM | H40.023 | Open angle with borderline findings, high risk, bilateral | 45557412 |
| ICD10CM | H40.029 | Open angle with borderline findings, high risk, unspecified eye | 45543041 |
| ICD9CM | 365.0 | Borderline glaucoma [glaucoma suspect] | 44823052 |
| ICD9CM | 365.00 | Preglaucoma, unspecified | 44821881 |
| ICD9CM | 365.01 | Open angle with borderline findings, low risk | 44825367 |
| ICD9CM | 377.14 | Glaucomatous atrophy [cupping] of optic disc | 44825404 |
| Unspecified glaucoma\* | ICD10CM | H40.9X | Unspecified glaucoma | 35207557 |
| ICD10CM | H40.10 | Unspecified open-angle glaucoma | 45538274 |
| ICD10CM | H40.10X0 | Unspecified open-angle glaucoma, stage unspecified | 45557416 |
| ICD10CM | H40.10X1 | Unspecified open-angle glaucoma, mild stage | 45557417 |
| ICD10CM | H40.10X2 | Unspecified open-angle glaucoma, moderate stage | 45576741 |
| ICD10CM | H40.10X3 | Unspecified open-angle glaucoma, severe stage | 45557418 |
| ICD10CM | H40.10X4 | Unspecified open-angle glaucoma, indeterminate stage | 45591334 |
| ICD9CM | 365.1 | Open-angle glaucoma, unspecified | 44835863 |
| Other specified glaucoma\* | ICD10CM | H40.15X | Residual stage of open-angle glaucoma | 1568771 |
| ICD10CM | H40.8X | Other glaucoma | 1568798 |
| ICD9CM | 365.15 | Residual stage of open angle glaucoma | 44821882 |
| ICD9CM | 365.8X | Other specified forms of glaucoma | 44825374 |
| Ocular hypertension without glaucoma\* | ICD10CM | H40.05 | Ocular hypertension | 45547881 |
| ICD9CM | 365.04 | Ocular hypertension | 44837038 |
| Anatomical narrow angle | ICD10CM | H40.03 | Anatomical narrow angle | 1568765 |
| ICD9CM | 365.02 | Anatomical narrow angle borderline glaucoma | 44819623 |
| Steroid responder | ICD10CM | H40.04 | Steroid responder | 1568766 |
| ICD9CM | 365.03 | Steroid responders borderline glaucoma | 44831159 |
| ICD9CM | 365.31 | Corticosteroid-induced glaucoma, glaucomatous stage | 44819625 |
| Primary angle closure with and without glaucoma | ICD10CM | H40.06 | Primary angle closure without glaucoma damage | 1568767 |
| ICD10CM | H40.2X | Primary angle-closure glaucoma | 1568792 |
| ICD9CM | 365.06 | Primary angle closure without glaucoma damage | 44835862 |
| ICD9CM | 365.2 | Primary angle-closure glaucoma | 44819624 |
| ICD9CM | 365.21 | Intermittent angle-closure glaucoma | 44825370 |
| ICD9CM | 365.22 | Acute angle-closure glaucoma | 44835864 |
| ICD9CM | 365.23 | Chronic angle-closure glaucoma | 44832315 |
| ICD9CM | 365.41 | Glaucoma associated with chamber angle anomalies | 44825372 |
| Pigmentary glaucoma | ICD10CM | H40.13 | Pigmentary glaucoma | 45557420 |
| ICD9CM | 365.13 | Pigmentary open-angle glaucoma | 44825368 |
| Capsular glaucoma with pseudoexfoliation | ICD10CM | H40.14 | Capsular glaucoma with pseudoexfoliation of lens | 1568770 |
| ICD9CM | 365.51 | Phacolytic glaucoma | 44837039 |
| ICD9CM | 365.52 | Pseudoexfoliation glaucoma | 44819627 |
| ICD9CM | 366.11 | Pseudoexfoliation of lens capsule | 44820797 |
| Glaucoma secondary to eye trauma | ICD10CM | H40.3X | Glaucoma secondary to eye trauma | 1568794 |
| ICD9CM | 365.65 | Glaucoma associated with ocular trauma | 44831163 |
| Glaucoma secondary to eye inflammation | ICD10CM | H40.4X | Glaucoma secondary to eye inflammation | 1568795 |
| ICD9CM | 365.62 | Glaucoma associated with ocular inflammations | 44823053 |
| Glaucoma secondary to other eye disorders | ICD10CM | H40.5X | Glaucoma secondary to other eye disorders | 1568796 |
| ICD9CM | 365.6 | Glaucoma associated with unspecified ocular disorder | 44835865 |
| Glaucoma secondary to drugs | ICD10CM | H40.6X | Glaucoma secondary to drugs | 1568797 |
| Childhood/congenital glaucoma | ICD10CM | Q15.0 | Congenital glaucoma | 35210763 |
| ICD9CM | 365.14 | Glaucoma of childhood | 44825369 |
| Recession of chamber angle | ICD10CM | H21.55X | Recession of chamber angle | 45605641 |
| ICD9CM | 364.77 | Recession of chamber angle of eye | 44833479 |
| Optic papillitis | ICD10CM | H46.0X | Optic papillitis | 45586484 |
| ICD9CM | 377.31 | Optic papillitis | 44833518 |
| Retrobulbar neuritis/other optic neuritis | ICD10CM | H46.1X | Retrobulbar neuritis | 45591375 |
| ICD10CM | H46.8 | Other optic neuritis | 45581685 |
| ICD10CM | H46.9 | Unspecified optic neuritis | 45552711 |
| ICD9CM | 377.3 | Optic neuritis | 44828945 |
| Nutritional optic neuropathy | ICD10CM | H46.2 | Nutritional optic neuropathy | 45547910 |
| ICD9CM | 377.33 | Nutritional optic neuropathy | 44819661 |
| Toxic optic neuropathy | ICD10CM | H46.3 | Toxic optic neuropathy | 45557442 |
| ICD9CM | 377.34 | Toxic optic neuropathy | 44830048 |
| Disorders of optic nerve, including ischemic optic neuropathies | ICD10CM | H47.0X | Disorders of optic nerve, not elsewhere classified | 1568844 |
| ICD9CM | 377.41 | Ischemic optic neuropathy | 44819662 |
| Papilledema | ICD10CM | H47.1X | Papilledema | 1568847 |
| ICD9CM | 377 | Papilledema | 44820826 |
| Optic atrophy (hereditary, unspecified) | ICD10CM | H47.2X | Optic atrophy | 1568848 |
| ICD9CM | 377.1 | Optic atrophy | 44831193 |
| ICD9CM | 377.11 | Primary optic atrophy | 44819660 |
| ICD9CM | 377.12 | Postinflammatory optic atrophy | 44827753 |
| Other disorders of optic disc (includes drusen, coloboma) | ICD10CM | H47.3X | Other disorders of optic disc | 1568850 |
| ICD9CM | 377.2 | Other disorders of optic disc | 44835895 |
| ICD9CM | 377.4 | Other disorders of optic nerve | 44827756 |
| Disorders of optic chiasm | ICD10CM | H47.4X | Disorders of optic chiasm | 1568853 |
| ICD9CM | 377.5 | Disorders of optic chiasm | 44826611 |
| Disorders of visual pathway | ICD10CM | H47.5X | Disorders of other visual pathways | 1568854 |
| ICD9CM | 377.6 | Disorders of other visual pathways | 44824203 |
| Disorders of visual cortex | ICD10CM | H47.6X | Disorders of visual cortex | 1568858 |
| ICD9CM | 377.7 | Disorders of visual cortex | 44821920 |
| Moderate or severe non-proliferative diabetic retinopathy | ICD10CM | E10.33X | Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy | 1567946 |
| ICD10CM | E10.34X | Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy | 1567947 |
| ICD10CM | E11.33X | Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy | 1567962 |
| ICD10CM | E11.34X | Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy | 1567963 |
| ICD9CM | 362.05 | Moderate nonproliferative diabetic retinopathy | 44832299 |
| ICD9CM | 362.06 | Severe nonproliferative diabetic retinopathy | 44832300 |
| Proliferative diabetic retinopathy including rubeosis | ICD10CM | E10.35X | Type 1 diabetes mellitus with proliferative diabetic retinopathy | 1567948 |
| ICD10CM | E11.35X | Type 2 diabetes mellitus with proliferative diabetic retinopathy | 1567964 |
| ICD10CM | H21.1X | Other vascular disorders of iris and ciliary body | 1568626 |
| ICD9CM | 362.02 | Proliferative diabetic retinopathy | 44833465 |
| ICD9CM | 362.2 | Other proliferative retinopathy | 44832301 |
| ICD9CM | 364.42 | Rubeosis iridis | 44832314 |
| Retinal artery occlusion | ICD10CM | H34.1X | Central retinal artery occlusion | 1568726 |
| ICD10CM | H34.2X | Other retinal artery occlusions | 1568727 |
| ICD9CM | 362.3 | Retinal vascular occlusion | 44834648 |
| ICD9CM | 362.31 | Central retinal artery occlusion | 44823042 |
| ICD9CM | 362.32 | Retinal arterial branch occlusion | 44828897 |
| ICD9CM | 362.33 | Partial retinal arterial occlusion | 44820786 |
| ICD9CM | 362.34 | Transient retinal arterial occlusion | 44830001 |
| Retinal vein occlusion | ICD10CM | H34.8X | Other retinal vascular occlusions | 1568730 |
| ICD9CM | 362.35 | Central retinal vein occlusion | 44835853 |
| ICD9CM | 362.36 | Venous tributary (branch) occlusion | 44832304 |
| Bilateral field defects | ICD10CM | H53.45X | Other localized visual field defect | 1568902 |
| ICD10CM | H53.46X | Homonymous bilateral field defects | 1568903 |
| ICD10CM | H53.47X | Heteronymous bilateral field defects | 45596135 |
| ICD10CM | H53.483 | Generalized contraction of visual field, bilateral | 45557472 |
| ICD9CM | 368.46 | Homonymous bilateral field defects | 44835871 |
| Unspecified field defects | ICD10CM | H53.40 | Unspecified visual field defects | 45586512 |
| Retinal detachment | ICD10CM | H33.00X | Unspecified retinal detachment with retinal break | 1568708 |
| ICD10CM | H33.01X | Retinal detachment with single break | 1568709 |
| ICD10CM | H33.02X | Retinal detachment with multiple breaks | 1568710 |
| ICD10CM | H33.03X | Retinal detachment with giant retinal tear | 1568711 |
| ICD10CM | H33.04X | Retinal detachment with retinal dialysis | 1568712 |
| ICD10CM | H33.05X | Total retinal detachment | 1568713 |
| ICD9CM | 361.0 | Retinal detachment with retinal defect | 44823037 |
| ICD9CM | 361.00 | Retinal detachment with retinal defect, unspecified | 44823038 |
| Serous retinal detachment | ICD10CM | H33.2X | Serous retinal detachment | 1568719 |
| ICD9CM | 361.2 | Serous retinal detachment | 44830000 |
| Traction detachment of retina | ICD10CM | H33.4X | Traction detachment of retina | 1568723 |
| ICD9CM | 361.8 | Other forms of retinal detachment | 44837025 |
| Other retinal detachments | ICD10CM | H33.8 | Other retinal detachments | 45605667 |
| ICD9CM | 361.89 | Other forms of retinal detachment | 44821869 |
| ICD9CM | 361.9 | Unspecified retinal detachment | 44823039 |
| ICD9CM | 362.43 | Hemorrhagic detachment of retinal pigment epithelium | 44820787 |
| Chorioretinal scars after surgery for detachment | ICD10CM | H59.811 | Chorioretinal scars after surgery for detachment, right eye | 45567107 |
| ICD10CM | H59.812 | Chorioretinal scars after surgery for detachment, left eye | 45547945 |
| ICD10CM | H59.813 | Chorioretinal scars after surgery for detachment, bilateral | 45543097 |
| ICD10CM | H59.819 | Chorioretinal scars after surgery for detachment, unspecified eye | 45600977 |
| X: placeholder for variables including laterality, location, staging and/or severity; underlined text=included in initial algorithm |
| \* These codes were only excluded in controls |

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| Supplementary Table 3. Clinical Criteria for POAG cases and controls chart review  |
| **Chart Review Criteria for Patients Identified by Algorithm as Primary Open-Angle Glaucoma Cases** |
| \*Structural signs criteria | * Structural signs of glaucoma include written or photographic documentation of glaucomatous cupping, cup-to-disc ratio asymmetry of >0.20, diffuse or localized neuroretinal rim thinning or notching, diffuse or localized atrophy of the retinal nerve fiber layer
 |
| * Average retinal nerve fiber layer (RNFL) or ganglion cell layer (GCL) thickness at p<1% value with ≥7/10 signal strength and structural signs of glaucoma listed in above or obvious localized RNFL or GCL thinning
 |
| †Visual field criteria | * Glaucomatous visual field defects must be documented with static threshold perimetry using either 24-2 SITA fast or SITA standard tests
 |
| * Visual field defects must meet at least one of the following criteria:
 |
| * Glaucoma hemifield tests (GHT) outside normal limits in the same area for ≥2 visits
 |
| * A repeatable borderline GHT if obvious localized glaucomatous optic nerve cupping in an area corresponding to the visual field defect
 |
| * A repeatable glaucomatous visual field defect defined as at least three contiguous points on the total deviation probability plot at the <2% level and a GHT results that is “outside normal limits”
 |
| ‡ Open angle by gonioscopy | * Charts were reviewed for documented gonioscopy findings that confirm an open anterior chamber angle. If unable to find gonioscopy results in chart review, there should be no evidence or documentation of narrow angles on Van Herick evaluation, history of laser peripheral iridotomy (LPI), or history of angle closure.
 |
| ¥ Free of secondary causes of elevated intraocular pressure or visual field defects | * Charts were reviewed to ensure no diagnosis of a secondary glaucoma or other conditions that could mimic glaucomatous field defects
 |
| ¶ Confounding ocular surgeries | * Patients can only have history of uncomplicated ocular surgeries, including but not limited to uncomplicated cataract surgery, strabismus surgery, or blepharoplasty. Patients with history of glaucoma surgeries will be included.
 |
| **Chart Review Criteria for Patients Identified by Algorithm as Controls** |
| † Absence of optic nerve signs of glaucoma | * Normal optic nerve on dilated fundus examination.
* If cup-to-disc ratio is ≥ 0.60H/V or asymmetry ≥0.20, must have a normal RNFL or GCL OCT
 |
| ¥ Normal intraocular pressure | * All intraocular pressure measurements ≤24 mmHg with ≥2 readings
 |
| ‡. No history of complicated ocular surgeries | * To be included, patient will not have any prior ocular surgeries other than but not limited to uncomplicated cataract surgery, strabismus surgery, or blepharoplasty.
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| Supplementary Table 4. Final POAG case and control definitions. |
| POAG case definition | POAG control definition |
| ≥2 mentions of CPT codes 92004, 92014, 92002, 92012, or 99000 |
| AND |
| absence of all exclusion codes |
| AND |
| age ≥30 years | age ≥65 years |
| AND |
| ≥6 mentions (on separate eye clinic visits) of inclusion codes | absence of all POAG inclusion codes |
| AND |
| semi-structured medication data for ≥2 separate IOP-lowering prescriptions (**Table 5**) |

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| **Supplementary Table 5. List of IOP-lowering medications included in semi-structured data.** |
| Medication  | OMOP Concept ID (RxNorm)  |
| LATANOPROST 0.005%  | 19080125 |
| TRAVOPROST 0.004%  | 19071252 |
| BIMATOPROST 0.03%  | 19074220 |
| DORZOLAMIDE HCL 2%  | 19076734 |
| BRINZOLAMIDE 1%  | 19074334 |
| BRIMONIDINE 0.2%/BRINZOLAMID 1%  | 43526602 |
| BRIMONIDINE TARTRATE 0.1%  | 40164130 |
| BRIMONIDINE TARTRATE 0.15%  | 40164134 |
| BRIMONIDINE TARTRATE 0.2%  | 40164141 |
| APRACLONIDINE HCL 0.5%  | 19073523 |
| TIMOLOL HEMIHYDRATE 0.25%  | 1594707 |
| TIMOLOL HEMIHYDRATE 0.5%  | 793238 |
| TIMOLOL MALEATE 0.5%  | 793238 |
| LEVOBUNOLOL HCL 0.5%  | 40242777 |
| LEVOBUNOLOL HCL 0.25%  | 40242771 |
| BETAXOLOL HCL 0.5%  | 19074187 |
| METIPRANOLOL 0.3%  | 905556 |
| CARTEOLOL 1%  | 40179060 |
| DORZOLAMIDE 2/TIMOLOL 0.5%  | 1594711 |
| BRIMONIDINE 0.2%/TIMOLOL 0.5%  | 40164138 |
| NETARSUDIL 0.02 %  | 793355 |