# Supplementary Materials

**Table S1** ICD Diagnosis Codes for Clinical Diagnoses Related to DR

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***ICD-9-CM Codes for DR and DME*** | | | | | | | |
| Background DR | | 362.01 | | | | | |
| Proliferative DR | | 362.02 | | | | | |
| NPDR NOS | | 362.03 | | | | | |
| Mild NPDR | | 362.04 | | | | | |
| Moderate NPDR | | 362.05 | | | | | |
| Severe NPDR | | 362.06 | | | | | |
| DME | | 362.07 | | | | | |
| ***ICD-10-CM Codes for DR, With and Without DME*** | | | | | | | |
|  | | **DM due to Underlying Condition** | **Drug-Induced DM** | | **Type 1 DM** | **Type 2 DM** | **Type Not Specified** |
| DR NOS with DME | | E08.311 | E09.311 | | E10.311 | E11.311 | E113.311 |
| DR NOS without DME | | E08.319 | E09.319 | | E10.319 | E11.319 | E13.319 |
| Mild NPDR with DME | | E08.321 | E09.321 | | E10.321 | E11.321 | E13.321 |
| Mild NPDR without DME | | E08.329 | E09.329 | | E10.329 | E11.329 | E13.329 |
| Moderate NPDR with DME | | E08.331 | E09.331 | | E10.331 | E11.331 | E13.331 |
| Moderate NPDR without DME | | E08.339 | E09.339 | | E10.339 | E11.339 | E13.339 |
| Severe NPDR with DME | | E08.341 | E09.341 | | E10.341 | E11.341 | E13.341 |
| Severe NPDR without DME | | E08.349 | E09.349 | | E10.349 | E11.349 | E13.349 |
| PDR with DME | | E08.351 | E09.351 | | E10.351 | E11.351 | E13.351 |
| PDR with TRD in macula | | E08.352 | E09.352 | | E10.352 | E11.352 | E13.352 |
| PDR with TRD not in macula | | E08.353 | E09.353 | | E10.353 | E11.353 | E13.353 |
| PDR with TRD and RRD | | E08.354 | E09.354 | | E10.354 | E11.354 | E13.354 |
| Stable PDR | | E08.355 | E09.355 | | E10.355 | E11.355 | E13.355 |
| PDR without DME | | E08.359 | E09.359 | | E10.359 | E11.359 | E13.359 |
| DR with ME resolved following treatment | | E08.37X | E09.37X | | E10.37X | E11.37X | E13.37X |
| ***ICD-9/10-CM Codes for Other Retinal Diseases*** | | | | | | | |
| **Age-Related Macular Degeneration** | | | | | | | |
| ICD-9-CM | 362.52 | | | Exudative senile macular degeneration | | | |
| ICD-10-CM | H3532 | | | Exudative age-related macular degeneration | | | |
| **Retinal Vein Occlusion** | | | | | | | |
| ICD-9-CM | 362.35 | | | Central retinal vein occlusion | | | |
| ICD-9-CM | 362.36 | | | Venous tributary (branch) occlusion | | | |
| ICD-10-CM | H34812 | | | Central retinal vein occlusion, left eye | | | |
| ICD-10-CM | H34811 | | | Central retinal vein occlusion, right eye | | | |
| ICD-10-CM | H34813 | | | Central retinal vein occlusion, bilateral | | | |
| ICD-10-CM | H34819 | | | Central retinal vein occlusion, unspecified eye | | | |
| ICD-10-CM | H34833 | | | Tributary (branch) retinal vein occlusion, bilateral | | | |
| ICD-10-CM | H34839 | | | Tributary (branch) retinal vein occlusion, unspecified eye | | | |
| ICD-10-CM | H34832 | | | Tributary (branch) retinal vein occlusion, left eye | | | |
| ICD-10-CM | H34831 | | | Tributary (branch) retinal vein occlusion, right eye | | | |
| **Myopic Choroidal Neovascularization** | | | | | | | |
| ICD-9-CM | 360.21 | | | Progressive high (degenerative) myopia | | | |
| ICD-10-CM | H35.051 | | | Retinal neovascularization, unspecified, right eye | | | |
| ICD-10-CM | H35.052 | | | Retinal neovascularization, unspecified, left eye | | | |
| ICD-10-CM | H35.053 | | | Retinal neovascularization, unspecified, bilateral | | | |
| ICD-10-CM | H35.059 | | | Retinal neovascularization, unspecified, unspecified eye | | | |
| ICD-10-CM | H44.20 | | | Degenerative myopia, unspecified eye | | | |
| ICD-10-CM | H44.21 | | | Degenerative myopia, right eye | | | |
| ICD-10-CM | H44.22 | | | Degenerative myopia, left eye | | | |
| ICD-10-CM | H44.23 | | | Degenerative myopia, bilateral | | | |
| ICD-10-CM | H44.2A1 | | | Degenerative myopia with choroidal neovascularization, right eye | | | |
| ICD-10-CM | H44.2A2 | | | Degenerative myopia with choroidal neovascularization, left eye | | | |
| ICD-10-CM | H44.2A3 | | | Degenerative myopia with choroidal neovascularization, bilateral | | | |
| ICD-10-CM | H44.2A9 | | | Degenerative myopia with choroidal neovascularization, unspecified eye | | | |
| ICD-10-CM | H35.051 | | | Retinal neovascularization, unspecified, right eye | | | |
| ICD-10-CM | H35.052 | | | Retinal neovascularization, unspecified, left eye | | | |
| ICD-10-CM | H35.053 | | | Retinal neovascularization, unspecified, bilateral | | | |
| ICD-10-CM | H35.059 | | | Retinal neovascularization, unspecified, unspecified eye | | | |
| ICD-10-CM | H44.20 | | | Degenerative myopia, unspecified eye | | | |
| ICD-10-CM | H44.21 | | | Degenerative myopia, right eye | | | |
| ICD-10-CM | H44.22 | | | Degenerative myopia, left eye | | | |
| ICD-10-CM | H44.23 | | | Degenerative myopia, bilateral | | | |
| ICD-10-CM | H44.2A1 | | | Degenerative myopia with choroidal neovascularization, right eye | | | |
| ICD-10-CM | H44.2A2 | | | Degenerative myopia with choroidal neovascularization,  left eye | | | |
| ICD-10-CM | H44.2A3 | | | Degenerative myopia with choroidal neovascularization, bilateral | | | |
| ICD-10-CM | H44.2A9 | | | Degenerative myopia with choroidal neovascularization, unspecified eye | | | |
| ICD-10-CM | H35.051 | | | Retinal neovascularization, unspecified, right eye | | | |
| ICD-10-CM | H35.052 | | | Retinal neovascularization, unspecified, left eye | | | |
| ICD-10-CM | H35.053 | | | Retinal neovascularization, unspecified, bilateral | | | |
| ICD-10-CM | H35.059 | | | Retinal neovascularization, unspecified, unspecified eye | | | |
| **Vitreous Hemorrhage** | | | | | | | |
| ICD-9-CM | 379.23 | | | Vitreous hemorrhage | | | |

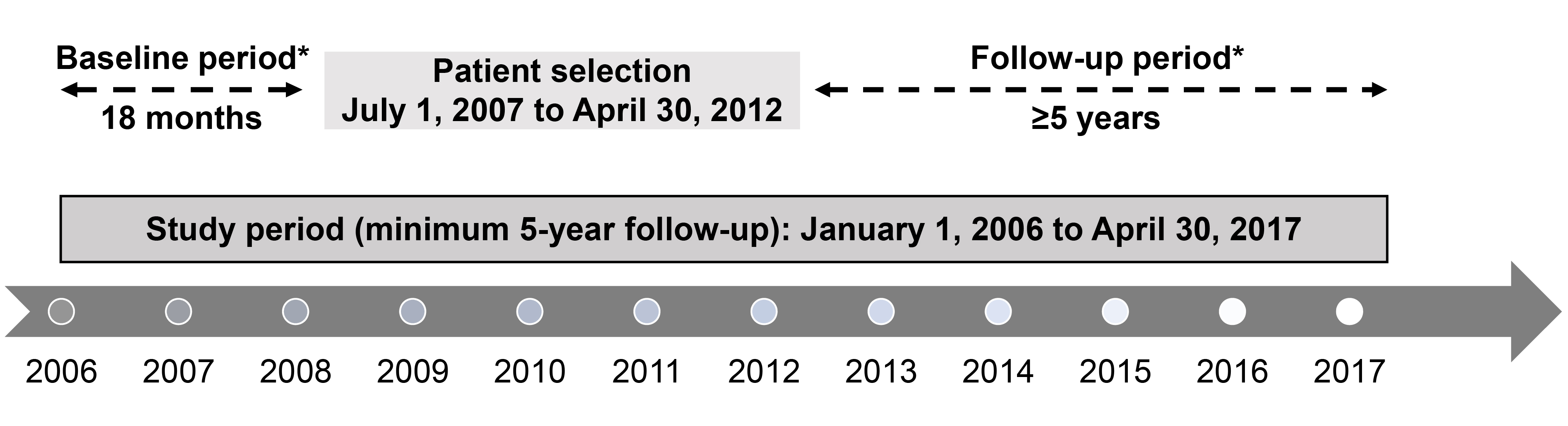
**Abbreviations:** DM, diabetes mellitus; DME, diabetic macular edema; DR, diabetic retinopathy; ICD-9/10-CM, International Classification of Diseases Ninth/Tenth Revision, Clinical Modification; ME, macular edema; NPDR, nonproliferative diabetic retinopathy, NOS, not otherwise specified; PDR, proliferative diabetic retinopathy; RRD, rhegmatogenous retinal detachment; TRD, tractional retinal detachment.

**Table S2** HCPCS and CPT Codes for Treatments and Procedures

|  |  |  |
| --- | --- | --- |
| ***Intravitreal Anti-VEGF Therapies*** | | |
| **Bevacizumab** | | |
| *01/01/2005–Present* | | |
| HCPCS | J9035 | Injection, bevacizumab, 10 mg |
| CPT | 67028 | Intravitreal injection of a pharmacologic agent |
| *01/01/2010–Present* | | |
| HCPCS | C9257 | Injection, bevacizumab, 0.25 mg |
| *Payor Dependent* | | |
| HCPCS | J7999 | Unlisted compounded drug |
| HCPCS | Q9977 | Unlisted compounded drug |
| HCPCS | J3490 | Unclassified injection |
| **Ranibizumab** | | |
| *1/1/2008–Present* | | |
| HCPCS | J2778 | Injection, ranibizumab, 0.1 mg |
| CPT | 67028 | Intravitreal injection of a pharmacologic agent |
| **Aflibercept** | | |
| *11/18/2011–4/1/2012* | | |
| HCPCS | J3490 or J3590\* | Unclassified injection or unclassified biologics |
| *4/1/2012–6/30/2012* | | |
| HCPCS | C9291† | Injection, aflibercept, 2 mg vial |
| *7/1/2012–12/31/2012* | | |
| HCPCS | Q2046‡ | Injection, aflibercept, 1 mg |
| *1/1/2013–Present* | | |
| HCPCS | J0178 | Injection, aflibercept, 1 mg |
| ***Intravitreal Steroid Therapies*** | | |
| HCPCS | C9256 | Injection, dexamethasone intravitreal implant, 0.1 mg |
| HCPCS | J1094 | Injection, dexamethasone acetate, 1 mg |
| HCPCS | J1100 | Injection, dexamethasone sodium phosphate, 1 mg |
| HCPCS | J7312 | Injection, dexamethasone, intravitreal implant, 0.1 mg |
| HCPCS | J3300 | Injection, triamcinolone acetonide preservative free, 1 mg |
| HCPCS | J3301 | Injection, triamcinolone acetonide, not otherwise specified, 10 mg |
| HCPCS | J3302 | Injection, triamcinolone diacetate, per 5 mg |
| HCPCS | J3303 | Injection, triamcinolone hexacetonide, per 5 mg |
| HCPCS | J7311 | Fluocinolone acetonide, intravitreal implant |
| CPT | 67028 | Intravitreal injection of a pharmacologic agent |
| CPT | 67027 | Implantation of intravitreal drug delivery system (eg, ganciclovir implant); includes concomitant removal of vitreous |
| ***Laser Therapies*** | | |
| **Local Photocoagulation** | | |
| CPT | 67220 | Destruction of localized lesion of choroid (eg, choroidal neovascularization); photocoagulation (eg, laser), ≥1 session |
| CPT | 0017T§ | Destruction of macular drusen, photocoagulation |
| ICD-9-CM | 14.24 | Destruction of chorioretinal lesion by laser photocoagulation |
| **Photodynamic Therapy** | | |
| CPT | 67221 | Destruction of localized lesion of choroid (eg, choroidal neovascularization); photodynamic therapy (includes intravenous infusion) |
| CPT | 67225 | Destruction of localized lesion of choroid (eg, choroidal neovascularization); photodynamic therapy, second eye, at single session (list separately in addition to code for primary eye treatment) |
| **Panretinal Photocoagulation** | | |
| CPT | 67228 | Treatment of extensive or progressive retinopathy (eg, diabetic retinopathy), photocoagulation |
| ***Retinal Surgery*** | | |
| **Vitrectomy** | | |
| CPT | 67036 | Vitrectomy, mechanical, pars plana approach |
| CPT | 67039 | Vitrectomy, mechanical, pars plana approach; with focal endolaser photocoagulation |
| CPT | 67040 | Vitrectomy, mechanical, pars plana approach; with endolaser panretinal photocoagulation |
| CPT | 67041 | Vitrectomy, mechanical, pars plana approach; with removal of preretinal cellular membrane (eg, macular pucker) |
| CPT | 67042 | Vitrectomy, mechanical, pars plana approach; with removal of internal limiting membrane of retina (eg, for repair of macular hole, diabetic macular edema), includes, if performed, intraocular tamponade (ie, air, gas, or silicone oil) |
| CPT | 67043 | Vitrectomy, mechanical, pars plana approach; with removal of subretinal membrane (eg, choroidal neovascularization), includes, if performed, intraocular tamponade (ie, air, gas, or silicone oil) and laser photocoagulation |
| **Retinal detachment** | | |
| CPT | 67113|| | Repair of complex retinal detachment (eg, proliferative vitreoretinopathy, stage C-1 or greater, diabetic traction retinal detachment, retinopathy of prematurity, retinal tear of >90 degrees), with vitrectomy and membrane peeling; may include air, gas, or silicone oil |

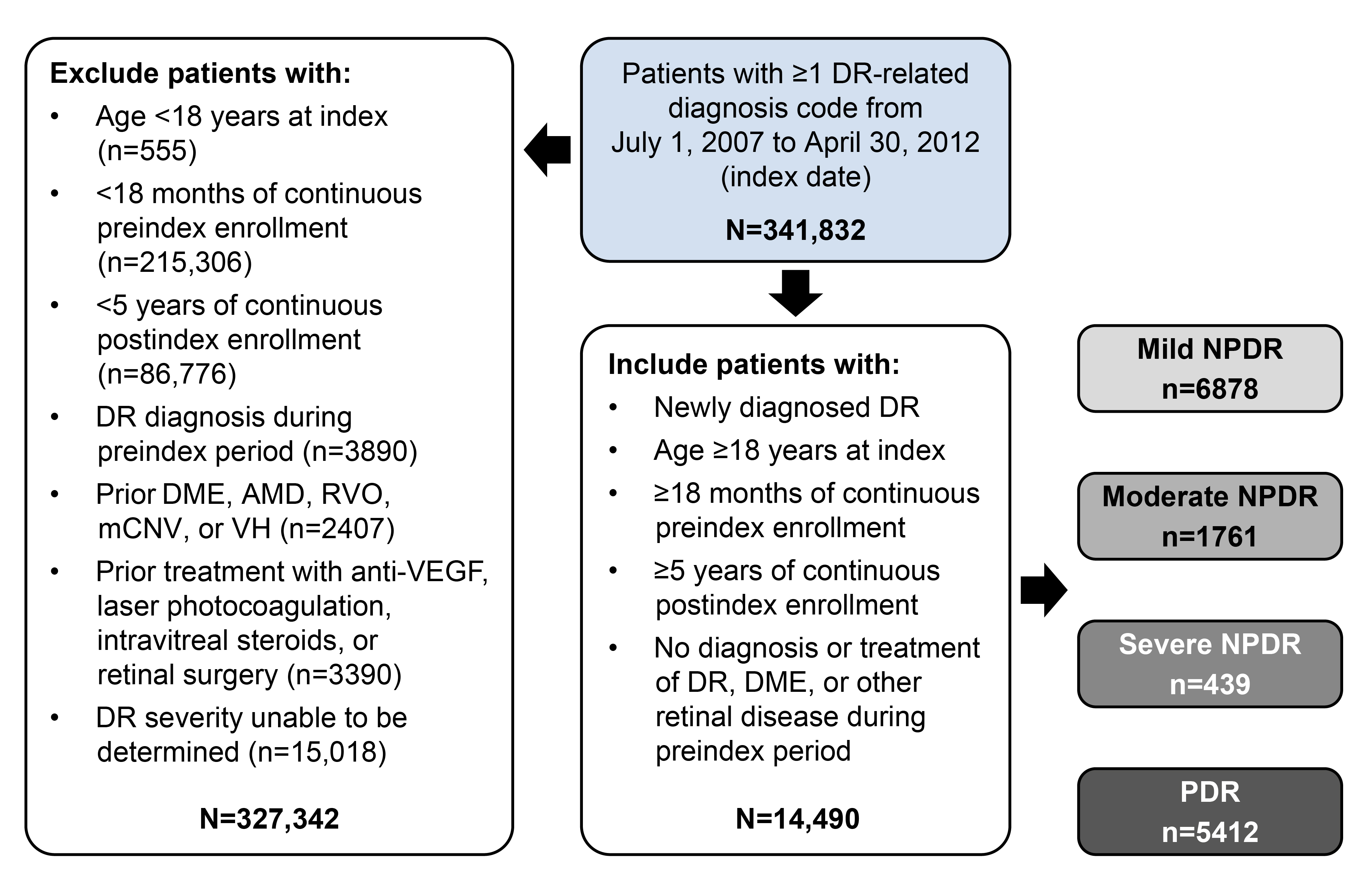
**Notes:**\*Cost reported on claims with HCPCS code J3490 or J3590 must be ≥$1500. †HCPCS code C9291 was deleted on June 30, 2012. ‡HCPCS code Q2046 was deleted on December 31, 2012. §CPT code 0017T was deleted on December 31, 2010. ||CPT code 67113 replaced the CPT code combination of 67038 and 67108, which was deleted effective January 2008.

**Abbreviations:** CPT, Current Procedural Terminology; HCPCS, Healthcare Common Procedure Coding System; ICD-9-CM, International Classification of Diseases Ninth Revision, Clinical Modification; VEGF, vascular endothelial growth factor.



**Figure S1** Study design schematic.

**Notes:** \*To ensure that the index date for each patient accurately represented an initial diagnosis of diabetic retinopathy, and that data were available for the entire study period, continuous insurance coverage was required for ≥18 months before and ≥5 years after the index date.

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**Figure S2** Patient selection flow chart.

**Abbreviations:** AMD, age-related macular degeneration; mCNV, myopic choroidal neovascularization; DME, diabetic macular edema; DR, diabetic retinopathy; NPDR, nonproliferative diabetic retinopathy; PDR, proliferative diabetic retinopathy; RVO, retinal vein occlusion; VEGF, vascular endothelial growth factor; VH, vitreous hemorrhage.