

Appendix 1

Table 1. ICD Procedure codes used to select episodes related to intravitreal injections with anti-VEGF

ICD version	Code	Denomination
ICD-9	1474	Other mechanical vitrectomy
ICD-9	1475	Injection of vitreous substitute
ICD-9	1479	Other operations on vitreous
ICD-9	149	Other operations on retina, choroid and posterior chamber
ICD-10	3E0C30M	Introduction of monoclonal antibody into eye, percutaneous approach),
ICD-10	3E0C3GC	Introduction of other therapeutic substance into eye, percutaneous approach

IDENTIFICATION OF INTRAVITREAL ANTI-VEGF TREATMENT EVENTS FOR ICD-9

1. Main indications

Indication: DIABETIC MACULAR EDEMA (DME)

Numerator: Discharges, with either:

- A principal diagnosis code for Diabetic Macular Edema (**DIMAED**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Diabetic Macular Edema (**DIMAED**).

Indication: RETINAL VEIN OCCLUSION (RVO)

Indication: RETINAL VEIN OCCLUSION (CENTRAL)

Numerator: Discharges, with either:

- A principal diagnosis code for Retinal Vein Occlusion- Central (**RVOCEN**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Retinal Vein Occlusion- Central (**RVOCEN**).

Indication: RETINAL VEIN OCCLUSION (BRANCH)

Numerator: Discharges, with either:

- A principal diagnosis code for Retinal Vein Occlusion- Branch (**RVOBRA**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Retinal Vein Occlusion- Branch (**RVOBRA**).

Indication: NEOVASCULAR AGE-RELATED MACULAR DEGENERATION (nAMD)

Numerator: Discharges, with either:

- A principal diagnosis code for Exudative age-related macular degeneration (**EXARMD**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Exudative age-related macular degeneration (**EXARMD**) or for Macular puckering (**MACPUC**), or

- A principal diagnosis code for Other Conditions of the Retina and Choroid (**OCRECH**) or for Cystoid Macular Degeneration (**CYMADE**) or for Unspecified Macular Degeneration (**UNMADE**) and any secondary diagnosis codes for Exudative age-related macular degeneration (**EXARMD**) or for Macular puckering (**MACPUC**).

Indication: CHOROIDAL NEOVASCULARIZATION (CNV)

Numerator: Discharges with either:

- A principal diagnosis code for Retinal neovascularization or Myopia (**RNVMYO**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Retinal neovascularization or Myopia (**RNVMYO**) or
- A principal diagnosis for Other Conditions of the Retina and Choroid (**OCRECH**) and any secondary diagnosis, except if admission is for Indication neovascular age-related Macular Degeneration (**AMD**).
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Other Conditions of the Retina and Choroid (**OCRECH**), except if admission is for Indication neovascular age-related Macular Degeneration (**AMD**).

2. Other indications

Indication: OTHER VASCULAR OCCLUSIONS

**This indication is not included in Retinal Vein Occlusion*

Numerator: Discharges, with either:

- A principal diagnosis code for Other Vascular Occlusions (**OTVAOC**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Retinal Vein Occlusion (**OTVAOC**).

Indication: ATROPHIC MACULAR DEGENERATION

** This indication is not included in Neovascular Age-Related Macular Degeneration*

Numerator: Discharges, with either:

- A principal diagnosis code for Atrophic Macular Degeneration (**ATMADE**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Atrophic Macular Degeneration (**ATMADE**).

Indication: CYSTOID MACULAR DEGENERATION

** This indication is not included in Neovascular Age-Related Macular Degeneration*

Numerator: Discharges, with either:

- A principal diagnosis code for Cystoid Macular Degeneration (**CYMADE**) and any secondary diagnosis codes, except for Exudative age-related macular degeneration (**EXARMD**) or for Macular puckering (**MACPUC**) or for Atrophic Macular Degeneration (**ATMADE**); and patient aged less than 50 years old.

Indication: UNSPECIFIED MACULAR DEGENERATION

* This indication is not included in Neovascular Age-Related Macular Degeneration

Numerator: Discharges, with either:

- A principal diagnosis code for Unspecified Macular Degeneration (**UNMADE**) and any secondary diagnosis codes, except for Exudative age-related macular degeneration (**EXARMD**) or for Macular puckering (**MACPUC**) or for Atrophic Macular Degeneration (**ATMADE**), or
- A principal diagnosis code for Cystoid Macular Degeneration (**CYMADE**) and any secondary diagnosis codes, except for Exudative age-related macular degeneration (**EXARMD**) or for Macular puckering (**MACPUC**) or for Atrophic Macular Degeneration (**ATMADE**); and patient aged 50 years old or more.

3. Diabetes with ophthalmic manifestations not stated as uncontrolled

For episodes with principal diagnosis codes 25050 and 25052, not classified as any indication above, the following criteria applies:

If any secondary diagnosis code:	Indication
36201	Unspecified Diabetic Retinopathy
36202	Proliferative Diabetic Retinopathy
36203 to 36206	Nonproliferative Diabetic Retinopathy
Other diagnosis code	The secondary diagnosis code
No diagnosis code	25050 or 25052

4. Other relevant diagnosis to be included

For episodes with the principal diagnosis codes below, not classified as any indication above, the indication is the principal diagnosis itself:

3612	Serous retinal detachment
3619	Unspecified retinal detachment
25000	Diabetes mellitus without mention of complication, type II or unspecified type, not stated as uncontrolled
25052	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled
25053	Diabetes with ophthalmic manifestations, type I [juvenile type], uncontrolled
36100	Retinal detachment with retinal defect, unspecified
36101	Recent retinal detachment, partial, with single defect
36102	Recent retinal detachment, partial, with multiple defects
36103	Recent retinal detachment, partial, with giant tear
36105	Recent retinal detachment, total or subtotal
36106	Old retinal detachment, partial
36107	Old retinal detachment, total or subtotal
36181	Traction detachment of retina
36189	Other forms of retinal detachment
36210	Background retinopathy, unspecified
36212	Exudative retinopathy
36215	Retinal telangiectasia

36216	Retinal neovascularization NOS
36240	Retinal layer separation, unspecified
36242	Serous detachment of retinal pigment epithelium
36243	Hemorrhagic detachment of retinal pigment epithelium
36254	Macular cyst, hole, or pseudohole
36257	Drusen (degenerative)
36281	Retinal hemorrhage
36283	Retinal edema
36442	Rubeosis iridis
36474	Adhesions and disruptions of pupillary membranes
37060	Corneal neovascularization, unspecified
37923	Vitreous hemorrhage
37924	Other vitreous opacities
37925	Vitreous membranes and strands
37929	Other disorders of vitreous

5. Other relevant diagnosis to be excluded

For episodes with the principal diagnosis codes below, not classified as any indication above, the episode is excluded from the database:

36610	Senile cataract, unspecified
3638	Other disorders of choroid
3669	Unspecified cataract
8715	Penetration of eyeball with magnetic foreign body
36282	Retinal exudates and deposits
36289	Other retinal disorders
36504	Ocular hypertension
36563	Glaucoma associated with vascular disorders
36614	Posterior subcapsular polar senile cataract
36619	Other and combined forms of senile cataract
37922	Crystalline deposits in vitreous
99653	Mechanical complication due to ocular lens prosthesis
99679	Other complications due to other internal prosthetic device, implant, and graft

6. Other diagnosis to be excluded

For episodes with the principal diagnosis codes below, the episode is excluded from the database:

8711	Ocular laceration with prolapse or exposure of intraocular tissue
36000	Purulent endophthalmitis, unspecified
36001	Acute endophthalmitis
36615	Cortical senile cataract
36616	Senile nuclear sclerosis
36617	Total or mature cataract
36653	After-cataract, obscuring vision

37931	Aphakia
37932	Subluxation of lens
37934	Posterior dislocation of lens
99859	Other postoperative infection
99882	Cataract fragments in eye following cataract surgery
V5849	Other specified aftercare following surgery

7. Other diagnosis to be included

For all other episodes that do not meet any of the criteria above, the indication is the principal diagnosis

ICD 9 CODES

Codes for Diabetic Macular Edema (**DIMAED**):

36207	Diabetic macular edema
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Codes for Retinal Vein Occlusion- Central (**RVOCEN**):

36235	Central retinal vein occlusion
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Codes for Retinal Vein Occlusion- Branch (**RVOBRA**):

36236	Venous tributary (branch) occlusion
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Codes for Exudative age-related macular degeneration (**EXARMD**):

36252	Exudative senile macular degeneration
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Codes for Macular puckering (**MACPUC**):

36256	Macular puckering
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Codes for Retinal neovascularization or Myopia (**RNVMYO**):

36021	Progressive high (degenerative) myopia
36216	Retinal neovascularization NOS
3671	Myopia

Codes for Other Conditions of the Retina and Choroid (**OCRECH**):

36241	Central serous retinopathy
36256	Macular puckering
36320	Chorioretinitis, unspecified
36343	Angioid streaks of choroid

Codes for Cystoid Macular Degeneration (**CYMADE**):

36253	Cystoid macular degeneration
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Codes for Unspecified Macular Degeneration (**UNMADE**):

36250 Macular degeneration (senile), unspecified

Codes for Other Relevant Conditions (OTRECO):

3612	Serous retinal detachment
3619	Unspecified retinal detachment
3638	Other disorders of choroid
3669	Unspecified cataract
8715	Penetration of eyeball with magnetic foreign body
25000	Diabetes mellitus without mention of complication, type II or unspecified type, not stated as uncontrolled
25050	Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled
25051	Diabetes with ophthalmic manifestations, type I [juvenile type], not stated as uncontrolled
25052	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled
25053	Diabetes with ophthalmic manifestations, type I [juvenile type], uncontrolled
36100	Retinal detachment with retinal defect, unspecified
36101	Recent retinal detachment, partial, with single defect
36102	Recent retinal detachment, partial, with multiple defects
36103	Recent retinal detachment, partial, with giant tear
36105	Recent retinal detachment, total or subtotal
36106	Old retinal detachment, partial
36107	Old retinal detachment, total or subtotal
36181	Traction detachment of retina
36189	Other forms of retinal detachment
36210	Background retinopathy, unspecified
36212	Exudative retinopathy
36215	Retinal telangiectasia
36216	Retinal neovascularization NOS
36240	Retinal layer separation, unspecified
36242	Serous detachment of retinal pigment epithelium
36243	Hemorrhagic detachment of retinal pigment epithelium
36254	Macular cyst, hole, or pseudohole
36257	Drusen (degenerative)
36281	Retinal hemorrhage
36282	Retinal exudates and deposits
36283	Retinal edema
36289	Other retinal disorders
36442	Rubeosis iridis
36474	Adhesions and disruptions of pupillary membranes
36504	Ocular hypertension
36563	Glaucoma associated with vascular disorders
36610	Senile cataract, unspecified
36614	Posterior subcapsular polar senile cataract
36619	Other and combined forms of senile cataract
37060	Corneal neovascularization, unspecified

37922	Crystalline deposits in vitreous
37923	Vitreous hemorrhage
37924	Other vitreous opacities
37925	Vitreous membranes and strands
37929	Other disorders of vitreous
99653	Mechanical complication due to ocular lens prosthesis
99679	Other complications due to other internal prosthetic device, implant, and graft

Codes for Other Vascular Occlusions (**OTVAOC**):

36230	Retinal vascular occlusion, unspecified
36231	Central retinal artery occlusion
36232	Retinal arterial branch occlusion

Codes for Atrophic Macular Degeneration (**ATMADE**):

36251	Nonexudative senile macular degeneration
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IDENTIFICATION OF INTRAVITREAL ANTI-VEGF TREATMENT EVENTS FOR ICD-10

1. Main indications

Indication: DIABETIC MACULAR EDEMA (DME)

Numerator: Discharges, with either:

- A principal diagnosis code for Diabetic Macular Edema (**DIMAED**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) or for Other Type 2 Diabetes Conditions (**ODIACO**) and any secondary diagnosis codes for Diabetic Macular Edema (**DIMAED**) or
- A principal diagnosis code for Retinal Edema (**RETEDE**) and any secondary diagnosis codes for any diabetic condition (ICD10 codes E08-E13).

Indication: RETINAL VEIN OCCLUSION (RVO)

Indication: RETINAL VEIN OCCLUSION (CENTRAL)

Numerator: Discharges, with either:

- A principal diagnosis code for Retinal Vein Occlusion- Central (**RVOCEN**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) or Other Diagnosis for Macular Degeneration (**ODMADE**) and any secondary diagnosis codes for Retinal Vein Occlusion- Central (**RVOCEN**).

Indication: RETINAL VEIN OCCLUSION (BRANCH)

Numerator: Discharges, with either:

- A principal diagnosis code for Retinal Vein Occlusion- Branch (**RVOBRA**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) or Other Diagnosis for Macular Degeneration (**ODMADE**) and any secondary diagnosis codes for Retinal Vein Occlusion- Branch (**RVOBRA**).

Indication: NEOVASCULAR AGE-RELATED MACULAR DEGENERATION (nAMD)

Numerator: Discharges, with either:

- A principal diagnosis code for Exudative age-related macular degeneration (**EXARMD**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) or Other Diagnosis for Macular Degeneration (**ODMADE**) or diagnosis code for Macular Puckering (**MACPUC**) and any secondary diagnosis codes for Exudative age-related macular degeneration (**EXARMD**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) or Other Diagnosis for Macular Degeneration (**ODMADE**) and a previous nAMD case, regardless of age.

Indication: CHOROIDAL NEOVASCULARIZATION (CNV)

Numerator: Discharges with either:

- A principal diagnosis code for Retinal neovascularization or Myopia (**RNVMYO**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) or Other Diagnosis for Macular Degeneration (**ODMADE**) and any secondary diagnosis codes for Retinal neovascularization or Myopia (**RNVMYO**) or
- A principal diagnosis for Macular Puckering (**MACPUC**), except if secondary diagnosis codes for Diabetic Macular Edema (**DIMAED**).

2. Other indications**Indication: OTHER VASCULAR OCCLUSIONS**

**This indication is not included in Retinal Vein Occlusion*

Numerator: Discharges, with either:

- A principal diagnosis code for Other Vascular Occlusions (**OTVAOC**) or
- A principal diagnosis code for Other Relevant (**OTRECO**) and any secondary diagnosis codes for Retinal Vein Occlusion (**OTVAOC**).

Indication: ATROPHIC MACULAR DEGENERATION

** This indication is not included in Neovascular Age-Related Macular Degeneration*

Numerator: Discharges, with either:

- A principal diagnosis code for Atrophic Macular Degeneration (**ATMADE**) or
- A principal diagnosis code for Other Relevant Conditions (**OTRECO**) and any secondary diagnosis codes for Atrophic Macular Degeneration (**ATMADE**).

3. Diabetes with Retinopathy

For episodes with the principal diagnosis codes below, without secondary diagnosis of Diabetic Macular Edema (**DIMAED**), the following criteria applies:

Principal diagnosis	Indication
E11319	Unspecified Diabetic Retinopathy
E113591, E113592, E113593	Proliferative Diabetic Retinopathy

E113291, E113292, E113491, E113551, E113552 Nonproliferative Diabetic Retinopathy

4. Other diagnosis to be excluded

For episodes with the principal diagnosis codes below, the episode is excluded from the database:

G245	Blepharospasm
H401120	Primary open-angle glaucoma, left eye, stage unspecified
H5000	Unspecified esotropia
H5005	Alternating esotropia
Z48810	Encounter for surgical aftercare following surgery on the sense organs

5. Other diagnosis to be included

For all other episodes that do not meet any of the criteria above, the indication is the principal diagnosis

ICD 10 CODES

Codes for Diabetic Macular Edema (**DIMAED**):

E10311	Type 1 diabetes mellitus with unspecified diabetic retinopathy with macular edema
E103212	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, left eye
E11311	Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema
E113211	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, right eye
E113212	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, left eye
E113213	Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, bilateral
E11331	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema
E113311	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, right eye
E113312	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, left eye
E113313	Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, bilateral
E113411	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, right eye
E113412	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, left eye
E113413	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, bilateral
E113419	Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, unspecified eye
E113511	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, right eye
E113512	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, left eye

E113513	Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema, bilateral
E13311	Other specified diabetes mellitus with unspecified diabetic retinopathy with macular edema
E133413	Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, bilateral
E133511	Other specified diabetes mellitus with proliferative diabetic retinopathy with macular edema, unspecified eye

Codes for Other Type 2 Diabetes Conditions (**ODIACO**):

E113551	Type 2 diabetes mellitus with stable proliferative diabetic retinopathy, right eye
E113552	Type 2 diabetes mellitus with stable proliferative diabetic retinopathy, left eye
E1136	Type 2 diabetes mellitus with diabetic cataract

Codes for Retinal Edema (**RETEDE**):

H3581	Retinal edema
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Codes for Retinal Vein Occlusion- Central (**RVOCEN**):

H348110	Central retinal vein occlusion, right eye, with macular edema
H348111	Central retinal vein occlusion, right eye, with retinal neovascularization
H348112	Central retinal vein occlusion, right eye, stable
H348120	Central retinal vein occlusion, left eye, with macular edema
H348121	Central retinal vein occlusion, left eye, with retinal neovascularization
H348122	Central retinal vein occlusion, left eye, stable
H348130	Central retinal vein occlusion, bilateral, with macular edema
H348131	Central retinal vein occlusion, bilateral, with retinal neovascularization
H348132	Central retinal vein occlusion, bilateral, stable
H348190	Central retinal vein occlusion, unspecified eye, with macular edema

Codes for Retinal Vein Occlusion- Branch (**RVOBRA**):

H348310	Tributary (branch) retinal vein occlusion, right eye, with macular edema
H348311	Tributary (branch) retinal vein occlusion, right eye, with retinal neovascularization
H348312	Tributary (branch) retinal vein occlusion, right eye, stable
H348320	Tributary (branch) retinal vein occlusion, left eye, with macular edema
H348321	Tributary (branch) retinal vein occlusion, left eye, with retinal neovascularization
H348322	Tributary (branch) retinal vein occlusion, left eye, stable
H348330	Tributary (branch) retinal vein occlusion, bilateral, with macular edema
H348331	Tributary (branch) retinal vein occlusion, bilateral, with retinal neovascularization
H348332	Tributary (branch) retinal vein occlusion, bilateral, stable
H348390	Tributary (branch) retinal vein occlusion, unspecified eye, with macular edema
H348391	Tributary (branch) retinal vein occlusion, unspecified eye, with retinal neovascularization
H348392	Tributary (branch) retinal vein occlusion, unspecified eye, stable

Codes for Exudative age-related macular degeneration (**EXARMD**):

H35321	Exudative age-related macular degeneration, right eye
H353210	Exudative age-related macular degeneration, right eye, stage unspecified
H353211	Exudative age-related macular degeneration, right eye, with active choroidal neovascularization
H353212	Exudative age-related macular degeneration, right eye, with inactive choroidal neovascularization
H353213	Exudative age-related macular degeneration, right eye, with inactive scar
H353220	Exudative age-related macular degeneration, left eye, stage unspecified
H353221	Exudative age-related macular degeneration, left eye, with active choroidal neovascularization
H353222	Exudative age-related macular degeneration, left eye, with inactive choroidal neovascularization
H353230	Exudative age-related macular degeneration, bilateral, stage unspecified
H353231	Exudative age-related macular degeneration, bilateral, with active choroidal neovascularization
H353232	Exudative age-related macular degeneration, bilateral, with inactive choroidal neovascularization
H353290	Exudative age-related macular degeneration, unspecified, stage unspecified
H353291	Exudative age-related macular degeneration, unspecified, with active choroidal neovascularization

Codes for Macular puckering (**MACPUC**):

H35371	Puckering of Macula, right eye
H35372	Puckering of Macula, left eye
H35379	Puckering of Macula, unspecified eye

Codes for Retinal neovascularization or Myopia (**RNVMYO**):

H35051	Retinal neovascularization, unspecified, right eye
H35052	Retinal neovascularization, unspecified, left eye
H35053	Retinal neovascularization, unspecified, bilateral
H35059	Retinal neovascularization, unspecified, unspecified eye
H3533	Angioid streaks of macula
H4421	Degenerative myopia, right eye
H4422	Degenerative myopia, left eye
H442A1	Degenerative myopia with choroidal neovascularization, right eye
H442A2	Degenerative myopia with choroidal neovascularization, left eye

Codes for Other Diagnosis for Macular Degeneration (**ODMADE**):

H3530	Unspecified macular degeneration
H35351	Cystoid macular degeneration, right eye
H35352	Cystoid macular degeneration, left eye

Codes for Other Relevant Conditions (**OTRECO**):

H2511	Age-related nuclear cataract, right eye
H2512	Age-related nuclear cataract, left eye

H25811	Combined forms of age-related cataract, right eye
H25812	Combined forms of age-related cataract, left eye
H259	Unspecified age-related cataract
H269	Unspecified cataract
H318	Other specified disorders of choroid
H33001	Unspecified retinal detachment with retinal break, right eye
H33002	Unspecified retinal detachment with retinal break, left eye
H33011	Retinal detachment with single break, right eye
H33012	Retinal detachment with single break, left eye
H33021	Retinal detachment with multiple breaks, right eye
H33022	Retinal detachment with multiple breaks, left eye
H33031	Retinal detachment with giant retinal tear, right eye
H33032	Retinal detachment with giant retinal tear, left eye
H33051	Total retinal detachment, right eye
H33052	Total retinal detachment, left eye
H3321	Serous retinal detachment, right eye
H3322	Serous retinal detachment, left eye
H3500	Unspecified background retinopathy
H35021	Exudative retinopathy, right eye
H35022	Exudative retinopathy, left eye
H35712	Central serous chorioretinopathy, left eye
H3589	Other specified retinal disorders
H4089	Other specified glaucoma
H409	Unspecified glaucoma
H4311	Vitreous hemorrhage, right eye
H4312	Vitreous hemorrhage, left eye
H59031	Cystoid macular edema following cataract surgery, right eye
H59032	Cystoid macular edema following cataract surgery, left eye

Codes for Other Vascular Occlusions (**OTVAOC**):

H3411	Central retinal artery occlusion, right eye
H3412	Central retinal artery occlusion, left eye
H349	Unspecified retinal vascular occlusion

Codes for Atrophic Macular Degeneration (**ATMADE**):

H353110	Nonexudative age-related macular degeneration, right eye, stage unspecified
H353111	Nonexudative age-related macular degeneration, right eye, early dry stage
H353112	Nonexudative age-related macular degeneration, right eye, intermediary dry stage
H353113	Nonexudative age-related macular degeneration, right eye, advanced atrophic without subfoveal involvement
H353120	Nonexudative age-related macular degeneration, left eye, stage unspecified
H353121	Nonexudative age-related macular degeneration, left eye, early dry stage
H353122	Nonexudative age-related macular degeneration, left eye, intermediary dry stage

H353123	Nonexudative age-related macular degeneration, left eye, advanced atrophic without subfoveal involvement
H353130	Nonexudative age-related macular degeneration, bilateral, stage unspecified
H353132	Nonexudative age-related macular degeneration, bilateral, intermediary dry stage
H353190	Nonexudative age-related macular degeneration, unspecified eye, stage unspecified

Appendix 2

Organizational level of the hospital's ophthalmology departments. Minimal requirements, as defined by the National Network of hospital specialties and referral for Ophthalmology [1]

Group I:

- Health care: refraction test and consultations (general and diabetes)
- Minimum number of inhabitants in the area of direct influence: 75,000
- Working hours: 8 am to 8 pm
- Minimum equipment required: refraction with slit lamp and keratometer, biometer, ultrasound, campimeter, optical coherence tomography (OCT), angiograph / retinograph, YAG laser, Argon laser or similar, operating microscope, phacoemulsifier
- Minimum of Ophthalmologist specialists: 5

Group II:

- Health care: all ophthalmic health care with the exception of pediatric oncology, transplantation, glaucoma and cataracts, retinopathy of prematurity, rare diseases
- Daytime medical and surgical urgency: 12h/day; 7 days/week
- Minimum of Ophthalmologist specialists: 12
- Maximum of ophthalmologists: to be defined according to the population to be served;
- Minimum equipment required: in addition to equipment required for hospitals in Group I, vitrectomy device with endolaser, specular microscope and corneal topograph.

Group III:

- Health care - responsible for all ophthalmic health care, excluding those related to Reference Centers (approved or to be approved)
- Multipurpose emergency: 2 ophthalmologists in physical presence 24h/day; 7 days/week.
- Minimum equipment required: in addition to equipment required for hospitals in Group II, Retcam and portable electrophysiology

Source: [1] Serviço Nacional de Saúde. Rede nacional de especialidade hospitalar e de referência de oftalmologia [Internet]. 2016. Available from: https://www.sns.gov.pt/wp-content/uploads/2016/05/Proposta-RNEHR-Oftalmologia-2016-ACSS-1_VFinal.pdf

Appendix 3

Table S1. Proportion of patients treated with anti-VEGF injections, 2013 and 2018, per region and per diagnosis, Portugal

Region	nAMD	DME	CNV	RVO
Alentejo	4,57%	7,40%	5,22%	7,06%
Algarve	1,61%	4,04%	1,83%	1,20%
Metropolitan area of Lisbon	25,53%	21,90%	24,28%	25,45%
Metropolitan area of Porto	27,12%	24,97%	26,82%	26,08%
Central region	28,56%	19,04%	25,26%	28,57%
Northern region	12,61%	22,65%	16,58%	11,64%

Table S2. Spearman's correlation between rate of anti-VEGF treatments and ecological variables (N=278 municipalities).

Year	Purchasing power	Rate of ophthalmologists	Ophthalmology consultations in all hospitals	Ophthalmology consultations in public hospitals
2013	0.048	0.085	0.131*	0.124*
2014	0.041	0.109	0.102	0.106
2015	0.101	0.122*	0.105	0.103
2016	0.206*	0.144*	0.156*	0.130*
2017	0.152*	0.085	0.083	0.104
2018	0.215*	0.106	0.097	0.11

*P-value < 0.05; correlation statistically significant

Table S3. Stepwise linear regression models, rate of anti-VEGF treatments as dependent variable (N=278 municipalities).

Year	Variable	β adjusted coefficient	Significance	Adjusted R ²
2013	Constant		0	0.026
	Ophthalmology consultations in all hospitals	0.174	0.008	
2014	Constant		0.000	0.021
	Ophthalmology consultations in all hospitals	0.158	0.016	
2015	Constant		0.000	0.020
	Ophthalmology consultations in all hospitals	0.156	0.018	
2016	Constant		0.000	0.039
	Purchasing power	0.207	0.002	
2017	Constant		0.033	0.033
	Purchasing power	0.192	0.004	
2018	Constant		0.085	0.043
	Purchasing power	0.217	0.001	