GLAUCOMA

Includes Congenital Glaucoma, Steroid-Induced Glaucoma and Glaucoma Secondary to Other Ocular Disorders.

Background

This case definition was developed by the Armed Forces Health Surveillance Division (AFHSD) for the purpose of epidemiological surveillance of a condition important to military-associated populations.

Clinical Description

Glaucoma is an eye condition that involves progressive optic nerve damage. The condition is often, but not always, associated with elevated intraocular pressure (IOP) and gradual, painless vision loss. The most common form of glaucoma is primary open-angle glaucoma (POAG), a chronic, progressive condition with few symptoms until late in the course of disease. A less common form is acute angle-closure glaucoma (AACG), an ocular emergency defined by symptoms of acute eye pain, blurred vision, nausea and vomiting, and a rapid rise in IOP. Risk factors for development of glaucoma include age > 60 years old, African American race, and a positive family history. Treatment includes medication and surgery aimed at reducing the pressure in the eye. If undetected or left untreated, glaucoma can lead to blindness.[1,2]

Case Definition and Incidence Rules *(2019-present)*

For surveillance purposes, a case of glaucoma is defined as:

- *One hospitalization* with a case defining diagnosis of glaucoma (see ICD9 and ICD10 code lists below) in *any* diagnostic position; or

- *One outpatient medical encounter* in an optometry or ophthalmology clinic, defined by Medical Expense and Performance Reporting System (MEPRS) code BBD or BHC, with a case defining diagnosis of glaucoma (see ICD9 and ICD10 codes lists) in *any* diagnostic position; or

- *Two outpatient medical encounters*, *within 180 days*, with a case defining diagnosis of glaucoma (see ICD9 and ICD10 code lists below) in *any* diagnostic position.

Incidence rules:

For individuals who meet the case definition:

- The incidence date is considered the date of the first hospitalization or outpatient medical encounter that includes a case defining diagnosis of glaucoma.

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[1] Hurt, Lee. Armed Forces Health Surveillance Branch. Glaucoma, Active Component, U.S. Armed Forces, 1998-2013. *MSMR* 2014; 21(12): 17-22.

[2] American Optometric Association. https://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/glaucoma?sso=y; Accessed July 2024.

Case Definition and Incidence Rules *(continued)*

- An individual is considered an incident case *once per lifetime*.

Exclusions:

- None

Codes

The following ICD9 and ICD10 codes are included in the case definition:

Condition	ICD-10-CM Codes	ICD-9-CM Codes
Absolute glaucoma	*H44.51 (absolute glaucoma…)*	360.42 (blind hypertensive eye; absolute glaucoma)
	- H44.511 (right eye)	
	- H44.512 (left eye)	
	- H44.513 (bilateral)	
	- H44.519 (absolute glaucoma, unspecified eye)	
	H40 (glaucoma)	*365 (glaucoma)*
Borderline glaucoma *(glaucoma suspect)*	*H40.0 (glaucoma suspect)*	*365.0 (borderline glaucoma [glaucoma suspect])*
	H40.00 (preglaucoma, unspecified…)	- 365.00 (preglaucoma, unspecified)
	- H40.001 (right eye)	
	- H40.002 (left eye)	
	- H40.003 (bilateral)	
	- H40.009 (unspecified eye)	
	H40.01 (open angle with borderline findings, low risk …)	- 365.01 (open angle with borderline findings, low risk)
	- H40.011 (right eye)	
	- H40.012 (left eye)	
	- H40.013 (bilateral)	
	- H40.019 (unspecified eye)	
	H40.02 (open angle with borderline findings, high risk …)	- 365.05 (open angle with borderline findings, high risk)
	- H40.021 (right eye)	

	- H40.022 (left eye)	
	- H40.023 (bilateral)	
	- H40.029 (unspecified eye)	
	H40.03 (anatomical narrow angle …)	- 365.02 (anatomical narrow angle)
	- H40.031 (right eye)	
	- H40.032 (left eye)	
	- H40.033 (bilateral)	
	- H40.039 (unspecified eye)	
	H40.04 (steroid responder …)	- 365.03 (steroid responder)
	- H40.041 (right eye)	
	- H40.042 (left eye)	
	- H40.043 (bilateral)	
	- H40.049 (unspecified eye)	
	H40.05 (ocular hypertension …)	- 365.04 (ocular hypertension)
	- H40.051 (right eye)	
	- H40.052 (left eye)	
	- H40.053 (bilateral)	
	- H40.059 (unspecified eye)	
	H40.06 (primary angle closure without glaucoma damage …)	- 365.06 (primary angle closure without glaucoma damage)
	- H40.061 (right eye)	
	- H40.062 (left eye)	
	- H40.063 (bilateral)	
	- H40.069 (unspecified eye)	
Open-angle glaucoma	*H40.1 (open-angle glaucoma)*	*365.1 (open-angle glaucoma)*
	H40.10 (unspecified open-angle glaucoma…)	- 365.10 (open-angle glaucoma, unspecified)
	- H40.10X0 (stage unspecified)	*With:*
	- H40.10X1 (mild stage)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.10X2 (moderate stage)	
	- H40.10X3 (severe stage)	
	- H40.10X4 (indeterminate stage)	

	H40.11 (primary open-angle glaucoma)	- 365.11 (primary open-angle glaucoma)
	H40.111 (primary open-angle glaucoma, *right eye…*)	*With:*
	- H40.1110 (stage unspecified)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.1111 (mild stage)	
	- H40.1112 (moderate stage)	
	- H40.1113 (severe stage)	
	- H40.1114 (indeterminate stage)	
	H40.112 (primary open-angle glaucoma, *left eye…*)	
	- H40.1120 (stage unspecified)	
	- H40.1121 (mild stage)	
	- H40.1122 (moderate stage)	
	- H40.1123 (severe stage)	
	- H40.1124 (indeterminate stage)	
	H40.113 (primary open-angle glaucoma, *bilateral…*)	
	- H40.1130 (stage unspecified)	
	- H40.1131 (mild stage)	
	- H40.1132 (moderate stage)	
	- H40.1133 (severe stage)	
	- H40.1134 (indeterminate stage)	
	H40.119 (primary open-angle glaucoma, *unspecified eye…*)	
	- H40.1190 (stage unspecified)	
	- H40.1191 (mild stage)	
	- H40.1192 (moderate stage)	
	- H40.1193 (severe stage)	
	- H40.1194 (indeterminate stage)	
	H40.12 (low tension glaucoma)	- 365.12 (low tension glaucoma)
	H40.121 (low tension glaucoma, *right eye…*)	*With:*
	- H40.1210 (stage unspecified)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.1211 (mild stage)	

	- H40.1212 (moderate stage)	
	- H40.1213 (severe stage)	
	- H40.1214 (indeterminate stage)	
	H40.122 (low tension glaucoma, *left eye…*)	
	- H40.1220 (stage unspecified)	
	- H40.1221 (mild stage)	
	- H40.1222 (moderate stage)	
	- H40.1223 (severe stage)	
	- H40.1224 (indeterminate stage)	
	H40.123 (low tension glaucoma, *bilateral…)*	
	- H40.1230 (stage unspecified)	
	- H40.1231 (mild stage)	
	- H40.1232 (moderate stage)	
	- H40.1233 (severe stage)	
	- H40.1234 (indeterminate stage)	
	H40.129 (low tension glaucoma, *unspecified eye…*)	
	- H40.1290 (stage unspecified)	
	- H40.1291 (mild stage)	
	- H40.1292 (moderate stage)	
	- H40.1293 (severe stage)	
	- H40.1294 (indeterminate stage)	
	H40.13 (pigmentary glaucoma)	- 365.13 (pigmentary glaucoma)
	H40.131 (pigmentary glaucoma, *right eye…*)	*With:*
	- H40.1310 (stage unspecified)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.1311 (mild stage)	
	- H40.1312 (moderate stage)	
	- H40.1313 (severe stage)	
	- H40.1314 (indeterminate stage)	
	H40.132 (pigmentary glaucoma, *left eye…*)	
	- H40.1320 (stage unspecified)	
	- H40.1321 (mild stage)	

- H40.1322 (moderate stage)	
- H40.1323 (severe stage)	
- H40.1324 (indeterminate stage)	
H40.133 (pigmentary glaucoma, *bilateral…*)	
- H40.1330 (stage unspecified)	
- H40.1331 (mild stage)	
- H40.1332 (moderate stage)	
- H40.1333 (severe stage)	
- H40.1334 (indeterminate stage)	
H40.139 (pigmentary glaucoma, *unspecified eye…*)	
- H40.1390 (stage unspecified)	
- H40.1391 (mild stage)	
- H40.1392 (moderate stage)	
- H40.1393 (severe stage)	
- H40.1394 (indeterminate stage)	
H40.14 (capsular glaucoma with pseudoexfoliation of lens	- 365.52 (pseudoexfoliation glaucoma) *With:* - 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
H40.141 (capsular glaucoma with pseudoexfoliation of lens, *right* eye…)	
- H40.1410 (stage unspecified)	
- H40.1411 (mild stage)	
- H40.1412 (moderate stage)	
- H40.1413 (severe stage)	
- H40.1414 (indeterminate stage)	
H40.142 (capsular glaucoma with pseudoexfoliation of lens, *left* eye…)	
- H40.1420 (stage unspecified)	
- H40.1421 (mild stage)	
- H40.1422 (moderate stage)	
- H40.1423 (severe stage)	
- H40.1424 (indeterminate stage)	
H40.143 (capsular glaucoma with pseudoexfoliation of lens, *bilateral…*)	

	- H40.1430 (stage unspecified)	
	- H40.1431 (mild stage)	
	- H40.1432 (moderate stage)	
	- H40.1433 (severe stage)	
	- H40.1434 (indeterminate stage)	
	H40.149 (capsular glaucoma with pseudoexfoliation of lens, *unspecified* eye…)	
	- H40.1490 (stage unspecified)	
	- H40.1491 (mild stage)	
	- H40.1492 (moderate stage)	
	- H40.1493 (severe stage)	
	- H40.1294 (indeterminate stage)	
	H40.15 residual stage of open angle glaucoma	- 365.15 (residual stage of open angle glaucoma)
	- H40.151 (right eye)	
	- H40.152 (left eye)	
	- H40.153 (bilateral)	
	- H40.159 (unspecified eye)	
Angle-closure glaucoma	*H40.2 (primary angle closure glaucoma)*	*365.2 (primary angle-closure glaucoma)*
	H40.20 (unspecified primary angle-closure glaucoma…)	365.2 (primary angle-closure glaucoma) *With:* 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.20X0 (stage unspecified)	
	- H40.20X1 (mild stage)	
	- H40.20X2 (moderate stage)	
	- H40.20X3 (severe stage)	
	- H40.20X4 (indeterminate stage)	
	H40.21 (acute angle-closure glaucoma…)	- 365.22 (acute angle-closure glaucoma)
	- H40.211 (right eye)	
	- H40.212 (left eye)	
	- H40.213 (bilateral)	
	- H40.219 (unspecified eye)	
	H40.22 (chronic angle-closure glaucoma…)	

H40.221 (chronic angle-closure glaucoma, *right* eye…)	- 365.23 (chronic angle-closure glaucoma)
- H40.2210 (stage unspecified)	*With:*
- H40.2211 (mild stage)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
- H40.2212 (moderate stage)	
- H40.2213 (severe stage)	
H40.222 (chronic angle-closure glaucoma, *left* eye…)	
- H40.2220 (stage unspecified)	
- H40. 2221 (mild stage)	
- H40. 2222 (moderate stage)	
- H40. 2223 (severe stage)	
- H40. 2224 (indeterminate stage)	
H40.223 (chronic angle-closure glaucoma, *bilateral*…)	
- H40.2230 (stage unspecified)	
- H40. 2231 (mild stage)	
- H40. 2232 (moderate stage)	
- H40. 2233 (severe stage)	
- H40. 2234 (indeterminate stage)	
H40.229 (chronic angle-closure glaucoma, *unspecified* eye…)	
- H40.2290 (stage unspecified)	
- H40. 2291(mild stage)	
- H40. 2292 (moderate stage)	
- H40. 2293 (severe stage)	
- H40. 2294 (indeterminate stage)	
H40.23 (intermittent angle-closure glaucoma)	- 365.21 (intermittent angle-closure glaucoma)
- H40.231 (right eye)	
- H40.232 (left eye)	
- H40.233 (bilateral)	
- H40.239 (unspecified eye)	

	H40.24 (residual stage of angle-closure glaucoma)	- 365.24 (residual stage of angle-closure glaucoma)
	- H40.241 (right eye)	
	- H40.242 (left eye)	
	- H40.243 (bilateral)	
	- H40.249 (unspecified eye)	
Glaucoma secondary to eye trauma	*H40.3 (glaucoma secondary to eye trauma…)*	*365.65 (glaucoma associated with ocular trauma)*
	H40.30 (glaucoma secondary to eye trauma, *unspecified* eye…)	- 365.65 (glaucoma associated with ocular trauma)
	- H40.30X0 (stage unspecified)	*With:*
	- H40.30X1 (mild stage)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.30X2 (moderate stage)	
	- H40.30X3 (severe stage)	
	- H40. 30X4 (indeterminate stage)	
	H40.31 (glaucoma secondary to eye trauma, *right* eye…)	
	- H40.31X0 (stage unspecified)	
	- H40.31X1 (mild stage)	
	- H40.31X2 (moderate stage)	
	- H40.31X3 (severe stage)	
	- H40.31X4 (indeterminate stage)	
	H40.32 (glaucoma secondary to eye trauma, *left* eye…)	
	- H40.32X0 (stage unspecified)	
	- H40.32X1 (mild stage)	
	- H40.32X2 (moderate stage)	
	- H40.32X3 (severe stage)	
	- H40.32X4 (indeterminate stage)	
	H40.33 (glaucoma secondary to eye trauma, *left* eye…)	
	- H40.33X0 (stage unspecified)	
	- H40.33X1 (mild stage)	
	- H40.33X2 (moderate stage)	

	- H40.33X3 (severe stage)	
	- H40.33X4 (indeterminate stage)	
Glaucoma secondary to eye inflammation	*H40.4 (glaucoma secondary to eye inflammation...)*	*365.62 (glaucoma associated with ocular inflammations)*
	H40.40 (glaucoma secondary to eye inflammation, *unspecified* eye…)	- 365.62 (glaucoma associated with ocular inflammations)
	- H40.40X0 (stage unspecified)	*With:*
	- H40. 40X1 (mild stage)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40. 40X2 (moderate stage)	
	- H40. 40X3 (severe stage)	
	- H40. 40X4 (indeterminate stage)	
	H40.41 (glaucoma secondary to eye inflammation, *right* eye…)	
	- H40.41X0 (stage unspecified)	
	- H40. 41X1 (mild stage)	
	- H40. 41X2 (moderate stage)	
	- H40. 41X3 (severe stage)	
	- H40. 41X4 (indeterminate stage)	
	H40.42 (glaucoma secondary to eye inflammation, *left* eye…)	
	- H40.42X0 (stage unspecified)	
	- H40. 42X1 (mild stage)	
	- H40. 42X2 (moderate stage)	
	- H40. 42X3 (severe stage)	
	- H40. 42X4 (indeterminate stage)	
	H40.43 (glaucoma secondary to eye inflammation, *bilateral*…)	
	- H40.43X0 (stage unspecified)	
	- H40. 43X1 (mild stage)	
	- H40. 43X2 (moderate stage)	
	- H40. 43X3 (severe stage)	
	- H40. 43X4 (indeterminate stage)	

Glaucoma associated with other ocular disorders	*H40.5 (glaucoma secondary to other eye disorders)*	*365.5 (glaucoma associated with disorders of the lens)* *365.6 (glaucoma associated with other ocular disorders)*
	H40.50 (glaucoma secondary to other eye disorders, *unspecified* eye…)	- 365.59 (glaucoma associated with other lens disorders)
	- H40.50X0 (stage unspecified)	- 365.60 (glaucoma associated with unspecified ocular disorder)
	- H40. 50X1 (mild stage)	- 365.61 (glaucoma associated with pupillary block)
	- H40. 50X2 (moderate stage)	- 365.64 (glaucoma associated with tumors or cysts)
	- H40. 50X3 (severe stage)	*With:*
	- H40. 50X4 (indeterminate stage)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	H40.51 (glaucoma secondary to other eye disorders, *right* eye…)	
	- H40.51X0 (stage unspecified)	
	- H40.51X1 (mild stage)	
	- H40.51X2 (moderate stage)	
	- H40.51X3 (severe stage)	
	- H40.51X4 (indeterminate stage)	
	H40.52 (glaucoma secondary to other eye disorders, *left* eye…)	
	- H40.52X0 (stage unspecified)	
	- H40.52X1 (mild stage)	
	- H40.52X2 (moderate stage)	
	- H40.52X3 (severe stage)	
	- H40.52X4 (indeterminate stage)	
	H40.53 (glaucoma secondary to other eye disorders, *bilateral*…)	
	- H40.53X0 (stage unspecified)	
	- H40.53X1 (mild stage)	
	- H40.53X2 (moderate stage)	
	- H40.53X3 (severe stage)	
	- H40.53X4 (indeterminate stage)	
Glaucoma secondary to drugs	*H40.6 (glaucoma secondary to drugs)*	*365.3 (corticosteroid-induced glaucoma)*
	H40.60 (glaucoma secondary to drugs, *unspecified* eye…)	

	- H40.60X0 (stage unspecified)	- 365.31 (corticosteroid-induced glaucoma, glaucomatous stage)
	- H40.60X1 (mild stage)	- 365.32 (corticosteroid-induced glaucoma, residual stage)
	- H40.60X2 (moderate stage)	*With:*
	- H40 60X3 (severe stage)	- 365.7[0-4] (glaucoma stage): [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate)
	- H40.60X4 (indeterminate stage)	
	H40.61 (glaucoma secondary to drugs, *right eye…*)	
	- H40.61X0 (stage unspecified)	
	- H40.61X1 (mild stage)	
	- H40.61X2 (moderate stage)	
	- H40.61X3 (severe stage)	
	- H40.61X4 (indeterminate stage)	
	H40.62 (glaucoma secondary to drugs, *left eye…*)	
	- H40.62X0 (stage unspecified)	
	- H40.62X1 (mild stage)	
	- H40.62X2 (moderate stage)	
	- H40.62X3 (severe stage)	
	- H40 62X4 (indeterminate stage)	
	H40.63 (glaucoma secondary to drugs, *bilateral…*)	
	- H40.63X0 (stage unspecified)	
	- H40.63X1 (mild stage)	
	- H40.63X2 (moderate stage)	
	- H40.63X3 (severe stage)	
	- H40.63X4 (indeterminate stage)	
Other glaucoma	*H40.8 (other glaucoma)*	*365.8 (other specified forms of glaucoma)*
	H40.81 (glaucoma with increased episcleral venous pressure)	- 365.82 (glaucoma with increased episcleral venous pressure)
	- H40.811 (right eye)	
	- H40.812 (left eye)	
	- H40.813 (bilateral)	
	- H40.819 (unspecified eye)	

	H40.82 (hypersecretion glaucoma)	- 365.81 (hypersecretion glaucoma)
	- H40.821 (right eye)	
	- H40.822 (left eye)	
	- H40.823 (bilateral)	
	- H40.829 (unspecified eye)	
	H40.83 (aqueous misdirection)	- 365.83 (aqueous misdirection)
	- H40.831 (right eye)	
	- H40.832 (left eye)	
	- H40.833 (bilateral)	
	- H40.839 (unspecified eye)	
	H40.89 (other specified glaucoma)	*365.4 (glaucoma associated with anomalies, dystrophies, and systemic syndromes)* - 365.41 (glaucoma associated with chamber angle anomalies) - 365.42 (glaucoma associated with anomalies of iris) - 365.43 (glaucoma associated with anterior segment anomalies) - 365.51 (phacolytic glaucoma) - 365.63 (glaucoma associated with vascular disorders) - 365.89 (other specified glaucoma)
Unspecified glaucoma	*H40.9 (unspecified glaucoma)*	*365.7[0-4] (glaucoma stage):* [0] unspecified, [1] early, [2] moderate, [3] severe, [4] indeterminate) *365.9 (glaucoma, unspecified)*
Glaucoma in diseases classified elsewhere	*H42 (glaucoma in diseases classified elsewhere)*	- 365.44 (glaucoma associated with systemic syndromes)
Congenital glaucoma	Q15.0 (congenital glaucoma)	365.14 (glaucoma of childhood) *743.2 (buphthalmos; glaucoma: congenital)* - 743.20 (buphthalmos, unspecified) - 743.21 (simple buphthalmos) - 743.22 (buphthalmos associated with ocular anomalies)

Development and Revisions

- In June of 2017 the case definition was updated to include ICD10 codes.

- This case definition was developed in December of 2014 by the Armed Forces Health Surveillance Branch (AFHSB) Epidemiology and Analyses staff for a *Medical Surveillance Monthly Report (MSMR)* article on glaucoma.[1] The case definition was developed based on reviews of the ICD9 and ICD10 codes, the scientific literature, and previous AFHSB analyses.

Case Definition and Incidence Rule Rationale

- In February 2019, in consultation with the DoD Vision Center of Excellence, the outpatient case finding criteria was updated to be more specific. The 2014 definition required "one outpatient medical encounter in *any* diagnosis position."[1] The 2019 definition requires "*one outpatient medical* encounter from an optometry or ophthalmology clinic in *any* diagnostic position," or *two outpatient encounters*, *within 180 days*, in *any* diagnostic position."[3]

  For this update, exploratory analyses of incident cases between 2013 and 2017 revealed 38,880 cases using the 2014 definition and 37,718 cases using the 2019 definition.

- The case definition uses one hospitalization or one outpatient medical encounter to define a case of glaucoma. An outpatient encounter for glaucoma screening may precede either a subsequent exclusion or confirmation of a definitive diagnosis; therefore, using only one outpatient encounter to define a case may result in an overestimation of incident cases. To avoid counting single screening visits as cases, investigators may want to consider using two outpatient visits to define a case.

Code Set Determination and Rationale

- None

Reports

The AFHSD reports on glaucoma in the following reports:

- Periodic MSMR articles

Review

Jul 2024	Case definition reviewed by the AFHSD Surveillance Methods and Standards (SMS) working group.
Feb 2019	Case definition updated by the *MSMR* staff, in consultation with the DoD Vision Center of Excellence; adopted by the AFHSB SMS working group.
Jun 2017	Case definition reviewed and adopted by the AFHSB SMS working group.
Dec 2014	Case definition developed by AFHSB Epidemiology and Analysis staff.

Comments

None

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[3] Update: Incidence of Glaucoma Diagnosis, Active Component, U.S. Armed Forces, 2013-2017. *Medical Surveillance Monthly Report (MSMR).* 2019 Feb; 26 (2):15-20.