

University of Massachusetts Medical School
Eye Care Emergency Department Avoidance (EyEDA) Model:
Quantitative Analysis for the PTAC Preliminary Review Team

November 1, 2019

Summary

This document provides an analysis of Medicare claims data regarding several issues relevant to the proposal submitted by the University of Massachusetts Medical School entitled “Eye Care Emergency Department Avoidance (EyEDA) Model” to the Physician-Focused Payment Model Technical Advisory Committee (PTAC). Those issues include beneficiary use of eye care specialists (optometrists and ophthalmologists), rates of visits (events) for conditions identified by the submitter as being “ED-avoidable” in emergency department (ED) and non-ED locations, and the distribution and rate of events by provider type for the non-ED events.

Data used in this analysis are from the 20-percent sample of Medicare Fee-for-Service (FFS) claims maintained in the Centers for Medicare & Medicaid Services (CMS) Chronic Conditions Data Warehouse (CCW). Data were accessed on August 29, 2019, and cover claims with end dates in calendar year (CY) 2017. Appendix A contains definitions of measures used in the analysis. Appendices B and C contain the provider and diagnosis codes used, respectively.

Exhibit 1 shows the count of Medicare beneficiaries who saw an ophthalmologist or optometrist on a FFS basis during CY 2017 by selected medical conditions: whether they were ever diagnosed with diabetes, ever diagnosed with glaucoma, or had cataract surgery during the year. These three conditions were selected because Medicare provides expanded coverage of eye care services for beneficiaries with these conditions.

Exhibit 2 shows the number of events observed in CY 2017 for eye conditions identified by the submitter. An event is defined as a unique combination of beneficiary, performing provider, service date, and principal claim diagnosis. Thus, a beneficiary seen by a primary care physician (PCP) and referred to a specialist on the same day would generate two events; a beneficiary seen in an ED and admitted on the same day would generate one event.

A total of 25 million such events were counted. Note that a given FFS beneficiary could have more than one event in a diagnosis grouping, as well as events in more than one diagnosis grouping. The diagnosis groupings are ordered in Exhibit 2 by the number of events that involved an ED visit. Conjunctivitis and eye pain combined account for more than half of the ED visits in this selection of conditions, even though about 5 percent of the visits for these conditions were ED-related. By contrast, a third of visits related to eye-related superficial injuries of the head were ED-related, but these injuries account for less than 6 percent of all eye-related events in the table. (Note that only select diagnosis codes in a broad ICD-10 category are included in the tabulation; for example, only codes related to diabetic retinopathy are counted in the broader diabetes category combining E10 and E11.)

Overall, eye-related ED events were slightly more likely to occur on weekends. Strictly speaking, if events were spread evenly across days of the week, Saturdays and Sundays would account for 29 percent of events, in contrast to the observed 35 percent. However, claims data do not permit identification of the relative frequency of “after-hours” events—for example, those that begin at 10:00 on a Friday night.

Slightly more than half of eye-related ED events that resulted in discharge from the ED (as opposed to inpatient admission) were for beneficiaries who had not seen an ophthalmologist or optometrist in the 12 months prior to the event.

Exhibit 3 shows the distribution of non-emergent events among specialty groups. The table shows the events in the rightmost column of Exhibit 2, separately for events in which the rendering provider was an optometrist, ophthalmologist, PCP, and other provider. Ophthalmologists were more likely to be the rendering provider in cases of clinical severity such as acute posterior vitreous detachment and corneal injury, while PCPs were relatively more likely to treat less severe eye-related conditions such as conjunctivitis.

Among providers who saw FFS patients for eye-related conditions, specialists tended to see far more such events. Even among specialists, however, some conditions were seen more often than others. For example, the median number of cases of acute vitreous detachment seen by an ophthalmologist in 2017 was 10, compared to 5 for conjunctivitis. PCPs saw very few events relative to optometrists or ophthalmologists.

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Exhibit 1: Count of Medicare beneficiaries who saw an ophthalmologist or optometrist on a FFS basis during CY 2017, by selected condition

| Condition | Total beneficiaries | Seen in the ED for Diagnosis Groups | | | % Seen in the ED for Diagnosis Groups | | |
|---|---------------------|-------------------------------------|-----------------------|--------------------|---------------------------------------|-----------------------|--------------------|
| | | Total | Admitted as inpatient | Discharged from ED | Total | Admitted as inpatient | Discharged from ED |
| All beneficiaries | 15,912,450 | 102,680 | 5,890 | 97,445 | 0.65% | 0.04% | 0.61% |
| With ever-diagnosed diabetes before 2018 | 6,427,150 | 44,955 | 3,160 | 42,155 | 0.70% | 0.05% | 0.66% |
| With ever-diagnosed glaucoma before 2018 | 5,234,020 | 31,535 | 1,975 | 29,815 | 0.60% | 0.04% | 0.57% |
| With cataract surgery during year | 1,209,845 | 7,820 | 250 | 7,605 | 0.65% | 0.02% | 0.63% |
| <p>SOURCE: CY 2017 20-percent claims sample. All numbers are inflated to reflect total population (that is, sample counts are multiplied by 5). NOTE: Diagnosis grouping is based on admitting diagnosis for inpatient claims and principal diagnosis for outpatient and carrier claims.</p> | | | | | | | |

Exhibit 2: Counts of events with submitter-specified eye conditions, CY 2017, by event disposition, prior contact with an ophthalmologist or optometrist, and day of week for presentation

| Diagnosis Grouping | All events | With ED Involvement | | | Total Admitted to Hospital from ED | Total Discharged from ED | | | | | | | | | Total Ambulatory Events with no ED Involvement |
|---|------------|---------------------------|---|-----------------------------|------------------------------------|--------------------------|----------------|---------|---|-------|-------|-----------------------|-------|-------|--|
| | | Total with ED Involvement | Cumulative Percent of ED-Avoidable Events | Percent with ED Involvement | | Total Discharged from ED | By Day of Week | | Percentage Discharged from ED by Prior Contact with Optometrist/Ophthalmologist and Day of Week | | | | | | |
| | | | | | | | Weekday | Weekend | With prior contact | | | Without prior contact | | | |
| Total | Weekday | Weekend | Total | Weekday | Weekend | Total | Weekday | Weekend | | | | | | | |
| <u>_TOTAL_</u> | 25,212,740 | 168,955 | | 0.7% | 8,380 | 160,575 | 64.8% | 35.2% | 43.2% | 27.1% | 16.1% | 56.8% | 37.7% | 19.1% | 25,042,165 |
| Conjunctivitis | 1,069,870 | 53,075 | 31.4% | 5.0% | 110 | 52,965 | 60.8% | 39.2% | 38.6% | 22.1% | 16.5% | 61.4% | 38.6% | 22.8% | 1,016,780 |
| Eye pain | 894,850 | 41,320 | 55.9% | 4.6% | 5,865 | 35,455 | 70.1% | 29.9% | 50.4% | 34.7% | 15.8% | 49.6% | 35.5% | 14.1% | 852,570 |
| Other - H11 - Other disorders of conjunctiva | 315,155 | 14,765 | 64.6% | 4.7% | 70 | 14,695 | 60.6% | 39.4% | 47.4% | 26.9% | 20.5% | 52.6% | 33.7% | 18.9% | 300,365 |
| Acute posterior vitreous detachment | 1,339,195 | 10,045 | 70.6% | 0.8% | 285 | 9,760 | 65.2% | 34.8% | 39.2% | 24.6% | 14.6% | 60.8% | 40.6% | 20.2% | 1,329,075 |
| Other - S00 - Superficial injury of head | 29,435 | 9,605 | 76.2% | 32.6% | 170 | 9,435 | 71.2% | 28.8% | 46.5% | 33.5% | 12.9% | 53.5% | 37.7% | 15.8% | 19,820 |
| Other - S05 - Injury of eye and orbit | 33,000 | 7,040 | 80.4% | 21.3% | 195 | 6,845 | 68.9% | 31.1% | 46.5% | 32.5% | 14.0% | 53.5% | 36.4% | 17.1% | 25,945 |
| Hordeolum | 371,965 | 6,675 | 84.4% | 1.8% | a/ | a/ | 61.7% | 38.3% | 32.7% | 18.0% | 14.8% | 67.3% | 43.7% | 23.5% | 365,290 |
| Other - H57 - Other disorders of eye and adnexa | 81,860 | 6,010 | 87.9% | 7.3% | a/ | a/ | 66.7% | 33.3% | 46.3% | 29.8% | 16.5% | 53.7% | 37.0% | 16.8% | 75,825 |
| Corneal injury | 1,075,880 | 5,070 | 90.9% | 0.5% | a/ | a/ | 64.7% | 35.3% | 39.4% | 24.7% | 14.6% | 60.6% | 40.0% | 20.7% | 1,070,705 |
| Other - T15 - Foreign body on external eye | 41,080 | 3,545 | 93.0% | 8.6% | a/ | a/ | 63.8% | 36.2% | 36.2% | 20.2% | 16.1% | 63.8% | 43.6% | 20.2% | 37,535 |
| Corneal injury with foreign body | 33,600 | 3,465 | 95.1% | 10.3% | a/ | a/ | 64.6% | 35.4% | 28.0% | 17.7% | 10.2% | 72.0% | 46.9% | 25.1% | 30,135 |
| Other - H33 - Retinal detachments and breaks | 188,320 | 1,295 | 95.8% | 0.7% | a/ | a/ | 56.9% | 43.1% | 53.0% | 28.9% | 24.1% | 47.0% | 28.1% | 19.0% | 187,010 |
| Other - H34 - Retinal vascular occlusions | 695,925 | 1,140 | 96.5% | 0.2% | a/ | a/ | 70.4% | 29.6% | 53.9% | 35.5% | 18.4% | 46.1% | 34.9% | 11.2% | 694,745 |
| Other - H02 - Other disorders of eyelid | 257,490 | 990 | 97.1% | 0.4% | a/ | a/ | 61.9% | 38.1% | 48.6% | 26.5% | 22.1% | 51.4% | 35.4% | 16.0% | 256,485 |

| Diagnosis Grouping | All events | With ED Involvement | | | Total Admitted to Hospital from ED | Total Discharged from ED | | | | | | | | | | Total Ambulatory Events with no ED Involvement |
|--|------------|---------------------------|---|-----------------------------|------------------------------------|--------------------------|----------------|---------|---|---------|---------|-----------------------|---------|---------|-----------|--|
| | | Total with ED Involvement | Cumulative Percent of ED-Avoidable Events | Percent with ED Involvement | | Total Discharged from ED | By Day of Week | | Percentage Discharged from ED by Prior Contact with Optometrist/Ophthalmologist and Day of Week | | | | | | | |
| | | | | | | | Weekday | Weekend | With prior contact | | | Without prior contact | | | | |
| | | | | | | | | | Total | Weekday | Weekend | Total | Weekday | Weekend | | |
| Other - H05 - Disorders of orbit | 17,915 | 930 | 97.6% | 5.2% | a/ | a/ | 67.3% | 32.7% | 43.4% | 25.7% | 17.7% | 56.6% | 41.6% | 15.0% | 16,845 | |
| Other - H40 - Glaucoma | 7,289,965 | 820 | 98.1% | 0.0% | a/ | a/ | 69.1% | 30.9% | 66.7% | 47.5% | 19.1% | 33.3% | 21.6% | 11.7% | 7,289,115 | |
| Other - Diabetes ¹ | 1,749,910 | 475 | 98.4% | 0.0% | a/ | a/ | 77.3% | 22.7% | 64.8% | 54.5% | 10.2% | 35.2% | 22.7% | 12.5% | 1,749,415 | |
| Other - H54 - Blindness and low vision | 31,330 | 460 | 98.7% | 1.5% | a/ | a/ | 72.2% | 27.8% | 50.0% | 36.1% | 13.9% | 50.0% | 36.1% | 13.9% | 30,835 | |
| Other - H21 - Other disorders of iris and ciliary body | 21,540 | 365 | 98.9% | 1.7% | a/ | a/ | 55.9% | 44.1% | 63.2% | 38.2% | 25.0% | 36.8% | 17.6% | 19.1% | 21,170 | |
| Other - G43 - Migraine | 5,975 | 355 | 99.1% | 5.9% | a/ | a/ | 71.6% | 28.4% | 28.4% | 19.4% | 9.0% | 71.6% | 52.2% | 19.4% | 5,615 | |
| Other - H35 - Other retinal disorders | 6,128,670 | 275 | 99.3% | 0.0% | a/ | a/ | 72.5% | 27.5% | 62.7% | 45.1% | 17.6% | 37.3% | 27.5% | 9.8% | 6,128,390 | |
| Other - B02 - Zoster [herpes zoster] | 6,165 | 270 | 99.4% | 4.4% | a/ | a/ | 54.5% | 45.5% | 34.1% | 15.9% | 18.2% | 65.9% | 38.6% | 27.3% | 5,875 | |
| Other - H47 - Other disorders of optic [2nd] nerve and visual pathways | 194,445 | 170 | 99.5% | 0.1% | a/ | a/ | 73.9% | 26.1% | b/ | c/ | c/ | b/ | 34.8% | 21.7% | 194,255 | |
| Other - H55 - Nystagmus and Other irregular eye movements | 10,420 | 170 | 99.6% | 1.6% | a/ | a/ | 76.7% | 23.3% | b/ | c/ | c/ | b/ | 46.7% | 13.3% | 10,245 | |
| Other - H04 - Disorders of lacrimal system | 61,360 | 125 | 99.7% | 0.2% | a/ | a/ | 45.5% | 54.5% | b/ | c/ | c/ | b/ | c/ | c/ | 61,230 | |
| Other - H25 - Age-related cataract | 2,595,110 | 115 | 99.8% | 0.0% | a/ | a/ | 100.0% | 0.0% | b/ | c/ | c/ | b/ | c/ | c/ | 2,594,995 | |

¹ Includes type 1 and type 2 diabetes.

| Diagnosis Grouping | All events | With ED Involvement | | | Total Admitted to Hospital from ED | Total Discharged from ED | | | | | | | | | Total Ambulatory Events with no ED Involvement |
|--|------------|---------------------------|---|-----------------------------|------------------------------------|--------------------------|----------------|---------|---|---------|---------|-----------------------|---------|---------|--|
| | | Total with ED Involvement | Cumulative Percent of ED-Avoidable Events | Percent with ED Involvement | | Total Discharged from ED | By Day of Week | | Percentage Discharged from ED by Prior Contact with Optometrist/Ophthalmologist and Day of Week | | | | | | |
| | | | | | | | Weekday | Weekend | With prior contact | | | Without prior contact | | | |
| | | | | | | | | | Total | Weekday | Weekend | Total | Weekday | Weekend | |
| Other - H01 - Other inflammation of eyelid | 162,905 | 115 | 99.8% | 0.1% | a/ | a/ | 43.5% | 56.5% | b/ | c/ | c/ | b/ | 30.4% | 21.7% | 162,790 |
| Other - B30 - Viral conjunctivitis | 6,520 | 105 | 99.9% | 1.6% | a/ | a/ | 61.9% | 38.1% | b/ | c/ | c/ | b/ | 42.9% | 19.0% | 6,415 |
| Other - Fewer than 100 ED events | 502,885 | 165 | 100.0% | 0.0% | a/ | a/ | 82.1% | 17.9% | b/ | c/ | c/ | b/ | 57.1% | 7.1% | 502,690 |

SOURCE: CY 2017 20-percent claims sample. All numbers are inflated to reflect total population (i.e., sample counts are multiplied by 5).

NOTES: a/ Cell values are suppressed because fewer than 11 sample cases were admitted.

b/ Cell values are suppressed if fewer than 11 sample cases were observed in either total category.

c/ Cell values are suppressed if fewer than 11 total sample cases were observed.

Prior contact means that the beneficiary had a Medicare FFS claim with an ophthalmologist or optometrist 30-365 days prior to the ED event, based on CY 2016 and CY 2017 claims.

Note that only selected diagnosis codes in a broad ICD-10 category are included in the tabulation. See Appendix C for a list of included diagnoses in each grouping.

Exhibit 3. Counts of submitter-specified eye-related events among FFS Medicare beneficiaries occurring in ambulatory settings without Emergency Department involvement, CY 2017, by provider type and principal diagnosis group

| | Principal Diagnosis Group | | | | | | | |
|---|---------------------------|-------------------------------------|----------------|----------------|----------------------------------|----------|-----------|------------|
| | All Selected diagnoses | Acute Posterior Vitreous Detachment | Conjunctivitis | Corneal Injury | Corneal Injury With Foreign Body | Eye Pain | Hordeolum | Other |
| All providers (unique NPIs) | | | | | | | | |
| Number of providers with at least one event | 193,716 | 43,046 | 74,972 | 31,506 | 4,339 | 60,583 | 31,056 | 116,116 |
| Number of events | 25,042,165 | 1,329,075 | 1,016,780 | 1,070,705 | 30,135 | 852,570 | 365,290 | 20,377,610 |
| Percent of total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Mean events per provider | 129 | 31 | 14 | 34 | 7 | 14 | 12 | 175 |
| Maximum events per provider | 33,630 | 4,145 | 2,385 | 2,100 | 570 | 1,875 | 370 | 33,630 |
| 75th percentile of events per provider | 30 | 30 | 15 | 35 | 5 | 10 | 10 | 85 |
| Median events per provider | 10 | 10 | 5 | 15 | 5 | 5 | 5 | 10 |
| 25th percentile of events per provider | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Ophthalmologists (unique NPIs) | | | | | | | | |
| Number of providers with at least one event | 17,034 | 13,221 | 10,927 | 11,279 | 1,752 | 11,206 | 8,648 | 16,634 |
| Number of events | 16,458,940 | 797,200 | 315,700 | 602,250 | 13,260 | 324,550 | 176,665 | 14,229,315 |
| Percent of total | 66% | 60% | 31% | 56% | 44% | 38% | 48% | 70% |
| Mean events per provider | 966 | 60 | 29 | 53 | 8 | 29 | 20 | 855 |
| Maximum events per provider | 10,085 | 4,145 | 2,025 | 2,100 | 570 | 1,875 | 370 | 9,580 |
| 75th percentile of events per provider | 1,340 | 75 | 35 | 60 | 10 | 30 | 25 | 1,180 |
| Median events per provider | 640 | 35 | 15 | 25 | 5 | 15 | 15 | 520 |
| 25th percentile of events per provider | 230 | 15 | 10 | 10 | 5 | 5 | 5 | 180 |
| Optometrists (unique NPIs) | | | | | | | | |
| Number of providers with at least one event | 29,785 | 17,591 | 16,744 | 15,457 | 1,857 | 11,629 | 9,063 | 28,108 |
| Number of events | 5,302,125 | 386,715 | 311,140 | 398,860 | 12,700 | 224,580 | 102,585 | 3,865,545 |
| Percent of total | 21% | 29% | 31% | 37% | 42% | 26% | 28% | 19% |
| Mean events per provider | 178 | 22 | 19 | 26 | 7 | 19 | 11 | 138 |
| Maximum events per provider | 4,560 | 830 | 730 | 1,170 | 45 | 1,750 | 340 | 3,905 |
| 75th percentile of events per provider | 220 | 25 | 20 | 25 | 10 | 15 | 15 | 165 |
| Median events per provider | 90 | 10 | 10 | 10 | 5 | 10 | 5 | 65 |
| 25th percentile of events per provider | 30 | 5 | 5 | 5 | 5 | 5 | 5 | 20 |
| PCPs (unique NPIs) | | | | | | | | |
| Number of providers with at least one event | 88,588 | 5,032 | 41,063 | 1,544 | 378 | 19,088 | 11,110 | 36,035 |
| Number of events | 863,490 | 36,125 | 304,575 | 11,525 | 2,070 | 121,345 | 64,555 | 323,295 |
| Percent of total | 3% | 3% | 30% | 1% | 7% | 14% | 18% | 2% |
| Mean events per provider | 10 | 7 | 7 | 7 | 5 | 6 | 6 | 9 |
| Maximum events per provider | 2,415 | 245 | 210 | 370 | 95 | 130 | 115 | 2,300 |
| 75th percentile of events per provider | 10 | 5 | 10 | 5 | 5 | 5 | 5 | 10 |

| | Principal Diagnosis Group | | | | | | | |
|---|---------------------------|-------------------------------------|----------------|----------------|----------------------------------|----------|-----------|-----------|
| | All Selected diagnoses | Acute Posterior Vitreous Detachment | Conjunctivitis | Corneal Injury | Corneal Injury With Foreign Body | Eye Pain | Hordeolum | Other |
| Median events per provider | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 25th percentile of events per provider | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| All other (unique NPIs) | | | | | | | | |
| Number of providers with at least one event | 58,309 | 7,202 | 6,238 | 3,226 | 352 | 18,660 | 2,235 | 35,339 |
| Number of events | 2,417,610 | 109,035 | 85,365 | 58,070 | 2,105 | 182,095 | 21,485 | 1,959,455 |
| Percent of total | 10% | 8% | 8% | 5% | 7% | 21% | 6% | 10% |
| Mean events per provider | 41 | 15 | 14 | 18 | 6 | 10 | 10 | 55 |
| Maximum events per provider | 33,630 | 800 | 2,385 | 950 | 70 | 1,790 | 210 | 33,630 |
| 75th percentile of events per provider | 15 | 15 | 10 | 15 | 5 | 10 | 10 | 15 |
| Median events per provider | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 25th percentile of events per provider | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

SOURCE: CY 2017 20-percent claims sample. All numbers are inflated to reflect total population (i.e., sample counts are multiplied by 5).

See Appendix C for a list of ICD-10 diagnosis codes in each diagnosis group.

NOTES: Ambulatory settings include practitioner offices, hospital outpatient departments, Federally-Qualified Health Centers, and nursing homes.

Note that because this table is based on a 20-percent sample, even with adjustment to national totals, some providers with a small number of claims will not appear in the sample. Their absence decreases the number of providers, and sampling likely skews the distribution of events upward to an unknown extent.

Appendix A. Measures used in the analysis

Provider

Providers of service were identified using the National Provider Identifier (NPI) on the claim. For claims submitted using the CMS-1500 form (“carrier claims”), the NPI identified at the line level as the performing provider was used. For claims submitted using the UB-04 form (“facility claims”), a hierarchy of choice was employed. If present, the rendering provider at the revenue center level was used. If no rendering provider was listed, the “other provider” from the claim header was used. If neither of these was listed, the NPI of the “operating provider” from the claim header was used. If none of these was listed, the NPI of the “attending provider” from the claim header was used.

Because of the way in which Medicare carrier claims are processed, it is possible for a provider to be an organization—in this analysis, for example, “a laboratory that operates independently of a hospital and physician's office to furnish physiological diagnostic services.”

Provider specialty

For carrier claims, the two-character CMS specialty code of the performing provider was used. This code is 18 for optometrists and 41 for ophthalmologists.

For facility claims, the provider specialty code is not populated in the 20-percent sample files. Therefore, provider specialty was determined using the provider taxonomy codes in the National Plan and Provider Enumeration System (NPPES). The self-identified primary taxonomy code and the two rightmost codes of the potential 15 contained in the NPPES record were used to identify the provider specialty at the NPI level for optometry and ophthalmology, and the primary taxonomy code was used for all other providers. This taxonomy code was translated to the two-character CMS specialty code using the CMS crosswalk table (see Appendix B below).

PCPs were identified using the primary taxonomy code and rightmost two taxonomy codes in NPPES, using the taxonomy list developed for the CPC+ and Primary Care First models (see Appendix B).

Event

An event was defined as a unique combination of beneficiary, performing provider, service date, and principal claim diagnosis. Thus, a beneficiary seen by a PCP and referred to a specialist on the same day would generate two events; a beneficiary seen in an ED and admitted on the same day would generate one event. Specifically, the table de-duplicates events both within and across claims.

Facility

Inpatient and outpatient claims were extracted based on admitting diagnosis code (for inpatient claims) or principal diagnosis code (for outpatient claims). Use of ED services was indicated by the presence of a revenue center code between 0450 and 0459 inclusive.

To remove same-day services, these claims were arranged by the from-date of the claim, with preference given to ED claims and then to outpatient claims.

Carrier

Carrier claims were extracted based on the principal claim diagnosis code. Within a claim, line items that duplicated the performing provider and service date were removed. Most hospital outpatient events result in a facility claim and a carrier claim, so lines whose service dates coincided with a facility claim were removed to avoid double-counting the event.

Event diagnosis codes

The basic list of conditions and related ICD-10 diagnosis codes came from the applicant’s proposal (Table B1). However, the applicant’s table did not appear to include all possible related diagnosis codes: for example, the table included H40.1110 (Primary open-angle glaucoma, right eye, stage unspecified), but not H40.1111 (... , mild stage), H40.1112 (... , moderate stage), H40.1113 (... , severe stage) or H40.1114 (... , indeterminate stage). Therefore, the original list was expanded to include codes that appeared to be relevant but were not on the list. In addition, the submitter’s Table B1 included three codes that appeared not to be related to eye conditions, and one code that contained a typographical error; the first three codes were dropped and the fourth code was corrected. The final list of diagnosis codes, including the diagnosis group to which they were assigned, is included as Appendix C.

Appendix B. Provider taxonomy codes

Provider taxonomy codes were used in this analysis for two reasons. First, the 20-percent sample of outpatient claims does not include the two-character provider specialty code assigned by CMS. To fill in that field, the claim’s attending, operating, “other,” or rendering NPI was matched to the NPPES to find the listed specialty taxonomy. That taxonomy code was then cross-walked to the two-character CMS provider specialty code. Second, the definition of PCP used for the CPC+ and Primary Care First models and used here as well, relies upon taxonomy codes rather than specialty codes. In NPPES, as many as 15 taxonomy codes can be ascribed to any given NPI, and one such code can be self-defined as the primary code; typically, the codes are entered in chronological order. The primary taxonomy code and the final two codes were examined to identify optometrists, ophthalmologists, and PCPs, as summarized below.

| | |
|--------------------------|--|
| Optometrists: | |
| 152W00000X | Optometrist |
| 152WC0802X | Optometrist, Corneal and Contact Management |
| 152WL0500X | Optometrist, Low Vision Rehabilitation |
| 152WX0102X | Optometrist, Occupational Vision |
| 152WP0200X | Optometrist, Pediatrics |
| 152WS0006X | Optometrist, Sports Vision |
| 152WV0400X | Optometrist, Vision Therapy |
| Ophthalmologists: | |
| 207W00000X | Ophthalmology |
| 207WX0009X | Ophthalmology, Glaucoma Specialist |
| 207WX0107X | Ophthalmology, Retina Specialist |
| 207WX0108X | Ophthalmology, Uveitis and Ocular Inflammatory Disease |
| 207WX0109X | Ophthalmology, Neuro-ophthalmology |
| 207WX0110X | Ophthalmology, Pediatric Ophthalmology and Strabismus Specialist |

| | |
|------------|--|
| 207WX0120X | Ophthalmology, Cornea and External Diseases Specialist |
| 207WX0200X | Ophthalmology, Ophthalmic Plastic and Reconstructive Surgery |
| PCPs: | |
| 207Q00000X | Family Medicine |
| 207QA0505X | Family Medicine, Adult Medicine |
| 207QG0300X | Family Medicine, Geriatric Medicine |
| 207QH0002X | Family Medicine, Hospice and Palliative Medicine |
| 208D00000X | General Practice |
| 207R00000X | Internal Medicine |
| 207RG0300X | Internal Medicine, Geriatric Medicine |
| 207RH0002X | Internal Medicine, Hospice and Palliative Medicine |
| 364S00000X | Clinical Nurse Specialist |
| 364SA2100X | Clinical Nurse Specialist, Acute Care |
| 364SA2200X | Clinical Nurse Specialist, Adult Health |
| 364SC2300X | Clinical Nurse Specialist, Chronic Care |
| 364SC1501X | Clinical Nurse Specialist, Community Health/Public Health |
| 364SF0001X | Clinical Nurse Specialist, Family Health |
| 364SG0600X | Clinical Nurse Specialist, Gerontology |
| 364SH1100X | Clinical Nurse Specialist, Holistic |
| 364SW0102X | Clinical Nurse Specialist, Women's Health |
| 363L00000X | Nurse Practitioner |
| 363LA2100X | Nurse Practitioner, Acute Care |
| 363LA2200X | Nurse Practitioner, Adult Health |
| 363LC1500X | Nurse Practitioner, Community Health |
| 363LF0000X | Nurse Practitioner, Family |
| 363LG0600X | Nurse Practitioner, Gerontology |
| 363LP2300X | Nurse Practitioner, Primary Care |
| 363LW0102X | Nurse Practitioner, Women's Health |
| 363A00000X | Physician Assistant |
| 363AM0700X | Physician Assistant, Medical |

Appendix C. Diagnostic codes used to identify eye conditions

The submitter’s proposal included a number of conditions it identified as ED-avoidable. In Table B1 of the proposal, the submitter included ICD-10 diagnosis codes associated with these conditions. This analysis began with the list of ICD-10 codes in Table B1 and then augmented this list to include codes for diagnoses that appear to be highly related (e.g., condition for right or left eye rather than for unspecified eye). The list of diagnosis codes is given below.

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-------------------------------------|---|
| G43.109 | ACUTE POSTERIOR VITREOUS DETACHMENT | Migraine with aura, not intractable, without status migrainosus |
| H43.10 H43.11 H43.12 H43.13 | ACUTE POSTERIOR VITREOUS DETACHMENT | Vitreous hemorrhage, unspecified eye |
| H43.20 H43.21 H43.22 | ACUTE POSTERIOR VITREOUS DETACHMENT | Crystalline deposits in vitreous body, unspecified eye |
| H43.311 H43.312 H43.313 | ACUTE POSTERIOR VITREOUS DETACHMENT | Vitreous membranes and strands, right eye |
| H43.391 H43.392 H43.393 H43.399 | ACUTE POSTERIOR VITREOUS DETACHMENT | Other vitreous opacities, right eye |
| H43.811 H43.812 H43.813 H43.819 | ACUTE POSTERIOR VITREOUS DETACHMENT | Vitreous degeneration, right eye |
| H43.821 H43.822 H43.823 H43.829 | ACUTE POSTERIOR VITREOUS DETACHMENT | Vitreomacular adhesion, right eye |
| H43.89 | ACUTE POSTERIOR VITREOUS DETACHMENT | Other disorders of vitreous body |
| H43.9 | ACUTE POSTERIOR VITREOUS DETACHMENT | Unspecified disorder of vitreous body |
| H10.01 H10.011 H10.012 H10.013 H10.019 | CONJUNCTIVITIS | Acute follicular conjunctivitis |
| H10.02 H10.021 H10.022 H10.023 H10.029 | CONJUNCTIVITIS | Other mucopurulent conjunctivitis |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|----------------|--|
| H10.1 H10.10 H10.11 H10.12 H10.13 | CONJUNCTIVITIS | Acute atopic conjunctivitis |
| H10.2 | CONJUNCTIVITIS | Other acute conjunctivitis |
| H10.21 H10.211 H10.212 H10.213 H10.219 | CONJUNCTIVITIS | Acute toxic conjunctivitis |
| H10.22 H10.221 H10.222 H10.223 H10.229 | CONJUNCTIVITIS | Pseudomembranous conjunctivitis |
| H10.23 H10.231 H10.232 H10.233 H10.239 | CONJUNCTIVITIS | Serous conjunctivitis, except viral |
| H10.3 H10.30 H10.31 H10.32 H10.33 | CONJUNCTIVITIS | Unspecified acute conjunctivitis |
| H10.4 H10.40 H10.401 H10.402 H10.403 H10.409 | CONJUNCTIVITIS | Chronic conjunctivitis |
| H10.41 H10.411 H10.412 H10.413 H10.419 | CONJUNCTIVITIS | Chronic giant papillary conjunctivitis |
| H10.42 H10.421 H10.422 H10.423 H10.429 | CONJUNCTIVITIS | Simple chronic conjunctivitis |
| H10.43 H10.431 H10.432 H10.433 H10.439 | CONJUNCTIVITIS | Chronic follicular conjunctivitis |
| H10.44 | CONJUNCTIVITIS | Vernal conjunctivitis |
| H10.45 | CONJUNCTIVITIS | Other chronic allergic conjunctivitis |
| H10.5 | CONJUNCTIVITIS | Blepharoconjunctivitis |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|----------------|---|
| H10.50 H10.501 H10.502 H10.503 H10.509 | CONJUNCTIVITIS | Unspecified blepharoconjunctivitis |
| H10.52 H10.521 H10.522 H10.523 H10.529 | CONJUNCTIVITIS | Angular blepharoconjunctivitis |
| H10.53 H10.531 H10.532 H10.533 H10.539 | CONJUNCTIVITIS | Contact blepharoconjunctivitis |
| H10.81 H10.811 H10.812 H10.813 H10.819 | CONJUNCTIVITIS | Pingueculitis |
| H10.89 | CONJUNCTIVITIS | Other conjunctivitis |
| H10.9 | CONJUNCTIVITIS | Unspecified conjunctivitis |
| S05.0 S05.00 S05.00XA S05.00XD S05.00XS S05.01 S05.01XA S05.01XD S05.01XS S05.02 S05.02XA S05.02XD S05.02XS | CONJUNCTIVITIS | Injury of conjunctiva and corneal abrasion without foreign body |
| S05.1 S05.10 S05.10XD S05.10XS S05.11 S05.11XD S05.12 S05.12XD | CONJUNCTIVITIS | Contusion of eyeball and orbital tissues |
| B00.52 | CORNEAL INJURY | Herpesviral keratitis |
| B02.33 | CORNEAL INJURY | Zoster keratitis |
| H16.00 H16.001 H16.002 H16.003 H16.009 | CORNEAL INJURY | Unspecified corneal ulcer |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|------------------|-----------------------------------|
| H16.01 H16.011 H16.012 H16.013 H16.019 | CORNEAL INJURY | Central corneal ulcer |
| H16.02 H16.021 H16.022 H16.023 H16.029 | CORNEAL INJURY | Ring corneal ulcer |
| H16.03 H16.031 H16.032 H16.033 H16.039 | CORNEAL INJURY | Corneal ulcer with hypopyon |
| H16.04 H16.041 H16.042 H16.043 H16.049 | CORNEAL INJURY | Marginal corneal ulcer |
| H16.07 H16.071 H16.072 H16.073 H16.079 | CORNEAL INJURY | Perforated corneal ulcer |
| H16.10 H16.101 H16.102 H16.103 H16.109 | CORNEAL INJURY | Unspecified superficial keratitis |
| H16.11 H16.111 H16.112 H16.113 H16.119 | CORNEAL INJURY | Macular keratitis |
| H16.12 H16.121 H16.122 H16.123 H16.129 | CORNEAL INJURY | Filamentary keratitis |
| H16.13 H16.131 H16.132 H16.133 H16.139 | CORNEAL INJURY | Photokeratitis |
| H16.14 H16.141 H16.142 H16.143 H16.149 | CORNEAL INJURY | Punctate keratitis |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|----------------|--|
| H16.2 | CORNEAL INJURY | Keratoconjunctivitis |
| H16.20 H16.201 H16.202 H16.203 H16.209 | CORNEAL INJURY | Unspecified keratoconjunctivitis |
| H16.21 H16.211 H16.212 H16.213 H16.219 | CORNEAL INJURY | Exposure keratoconjunctivitis |
| H16.22 H16.221 H16.222 H16.223 H16.229 | CORNEAL INJURY | Keratoconjunctivitis sicca, not specified as Sjogrens |
| H16.23 H16.231 H16.232 H16.233 H16.239 | CORNEAL INJURY | Neurotrophic keratoconjunctivitis |
| H16.25 H16.251 H16.252 H16.253 H16.259 | CORNEAL INJURY | Phlyctenular keratoconjunctivitis |
| H16.26 H16.261 H16.262 H16.263 H16.269 | CORNEAL INJURY | Vernal keratoconjunctivitis, with limbar and corneal involvement |
| H16.29 H16.291 H16.292 H16.293 H16.299 | CORNEAL INJURY | Other keratoconjunctivitis |
| H16.3 | CORNEAL INJURY | Interstitial and deep keratitis |
| H16.30 H16.301 H16.302 H16.303 H16.309 | CORNEAL INJURY | Unspecified interstitial keratitis |
| H16.31 H16.311 H16.312 H16.313 H16.319 | CORNEAL INJURY | Corneal abscess |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|----------------|---|
| H16.32 H16.321 H16.322 H16.323 H16.329 | CORNEAL INJURY | Diffuse interstitial keratitis |
| H16.39 H16.391 H16.392 H16.393 H16.399 | CORNEAL INJURY | Other interstitial and deep keratitis |
| H16.8 | CORNEAL INJURY | Other keratitis |
| H16.9 | CORNEAL INJURY | Unspecified keratitis |
| H18.00 H18.001 H18.002 H18.003 H18.009 | CORNEAL INJURY | Unspecified corneal deposit |
| H18.01 | CORNEAL INJURY | Anterior corneal pigmentations |
| H18.04 | CORNEAL INJURY | Kayser-Fleischer ring |
| H18.1 H18.10 H18.11 H18.12 H18.13 | CORNEAL INJURY | Bullous keratopathy |
| H18.2 | CORNEAL INJURY | Other and unspecified corneal edema |
| H18.20 | CORNEAL INJURY | Unspecified corneal edema |
| H18.21 H18.211 H18.212 H18.213 H18.219 | CORNEAL INJURY | Corneal edema secondary to contact lens |
| H18.22 H18.221 H18.222 H18.223 H18.229 | CORNEAL INJURY | Idiopathic corneal edema |
| H18.23 H18.231 H18.232 H18.233 H18.239 | CORNEAL INJURY | Secondary corneal edema |
| H18.30 | CORNEAL INJURY | Unspecified corneal membrane change |
| H18.32 H18.321 H18.322 H18.323 H18.329 | CORNEAL INJURY | Folds in Descemets membrane |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|----------------|---|
| H18.33 H18.331 H18.332 H18.333 H18.339 | CORNEAL INJURY | Rupture in Descemets membrane |
| H18.40 | CORNEAL INJURY | Unspecified corneal degeneration |
| H18.41 H18.411 H18.412 H18.413 H18.419 | CORNEAL INJURY | Arcus senilis |
| H18.42 H18.421 H18.422 H18.423 H18.429 | CORNEAL INJURY | Band keratopathy |
| H18.45 H18.451 H18.452 H18.453 H18.459 | CORNEAL INJURY | Nodular corneal degeneration |
| H18.46 H18.461 H18.462 H18.463 H18.469 | CORNEAL INJURY | Peripheral corneal degeneration |
| H18.49 | CORNEAL INJURY | Other corneal degeneration |
| H18.60 H18.601 H18.602 H18.603 H18.609 | CORNEAL INJURY | Keratoconus, unspecified |
| H18.61 H18.611 H18.612 H18.613 H18.619 | CORNEAL INJURY | Keratoconus, stable |
| H18.62 H18.621 H18.622 H18.623 H18.629 | CORNEAL INJURY | Keratoconus, unstable |
| H18.7 | CORNEAL INJURY | Other and unspecified corneal deformities |
| H18.70 | CORNEAL INJURY | Unspecified corneal deformity |
| H18.71 H18.711 H18.712 H18.713 H18.719 | CORNEAL INJURY | Corneal ectasia |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|----------------------------------|--------------------------------------|
| H18.72 H18.721 H18.722 H18.723 H18.729 | CORNEAL INJURY | Corneal staphyloma |
| H18.73 H18.731 H18.732 H18.733 H18.739 | CORNEAL INJURY | Descemetocele |
| H18.79 H18.791 H18.792 H18.793 H18.799 | CORNEAL INJURY | Other corneal deformities |
| H18.82 H18.821 H18.822 H18.823 H18.829 | CORNEAL INJURY | Corneal disorder due to contact lens |
| H18.89 H18.891 H18.892 H18.893 H18.899 | CORNEAL INJURY | Other specified disorders of cornea |
| H18.9 | CORNEAL INJURY | Unspecified disorder of cornea |
| T26.1 T26.10 T26.10XA T26.10XD T26.10XS T26.11 T26.11XA T26.11XD T26.11XS T26.12 T26.12XA T26.12XD T26.12XS | CORNEAL INJURY | Burn of cornea and conjunctival sac |
| T15. | CORNEAL INJURY WITH FOREIGN BODY | Foreign body on external eye |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|----------------------------------|--|
| T15.0 T15.00 T15.00XA T15.00XD T15.00XS T15.01 T15.01XA T15.01XD T15.01XS T15.02 T15.02XA T15.02XD T15.02XS | CORNEAL INJURY WITH FOREIGN BODY | Foreign body in cornea |
| H40.21 H40.211 H40.212 H40.213 H40.219 | EYE PAIN | Acute angle-closure glaucoma |
| H53.00 H53.001 H53.002 H53.003 H53.009 | EYE PAIN | Unspecified amblyopia |
| H53.02 H53.021 H53.022 H53.023 H53.029 | EYE PAIN | Refractive amblyopia |
| H53.03 H53.031 H53.032 H53.033 H53.039 | EYE PAIN | Strabismic amblyopia |
| H53.10 | EYE PAIN | Unspecified subjective visual disturbances |
| H53.12 H53.121 H53.122 H53.123 H53.129 | EYE PAIN | Transient visual loss |
| H53.13 H53.131 H53.132 H53.133 H53.139 | EYE PAIN | Sudden visual loss |
| H53.14 H53.141 H53.142 H53.143 H53.149 | EYE PAIN | Visual discomfort |
| H53.15 | EYE PAIN | Visual distortions of shape and size |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|---|
| H53.16 | EYE PAIN | Psychophysical visual disturbances |
| H53.19 | EYE PAIN | Other subjective visual disturbances |
| H53.2 | EYE PAIN | Diplopia |
| H53.30 | EYE PAIN | Unspecified disorder of binocular vision |
| H53.33 | EYE PAIN | Simultaneous visual perception without fusion |
| H53.34 | EYE PAIN | Suppression of binocular vision |
| H53.4 | EYE PAIN | Visual field defects |
| H53.40 | EYE PAIN | Unspecified visual field defects |
| H53.41 H53.411 H53.412 H53.413 H53.419 | EYE PAIN | Scotoma involving central area |
| H53.42 H53.421 H53.422 H53.423 H53.429 | EYE PAIN | Scotoma of blind spot area |
| H53.43 H53.431 H53.432 H53.433 H53.439 | EYE PAIN | Sector or arcuate defects |
| H53.45 H53.451 H53.452 H53.453 H53.459 | EYE PAIN | Other localized visual field defect |
| H53.46 H53.461 H53.462 H53.469 | EYE PAIN | Homonymous bilateral field defects |
| H53.47 | EYE PAIN | Heteronymous bilateral field defects |
| H53.48 H53.481 H53.482 H53.483 H53.489 | EYE PAIN | Generalized contraction of visual field |
| H53.50 | EYE PAIN | Unspecified color vision deficiencies |
| H53.52 | EYE PAIN | Acquired color vision deficiency |
| H53.59 | EYE PAIN | Other color vision deficiencies |
| H53.60 | EYE PAIN | Unspecified night blindness |
| H53.63 | EYE PAIN | Congenital night blindness |
| H53.7 | EYE PAIN | Vision sensitivity deficiencies |
| H53.71 | EYE PAIN | Glare sensitivity |
| H53.72 | EYE PAIN | Impaired contrast sensitivity |
| H53.8 | EYE PAIN | Other visual disturbances |
| H53.9 | EYE PAIN | Unspecified visual disturbance |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|---|
| H57.1 H57.10 H57.11 H57.12 H57.13 | EYE PAIN | Ocular pain |
| S00.21 S00.211 S00.211A S00.211D S00.211S S00.212 S00.212A S00.212D S00.212S S00.219 S00.219A S00.219D S00.219S | EYE PAIN | Abrasion of eyelid and periocular area |
| H00.011 H00.012 H00.013 H00.014 H00.015 H00.016 H00.019 | HORDEOLUM | Hordeolum externum |
| H00.021 H00.022 H00.023 H00.024 H00.025 H00.026 H00.029 | HORDEOLUM | Hordeolum internum |
| H00.11 H00.12 H00.13 H00.14 H00.15 H00.16 H00.19 | HORDEOLUM | Chalazion |
| A54.31 | OTHER | Gonococcal conjunctivitis |
| B00.53 | OTHER | Herpesviral conjunctivitis |
| B02.31 | OTHER | Zoster conjunctivitis |
| B30.1 | OTHER | Conjunctivitis due to adenovirus |
| B30.3 | OTHER | Acute epidemic hemorrhagic conjunctivitis (enteroviral) |
| B39.9 | OTHER | Histoplasmosis, unspecified |
| B58.01 | OTHER | Toxoplasma chorioretinitis |
| C44.11 C44.111 C44.112 C44.119 | OTHER | Basal cell carcinoma of skin of eyelid, including canthus |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|--|
| D23.1 D23.10 D23.11 D23.12 | OTHER | Other benign neoplasm of skin of eyelid, including canthus |
| D31.0 D31.00 D31.01 D31.02 | OTHER | Benign neoplasm of conjunctiva |
| D31.3 D31.30 D31.31 D31.32 | OTHER | Benign neoplasm of choroid |
| D31.4 D31.40 D31.41 D31.42 | OTHER | Benign neoplasm of ciliary body |
| E10.31 E10.311 E10.319 E10.32 E10.321 E10.3211 E10.3212 E10.3213 E10.3219 E10.329 E10.3291 E10.3292 E10.3293 E10.3299 E10.33 E10.331 E10.3311 E10.3312 E10.3313 E10.3319 E10.339 E10.3391 E10.3392 E10.3393 E10.3399 E10.34 E10.341 E10.3411 E10.3412 E10.3413 E10.3419 E10.349 | OTHER | Type 1 diabetes mellitus with diabetic retinopathy |

| ICD-10 code | Condition | Diagnosis Code Description |
|-------------|-----------|----------------------------|
| E10.3491 | | |
| E10.3492 | | |
| E10.3493 | | |
| E10.3499 | | |
| E10.35 | | |
| E10.351 | | |
| E10.3511 | | |
| E10.3512 | | |
| E10.3513 | | |
| E10.3519 | | |
| E10.352 | | |
| E10.3521 | | |
| E10.3522 | | |
| E10.3523 | | |
| E10.3529 | | |
| E10.353 | | |
| E10.3531 | | |
| E10.3532 | | |
| E10.3533 | | |
| E10.3539 | | |
| E10.354 | | |
| E10.3541 | | |
| E10.3542 | | |
| E10.3543 | | |
| E10.3549 | | |
| E10.355 | | |
| E10.3551 | | |
| E10.3552 | | |
| E10.3553 | | |
| E10.3559 | | |
| E10.359 | | |
| E10.3591 | | |
| E10.3592 | | |
| E10.3593 | | |
| E10.3599 | | |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|--|
| E11.31 E11.311 E11.319 E11.32 E11.321 E11.3211 E11.3212 E11.3213 E11.3219 E11.329 E11.3291 E11.3292 E11.3293 E11.3299 E11.33 E11.331 E11.3311 E11.3312 E11.3313 E11.3319 E11.339 E11.3391 E11.3392 E11.3393 E11.3399 E11.34 E11.341 E11.3411 E11.3412 E11.3413 E11.3419 E11.349 E11.3491 E11.3492 E11.3493 E11.3499 E11.35 E11.351 E11.3511 E11.3512 E11.3513 E11.3519 E11.352 E11.3521 E11.3522 E11.3523 E11.3529 | OTHER | Type 2 diabetes mellitus with diabetic retinopathy |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|--|
| E11.353 E11.3531 E11.3532 E11.3533 E11.3539 E11.354 E11.3541 E11.3542 E11.3543 E11.3549 E11.355 E11.3551 E11.3552 E11.3553 E11.3559 E11.359 E11.3591 E11.3592 E11.3593 E11.3599 | | |
| G43.10 | OTHER | Migraine with aura, not intractable |
| G43.101 | OTHER | Migraine with aura, not intractable, with status migrainosus |
| H00.01 | OTHER | Hordeolum externum |
| H00.02 | OTHER | Hordeolum internum |
| H00.1 | OTHER | Chalazion |
| H01.02 H01.021 H01.022 H01.023 H01.024 H01.025 H01.026 H01.029 | OTHER | Squamous blepharitis |
| H01.11 H01.111 H01.112 H01.113 H01.114 H01.115 H01.116 H01.119 | OTHER | Allergic dermatitis of eyelid |
| H02.01 H02.011 H02.012 H02.013 H02.014 H02.015 H02.016 H02.019 | OTHER | Cicatricial entropion of eyelid |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|-------------------------------------|
| H02.03 H02.031 H02.032 H02.033 H02.034 H02.035 H02.036 H02.039 | OTHER | Senile entropion of eyelid |
| H02.05 H02.051 H02.052 H02.053 H02.054 H02.055 H02.056 H02.059 | OTHER | Trichiasis without entropion |
| H02.13 H02.131 H02.132 H02.133 H02.134 H02.135 H02.136 H02.139 | OTHER | Senile ectropion of eyelid |
| H02.6 H02.60 H02.61 H02.62 H02.63 H02.64 H02.65 H02.66 | OTHER | Xanthelasma of eyelid |
| H02.84 H02.841 H02.842 H02.843 H02.844 H02.845 H02.846 H02.849 | OTHER | Edema of eyelid |
| H02.89 | OTHER | Other specified disorders of eyelid |
| H04.21 H04.211 H04.212 H04.213 H04.219 | OTHER | Epiphora due to excess lacrimation |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|--|
| H04.22 H04.221 H04.222 H04.223 H04.229 | OTHER | Epiphora due to insufficient drainage |
| H04.32 H04.321 H04.322 H04.323 H04.329 | OTHER | Acute dacryocystitis |
| H04.54 H04.541 H04.542 H04.543 H04.549 | OTHER | Stenosis of lacrimal canaliculi |
| H05.01 H05.011 H05.012 H05.013 H05.019 | OTHER | Cellulitis of orbit |
| H05.24 H05.241 H05.242 H05.243 H05.249 | OTHER | Constant exophthalmos |
| H11.04 H11.041 H11.042 H11.043 H11.049 | OTHER | Peripheral pterygium of eye, stationary |
| H11.05 H11.051 H11.052 H11.053 H11.059 | OTHER | Peripheral pterygium of eye, progressive |
| H11.12 H11.121 H11.122 H11.123 H11.129 | OTHER | Conjunctival concretions |
| H11.13 H11.131 H11.132 H11.133 H11.139 | OTHER | Conjunctival pigmentations |
| H11.15 H11.151 H11.152 H11.153 H11.159 | OTHER | Pinguecula |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|------------------------------|
| H11.3 H11.30 H11.31 H11.32 H11.33 | OTHER | Conjunctival hemorrhage |
| H11.42 H11.421 H11.422 H11.423 H11.429 | OTHER | Conjunctival edema |
| H11.43 H11.431 H11.432 H11.433 H11.439 | OTHER | Conjunctival hyperemia |
| H11.44 H11.441 H11.442 H11.443 H11.449 | OTHER | Conjunctival cysts |
| H11.82 H11.821 H11.822 H11.823 H11.829 | OTHER | Conjunctivochalasis |
| H15.01 H15.011 H15.012 H15.013 H15.019 | OTHER | Anterior scleritis |
| H15.11 H15.111 H15.112 H15.113 H15.119 | OTHER | Episcleritis periodica fugax |
| H17.1 H17.10 H17.11 H17.12 H17.13 | OTHER | Central corneal opacity |
| H17.82 H17.821 H17.822 H17.823 H17.829 | OTHER | Peripheral opacity of cornea |
| H21.0 H21.00 H21.01 H21.02 H21.03 | OTHER | Hyphema |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|--|
| H21.23 H21.231 H21.232 H21.233 H21.239 | OTHER | Degeneration of iris (pigmentary) |
| H21.55 H21.551 H21.552 H21.553 H21.559 | OTHER | Recession of chamber angle |
| H25.81 H25.811 H25.812 H25.813 H25.819 | OTHER | Combined forms of age-related cataract |
| H26.05 H26.051 H26.052 H26.053 H26.059 | OTHER | Posterior subcapsular polar infantile and juvenile cataract |
| H26.11 H26.111 H26.112 H26.113 H26.119 | OTHER | Localized traumatic opacities |
| H26.13 H26.131 H26.132 H26.133 H26.139 | OTHER | Total traumatic cataract |
| H26.3 H26.30 H26.31 H26.32 H26.33 | OTHER | Drug-induced cataract |
| H31.01 H31.011 H31.012 H31.013 H31.019 | OTHER | Macula scars of posterior pole (postinflammatory) (post-traumatic) |
| H33.01 H33.011 H33.012 H33.013 H33.019 | OTHER | Retinal detachment with single break |
| H33.05 H33.051 H33.052 H33.053 H33.059 | OTHER | Total retinal detachment |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|---|
| H33.10 H33.101 H33.102 H33.103 H33.109 | OTHER | Unspecified retinoschisis |
| H33.2 H33.20 H33.21 H33.22 H33.23 | OTHER | Serous retinal detachment |
| H33.31 H33.311 H33.312 H33.313 H33.319 | OTHER | Horseshoe tear of retina without detachment |
| H33.32 H33.321 H33.322 H33.323 H33.329 | OTHER | Round hole of retina without detachment |
| H34.1 H34.10 H34.11 H34.12 H34.13 | OTHER | Central retinal artery occlusion |
| H34.23 H34.231 H34.232 H34.233 H34.239 | OTHER | Retinal artery branch occlusion |
| H34.811 H34.8110 H34.8111 H34.8112 H34.812 H34.8120 H34.8121 H34.8122 H34.813 H34.8130 H34.8131 H34.8132 H34.819 H34.8190 H34.8191 H34.8192 | OTHER | Central retinal vein occlusion |

| ICD-10 code | Condition | Diagnosis Code Description |
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| H34.83 H34.831 H34.8310 H34.8311 H34.8312 H34.832 H34.8320 H34.8321 H34.8322 H34.833 H34.8330 H34.8331 H34.8332 H34.839 H34.8390 H34.8391 H34.8392 | OTHER | Tributary (branch) retinal vein occlusion |
| H35.01 H35.011 H35.012 H35.013 H35.019 | OTHER | Changes in retinal vascular appearance |
| H35.31 H35.311 H35.3110 H35.3111 H35.3112 H35.3113 H35.3114 H35.312 H35.3120 H35.3121 H35.3122 H35.3123 H35.3124 H35.313 H35.3130 H35.3131 H35.3132 H35.3133 H35.3134 H35.319 H35.3190 H35.3191 H35.3192 H35.3193 H35.3194 | OTHER | Nonexudative age-related macular degeneration |

| ICD-10 code | Condition | Diagnosis Code Description |
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| H35.32 H35.321 H35.3210 H35.3211 H35.3212 H35.3213 H35.322 H35.3220 H35.3221 H35.3222 H35.3223 H35.323 H35.3230 H35.3231 H35.3232 H35.3233 H35.329 H35.3290 H35.3291 H35.3292 H35.3293 | OTHER | Exudative age-related macular degeneration |
| H35.34 H35.341 H35.342 H35.343 H35.349 | OTHER | Macular cyst, hole, or pseudohole |
| H35.35 H35.351 H35.352 H35.353 H35.359 | OTHER | Cystoid macular degeneration |
| H35.36 H35.361 H35.362 H35.363 H35.369 | OTHER | Drusen (degenerative) of macula |
| H35.37 H35.371 H35.372 H35.373 H35.379 | OTHER | Puckering of macula |
| H35.38 H35.381 H35.382 H35.383 H35.389 | OTHER | Toxic maculopathy |

| ICD-10 code | Condition | Diagnosis Code Description |
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| H35.41 H35.411 H35.412 H35.413 H35.419 | OTHER | Lattice degeneration of retina |
| H35.43 H35.431 H35.432 H35.433 H35.439 | OTHER | Paving stone degeneration of retina |
| H35.44 H35.441 H35.442 H35.443 H35.449 | OTHER | Age-related reticular degeneration of retina |
| H35.52 | OTHER | Pigmentary retinal dystrophy |
| H35.71 H35.711 H35.712 H35.713 H35.719 | OTHER | Central serous chorioretinopathy |
| H35.72 H35.721 H35.722 H35.723 H35.729 | OTHER | Serous detachment of retinal pigment epithelium |
| H35.8 | OTHER | Other specified retinal disorders |
| H35.81 | OTHER | Retinal edema |
| H35.82 | OTHER | Retinal ischemia |
| H35.89 | OTHER | Other specified retinal disorders |
| H40.00 H40.001 H40.002 H40.003 H40.009 | OTHER | Preglaucoma, unspecified |
| H40.01 H40.011 H40.012 H40.013 H40.019 | OTHER | Open angle with borderline findings, low risk |
| H40.02 H40.021 H40.022 H40.023 H40.029 | OTHER | Open angle with borderline findings, high risk |
| H40.03 H40.031 H40.032 H40.033 H40.039 | OTHER | Anatomical narrow angle |

| ICD-10 code | Condition | Diagnosis Code Description |
|--|-----------|-----------------------------|
| H40.04 H40.041 H40.042 H40.043 H40.049 | OTHER | Steroid responder |
| H40.05 H40.051 H40.052 H40.053 H40.059 | OTHER | Ocular hypertension |
| H40.11 H40.111 H40.1110 H40.1111 H40.1112 H40.1113 H40.1114 H40.112 H40.1120 H40.1121 H40.1122 H40.1123 H40.1124 H40.113 H40.1130 H40.1131 H40.1132 H40.1133 H40.1134 H40.119 H40.1190 H40.1191 H40.1192 H40.1193 H40.1194 | OTHER | Primary open-angle glaucoma |

| ICD-10 code | Condition | Diagnosis Code Description |
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| H40.12 H40.121 H40.1210 H40.1211 H40.1212 H40.1213 H40.1214 H40.122 H40.1220 H40.1221 H40.1222 H40.1223 H40.1224 H40.123 H40.1230 H40.1231 H40.1232 H40.1233 H40.1234 H40.129 H40.1290 H40.1291 H40.1292 H40.1293 H40.1294 | OTHER | Low-tension glaucoma |
| H40.13 H40.131 H40.1310 H40.1311 H40.1312 H40.1313 H40.1314 H40.132 H40.1320 H40.1321 H40.1322 H40.1323 H40.1324 H40.133 H40.1330 H40.1331 H40.1332 H40.1333 H40.1334 H40.139 H40.1390 H40.1391 H40.1392 H40.1393 H40.1394 | OTHER | Pigmentary glaucoma |

| ICD-10 code | Condition | Diagnosis Code Description |
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| H40.14 H40.141 H40.1410 H40.1411 H40.1412 H40.1413 H40.1414 H40.142 H40.1420 H40.1421 H40.1422 H40.1423 H40.1424 H40.143 H40.1430 H40.1431 H40.1432 H40.1433 H40.1434 H40.149 H40.1490 H40.1491 H40.1492 H40.1493 H40.1494 | OTHER | Capsular glaucoma with pseudoexfoliation of lens |
| H40.22 H40.221 H40.2210 H40.2211 H40.2212 H40.2213 H40.2214 H40.222 H40.2220 H40.2221 H40.2222 H40.2223 H40.2224 H40.223 H40.2230 H40.2231 H40.2232 H40.2233 H40.2234 H40.229 H40.2290 H40.2291 H40.2292 H40.2293 H40.2294 | OTHER | Chronic angle-closure glaucoma |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|---|
| H40.4 H40.40 H40.40X0 H40.40X1 H40.40X2 H40.40X3 H40.40X4 H40.41 H40.41X0 H40.41X1 H40.41X2 H40.41X3 H40.41X4 H40.42 H40.42X0 H40.42X1 H40.42X2 H40.42X3 H40.42X4 H40.43 H40.43X0 H40.43X1 H40.43X2 H40.43X3 H40.43X4 | OTHER | Glaucoma secondary to eye inflammation |
| H40.5 H40.50 H40.50X0 H40.50X1 H40.50X2 H40.50X3 H40.50X4 H40.51 H40.51X0 H40.51X1 H40.51X2 H40.51X3 H40.51X4 H40.52 H40.52X0 H40.52X1 H40.52X2 H40.52X3 H40.52X4 H40.53 H40.53X0 H40.53X1 H40.53X2 H40.53X3 H40.53X4 | OTHER | Glaucoma secondary to other eye disorders |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|--|
| H40.6 H40.60 H40.60X0 H40.60X1 H40.60X2 H40.60X3 H40.60X4 H40.61 H40.61X0 H40.61X1 H40.61X2 H40.61X3 H40.61X4 H40.62 H40.62X0 H40.62X1 H40.62X2 H40.62X3 H40.62X4 H40.63 H40.63X0 H40.63X1 H40.63X2 H40.63X3 H40.63X4 | OTHER | Glaucoma secondary to drugs |
| H43.1 | OTHER | Vitreous hemorrhage |
| H43.2 | OTHER | Crystalline deposits in vitreous body |
| H43.23 | OTHER | Crystalline deposits in vitreous body, bilateral |
| H43.3 | OTHER | Other vitreous opacities |
| H43.31 | OTHER | Vitreous membranes and strands |
| H43.319 | OTHER | Vitreous membranes and strands, unspecified eye |
| H43.39 | OTHER | Other vitreous opacities |
| H43.8 | OTHER | Other disorders of vitreous body |
| H43.81 | OTHER | Vitreous degeneration |
| H43.82 | OTHER | Vitreomacular adhesion |
| H44.2 H44.20 H44.21 H44.22 H44.23 | OTHER | Degenerative myopia |
| H46.0 H46.00 H46.01 H46.02 H46.03 | OTHER | Optic papillitis |
| H46.1 H46.10 H46.11 H46.12 H46.13 | OTHER | Retrolubar neuritis |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|---|
| H47.01 H47.011 H47.012 H47.013 H47.019 | OTHER | Ischemic optic neuropathy |
| H47.11 | OTHER | Papilledema associated with increased intracranial pressure |
| H47.2 | OTHER | Optic atrophy |
| H47.20 | OTHER | Unspecified optic atrophy |
| H47.21 H47.211 H47.212 H47.213 H47.219 | OTHER | Primary optic atrophy |
| H47.22 | OTHER | Hereditary optic atrophy |
| H47.23 H47.231 H47.232 H47.233 H47.239 | OTHER | Glaucomatous optic atrophy |
| H47.29 H47.291 H47.292 H47.293 H47.299 | OTHER | Other optic atrophy |
| H47.32 H47.321 H47.322 H47.323 H47.329 | OTHER | Drusen of optic disc |
| H47.33 H47.331 H47.332 H47.333 H47.339 | OTHER | Pseudopapilledema of optic disc |
| H54.1 H54.10 H54.11 H54.12 | OTHER | Blindness, one eye, low vision other eye |
| H54.2 | OTHER | Low vision, both eyes |
| H54.4 H54.40 H54.41 H54.42 | OTHER | Blindness, one eye |
| H55.0 H55.00 H55.01 H55.02 H55.03 H55.04 H55.09 | OTHER | Nystagmus |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|--|
| H57.0 | OTHER | Anomalies of pupillary function |
| H57.00 | OTHER | Unspecified anomaly of pupillary function |
| H57.01 | OTHER | Argyll Robertson pupil, atypical |
| H57.02 | OTHER | Anisocoria |
| H57.03 | OTHER | Miosis |
| H57.04 | OTHER | Mydriasis |
| H57.05 H57.051 H57.052 H57.053 H57.059 | OTHER | Tonic pupil |
| H57.09 | OTHER | Other anomalies of pupillary function |
| H57.8 | OTHER | Other specified disorders of eye and adnexa |
| H57.9 | OTHER | Unspecified disorder of eye and adnexa |
| M35.01 | OTHER | Sicca syndrome with keratoconjunctivitis |
| Q10.0 | OTHER | Congenital ptosis |
| Q12.0 | OTHER | Congenital cataract |
| Q13.0 | OTHER | Coloboma of iris |
| S00.1 S00.10 S00.10XA S00.10XD S00.10XS S00.11 S00.11XA S00.11XD S00.11XS S00.12 S00.12XA S00.12XD S00.12XS | OTHER | Contusion of eyelid and periocular area |
| S05.10XA S05.11XA S05.11XS S05.12XA S05.12XS | OTHER | Contusion of eyeball and orbital tissues, unspecified eye, initial encounter |
| T15.1 T15.10 T15.10XA T15.10XD T15.10XS T15.11 T15.11XA T15.11XD T15.11XS T15.12 T15.12XA T15.12XD T15.12XS | OTHER | Foreign body in conjunctival sac |

| ICD-10 code | Condition | Diagnosis Code Description |
|---|-----------|--|
| T15.8 T15.80 T15.80XA T15.80XD T15.80XS T15.81 T15.81XA T15.81XD T15.81XS T15.82 T15.82XA T15.82XD T15.82XS | OTHER | Foreign body in other and multiple parts of external eye |
| T15.9 T15.90 T15.90XA T15.90XD T15.90XS T15.91 T15.91XA T15.91XD T15.91XS T15.92 T15.92XA T15.92XD T15.92XS | OTHER | Foreign body on external eye, part unspecified |