



# Predictive Value of the International Classification of Diseases, 9th Revision Codes for Identifying Ocular Oncology Diagnoses

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## BACKGROUND

Administrative claims in clinical registries and database studies have been increasingly used in ophthalmology research, including ocular oncology.<sup>1,2</sup> The variable accuracy of billing codes in identifying diagnoses remains a significant limitation. Clinical registries and claims data have been previously utilized in the ocular oncology literature,<sup>3-5</sup> however no studies to date have assessed the accuracy of claims data for capturing ocular neoplasms to the best of our knowledge.

## OBJECTIVES

To determine the predictive value of International Classification of Diseases, 9th Revision (ICD-9) billing codes for identifying ocular oncology diagnoses.

## METHODS

**Participants:** All patients of any age residing in Olmsted County, Minnesota diagnosed with any ocular neoplasm from January 1, 2006, to October 1, 2015, in the Rochester Epidemiology Project (REP) database.

**Data:** Extensive diagnostic code search utilizing 45 ocular neoplasm-related ICD-9 codes was performed to identify all potential patients diagnosed with any ocular neoplasm. All medical records identified via the diagnostic code search were retrospectively reviewed to assess diagnoses and demographic data.

**Primary Outcomes:** Positive predictive value (PPV) and negative predictive value (NPV) of ICD-9 codes for each diagnosis. PPV= True positive/(True positive+false positive); NPV = True negative/(True negative+false negative)

**Statistical Analysis:** Data analysis was performed using SAS Version 9 (SAS Institute; Cary, North Caroline).

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## RESULTS

Table 1: Number of cases identified via medical record review versus diagnostic code search, with positive and negative predictive values

Diagnosis	Medical record data versus ICD-9 code search data				Positive Predictive Value (PPV)	Negative Predictive Value (NPV)
	Congruent		Incongruent			
	Present in both medical record and ICD-9 code search (True positives)	Absent in both medical record and ICD-9 code search (True negatives)	Present in medical record, absent in ICD-9 code search (False negatives)	Absent in medical record, present in ICD-9 code search (False positives)		
<b>Intraocular</b>						
Choroidal melanoma	6	3905	3	18	25.0%	99.9%
Choroidal nevus	710	2665	114	443	61.6%	95.9%
Congenital hypertrophy of the retinal pigment epithelium (CHRPE)	0	3926	6	0	-	99.8%
Iris nevus	0	3856	76	0	-	98.1%
<b>Extraocular/Orbital</b>						
Dermoid cyst	6	3441	6	479	25.0%	99.9%
Ductal epithelial cyst lacrimal gland	1	3920	8	3	61.6%	95.9%
Epidermal inclusion cyst	250	3434	13	235	-	99.8%
Eyelid actinic keratosis	0	3924	8	0	-	98.1%
Eyelid basal cell carcinoma	62	3729	119	22	25.0%	99.9%
Eyelid cutaneous nevus	0	3924	8	0	61.6%	95.9%
Eyelid hidrocystoma	0	3873	59	0	-	99.8%
Eyelid neurofibroma	0	3927	5	0	-	98.1%
Eyelid papilloma	0	3907	25	0	25.0%	99.9%
Eyelid sebaceous cyst	40	3447	0	445	61.6%	95.9%
Eyelid seborrheic keratosis	0	3920	12	0	-	99.8%
Eyelid squamous cell carcinoma	7	3877	40	8	-	98.1%
<b>Ocular Surface</b>						
Conjunctival complexio-associated melanosis	6	3818	10	98	5.8%	99.7%
Conjunctival cyst	0	3708	5	219	0.0%	99.9%
Conjunctival nevus	36	3797	38	61	37.1%	99.0%
Ocular surface squamous neoplasia	0	3913	6	13	0.0%	99.8%
Primary acquired melanosis	38	3804	24	66	36.5%	99.4%

## RESULTS

Diagnosis	Sensitivity	Specificity
Choroidal melanoma	66.7%	99.5%
Choroidal nevus	86.2%	85.7%
Dermoid cyst	50.0%	87.8%
Ductal epithelial cyst lacrimal gland	11.1%	99.9%
Epidermal inclusion cyst	95.1%	93.6%
Eyelid basal cell carcinoma	34.3%	99.4%
Eyelid sebaceous cyst	100.0%	88.6%
Eyelid squamous cell carcinoma	14.9%	99.8%
Conjunctival complexio-associated melanosis	37.5%	97.5%
Conjunctival cyst	0.0%	94.4%
Conjunctival nevus	48.6%	98.4%
Primary acquired melanosis	61.3%	98.3%

## CONCLUSION

There was wide variation in predictive value of ocular neoplasm-related ICD-9 billing codes, which suggests that ocular oncology-related claims data alone may overestimate the true number of ocular oncology diagnoses.

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## DISCLOSURES

The authors of this project report no disclosures.