Published in final edited form as:

Ophthalmology. 2016 April ; 123(4): 917–919. doi:10.1016/j.ophtha.2015.10.032.

Eye-related Emergency Department Visits In the United States, 2010

Kamyar Vaziri, M.D.¹, Stephen G. Schwartz, M.D., MBA¹, Harry W. Flynn Jr., M.D.¹, Krishna S. Kishor, M.D.¹, and Andrew A. Moshfeghi, M.D., MBA²

¹

²

This study reports 2010 data from the Nationwide Emergency Department Sample (NEDS) database to provide nationally representative information regarding the utilization, patient characteristics, and costs of eye-related presentations to emergency departments (EDs) in the US. The NEDS is a comprehensive all-payer database, part of the Healthcare Cost and Utilization Project (HCUP), and was created by Agency for Healthcare Research and Quality (AHRQ).

The NEDS contains 28 million ED visits from 961 hospitals, representing about 20% of all ED visits in the United States.¹ The NEDS provides sampling weights, which allows calculation of national estimates regarding the 130 million ED visits that occurred nationwide in 2010. Investigational review board approval was not required for this study as the NEDS is publically available and contains only de-identified anonymized data. All authors abided by the HCUP Data Use Agreement.

The 2010 NEDS was queried for International Classification of Diseases, 9th revision (ICD-9) codes for all ophthalmic medical conditions and injuries. For ophthalmic injuries, if the cause of injury was external, ICD-9 injury E-codes were also collected to identify causes and mechanisms of injury.

To capture all the ophthalmic procedures performed in the EDs, the Clinical Classifications Software (CCS), also developed by the HCUP, was utilized. The CCS maps 3,900 ICD-9 procedure codes into organized and organ-based (i.e. ophthalmic procedures) procedure categories. Emergency procedures performed outside of EDs were not included in this study.

Corresponding author: Stephen G. Schwartz, MD, MBA, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, 3880 Tamiami Trail North, Naples, FL 34103, (239) 659-3937, FAX (239) 659-3984, sschwartz2@med.miami.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conflict of Interest:

All other authors have no financial disclosures.

Meeting Presentation: Data in this manuscript are to be presented at the American Academy of Ophthalmology (AAO) Annual Meeting, 2015.

As different diagnoses pertaining to multiple body parts can be made during a single ED visit, the NEDS database records the primary reason for each visit as the first diagnosis. To capture ED visits that ophthalmic reasons were the chief complaints, only included records with an ophthalmic diagnosis as the first diagnosis were included.

Statistical analyses were performed using descriptive statistics and cross tabulations. Complex sample analysis utilizing Taylor linearization was used to estimate national statistics. Taylor linearization was also used to calculate 95% confidence intervals (CIs) and sampling errors (SEs) when appropriate. The 2010 US Census was used as the source of referent population to calculate incidence rates for ophthalmic ED visits for every 100,000 people. All statistical analyses were performed by SPSS (version 21, SPSS Inc., Chicago, IL, USA).

An estimated 128,970,364 ED visits occurred in the US in 2010, of which 1,996,735 visits (1.5%) had an ophthalmic principal diagnosis. This implies a rate of 646.7 ophthalmic-related visits per 100,000 population (95% CI, 646.0-647.4). The most common demographic characteristics of patients seeking ophthalmic care in an ED included male sex (53.2%), age 18-44 years (42.8%), and urban residence (82.0%). The demographic characteristics of patients presenting to an ED for ophthalmic complaints were broadly similar to those of patients presenting to an ED for all complaints, with the exceptions that ophthalmic patients were more likely to be male and less likely to be age 65 years or older (Table 1).

The most common ICD-9 diagnoses of patients presenting to EDs for ophthalmic complaints were conjunctivitis (33.8%), corneal injury without foreign body (13.1%), corneal foreign body (7.8%), eye pain (4.2%), and hordeolum (4.0%). Approximately 34% (N=677,823; Table 2) of ophthalmic ED presentations were related to trauma while the remaining 66% (N= 1,318,912; Table 3) were unrelated to injury.

Of patients presenting to an ED for ophthalmic reasons, 97.2% were treated and released. The remainder were admitted to the same hospital or transferred to another acute-care hospital. Of the patients admitted, the most common diagnoses were orbital fractures (12.7%), other disorders of the orbit (12.4%), visual disturbances (11.5%), open wounds of the eye (8.3%), other disorders related to the adnexa (6.4%), and retinal disorders (6.2%). Approximately 35% of admitted patients were for trauma.

An estimated 31,738 patients nationally underwent an estimated 35,558 ophthalmic procedures in EDs in 2010. The most common procedures were eyelid repair (52.9%), drainage of eyelid abscess (5.4%), and removal of foreign bodies from eyelids (4.0%).

The mean charge per ED visit for ophthalmic reasons was \$989.30 and the total ED charge for these visits in the year 2010 was close to \$1.72 billion. In comparison, the mean charge per ED visit for all reasons in 2010 was \$2,060, for a total of \$225 billion.

The chief limitation of this study is that the NEDS does not report who made the diagnoses (ophthalmologists, emergency physicians, or other providers). The ICD-9 codes recorded by the hospitals could be inaccurate since in many EDs, non-ophthalmologists evaluate

ophthalmic diseases. The NEDS generally captures the primary reason for the ED visit as the first recorded diagnosis, but it is possible that in some cases the ophthalmic chief complaint was not entered as the first diagnosis. Such cases would have been missed by this analysis, which therefore reduces the estimated ED charges reported here. More sophisticated econometric techniques might provide more accurate estimates. Further, the NEDS captures charges, but not overall costs of care, which are not reported here.

In the NEDS, presentations for ophthalmic reasons accounted for 1.5% of all ED visits in 2010, which is slightly lower than the 2.6% reported based on data from 1993.² It is not possible to statistically compare this sample to that of the prior study.

Due to implementation of the Patient Protection and Affordable Care Act (PPACA), an estimated 12 million previously uninsured patients will be covered by the Medicaid and the State Children's Health Insurance Program by the end of 2016.³ It is estimated that the number of annual ED visits will increase 4%-7%.⁴ This suggests that the EDs might see more Medicaid-covered patients with ophthalmic diagnoses. In addition, ophthalmic ED visits make up 1.5% of all ED visits but only 0.76% of total ED charges, suggesting that reimbursements for ophthalmic care may lag behind those of other types of care. These trends may decrease hospital revenues and decrease the financial incentive for EDs to offer ophthalmology specialist care and for ophthalmologists to be willing to cover EDs.

The results presented here may serve as a resource for annual comparisons and may be useful in planning for future emergency eye care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Financial Support: Partially supported by NIH Center Core Grant P30EY014801 and an unrestricted grant from Research to Prevent Blindness.

Dr. Schwartz has received consulting fees from Alimera and Bausch + Lomb and writers's fees from Vindico. Dr. Kishor has received research grant support from the Leonard and Norma Klorfine Foundation.

REFERENCES

1. Agency for Healthcare Research and Quality Healthcare Cost and Utilization Project (HCUP). [August 24, 2015] Introduction to the HCUP Nationwide Emergency Department Sample (NEDS), 2010. 2012. Available at: http://www.hcup-us.ahrq.gov/db/nation/neds/NEDS_Introduction_2010.jsp
2. Nash EA, Margo CE. Patterns of emergency department visits for disorders of the eye and ocular adnexa. Arch Ophthalmol. 1998; 116:1222-1226. [PubMed: 9747684]
3. Congressional Budget Office. [August 24, 2015] Updated Estimates of the Effects of the Insurance Coverage Provisions of the Affordable Care Act. Apr. 2014 Available at: <https://www.cbo.gov/sites/default/files/cbofiles/attachments/43900-2014-04-ACAtables2.pdf>
4. Goodman, JC. [August 24, 2015] Emergency Room Visits Likely to Increase Under ObamaCare. Available at: <http://www.ncpa.org/pub/ba709>

Table 1

Demographic Characteristics Of Patients Visiting Emergency Departments (EDs) For Primarily Ophthalmic Reasons

	National Estimates (Weighted)			Unweighted
Variable	# of ED visits	%	95% CI (%)	# of ED visits
Age				
<18	555,982	27.8	27.7-28.0	123,057
18-44	855,310	42.8	42.7-43.0	184,415
45-64	416,048	20.8	20.7-21.0	88,360
65+	169,291	8.5	8.4-8.6	35,814
Sex				
Male	1,061,165	53.2	53.0-53.3	228,943
Female	935,327	46.8	46.7-47.0	202,673
Place of Residence				
Urban	1,625,897	82.0	81.8-82.1	357,260
Rural	357,513	18.0	17.9-18.2	71,545
Median Income for Patient's ZIP Code				
\$41,000 or less	632,133	32.3	32.2-32.5	138,222
\$41,000-\$50,999	526,847	26.9	26.8-27.1	113,967
\$51,000-\$66,999	430,975	22.0	21.9-22.2	93,650
\$67,000 or more	365,287	18.7	18.6-18.8	76,879
Visited ED's Region				
Northeast	472,567	23.7	23.5-23.8	92,095
Midwest	474,359	23.8	23.6-23.9	93,204
South	720,076	36.1	35.9-36.2	175,560
West	329,732	16.5	16.4-16.6	70,806
Primary Payer				
Medicare	204,247	10.3	10.2-10.4	43,500
Medicaid	509,830	25.8	25.6-25.9	113,722
Private Insurance	721,596	36.5	35.3-36.6	152,207
Self-Pay	388,331	19.6	19.5-19.7	86,548
Other	155,614	7.8	7.7-7.8	32,884