Large Geographic Variation in Rates of Visits to the Emergency Department for Ocular Problems Among 306 US Communities

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BACKGROUND

- Use of the ED by U.S. patients rose rapidly from 108 million visits in 2000 to 130 million visits in 2010.[1]
- A 2012 systematic review estimated that nearly 40% of all ED visits were for non-urgent medical conditions.[2]
- Recent publications show that the trend of increased ED use is also true for eye conditions.[3-4]
- 23-44% of visits to the ED for eye conditions are for non-urgent diagnoses. [3-4]
- However, the geographic variation of ED use for eye conditions has not previously been explored
- Understanding the geographic variation of ED use can help providers and policy makers in their efforts to ensure that patients are receiving care in the most appropriate setting.

PURPOSE

- To determine the extent of geographic variation in the utilization of EDs for patients with ocular conditions including those with urgent and non-urgent ocular conditions.

METHODS

Retrospective study of 11,160,833 enrollees in a nationwide U.S. managed-care network during January 1, 2001 to December 31, 2014.

Data Source
- The Clinformatics DataMart database (OptumInsight, Eden Prairie, MN) contains detailed records of all beneficiaries in a large nationwide U.S. managed care network. The dataset includes all individuals with ≥1 ICD-9-CM codes for eye-related diagnoses (360-379.9), one or more Current Procedural Terminology (CPT) codes capturing all visits, diagnostic, and therapeutic procedures (99281-99285) for ocular problems.

Sample Selection
- Inclusion criteria: age >= 21 years, continuous enrollment in the medical plan, and enrollment in the plan for ≥1 year during 2001-2014.

Defining Urgent and Non-urgent Ocular Conditions
- Using billing codes, we identified all visits to an ED for ocular problems and classified each as urgent, non urgent, or other:
  - We defined urgent ocular conditions as sight or life threatening ocular conditions. E.g. temporal arteritis, retinal detachment .
  - We defined non-urgent ocular conditions as those which rarely affect vision or cause considerable discomfort. E.g. chalazion or conjunctivitis.
- A subset of ocular conditions could not be easily classified as urgent or non-urgent and were called "other".

Geographic Areas
- We divided the US into 306 hospital referral regions (HRRs) representing regional health care markets, following methodology described in The Dartmouth Atlas of Health Care.[5]
- Enrollees were assigned a specific HRR based on their residential zip code at plan enrollment.

Analyses
- For each HRR, we determined the number and percentage of visits to ED for eye-related diagnoses per 10,000 person-years. Similar calculations were done for urgent and non-urgent visits for ocular problems.
- We ranked communities from lowest to highest in number of urgent, non-urgent, and any ED visit for an ocular problem per 10,000 person-years.

RESULTS

Of the 11,160,833 enrollees, 376,680 (3.4%) presented to the ED for ≥1 eye-related problem during a mean ± SD of 4.6 ± 3.0 years of follow-up in the plan. The mean ± SD age was 47.4 ± 15.1 years old. 6,320,557 (56.6%) were female, 77.3% (7,713,966) were white, 9.4% (941,723) were black, 9.4% (938,981) were Latino, and 3.8% (380,251) were Asian American.

Visits to the ED for Any Ocular Condition

The majority of communities (249 of 306 HRRs, 81.4%) had 40 to 100 eye-related visits per 10,000 person-years.
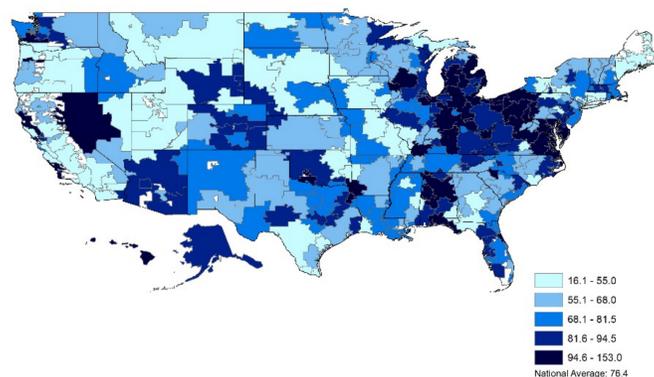

Figure 1: Map showing geographic variation in ED visits for any ocular condition throughout U.S. Communities with low ED utilization rates for ocular problems are shaded in lighter blue, while those with higher ED utilization rates are shaded with darker blue.
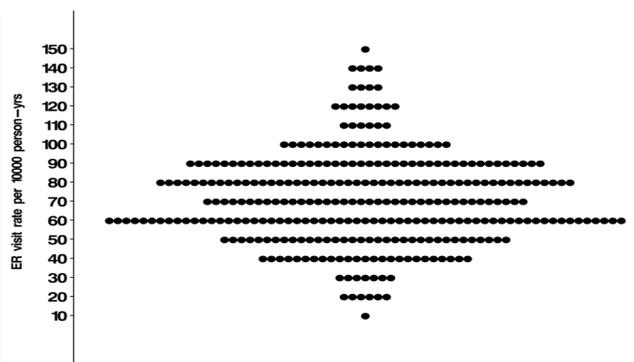
Figure 2: Turnip plot shows the total number of eligible enrollees visiting the ED for any ocular condition per 10,000 enrollees. Each black dot represents a specific HRR (community).

Visits to the ED for Non-Urgent Ocular Conditions

Persons residing in most communities (236 of 306 HRRs, 77.1%) had 10 to 25 visits to an ED for non-urgent ocular problems per 10,000 person-years. Communities in the West Coast and Northwest had fewer visits for non-urgent eye complaints compared to communities in Ohio Valley and mid-Atlantic states.
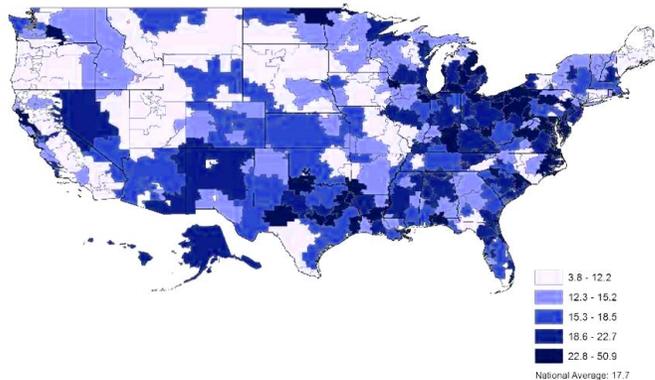

Figure 3: Map showing geographic variation in visits to an ED for non-urgent ocular problems for communities throughout U.S.
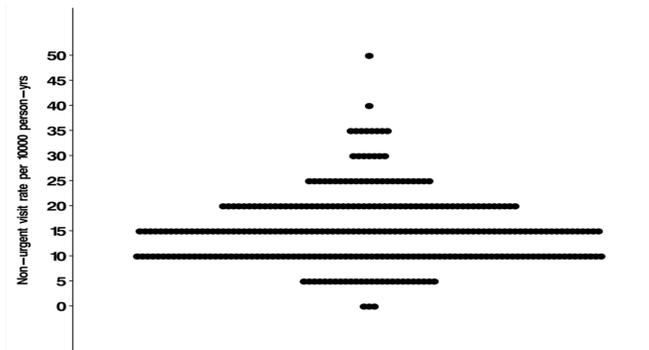
Figure 4: Turnip plot show ED visit rate for non-urgent ocular problems (total number of eligible enrollees visiting the ED for a non-urgent ocular problem per 10,000 enrollees). Each black dot represents a specific HRR (community).

Visits to the ED for Urgent Eye Conditions

Persons residing in most communities (288 of 306 HRRs, 94.1%) had 2 to 9 visits to an ED for urgent ocular problems per 10,000 person-years. Communities in the West Coast and Northwest had lower rates of visits for urgent eye complaints compared to the upper Midwest. The rates of visits for urgent ocular conditions varied from as low as (0/10,000) in Mason City, IA and Marquette, MI to as high as (12.4/10,000) in Dearborn, MI
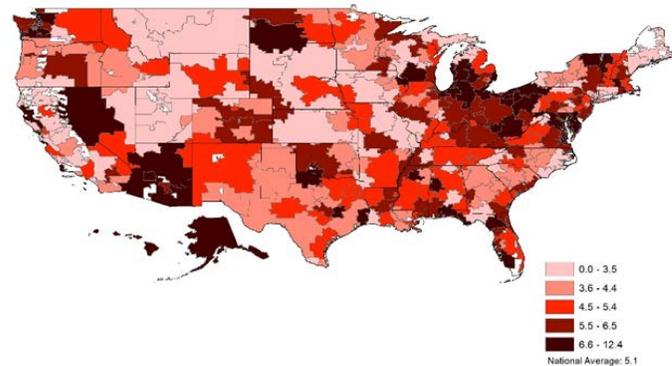

Figure 5: Map showing geographic variation in visits to an ED for urgent ocular problems for communities throughout U.S.

Figure 6: Turnip plot show ED visit rate for urgent ocular problems (total number of eligible enrollees visiting the ED for an urgent ocular problem per 10,000 enrollees).

Communities with Highest & Lowest Rates of Visits for Non-Urgent Eye Problems

Non-Urgent	Rank	Hospital Referral Region	Hospital Referral Region (state)	Total number of patients	Non-urgent visit (percentage)
TOP 10	1	Bangor	ME	2,705	3.8
	2	Medford	OR	3,620	4.3
	3	Cape Girardeau	MO	5,602	4.8
	4	Bismarck	ND	2,810	5.2
	5	Sioux Falls	SD	13,376	5.6
	6	McAllen	TX	5,847	6.2
	7	Hartford	CT	38,381	6.4
	8	Mason City	IA	2,159	6.5
	9	Iowa City	IA	5,245	6.5
	10	Des Moines	IA	40,125	6.5
BOTTOM 10	297	Pittsburgh	PA	25,200	36.3
	298	St. Joseph	MI	1,931	36.3
	299	Dearborn	MI	3,795	36.4
	300	Muskegon	MI	4,064	36.6
	301	Lawton	OK	1,690	36.7
	302	Newport News	VA	7,014	38.3
	303	Toledo	OH	13,558	38.7
	304	Kalamazoo	MI	26,279	39.8
	305	Dubuque	IA	7,722	41.8
	306	Elyria	OH	7,628	50.9

Table 1 – Top 10 and bottom 10 communities for ED visits for non-urgent ocular problems

DISCUSSION

Key Findings:
- 376,680 patients (3.4%) went to the ED for ≥1 ocular problem(s) during an average of 4 to 5 years of follow-up in the plan.
- Visits to the ED for ocular problems varied from 16.1/10,000 person-years in Bangor, ME to 153/10,000 person-years in Elyria, OH.
- West Coast and Northwest regions had fewer visits for non-urgent problems compared to the upper Midwest and mid-Atlantic regions.
- We found a 13-fold difference between communities with the lowest (Bangor, ME) and highest (Elyria, OH) visit rates for non-urgent eye problems.

Limitations:
- All enrollees in our study had commercial health insurance. Thus their health care behaviors may not be generalizable to individuals without health insurance or very different health care plans.

Conclusions and Implications:
- There are many ED visits for ocular problems, especially non-urgent ocular diseases and this varies considerably in communities throughout the country.
- Public health researchers and health policy-makers can study factors such as eye care provider availability and accessibility in communities where rates of visits to an ED for non-urgent ocular conditions are low, to offer insight of opportunities to reduce rates of visits for non-urgent ocular problems in communities where rates of considerably higher.

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