

# Trends in Intraocular Lens Exchange Surgeries among Medicare Beneficiaries 2011-2020

Jane Huang, BS; Chen Dun, MHS; Hyeck-Soo Son, MD; Martin Makary, MD, MPH; Divya Srikumaran, MD; Fasika A. Woreta, MD

Johns Hopkins University School of Medicine, Baltimore, Maryland, USA

## BACKGROUND

- Implantation of intraocular lens (IOL) is an effective solution to restore vision in patients with cataracts, myopia, presbyopia, and astigmatism
- Though IOL implantation is generally safe, it is sometimes necessary to perform an IOL exchange
- While previous studies have looked at single-center data for IOL exchange surgeries, nationwide demographics and surgical trends have yet to be elucidated

## OBJECTIVES

- To assess national trends in prevalence, patient demographics, and surgeon characteristics of IOL exchange in the United States
- To identify the most common post-operative complications

## METHODS

- Study design**
  - Retrospective, cross-sectional analysis
- Setting**
  - 100% Medicare fee-for-service claims database
- Population**
  - n = 50,583 procedures
  - Patients aged 65 and older who received IOL exchange surgery between 2011-2020
  - Identified using Current Procedural Terminology code 66986
- Data collection**
  - Patient characteristics
    - Age, sex, race/ethnicity, ZIP code of residence, surgical location, ocular and systemic comorbidities, history of intraocular surgery
  - Surgeon characteristics
    - Age, sex, region/population density, years since medical school graduation, and volume of IOL surgery
  - Post-operative complications
    - Subset analysis of n = 7,788 procedures with sufficient follow-up data

## RESULTS

**Table 1: Baseline demographic characteristics of patients**

	N (%)
<b>Age</b>	
65-74	25511 (48.52)
75-84	18858 (35.86)
85+	8214 (15.62)
<b>Sex</b>	
Female	27957 (53.17)
Male	24626 (46.83)
<b>Race/Ethnicity</b>	
White	47228 (89.82)
Black	2034 (3.87)
Asian	888 (1.69)
Hispanic	655 (1.25)
Native American	187 (0.36)
Other/unknown	1591 (3.03)
<b>Laterality</b>	
Right eye	26545 (50.48)
Left eye	26038 (49.52)
<b>Surgical location</b>	
Ambulatory surgery center	33840 (64.36)
Outpatient hospital	17037 (32.40)
Other	1706 (3.24)
<b>Population density of practice location</b>	
Urban	44095 (83.86)
Rural	8488 (16.14)
<b>Region</b>	
South	19655 (37.38)
West	12213 (23.23)
Midwest	10319 (19.62)
Northeast	10344 (19.67)
Other	52 (0.10)
<b>Ocular comorbidities</b>	
Glaucoma	20336 (38.67)
Age-related macular degeneration	16788 (31.93)
Epiretinal membrane	9873 (18.78)
Corneal edema	4541 (8.64)
Fuchs dystrophy	3524 (6.70)
Diabetic retinopathy	3178 (6.04)
Pseudoexfoliation syndrome	2884 (5.48)
Ocular trauma	1416 (2.69)
<b>Systemic comorbidities</b>	
Hypertension	39051 (74.27)
Diabetes	15230 (28.96)

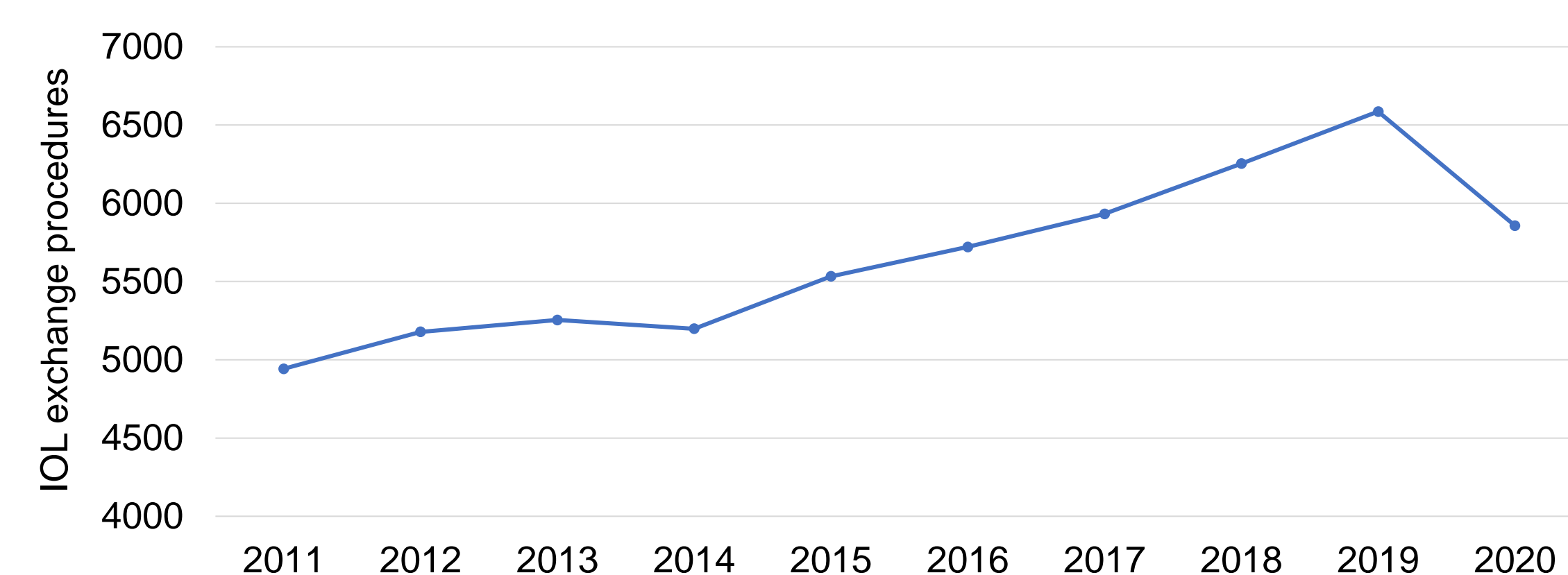
**Table 3: Indications for IOL exchange**

Indication	N (%)
Mechanical lens failure	22252 (51.38)
Lens displacement	9155 (21.14)
Lens subluxation	4308 (9.95)
Posterior lens dislocation	4062 (9.38)
Anisometropia and other visual disturbances	1530 (3.53)
Anterior lens dislocation	1021 (2.36)
Senile nuclear sclerosis	978 (2.26)

**Table 2: Baseline demographic characteristics of surgeons**

	N (%) or Mean $\pm$ SD
<b>Years since medical school graduation</b>	
0-10	846 (11.29)
11-20	1838 (24.53)
21-30	1970 (26.29)
31+	2272 (30.32)
Unknown	567 (7.57)
<b>Mean years since medical school graduation</b>	24.66 $\pm$ 11.15
<b>Sex</b>	
Male	6308 (84.19)
Female	1180 (15.75)
Unknown	5 (0.07)
<b>Population density of practice location</b>	
Urban	6907 (92.18)
Rural	578 (7.71)
N/A	8 (0.11)
<b>Region</b>	
South	2685 (35.83)
West	1691 (22.57)
Midwest	1555 (20.75)
Northeast	1528 (20.39)
Other/NA	34 (0.45)
<b>Surgeon volume of IOL exchange</b>	
1 procedure	2240 (29.89)
2-3 procedures	1951 (26.04)
4-7 procedures	1527 (20.38)
8 or more procedures	1775 (23.69)
<b>Mean volume of IOL exchange, (SD)</b>	7.02 $\pm$ 13.58

**Figure: Trends in IOL exchange rates**



**Table 4: Complications following IOL exchange**

Complication	Time Frame	N (%)
Epiretinal membrane	90 days	200 (2.57)
	1 year	531 (6.82)
Mechanical complication of IOL	30 days	195 (2.50)
	90 days	308 (3.95)
IOL dislocation	1 year	460 (5.91)
	30 days	170 (2.18)
Cystoid macular edema	1 year	385 (4.94)
	90 days	191 (2.45)
Retinal detachment surgery	90 days	80 (1.03)
	1 year	118 (1.52)
Bullous keratopathy or other corneal edema	1 year	106 (1.36)
	90 days	39 (0.50)
Retinal and tractional retinal detachment	1 year	68 (0.87)
	90 days	24 (0.31)
Endophthalmitis	90 days	24 (0.31)
	1 week	8 (0.10)
Suprachoroidal hemorrhage	1 week	8 (0.10)

## RESULTS (CONT.)

- The number of IOL exchange surgeries increased steadily from 4,621 cases in 2011 to 6,114 cases in 2019 (p<0.001)
- Surgeries were most commonly performed:
  - On white patients (89.6%)
  - At ambulatory surgical centers (64.7%)
  - In the South (37.4%)
- 83.9% of patients received surgery in urban locations, with 92.2% of surgeons practicing in urban areas
- Most surgeons were male (84.2%)
- The average number  $\pm$  SD of IOL exchange surgeries performed per surgeon was 7.02  $\pm$  13.58
- Three most common indications for IOL exchange were mechanical lens failure (51.4%), lens displacement (21.1%), and lens subluxation (10.0%)
- Post-operatively, common 1-year complications include epiretinal membrane (6.8%), mechanical complication of IOL (5.9%), and IOL dislocation (4.9%)
- 90-day endophthalmitis rate remained low at 0.3%

## LIMITATIONS

- Prior to the switch to International Classification of Diseases 10th edition codes in 2015, laterality information for procedures and complications was limited
- As a result, post-operative complications in this study could only be analyzed as a subset (2017-2020) of the original study population

## CONCLUSIONS

- IOL exchange surgeries have become increasingly common in the last decade.
- Most physicians who perform IOL exchange surgeries are male surgeons practicing in urban locations
- The most common post-operative complications were epiretinal membrane and mechanical dislocation of IOL