

Variation in the use of bevacizumab and ranibizumab for diabetic macular edema

Annie Wu,¹ Connie Wu,¹ Paul Greenberg,^{1,2} Fei Yu,³ Flora Lum,⁴ Anne Coleman³

¹Division of Ophthalmology, Warren Alpert Medical School of Brown University, Providence, RI, USA

²Section of Ophthalmology, VA Medical Center, Providence, RI, USA

³Department of Ophthalmology, UCLA Stein Eye Institute, Los Angeles, CA, USA

⁴American Academy of Ophthalmology, San Francisco, CA, USA



BACKGROUND

Diabetic retinopathy is the leading cause of blindness in individuals aged 20-74 years in the United States (US).¹ Among those with diabetic retinopathy, the number one cause of visual impairment is diabetic macular edema (DME).² The advent of anti-vascular endothelial growth factor (VEGF) agents for the treatment of DME has greatly improved clinical outcomes in patients compared to laser therapy.³ However, the annual costs of anti-VEGF therapy exceeded \$2.3 billion among the fee-for-service Medicare population in 2008.⁴ Medicare reimbursements were \$50 per bevacizumab and \$1,903 per ranibizumab injection in 2012.⁵ Significant geographic variation in intravitreal anti-VEGF injection rates of bevacizumab and ranibizumab has been reported in Medicare beneficiaries with retinal disease.⁶

PURPOSE

To investigate the distribution of intravitreal bevacizumab and ranibizumab injection use for DME in the US with the goal of improving cost-effective medication utilization.

METHODS

A 5% sample of Medicare beneficiaries in the Carrier file (Part B Medicare claims file) was obtained to identify all beneficiaries with an ICD-9-CM code for DME (362.07) from 2010 to 2013. Patient characteristics including age, gender, and Charlson Comorbidity Index (CCI) were collected. HSCPS codes for bevacizumab (J3590, J9035, and J3490) and for ranibizumab (J2778) were used to identify the mode of treatment and associated billing and reimbursement amounts for each patient. Geographic variation was determined by comparing injection frequencies across the nine US census divisions using Chi-squared analysis.

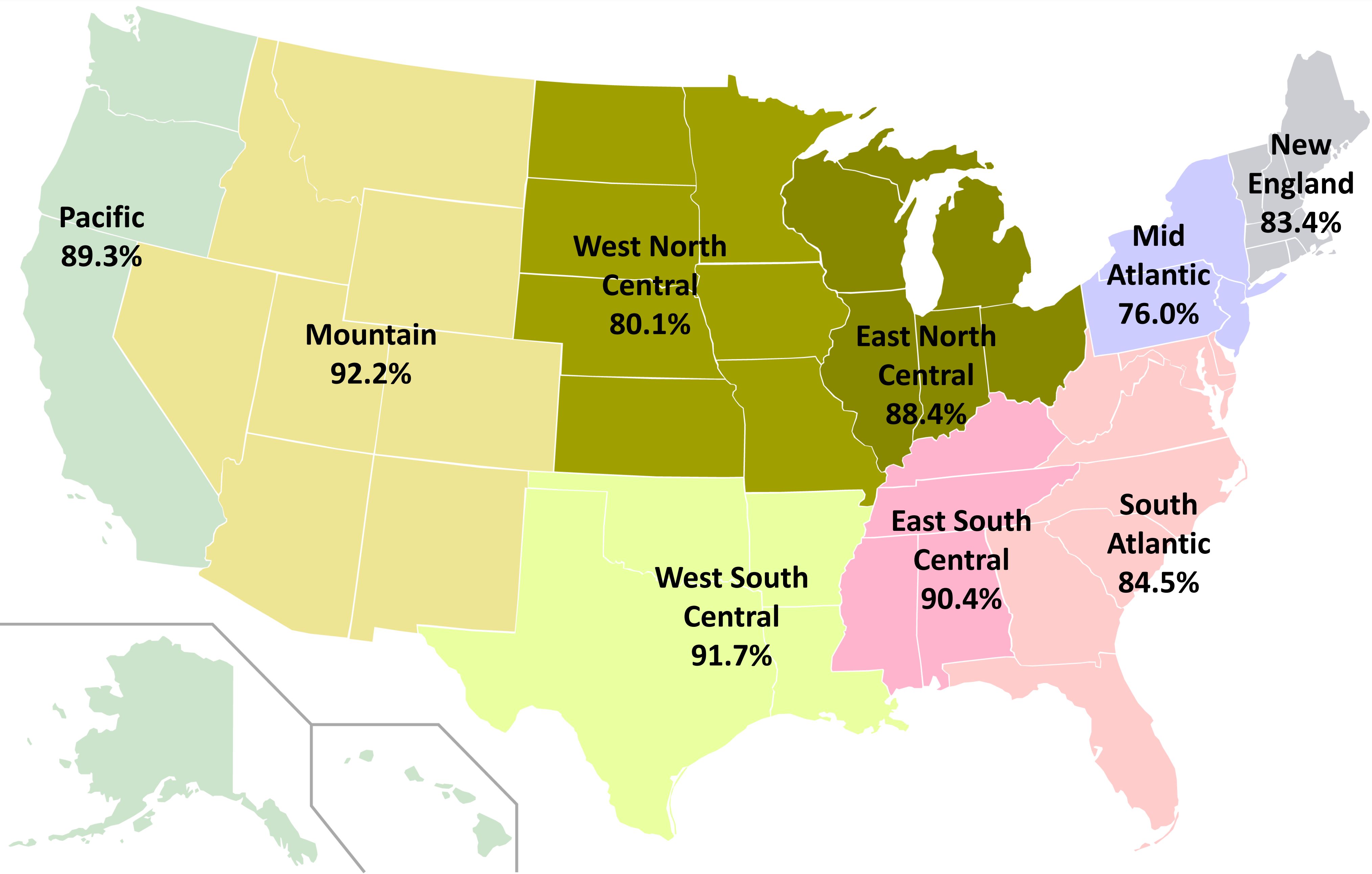


Figure 1. Map showing frequency of bevacizumab injections (vs ranibizumab) within each US Census Division among Medicare beneficiaries with diabetic macular edema from 2010-2013.

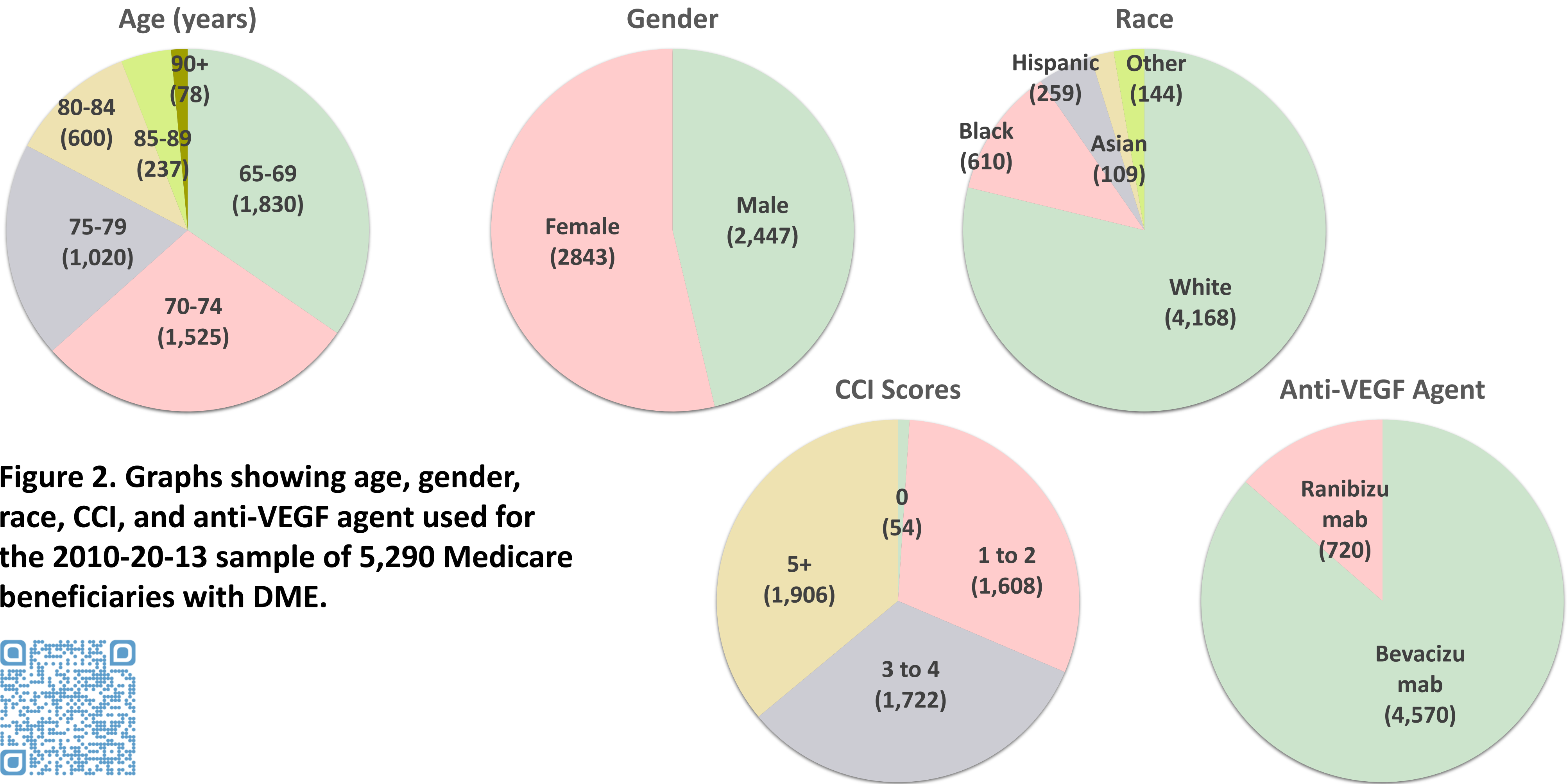


Figure 2. Graphs showing age, gender, race, CCI, and anti-VEGF agent used for the 2010-2013 sample of 5,290 Medicare beneficiaries with DME.



data tables

RESULTS

- The 2010-2013 sample included 5,290 Medicare beneficiaries with DME: 34.6% were aged 65-69, 53.7% were female, 78.8% were white, and 36.0% had a CCI score of ≥ 5 .
- The frequencies of bevacizumab and ranibizumab injections for DME varied significantly between US census divisions ($p < 0.0001$).
- Overall, there was a greater frequency of bevacizumab use (86.4%) compared to ranibizumab use (13.6%)
- Highest frequencies of bevacizumab use: Mountain (92.2%) and West South Central (91.7%) divisions
- Highest frequencies of ranibizumab use: Mid Atlantic (24.0%) and West North Central (19.9%) divisions

CONCLUSIONS

This study suggests that the majority of Medicare beneficiaries received the more cost effective medication, bevacizumab, for the management of DME, though there were significant regional differences in the use of bevacizumab versus ranibizumab. Future research into factors driving geographic variation in the use of these agents may help direct cost-effective strategies for the management of DME.

REFERENCES

- Centers for Disease Control and Prevention (2011) National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011. Available at: http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf (accessed 3 November 2016).
- Varma R, Bressler NM, Doan QV, Gleason M, Danese M, Bower JK, Selvin E, Dolan C, Fine J, Colman S, Turpcu A. Prevalence of and risk factors for diabetic macular edema in the United States. JAMA Ophthalmol. 2014 Nov; 132(11):1334-40.
- Diabetic Retinopathy Clinical Research Network, Wells JA, Glassman AR, Ayala AR, Jampol LM, Aiello LP, Antoszyk AN, Arnold-Bush B, Baker CW, Bressler NM, Browning DJ, Elman MJ, Ferris FL, Friedman SM, Melia M, Pieramici DJ, Sun JK, Beck RW. Aflibercept, bevacizumab, or ranibizumab for diabetic macular edema. N Engl J Med. 2015 Mar 26;372(13):1193-203.
- Brechner R, Rosenfeld PJ, Babish JD, and Caplan S. Pharmacotherapy for neovascular age-related macular degeneration: an analysis of the 100% 2008 Medicare fee-for-service part B claims file. Am J Ophthalmol. 2001; 151: 887-895.
- Li E, Greenberg PB, Voruganti I, Krzystolik MG. Cost and Selection of Ophthalmic Anti-Vascular Endothelial Growth Factor Agents. R I Med J (2013). 2016 May 2;99(5):15-7.
- Erie JC, Barkmeier AJ, Hodge DO, Mahr MA. High Variation of Intravitreal Injection Rates and Medicare Anti-Vascular Endothelial Growth Factor Payments per Injection in the United States. Ophthalmology. 2016 Jun;123(6):1257-62.

Email: annie.wu09@gmail.com
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