

# Impact of Capacity and Resource Constraints on Wet Age-Related Macular Degeneration and Diabetic Macular Edema in the Brazilian Public Healthcare System: an Individual-Level Microsimulation Study



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## INTRODUCTION

- Traditional health technology assessments (HTA) often overlook real-world resource constraints, such as limited hospital capacity and workforce, leading to barriers in adopting new therapies and evaluating suboptimal patient outcomes<sup>1,2</sup>.
- The increasing prevalence of wet age-related macular degeneration (wAMD) and diabetic macular edema (DME) in Brazil, driven mainly by an ageing population and rising diabetes rates, places significant strain on ophthalmology services, which already face resource limitations, particularly in the Brazilian Public Healthcare System (SUS)<sup>3,4</sup>.
- Current anti-VEGF therapies require frequent injections, exacerbating healthcare system pressures; innovative agents such as faricimab, with extended durability, may help alleviate this burden by reducing injection frequency and optimizing resource use in the SUS<sup>5</sup>.
- The aim of this research was to assess the impact of intravitreal treatments for wAMD and DME on care capacity and resource management in the SUS.

## METHODS

- An individual-level microsimulation model developed in Microsoft Excel assessed resource constraints on wAMD and DME treatment in a hypothetical SUS ophthalmology hospital. The model simulated 150 patients (69 wAMD and 81 DME) over 5 years, with a specified growth rate from literature<sup>5</sup> and weekly interactions between patients and the hospital (**Figure 1**).
- Three treatment scenarios were simulated for both diseases: faricimab, aflibercept 2 mg, and ranibizumab. Bevacizumab (off-label) was analyzed for wAMD only, as reimbursed by the Ministry of Health<sup>6</sup>.
- Capacity constraints were represented by a limited number of available injections per week. The simulation incorporated patient characteristics, treatment intervals, hospital capacity, and delays based on national registries (DATASUS)<sup>6</sup>, published literature<sup>7-12</sup>, and expert opinion, measuring hospital visits and treatment delays across all scenarios.

## RESULTS

- The model estimated significantly lower appointment delays and hospital visits for both diseases with faricimab compared with aflibercept 2 mg and ranibizumab.
- Over five years, faricimab resulted in 93 delays, versus 6,627 for aflibercept 2 mg and 9,305 for ranibizumab, representing a 99% delay reduction (**Figure 2**).
- Faricimab required fewer hospital visits due to longer injection intervals: 3,648 visits compared with 4,160 for both aflibercept 2 mg and ranibizumab (**Figure 3**).
- Considering wAMD only, faricimab showed the lowest number of delays (78) and visits (1,448) compared with 714 and 1,797 for aflibercept 2 mg, 3,948 and 1,820 for ranibizumab, and 7,702 and 1,820 for bevacizumab, respectively (**Figure 4**).

## CONCLUSION

- Faricimab, with longer injection intervals, significantly reduces hospital visits and treatment delays for wAMD and DME compared with aflibercept 2 mg, ranibizumab, and bevacizumab in the Brazilian Public Healthcare System.
- This reduction eases the burden on SUS, enhancing the system’s efficiency and patient care.

### References:

1. Thokala P, Dixon S, Jahn B. Resource modelling: the missing piece of the HTA jigsaw? Pharmacoeconomics. 2015;33(3):193-203. doi:10.1007/s40273-014-0228-9; 2. Gale R, Cox O, Keenan C, Chakravarthy U. Health technology assessment of new retinal treatments; the need to capture healthcare capacity issues. Eye (Lond). 2022;36(12):2236-2238; 3. Wong WL, Su X, Li X, et al. Global prevalence of age-related macular degeneration and disease burden projection for 2020 and 2040: a systematic review and meta-analysis. Lancet Glob Health. 2014;2(2):e106-16; 4. Teo ZL, Tham YC, Yu M, et al. Global Prevalence of Diabetic Retinopathy and Projection of Burden through 2045. Ophthalmology. 2021;128(11):1580-1591; 5. Li T, Berdunov V, Hamilton R, et al. Economic Assessment in Resource-Constrained Systems: Individual-Level Simulation Model in Wet Age-Related Macular Degeneration and Diabetic Macular Oedema. Ophthalmol Ther. 2024;13(10):2577-2597; 6. Brasil. Ministério da Saúde. Departamento de Informática do SUS – DATASUS. Sistema de Informações Ambulatoriais do Sistema Único de Saúde (SIA-SUS). Disponível em: [http://ftp.datasus.gov.br/dissemin/publicos/SIASUS/200801\\_/Dados/](http://ftp.datasus.gov.br/dissemin/publicos/SIASUS/200801_/Dados/). Accessed on 14 March 2025; 7. Wykoff CC, Abreu F, Adams AP, et al. Efficacy, durability, and safety of intravitreal faricimab with extended dosing up to every 16 weeks in patients with diabetic macular oedema (YOSEMITE and RHINE): two randomised, double-masked, phase 3 trials. Lancet. 2022;399(10326):741-755; 8. Mitchell P, Holz FG, Hykin P, et al. EFFICACY AND SAFETY OF INTRAVITREAL AFLIBERCEPT USING A TREAT-AND-EXTEND REGIMEN FOR NEOVASCULAR AGE-RELATED MACULAR DEGENERATION: The ARIES Study; A Randomized Clinical Trial. Retina. 2021;41(9):1911-1920; 9. Kertes PJ, Galic IJ, Greve M, et al. Efficacy of a Treat-and-Extend Regimen With Ranibizumab in Patients With Neovascular Age-Related Macular Disease: A Randomized Clinical Trial. JAMA Ophthalmol. 2020;138(3):244-250; 10. Hirano T, Toriyama Y, Takamura Y, et al. Outcomes of a 2-year treat-and-extend regimen with aflibercept for diabetic macular edema. Sci Rep. 2021;11(1); 11. Heier JS, Khanani AM, Quezada Ruiz C, et al. Efficacy, durability, and safety of intravitreal faricimab up to every 16 weeks for neovascular age-related macular degeneration (TENAYA and LUCERNE): two randomised, double-masked, phase 3, non-inferiority trials. Lancet. 2022;399(10326):729-740; 12. Garweg JG, Štefanickova J, Hoyng C, et al. Dosing Regimens of Intravitreal Aflibercept for Diabetic Macular Edema Beyond the First Year: VIOLET, a Prospective Randomized Trial. Adv Ther. 2022;39(6):2701-2716.

Figure 1. Flow diagram of the booking schedule process in the microsimulation model

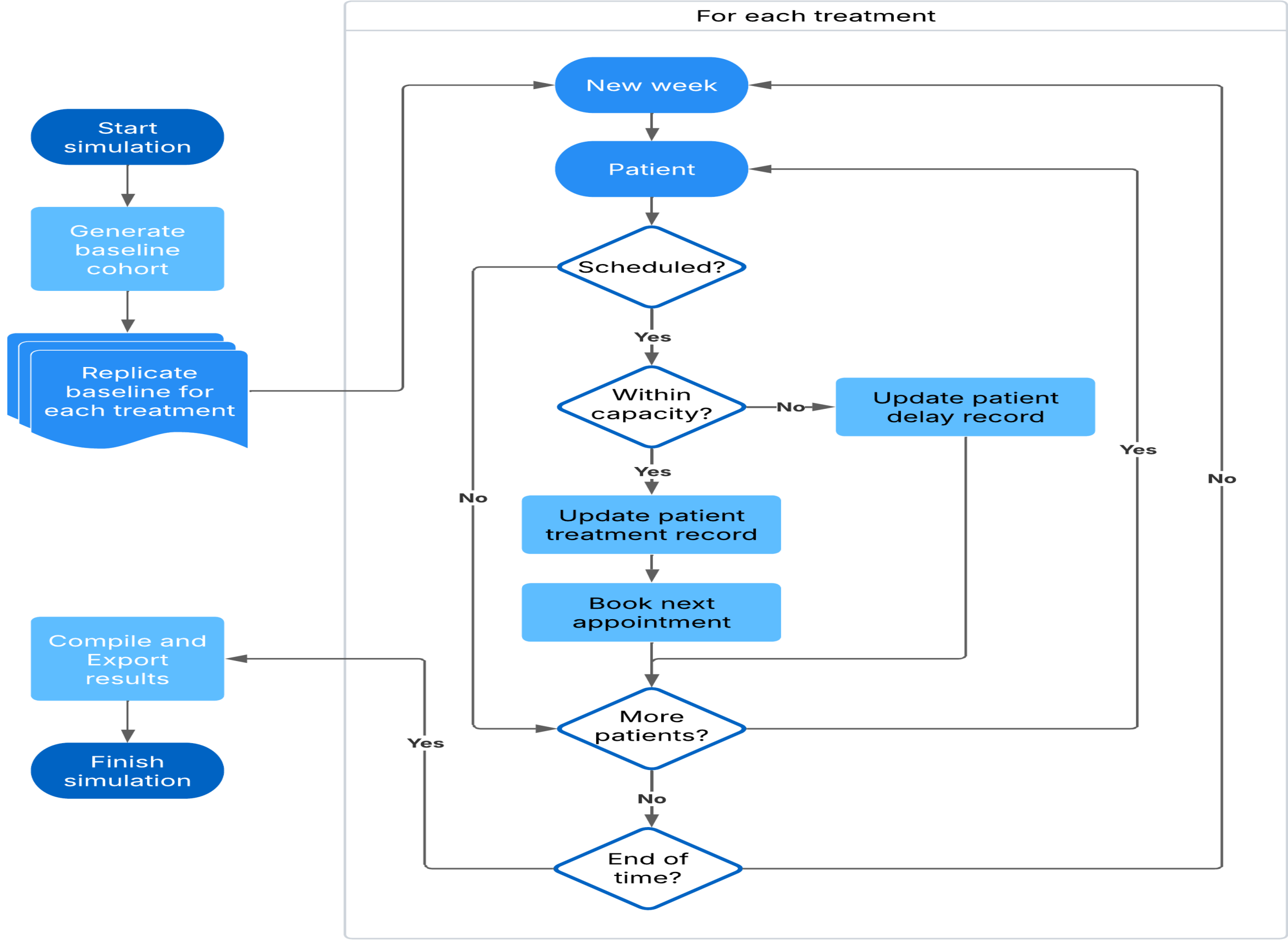


Figure 3. Comparison of annual hospital visits for each treatment, considering both wAMD and DME

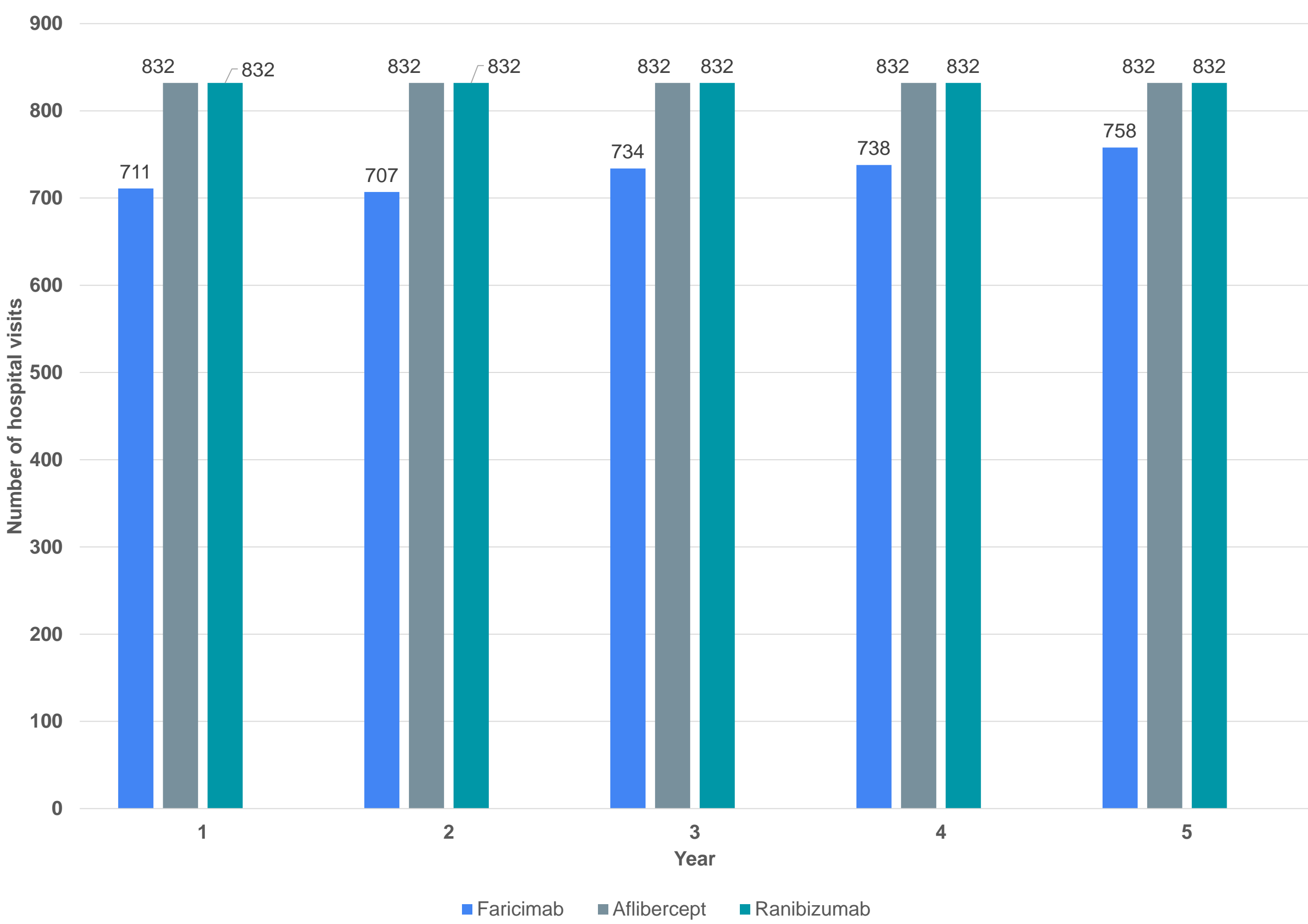


Figure 2. Comparison of annual appointment delays for each treatment, considering both wAMD and DME

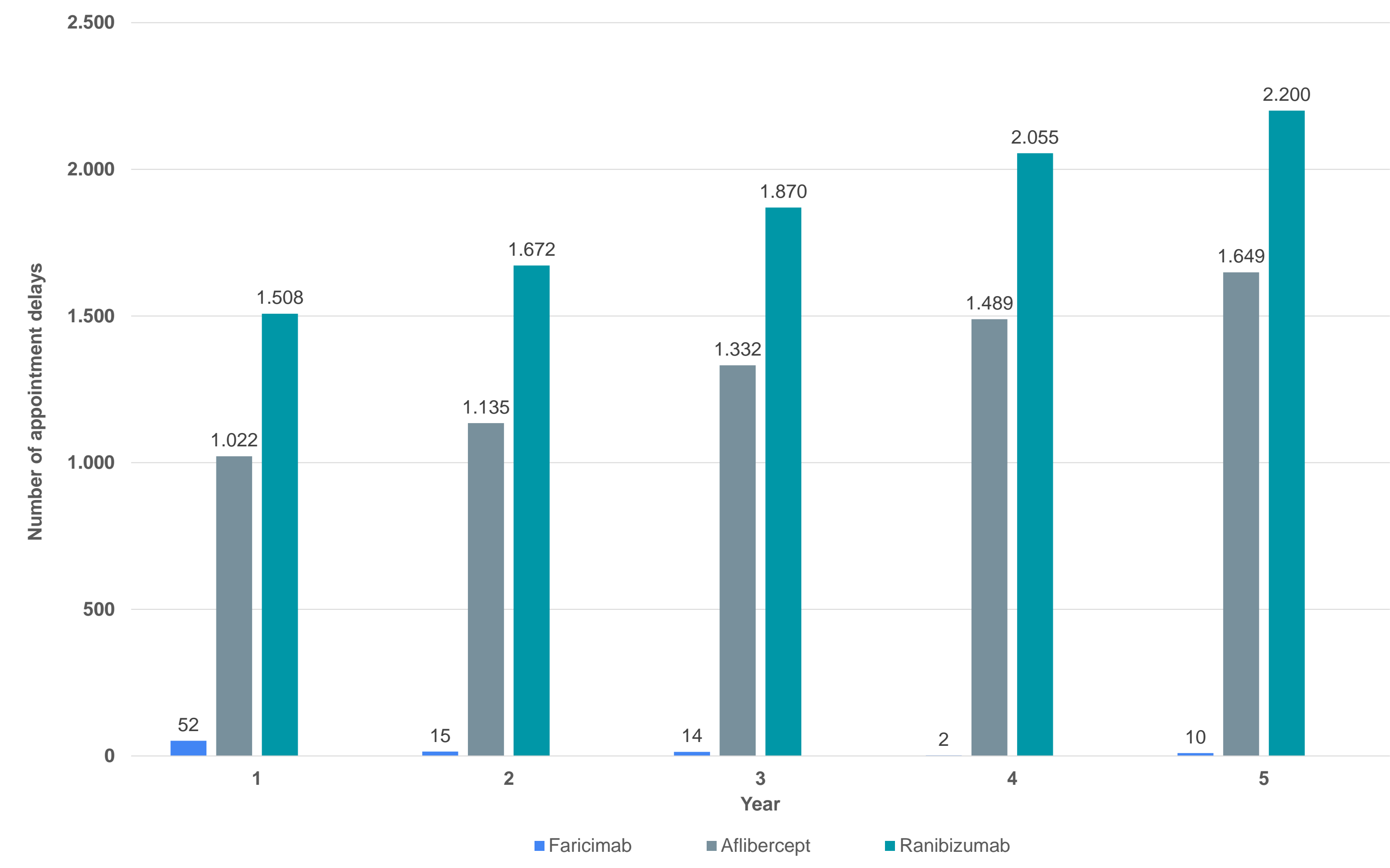


Figure 4. Comparison of annual appointment delays (A) and hospital visits (B) for each treatment (including off-label bevacizumab as reimbursed by the Ministry of Health), considering wAMD exclusively

