

Practice Patterns and Safety Protocols in Anti-VEGF Intravitreal Injections: Insights from Portugal

Práticas e Protocolos para a Realização de Injeções Intravítreas em Portugal

 João Romano ¹,  António Campos ¹, Nuno Oliveira ¹, Sara Silva ¹, Rita Tomás,  João P. Sousa ^{1,2}

¹ Ophthalmology Department, Centro Hospitalar de Leiria, Leiria, Portugal

² Health Sciences Research Centre in Biomedicine, Faculty of Health Sciences, University of Beira Interior, Covilhã, Portugal

Recebido/Received: 2023-10-15 | Aceite/Accepted: 2025-06-17 | Published online/Publicado online: 2026-03-17 | Publicado/Published: 2026-03-25

© 2026 Oftalmologia. This is an open-access article under the CC BY-NC 4.0. Re-use permitted under CC BY-NC 4.0. No commercial re-use.

© 2026 Oftalmologia. Este é um artigo de acesso aberto sob a licença CC BY-NC 4.0. Reutilização permitida de acordo com CC BY-NC 4.0. Nenhuma reutilização comercial.

DOI: <https://doi.org/10.48560/rspo.33243>

ABSTRACT

INTRODUCTION: Intravitreal injections (IVIs) of anti-vascular endothelial growth factor (VEGF) agents have revolutionized the treatment of retinal diseases, becoming a routine procedure for ophthalmologists worldwide. Despite their widespread adoption, the approaches to IVIs, encompassing preparation, technique, and antibiotic usage, exhibit significant diversity among healthcare providers.

This study aims to investigate the current practice patterns and safety protocols of anti-VEGF IVIs in Portugal.

METHODS: Cross-sectional survey of Portuguese ophthalmologists who administer intravitreal anti-VEGF injections. Participants completed an online and anonymous 29-question survey.

RESULTS: A total of 144 Portuguese ophthalmologists across the country participated, with an average of 11.3 ± 1.1 years in practice (27.1% retinal specialists). IVIs settings exhibited variability, with 77.8% conducted in operating rooms (OR) and 22.2% in procedure rooms outside the OR. Only 2.1% of the participants prescribed topical antibiotics before injection. Furthermore, 55.6% consistently replaced surgical gowns between procedures, 97.2% typically employed a lid speculum and 59.0% never used microscope. Povidone-iodine (PI) scrub at a concentration of 10% was performed on the periocular region by 97.9% of practitioners, and all applied a 5% PI solution to the ocular surface at some point prior to the intravitreal injection (IVI). A surgical time-out before the procedure was conducted by 44.4%. Most respondents (61.8%) were injected in the supero-temporal quadrant for both eyes. Regarding bilateral injections, 41.7% would typically perform them on the same day, whereas 30.6% would never consider it. After injection, 39.6% applied topical antibiotics, 20.8% lubricants or saline solution, and 6.2% topical intraocular pressure (IOP)-lowering medication. Longer-standing physician in practice was associated with the use of antibiotics ($p=0.008$) and IOP-lowering medication ($p=0.020$) after IVI. A total of 45.1% did not regularly assess optic nerve perfusion and 11.8% routinely prescribed topical antibiotics for home use after every IVI.

CONCLUSION: This survey underscores the heterogeneity in the Portuguese ophthalmologists' practices during IVI. Most physicians have aligned with the current trend of not using perioperative antibiotics, reflecting updated recommendations in the field. The practice of eyelid scrub-

bing and the consistent use of a lid speculum, although controversial in the literature, remain largely consensual among the Portuguese ophthalmologists.

KEYWORDS: Intravitreal Injections; Ophthalmologists; Practice Patterns, Physicians; Surveys and Questionnaires; Vascular Endothelial Growth Factor A/antagonists & inhibitors.

RESUMO

INTRODUÇÃO: As injeções intravítreas (IVIs) de anti-fator de crescimento endotelial vascular (VEGF) revolucionaram o tratamento de doenças retinianas, tornando-se um procedimento oftalmológico rotineiro. Apesar da sua utilização universal, as abordagens das IVIs, incluindo a preparação, técnica e uso de antibióticos exibem uma diversidade considerável entre médicos e instituições.

Este estudo tem como objetivo investigar as práticas e protocolos atuais relacionados com a realização de IVIs de anti-VEGF em Portugal.

MÉTODOS: Estudo transversal a oftalmologistas portugueses que administram IVIs de anti-VEGF. Os participantes responderam a um questionário online e anónimo com 29 questões.

RESULTADOS: Um total de 144 oftalmologistas portugueses de todo o país participaram, com uma média de $11,3 \pm 1,1$ anos de prática (27,1% especialistas). As IVIs são realizadas em 77,8% no bloco operatório (BO) e 22,2% em salas de procedimentos de retina fora do BO. Apenas 2,1% dos participantes prescrevem antibióticos tópicos para uso no domicílio antes da injeção. Além disso, 55,6% substituem consistentemente as batas cirúrgicas entre procedimentos, 97,2% usam um blefaróstato e 59,0% nunca utilizam o microscópio. A desinfecção da região periocular com iodopovidona a 10% é realizada por 97,9% dos participantes, e todos usam solução de iodopovidona a 5% na superfície ocular em algum momento antes da IVIs. Um *time-out* antes do procedimento é realizado por 44,4%. A maioria dos participantes (61,8%) injeta no quadrante supero-temporal em ambos os olhos. A administração de injeções bilaterais no mesmo dia é feita por 41,7%, enquanto 30,6% nunca o fazem. Após a injeção, 39,6% aplicam antibiótico tópico, 20,8% lubrificante ocular ou soro, e 6,2% um hipotensor tópico. Um maior tempo em atividade clínica dos médicos foi associado ao uso de antibióticos ($p=0,008$) e hipotensores ($p=0,020$) após a IVI. Um total de 45,1% não avalia regularmente a perfusão do nervo ótico e 11,8% prescreve rotineiramente antibióticos tópicos para uso no domicílio após cada IVI.

CONCLUSÃO: Este questionário destaca a heterogeneidade nas práticas dos oftalmologistas portugueses durante as IVIs. A maioria dos médicos não utiliza antibióticos perioperatórios, refletindo as recomendações atualizadas na área. A desinfecção periocular e o uso consistente do blefaróstato, embora controversos na literatura, permanecem amplamente consensuais entre os oftalmologistas portugueses.

PALAVRAS-CHAVE: Fator A de Crescimento do Endotélio Vascular/antagonistas & inibidores; Injeções Intravítreas; Inquéritos e Questionários; Oftalmologistas; Padrões de Prática Médica.

INTRODUCTION

In the ever-evolving landscape of ophthalmological care, intravitreal injections (IVIs) of anti-vascular endothelial growth factor (VEGF) agents have emerged as a transformative and globally recognized treatment modality for a wide spectrum of retinal diseases. Over the past two decades, their pivotal role in addressing conditions such as neovascular age-related macular degeneration (nAMD), diabetic macular edema, and retinal vein occlusion has led to a revolutionary shift in patient care. Frequent IVIs have become the standard of care, and their efficacy in maintaining or even enhancing visual acuity for various exudative retinal and choroidal disorders has been extensively documented.¹⁻³

IVIs widespread adoption has brought to light a note-

worthy divergence in practice patterns and safety protocols employed by healthcare providers.^{2,3} This diversity extends to various aspects, including patient preparation, injection technique, the usage of antibiotics, and post-injection management. The underlying objectives of these variations are multifaceted, encompassing the prevention of endophthalmitis, the enhancement of patient comfort, and the optimization of clinical procedures.

In light of this significant variability, the call for standardized and evidence-based guidelines has become increasingly resonant. The need for practical recommendations that encompass the latest evidence is imperative to mitigate potential risks and complications associated with IVIs.^{4,5}

Previous studies have shed light on the practice prefer-

ences for IVIs in various regions, including the United States, Canada, Australia, Israel, and Europe.⁶⁻¹³ However, the real landscape in Portugal remains uncharted in this regard.

This study conducted the first survey of current practice preferences and safety measures used in anti-VEGF IVIs in Portugal. By examining the unique practice patterns specific to Portugal, it aims to provide insights into local approaches, including variations in techniques, safety protocols, and patient care. The primary goal of this research is to evaluate the degree of practice pattern variability in Portugal, thereby contributing to the broader international understanding of IVIs practice.

MATERIAL AND METHODS

Portuguese ophthalmologists who administer intravitreal anti-VEGF injections in Portugal were invited from August to September 2023 to complete an anonymous online questionnaire (Annex 1).

This survey, presented in the Google Form® platform, collected responses from participants, encompassing a total of 29 multiple-choice questions with an option for free-text responses. The questionnaire covered diverse aspects, including participant demographics, practice settings, pre-procedure methods, injection practices, and post-procedure protocols associated with IVIs. It is noteworthy

that the initial page of the survey explicitly presented an informed consent statement, which participants were required to agree to before proceeding with the questionnaire. All procedures and data collection strictly adhered to the principles outlined in the Declaration of Helsinki, ensuring the ethical conduct of the research.

For data analysis, we utilized the Statistical Package for the Social Sciences for Windows, version 23 (IBM SPSS Statistics®). This comprehensive analysis included the calculation of descriptive statistics and frequency distributions for specific variables, shedding light on the prevailing trends and patterns within the collected data. To assess the relationships between demographic covariates and responses, logistic regression was employed, quantifying the impact of various factors on the survey results. A significance level of 0.05 was employed for all statistical comparisons to determine the presence of statistical significance.

RESULTS

DEMOGRAPHICS AND PRACTICE SETTINGS

A total of 144 Portuguese ophthalmologists participated in the survey, with diverse backgrounds (Table 1). Among them, 39 (27.1%) were retina specialists, and 56 (38.9%)

Table 1. Demographic profile of participants.

	NUMBER	PERCENT (%)
Clinical practice		
Retina specialist	39	27.1
Non-retina specialist*	49	34.0
Resident	56	38.9
Years of practice (including residency)		
Mean	11.3 ± 1.1 years	
Gender		
Male	75	52.1
Female	69	47.9
Geographic location (n=138)		
North	56	40.6
Center	37	26.8
South	42	30.4
Islands	3	2.2
Not identified	6	-
Mean number of IVIs per month		
<15	39	27.1
15-50	64	44.4
>50	41	28.5
Practice setting		
Surgical room (OR)	60	41.7
Procedure room (OR)	52	36.1
Procedure room (outside OR)	32	22.2

IVIs - Intravitreal injections; OR - Operating room.

* 4 retinal specialist also identified themselves as non-retina specialist, but were included only in the first category.

were ophthalmology residents. The average years of practice, including a 4-year ophthalmology residency, amounted to 11.3 ± 1.1 years. Around half of the participants were male (52.1%), and they represented all regions of Portugal, with 41.0% from the north, 27.1% from the center, 30.6% from the south, and 2.1% from the islands.

A substantial portion (72.9%) of respondents reported administering more than 15 IVIs per month, with 28.5% exceeding 50 IVIs and 27.1% administering fewer than 15 IVIs. In terms of clinical settings, 41.7% conducted IVIs in surgical rooms, while 58.3% utilized procedure rooms. For those utilizing procedure rooms, 61.9% performed IVIs inside the operating room (OR), while 38.1% conducted them outside the OR. Patient clothing inside the room exhibited variability, with 54.2% adopting OR cloths, 40.3% opting for personal clothing covered by surgical gowns, and 5.5% permitting patients to wear only their clothes. In surgical rooms, the majority (88.3%) mandated OR scrubs, whereas in procedure rooms, 70.2% allowed patients to wear personal clothing, with or without gowns.

PRE-INJECTION PRACTICES

Informed consent practices are diverse, with 50.7% of physicians indicating that patients signed a single informed consent form for all treatments. On the other hand, 27.8% required consent for each injection, 11.8% for each different medication, and 4.2% adopted an oral consent process. In free text, some reported that the patients re-signed the informed consent form from time to time.

Only 2.1% prescribed topical antibiotics for home use before injection.

Pre-injection preparations, outside the room, featured various practices, with 87.5% utilizing topical anesthetic, 56.3% applying povidone-iodine (PI) on the ocular surface, and 6.9% using topical antibiotics (Fig. 1). While 9.7% do not do anything outside the room, few practitioners (5.6%) reported scrubbed the periocular region with PI, and a minority (2.1%) opted for eye dilatation.

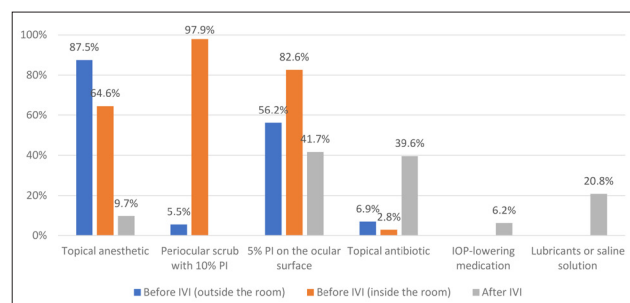


Figure 1. Pre and post injection practices of participants.

IVI - intravitreal injection; PI - povidone-iodine; IOP - intraocular pressure.

Inside the injection room, all respondents employed PI, with 97.9% scrubbing the periocular region and 82.6% applying PI on the eye. Most ophthalmologists (95.8%) always changed gloves between patients, 55.2% replaced surgical gowns, and 14.6% opted for not to use surgical gowns. The

use of masks (100%) and surgical caps (98.6%) was nearly universally adopted. A lid speculum was also used by almost all ophthalmologists (97.2%). Notably, 59.0% never used a microscope, while 9.0% consistently incorporated it into their practice. Physician positioning during IVIs exhibited variation, with 34.0% administering IVIs while sitting and 29.2% preferring a standing position but 91.7% employing an operating table for patients to recline. Eye draping was a common practice, with 97.9% of respondents employing it. The majority used a window with or without adhesive (81.6%), while 18.4% had a plastic adhesive transparent area to isolate the lid margins, eyelashes and eyebrow.

INJECTION PRACTICES

Immediately before injection procedures include 64.6% administering topical anesthetic, 61.8% using a PI solution and 2.8% employing topical antibiotics while 17.4% forgo anything. Medication preparation practices varied, with 18.7% usually preparing medications in the room, 53.1% regularly relying on hospital pharmacy preparation, and 14.6% exclusively using pre-filled syringes. For patients reporting iodine allergies, 93.7% utilized alternative antiseptics (usually chlorhexidine), with only 3.5% proceeding with PI. The majority of respondents (86.1%) utilized some sort of calliper to measure the distance to the limbus while 12.5% used a syringe or a cotton swab and only 1.4% did not employ any measurement. A surgical time-out was performed by 44.4% to review patient identity, procedure, and surgical laterality, and 80.6% employed surgical marking or labelling. The choice of injection quadrant revealed that 61.8% preferred the superotemporal quadrant, including 63.5% for right eyes and 59.4% for left eyes. The inferotemporal quadrant was the second most common choice, utilized by 34.7% of practitioners for each eye. Nasal quadrants were used by 6.3% in the left eye. About 40.3% usually displaced the conjunctiva, while 37.5% never practiced this technique. Same-day bilateral IVIs were common practice for 41.7%, but 30.6% never conducted them, and 19.4% considered them only in special cases.

PRACTICES AFTER INJECTIONS

After performing IVIs, 41.7% applied PI, 39.6% topical antibiotics, 20.8% lubricants or saline solution, and 6.2% topical intraocular pressure (IOP)-lowering medication. Longer-standing physicians in practice were associated with the use of antibiotics ($p=0.008$) and IOP-lowering medication ($p=0.020$) after IVIs. Although 45.1% did not regularly assess optic nerve perfusion, 52.8% tested gross visual acuity (hand motion or counting fingers), and 2.1% checked the IOP. After every IVI, 11.8% routinely prescribed topical antibiotics for home use, and 14.6% prescribed eye lubricant. In the case of patients with glaucoma, 74.3% of respondents took no special precautions. However, 10.4% applied topical IOP-lowering medication before or after the injection, and 9.7% measured IOP. Additional precautions reported on free text included slower medication injection, anterior chamber paracentesis, and avoiding injection at the site of a filtering bleb or shunt. Over the past five

years, the mean number of endophthalmitis cases after IVIs reported by each respondent was 0.24 ± 0.05 , with 22.2% of the participants having at least one case in that period. Additional practices reported in the free-text responses included changing the injection quadrant for patients who had undergone multiple IVIs in the same eye and occluding the eye after the procedure.

DISCUSSION

The practice of IVIs for administering anti-VEGF medications can vary significantly based on regional regulations, clinical settings, and professional guidelines. It's important to recognize that the approach to IVIs can be influenced by legal requirements and the local healthcare context. In Portugal, as in many countries, national laws and regulations dictate the clinical settings for IVIs. For instance, in the USA and Canada, office-based IVIs are common,⁶ while in Europe,¹⁰ including Portugal, IVIs are primarily limited to the operating room (OR) or dedicated sterile procedure rooms to minimize infection risks. The Portuguese College of Ophthalmology (PCO) advocates for the use of the OR or high-standard dedicated procedure rooms.¹⁴ Performing IVIs outside the OR offers certain benefits to patients, including increased comfort and reduced time spent on each visit.¹⁵ It may also increase efficiency while simultaneously freeing up operating room schedules for other surgeries.

Informed consent practices in Portugal are shaped by national laws. While the Portuguese Law n°1/2001 of 3rd January mandates informed consent, it does not necessarily require a written form.¹⁶ The Portuguese Retina Study Group (GER) recommends written informed consent for each distinct medication, although the specific protocol may vary based on the ethical commission of each hospital.¹⁷

The use of pre or perioperative topical antibiotics in Portugal is relatively low and aligns with the most recent international and national (GER) guidelines.^{2,17} Extensive studies have shown that the routine use of topical antibiotics may even contribute to the development of resistant bacterial strains.^{18,19} Subsequently, there is also insufficient evidence to support the routine use of post-injection antibiotics.²⁰ It is noteworthy that physicians with longer-standing practices tend to continue antibiotic prophylaxis, highlighting the challenges in changing established practices.

Even though periocular skin disinfection with PI is not recommended as routine and standard practice by European Experts Consensus and United States experts guidelines,^{2,3} Portuguese guidelines from GER and PCO still consider it a mandatory practice.^{14,17} Some studies have suggested that periocular lid scrubs may increase conjunctival bacterial counts by dislocating bacteria from the eyelid margin.^{21,22} On the other hand, applying topical 5% PI for over 30 seconds before IVIs is considered a safe approach for antisepsis as it is overall strongly recommended and universally adopted in Portugal.^{2,3} There is some evidence to support the use of multiple applications of PI, with the last application preceding the injection.²³ For patients with self-reported iodine allergies, chlorhexidine is a safe alternative.² However, self-reported iodine allergy lacks a sci-

tific basis, and there are no reports of anaphylaxis related to PI use in ophthalmology.²⁴ Nonetheless, adverse reactions to PI are typically limited to contact dermatitis or irritation and omitting preoperative disinfection poses risks that should not be underestimated.

To minimize the risk of contamination during IVIs, the use of facial masks and limiting physician-patient talking is recommended by European and Portuguese experts to avoid aerosol or droplet contamination.^{2,17} The use of sterile gloves, surgical gowns and caps is advised based on the specific IVI setting, even though conclusive evidence of endophthalmitis risk reduction is lacking.³ Patient draping, while common in Portugal, is not considered essential by European experts, and some reports suggest that plastic adhesive drapes may increase infection risk and patient anxiety.^{2,25,26}

The use of a lid speculum remains controversial in the literature, but it is common practice in Portugal.² Lid closure during IVI can certainly lead to needle contamination but also the pressure applied into the meibomian glands may also contaminated the ocular surface. While some recommend the bimanual retraction technique as a safe alternative to avoid needle contamination, more research is needed to establish the most effective technique for preventing lid closure during IVIs.^{27,28}

Time-out procedures must be implemented to ensure the patient safety and efficiency of the process.²⁹ The use of prefilled syringes during IVIs may reduce the risk of contamination associated with the transfer of medication from glass vials to syringes.^{30,31}

IVIs guidelines do not specify a particular injection site, but it is generally safe to perform IVIs 360° through the pars plana between 3.5 mm (aphakic/pseudophakic patients) and 4 mm (phakic patients) from the limbus.^{2,17} Consideration should be given to patient characteristics, such as the presence of a scleral patch, filtering bleb, or presclerotomy areas, and patients who receive repeated IVIs may benefit from alternating injection sites. Some guidelines recommend conjunctival displacement to prevent any direct route between the vitreous and ocular surface, with a sterile cotton-tipped applicator to prevent reflux.³²

Regular assessments of light perception or gross visual acuity can help detect non-perfusion of the central retinal artery and prompt appropriate immediate care, such as anterior chamber paracentesis.²¹

While bilateral IVIs are not routine practice in Portugal, they are considered safe, cost-effective, and convenient for patients.^{2,33} It is essential to prepare each eye separately and not reuse equipment.

Patients with ocular hypertension or glaucoma are at potential risk for progression due to repeated IOP spikes after IVIs.³⁴ Monitoring IOP after IVIs and over time is recommended for this patient population.² Techniques such as digital massage of the eye and slower injection speed can be considered in vulnerable eyes.² In contrast some studies have explored the prophylactic use of IOP-lowering medication for preventing post-IVI IOP spikes, but the results concluded their inefficacy.³⁴

The limitations of this study include the relatively low number of Portuguese ophthalmologists surveyed, which may introduce response bias and sample errors. While the results exhibit good demographic dispersion, they do not represent every public hospital in the country. Respondents' practices may vary depending on the clinical setting, but we tried to overcome this by addressing the most common practice patterns.

CONCLUSION

This survey offers a comprehensive overview of the contemporary practice patterns and safety protocols of anti-VEGF IVIs in Portugal. Despite minor variations in clinical settings and medication preparation methods, it is noteworthy that the majority of ophthalmologists have embraced current guidelines, which discourage the use of perioperative antibiotics. Certain practices, such as eyelid scrubbing with PI, the use of a lid speculum and eye draping, while still the subject of debate in the scientific literature, remain widely accepted and practiced within the country. This consensus underscores a dedication to strict aseptic protocols during IVIs, emphasizing the importance of maintaining a clean and sterile environment for the benefit of the patients.

AGRADECIMENTOS/ ACKNOWLEDGMENTS

We extend our sincere gratitude to all the ophthalmologists who dedicated their time to participate in this online survey. Special thanks for those who actively facilitated the distribution of the survey among their colleagues.

PRÉMIOS E APRESENTAÇÕES ANTERIORES/AWARDS AND PREVIOUS PRESENTATIONS

This work was submitted for presentation at "66º Congresso Português de Oftalmologia".

CONTRIBUTORSHIP STATEMENT / DECLARAÇÃO DE CONTRIBUIÇÃO

NO: Data interpretation, writing, revision.
SS: Study design, data interpretation, writing, revision.
RT: Writing and revision.
JPS: Study design and revision.
All authors approved the final version to be published.

NO: Interpretação de dados, redção, revisão.
SS: Desenho do estudo, interpretação de dados, redção, revisão.
RT: Redação e revisão.
JPS: Desenho do estudo e revisão.

Todos os autores aprovaram a versão final a ser publicada.

RESPONSABILIDADES ÉTICAS

Conflitos de Interesse: Os autores declaram a inexistência de conflitos de interesse na realização do presente trabalho.

Fontes de Financiamento: Não existiram fontes externas de financiamento para a realização deste artigo.

Confidencialidade dos Dados: Os autores declaram ter seguido os protocolos da sua instituição acerca da publicação dos dados de doentes.

Proteção de Pessoas e Animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pela Comissão de Ética responsável e de acordo com a Declaração de Helsínquia revista em 2024 e da Associação Médica Mundial.

Proveniência e Revisão por Pares: Não comissionado; revisão externa por pares.

ETHICAL DISCLOSURES

Conflicts of Interest: The authors have no conflicts of interest to declare.

Financing Support: This work has not received any contribution, grant or scholarship

Confidentiality of Data: The authors declare that they have followed the protocols of their work center on the publication of patient data.

Protection of Human and Animal Subjects: The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and those of the Code of Ethics of the World Medical Association (Declaration of Helsinki as revised in 2024).

Provenance and Peer Review: Not commissioned; externally peer-reviewed.

REFERENCES

1. Peyman GA, Lad EM, Moshfeghi DM. Intravitreal injection of therapeutic agents. *Retina*. 2009;29:875-912. doi:10.1097/IAE.0b013e3181a94f01
2. Grzybowski A, Told R, Sacu S, Bandello F, Moisseiev E, Loewenstein A, et al. 2018 Update on Intravitreal Injections: Euretina Expert Consensus Recommendations. *Ophthalmologica*. 2018;239:181-93. doi:10.1159/000486145
3. Avery RL, Bakri SJ, Blumenkranz MS, Brucker AJ, Cunningham ET Jr, D'Amico DJ, et al. Intravitreal injection technique and monitoring: Updated Guidelines of an Expert Panel. *Retina*. 2014;34:S1-S18. doi:10.1097/IAE.0000000000000399
4. Ramos MS, Xu LT, Singuri S, Castillo Tafur JC, Arepalli S, Ehlers JP, et al. Patient-Reported Complications after Intravitreal Injection and Their Predictive Factors. *Ophthalmol Retina*. 2021;5:625-32. doi:10.1016/j.oret.2020.09.024
5. Ghasemi Falavarjani K, Nguyen QD. Adverse events and complications associated with intravitreal injection of anti-VEGF agents: a review of literature. *Eye*. 2013;27:787-94. doi:10.1038/eye.2013.107
6. Uhr JH, Xu D, Rahimy E, Hsu J. Current Practice Preferences and Safety Protocols for Intravitreal Injection of Anti-Vascu-

- lar Endothelial Growth Factor Agents. *Ophthalmology Retina*. 2019;3:649-5. doi:10.1016/j.oret.2019.03.013
7. Chaturvedi R, Wannamaker KW, Riviere PJ, Khanani AM, Wykoff CC, Chao DL. Real-World Trends in Intravitreal Injection Practices among American Retina Specialists. *Ophthalmology Retina*. 2019;3:656-62. doi:10.1016/j.oret.2019.03.023
 8. Xing L, Dorrepaal SJ, Gale J. Survey of intravitreal injection techniques and treatment protocols among retina specialists in Canada. *Canadian Journal of Ophthalmology*. 2014;49:261-6. doi:10.1016/j.jcjo.2014.03.009
 9. Mimouni M, Segal O, Segal-Trivitz Y, Nemet AY, Geffen N, Neshet R. Survey of intravitreal injection techniques among retina specialists in Israel. *Clin Ophthalmol*. 2016;10:1111. doi:10.2147/OPTH.S96452
 10. Huang K, Sultan M, Zhou D, Tressler C, Mo J. Practice patterns of ophthalmologists administering intravitreal injections in Europe: a longitudinal survey. *Clin Ophthalmol*. 2016; 10:2485-8. doi:10.2147/OPTH.S117801
 11. Giberson M, Taylor V. Experience of New Brunswick ophthalmologists using intravitreal anti-vascular endothelial growth factor. *Can J Ophthalmol*. 2015;50:393-4. doi:10.1016/j.jcjo.2015.04.017
 12. Buck DA, Dawkins R, Kawasaki R, Sandhu SS, Allen PJ. Survey of Victorian ophthalmologists who use ranibizumab to treat age-related macular degeneration: to identify current practice and modifiable risk factors relevant to post-injection endophthalmitis. *Clin Exp Ophthalmol*. 2015;43:277-9. doi:10.1111/ceo.12405
 13. Chopra R, Preston GC, Keenan TD, Mulholland P, Patel PJ, Balaskas K, et al. Intravitreal injections: past trends and future projections within a UK tertiary hospital. *Eye*. 2022;36:1373-8. doi:10.1038/s41433-021-01646-3
 14. Ordem dos Médicos, Colégio da Especialidade de Oftalmologia. Parecer sobre a Realização de Injeções Intravítreas.pdf. Lisboa:OM; 2024.
 15. Rodríguez Ramírez M, Del Barrio Manso MI, Martín Sánchez MD. Intravitreal injections: What do patients prefer? Analysis of patient's satisfaction and preferences about where to perform intravitreal injections. *Arch Soc Esp Oftalmol*. 2014;89:477-83. doi:10.1016/j.oftale.2014.11.010
 16. Primeiro-Ministro O, de Oliveira AM. Decreto do Presidente da República n.º 1/2001. 2001.
 17. Mira F, Martins D, Duarte L, Alfaiate M, Faria R, Fernandes Fonseca A. Guidelines de tratamentos intravítreos. *Oftalmologia*. 2017; 41:S25-30. doi:10.48560/rspo.11821.
 18. Hunyor AP, Merani R, Darbar A, Korobelnik J, Lanzetta P, Okada AA. Topical antibiotics and intravitreal injections. *Acta Ophthalmol*. 2018;96:435-41. doi:10.1111/aos.13417
 19. Bande MF, Mansilla R, Pata MP, Fernández M, Blanco-Teijeiro MJ, Piñeiro A, et al. Intravitreal injections of anti-VEGF agents and antibiotic prophylaxis for endophthalmitis: A systematic review and meta-analysis. *Sci Rep*. 2017;7:18088. doi:10.1038/s41598-017-18412-9
 20. Bhatt SS, Stepien KE, Joshi K. Prophylactic antibiotic use after intravitreal injection: effect on endophthalmitis rate. *Retina*. 2011;31:2032-6. doi:10.1097/IAE.0b013e31820f4b4f
 21. Aiello LP, Brucker AJ, Chang S, Cunningham ET Jr, D'Amico DJ, Flynn HW Jr, et al. Evolving guidelines for intravitreal injections. *Retina*. 2004;24:S3-S19. doi:10.1097/00006982-200410001-00002
 22. Ali T, Jung K, Montan PG. Eyelid skin disinfecting and conjunctival bacteria in cataract surgery. *Acta Ophthalmol*. 2013;91:114-7. doi:10.1111/j.1755-3768.2012.02401.x
 23. Stranz CV, Fraenkel GE, Butcher AR, Esterman AJ, Goggin MJ. Survival of bacteria on the ocular surface following double application of povidone-iodine before cataract surgery. *Eye*. 2011;25:1423-8. doi:10.1038/eye.2011.182
 24. Wykoff CC, Flynn HW, Han DP. Allergy to Povidone-Iodine and Cephalosporins: The Clinical Dilemma in Ophthalmic Use. *Am J Ophthalmol*. 2011;151:4-6. doi:10.1016/j.ajo.2010.08.044
 25. Tailor R, Beasley R, Yang Y, Narendran N. Evaluation of patients' experiences at different stages of the intravitreal injection procedure - what can be improved? *Clin Ophthalmol*. 2011;5:1499-502. doi: 10.2147/OPTH.S24358.
 26. Webster J, Alghamdi A. Use of plastic adhesive drapes during surgery for preventing surgical site infection. *Cochrane Database Syst Rev*. 2015;2015:CD006353. doi: 10.1002/14651858.CD006353.pub4.
 27. Fineman MS, Hsu J, Spirm MJ, Kaiser RS. Bimanual assisted eyelid retraction technique for intravitreal injections. *Retina*. 2013;33:1968-70. doi:10.1097/IAE.0b013e318287da92
 28. Rahimy E, Fineman MS, Regillo CD, Spirm MJ, Hsu J, Kaiser RS, et al. Speculum versus Bimanual Lid Retraction during Intravitreal Injection. *Ophthalmology*. 2015;122:1729-30. doi:10.1016/j.ophtha.2015.02.001
 29. Van Calster J, Willekens K, Seys D, Van Elderen P, Spileers W, Vanhaecht K. Standardized care by redesign of an intravitreal injection pathway. *Eur J Ophthalmol*. 2019;29:92-9. doi:10.1177/1120672117754169
 30. Sassalos TM, Paulus YM. Prefilled syringes for intravitreal drug delivery. *Clin Ophthalmol*. 2019;13:701-6. doi:10.2147/OPTH.S169044
 31. Storey PP, Tauqeer Z, Yonekawa Y, Todorich B, Wolfe JD, Shah SP, et al. The impact of prefilled syringes on endophthalmitis following intravitreal injection of ranibizumab. *Am J Ophthalmol*. 2019;199:200-8. doi:10.1016/j.ajo.2018.11.023
 32. Wilson ME, Scott AW. Intravitreal injection therapy. [accessed Jan 2023] Available at: <https://www.aao.org/eyenet/article/how-to-give-intravitreal-injections>
 33. Lima LH, Zweifel SA, Engelbert M, Sorenson JA, Slakter JS, Cooney MJ, et al. Evaluation of safety for bilateral same-day intravitreal injections of anti-vascular endothelial growth factor therapy. *Retina*. 2009;29:1213-7. doi:10.1097/IAE.0b013e3181b32d27
 34. Frenkel MP. Effect of prophylactic intraocular pressure-lowering medication on intraocular pressure spikes after intravitreal injections. *Arch Ophthalmol*. 2010;128:1523. doi:10.1001/archophthol.2010.297



**Corresponding Author/
Autor Correspondente:**

João Romano

Ophthalmology department,
Centro Hospitalar de Leiria
Rua das Olhalvas,
2410-197 Leiria, Portugal
E-mail: jpedroromano@gmail.com



ORCID: 0000-0001-7964-982X

Anex 1. Questionnaire.

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

Análise nacional do procedimento de injeção intravítrea de anti-VEGF

Caro/a colega,

O uso de injeções intravítreas de anti-VEGF veio revolucionar o tratamento das doenças da retina nos últimos 20 anos. No entanto, apesar da sua presença constante no mundo da oftalmologia, os protocolos e preferências para a sua realização variam entre diferentes locais e médicos.

Deste modo, este **questionário anónimo de 3 minutos** pretende analisar a forma como este procedimento é normalmente praticado nos diferentes hospitais do nosso país.

Agradecemos desde já a sua participação!

João Romano
Médico Interno do Centro Hospitalar de Leiria

* Indica uma pergunta obrigatória.

- Consentimento de participação *

Marcar tudo o que for aplicável.

☐ Aceito participar voluntariamente neste estudo e autorizo a utilização dos dados exclusivamente para fins de investigação. Todos os dados recolhidos são anónimos e confidenciais.

O âmbito deste questionário prende-se com as injeções intravítreas de **anti-VEGF e não de outros fármacos**.

- Género *

Marcar apenas uma oval.

☐ Feminino
☐ Masculino

<https://docs.google.com/forms/d/1nC1gSEUHTa2YKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 1/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

- Atividade clínica *

Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Especialista de Retina Médica
☐ Especialista dedicado a outras subespecialidades
☐ Interno

- Tempo de atividade em oftalmologia (anos) *

Incluindo internato médico

- Instituição onde normalmente faz injeções intravítreas *

- Qual o número **médio** de injeções intravítreas que realiza por **mês**? *

Marcar apenas uma oval.

☐ <15
☐ 15-50
☐ >50

- Qual o local onde realiza, **normalmente**, as injeções intravítreas? *

Marcar apenas uma oval.

☐ Sala de cirurgia do bloco operatório
☐ Sala de procedimentos no bloco operatório
☐ Sala de procedimentos na consulta
☐ No gabinete de consulta
☐ Outra: _____

<https://docs.google.com/forms/d/1nC1gSEUHTa2YKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 2/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

- Qual o vestuário do doente para a injeção intravítrea nesse local? *

Marcar apenas uma oval.

☐ Roupa de exterior
☐ Roupa de exterior com bata de bloco
☐ Roupa de bloco

- O doente realiza algum tratamento prévio à injeção? (no **domicílio**) *

Marcar apenas uma oval.

☐ Não
☐ Antibiótico tópico
☐ Outra: _____

- O **consentimento informado** é assinado pelo doente: *

Marcar apenas uma oval.

☐ Para cada injeção intravítrea
☐ Para cada fármaco diferente
☐ Para todo o tratamento com injeções
☐ Não é assinado, apenas é dado consentimento verbal
☐ Outra: _____

- Como é feita a preparação do doente **antes** da entrada na sala? *

Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Anestésico tópico
☐ Antibiótico tópico
☐ Solução de iodopovidona no fundo de saco
☐ Nada é feito antes do doente entrar na sala
☐ Outra: _____

<https://docs.google.com/forms/d/1nC1gSEUHTa2YKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 3/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

- Como é feita a desinfeção do doente **na sala**? *

Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Solução de iodopovidona na região periocular
☐ Solução de iodopovidona no fundo de saco
☐ Não é feita desinfeção após o doente entrar na sala
☐ Outra: _____

- Quantas vezes **substitui** cada uma destas peças do **seu** vestuário quando realiza as injeções? *

Marcar apenas uma oval por linha.

	Entre cada doente	Por vezes	Raramente/Nunca	Não uso
Luvas cirúrgicas	☐	☐	☐	☐
Bata cirúrgica	☐	☐	☐	☐
Touca	☐	☐	☐	☐
Máscara	☐	☐	☐	☐

<https://docs.google.com/forms/d/1nC1gSEUHTa2YKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 4/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

14. Para a realização da injeção, utiliza: *

Marcar apenas uma oval por linha.

	Normalmente	Por vezes	Raramente	Nunca
Blefarostato	☐	☐	☐	☐
Microscópio	☐	☐	☐	☐
Banco/cadeira para cirurgião	☐	☐	☐	☐
Mesa/Maca operatória para o doente	☐	☐	☐	☐
Cadeira/cadeira de rodas para o doente	☐	☐	☐	☐

15. Que campo cirúrgico utiliza? *

Marcar apenas uma oval.

☐ Campo cirúrgico com película adesiva transparente

☐ Campo cirúrgico com janela adesiva

☐ Campo cirúrgico com janela (não adesiva)

☐ Não uso campo, normalmente

☐ Outra: _____

16. Aplica normalmente algum colírio imediatamente antes da injeção? *

Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Não

☐ Anestésico

☐ Solução de Iodopovidona

☐ Antibiótico

☐ Outra: _____

<https://docs.google.com/forms/d/1nC1gSEUHTa2iYKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 5/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

17. Onde é preparada a seringa com o fármaco? *

Marcar apenas uma oval por linha.

	Normalmente (todos os fármacos)	Por vezes (depende do fármaco)	Raramente/Nunca
Pré-carregada	☐	☐	☐
Na farmácia hospitalar	☐	☐	☐
No bloco	☐	☐	☐

18. No caso de o doente reportar uma alergia à Iodopovidona, qual a medida que normalmente adopta? *

Marcar apenas uma oval.

☐ Não altero o método

☐ Utilizo uma diluição da solução de Iodopovidona

☐ Utilizo outro antisséptico como a clorhexidina

☐ Não utilizo nenhum antisséptico

☐ Outra: _____

19. Como faz normalmente a medição da distância ao limbo? *

Marcar apenas uma oval.

☐ Não faço medição

☐ Compasso

☐ Seringa

☐ Cotonete/Bastonete

☐ Outra: _____

<https://docs.google.com/forms/d/1nC1gSEUHTa2iYKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 6/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

20. Como faz a verificação da lateralidade/fármaco antes da injeção? *

Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Time-out

☐ Marcação prévia no doente

☐ Apenas verificação prévia

☐ Outra: _____

21. Em que local faz habitualmente a injeção no olho direito? *

Marcar apenas uma oval.

☐ Quadrante superotemporal

☐ Quadrante inferotemporal

☐ Quadrante superonasal

☐ Quadrante inferonasal

☐ Outra: _____

22. Em que local faz habitualmente a injeção no olho esquerdo? *

Marcar apenas uma oval.

☐ Quadrante superotemporal

☐ Quadrante inferotemporal

☐ Quadrante superonasal

☐ Quadrante inferonasal

☐ Outra: _____

<https://docs.google.com/forms/d/1nC1gSEUHTa2iYKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 7/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

23. Faz mobilização da conjuntiva antes da inserção da agulha? *

Marcar apenas uma oval.

☐ Normalmente

☐ Por vezes

☐ Não/Raramente

24. Quando é necessário tratamento bilateral, faz injeção no mesmo dia? *

Marcar apenas uma oval.

☐ Normalmente sim

☐ Por vezes

☐ Raramente (casos muito selecionados)

☐ Nunca

25. Que colírios aplica após a injeção? (na sala) *

Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Nenhum

☐ Solução de Iodopovidona

☐ Antibiótico

☐ Hipotensor

☐ Soro

☐ Anestésico

☐ Outra: _____

<https://docs.google.com/forms/d/1nC1gSEUHTa2iYKzFAY-aoUphTRCBK8K-U2qZ33mg/edit> 8/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

26. Após a injeção faz verificação **rotineira** da perfusão do nervo ótico? *
Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Não
☐ Perceção luminosa
☐ Movimentos de mão
☐ Contar dedos
☐ Fundoscopia
☐ Medição da PIO
☐ Outra: _____

27. O doente realiza, normalmente, algum tratamento após a injeção? (no domicílio) *
Pode assinalar mais do que uma opção

Marcar tudo o que for aplicável.

☐ Não
☐ Antibiótico
☐ Hipotensor
☐ Lubrificante (assinalar apenas se prescrito por rotina após a injeção)
☐ AINE
☐ Outra: _____

28. Tem alguma precaução adicional em casos de doentes com **glaucoma**? *
Marcar apenas uma oval.

☐ Não
☐ Medição da PIO antes/após a injeção
☐ Paracetamol antes/após a injeção
☐ Aplicação de hipotensor antes/após a injeção
☐ Outra: _____

<https://docs.google.com/forms/d/1nC1g5EUH1a2YK2FAY-aoUphTRCBK8K-U2q233mg/edit> 9/10

16/10/23, 00:48 Análise nacional do procedimento de injeção intravítrea de anti-VEGF

29. Qual o número de casos de endoftalmite que teve após uma injeção intravítrea nos últimos 5 anos? *
Marcar apenas uma oval.

☐ 0
☐ 1
☐ 2
☐ Outra: _____

30. Quer acrescentar alguma informação relativa ao seu procedimento de injeção que não tenha sido abordada? (opcional)

Este conteúdo não foi criado nem aprovado pela Google.

Google Formulários

<https://docs.google.com/forms/d/1nC1g5EUH1a2YK2FAY-aoUphTRCBK8K-U2q233mg/edit> 10/10