



COVID-19 pandemic and ophthalmology: insights from the IVORC Academic Foundation

Fatemeh Heidary¹ and Reza Gharebaghi¹

¹ IVORC Academic Foundation (International Virtual Ophthalmic Research Center), Texas, United States

ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) pandemic posed unprecedented challenges for the global academic community. The International Virtual Ophthalmic Research Center (IVORC) Academic Foundation, which is committed to advancing vision science through international collaboration, research, and education, played a pivotal role in addressing these disruptions. Central to its mission are 2 affiliated journals in ophthalmology and optometry that serve as key platforms for innovative research on ocular disease management. In response to the pandemic, the IVORC implemented a series of strategic initiatives to support the vision science community, while ensuring research continuity and safety. This report reviews COVID-19-related publications in these journals and highlights the key actions of the IVORC in strengthening preparedness for future global health crises.

Methods: We reviewed COVID-19-related articles published in IVORC-affiliated journals from the onset of the pandemic through February 2025. Key findings were analyzed, focusing on the reported ocular manifestations of COVID-19 and potential ophthalmic complications associated with COVID-19 vaccination.

Results: To sustain academic engagement and research productivity, the IVORC expanded its virtual meetings, webinars, and digital outreach initiatives, with a strong emphasis on academic writing and publication ethics. The foundation actively promoted COVID-19-related ophthalmic research, published a clinical guideline, reported ocular manifestations of the disease, encouraged the adoption of teleophthalmology, and strengthened collaborations with regional and national societies. Between early 2020 and February 2025, IVORC-affiliated journals published 19 COVID-19-related articles from researchers across 10 countries, primarily in North America, Asia, and the Middle East. These comprised 6 original articles, 5 reviews, 2 case reports, 2 editorials, 2 short communications, and 2 letters, most of which appeared in *Medical hypothesis, discovery & innovation in ophthalmology*. Among the early contributions was a widely cited guideline for ophthalmic practice, published within months of the onset of the pandemic.

Conclusions: The proactive response of the IVORC to the COVID-19 crisis highlights the essential role of academic leadership in maintaining research continuity and scholarly communication during global health emergencies. The diverse and internationally authored IVORC publications reflect a commitment to innovation, collaboration, and the inclusion of perspectives from underrepresented regions. This experience reinforces the importance of prioritizing original research over publication volume—particularly clinical guidelines and studies detailing disease manifestations. Fast-track publication models must maintain rigorous editorial standards to ensure that scientific contributions remain timely and reliable during public health crises.

KEYWORDS

coronaviruses, COVID-19 pandemic, SARS-CoV-2 virus, COVID 19 vaccines, IVORC, eyes, eye manifestation

Correspondence: Reza Gharebaghi, IVORC Academic Foundation (International Virtual Ophthalmic Research Center), Texas, United States. Email: drgharebaghi@yahoo.com. ORCID iD: <https://orcid.org/0000-0002-4906-8597>

How to cite this article: Heidary F, Gharebaghi R. COVID-19 pandemic and ophthalmology: insights from the IVORC Academic Foundation. *Med Hypothesis Discov Innov Ophthalmol*. 2025 Spring; 14(1): 247-254. <https://doi.org/10.51329/mehdiophthal1516>

Received: 05 February 2025; Accepted: 29 April 2025



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INTRODUCTION

The International Virtual Ophthalmic Research Center (IVORC) Academic Foundation is an academic institute committed to advancing research and education in the visual sciences. Its core mission is to improve the understanding and management of ocular diseases through global collaboration with leading institutions and academic societies. The foundation engages a diverse, multidisciplinary network of nearly 10 000 scientists from over 100 countries, primarily through social platforms such as LinkedIn. The IVORC publishes 2 open-access, peer-reviewed journals: *Medical hypothesis discovery and innovation in ophthalmology*, established in 2012 and integrated into the IVORC from MEPTIC in 2015, and *Medical hypothesis, discovery & innovation in optometry*, founded in 2020. These publications provide a scholarly platform in ophthalmology and optometry, respectively [1].

The COVID-19 pandemic introduced unprecedented challenges to the global academic landscape [2, 3]. In response, the IVORC implemented a comprehensive set of strategies to support vision science research, ensuring the continuity of research activities while upholding safety standards. This report provides a brief review of COVID-19-related publications in IVORC journals and delineates the foundation's strategic initiatives undertaken during the pandemic, with the aim of bolstering resilience and preparedness for future potential global health crises.

METHODS

We analyzed all published COVID-19-related articles from the onset of the pandemic through February 2025 (Spring 2020 to Winter 2024 issues), focusing on papers published in journals affiliated with the IVORC. Additionally, we summarized the published ocular manifestations of COVID-19 and potential ophthalmic complications in adults and children, as detailed in these publications, promoting understanding of the impact of COVID-19 on eye health.

RESULTS

During the COVID-19 pandemic, the IVORC adopted a multifaceted strategy to support vision research and foster academic engagement. Key initiatives included expanding virtual meetings, webinars, and digital outreach, with a particular focus on organizing more than 30 courses on academic writing and publication ethics. The IVORC actively promoted the publication of COVID-19-related ophthalmic research, including a clinical guideline, studies on ocular manifestations, and potential vaccine-associated ophthalmic complications. The organization also encouraged the integration of teleophthalmology and strengthened collaborations with regional societies to ensure research continuity and knowledge exchange.

From the early days of the pandemic, our affiliated journals implemented a forward-thinking editorial strategy, which was later applied to all submitted manuscripts. This approach helped to achieve a zero retraction rate for the affiliated journals. Essential to this strategy was the introduction of the Field expert, Ethics expert, and Statistical peer reviewer (FES) peer review model [3], which involves 3 categories of reviewers: field experts, ethics experts, and statistical reviewers. For each manuscript, at least 2 field experts ensured scientific merit, the ethics expert assessed adherence to research ethics, and the statistical reviewer thoroughly reviewed the accuracy and integrity of statistical analysis and the validity of raw data [3]. To ensure the timely and reliable dissemination of high-quality research, our editorial team adopted additional strategies, including an accelerated peer review process using the FES model [3].

All COVID-19-related articles, as in all of our publications, were designated as open-access. The authors were encouraged to submit their papers as preprints to expedite the sharing of preliminary findings. Rigorous screening protocols were enforced to detect plagiarism, data fabrication, and conflicts of interest. We also prioritized original articles [4-9], provided particular support for submissions from developing countries, and actively encouraged manuscripts focusing on the ocular manifestations or consequences of COVID-19 and vaccines [4-21]. Notably, no articles were retracted. Between the onset of the pandemic and February 2025, IVORC-affiliated journals published 19 COVID-19-related articles from 10 countries [3-21]. Most contributions came from North America, Asia, and the Middle East [3-21], with the United States [3, 10, 11, 15, 17] and India [8, 13, 18-20] contributing 5 articles each, followed by Egypt [4, 7, 9] and Iran [11, 14, 16] with 3 each. Single contributions were received from Turkey [6], Argentina [10], China [12], Saudi Arabia [5], Kuwait [9], and Armenia [21]. The published papers included 6 original articles [4-9], 5 reviews [11-14, 21], 2 case reports [18, 19], 2 editorials [3, 10], 2 short communications [17, 20], and 2 letters [15, 16]. Most papers were published in *Medical hypothesis discovery and innovation in ophthalmology* (10 papers) [3-5, 10-16], and the remainder were published in the affiliated optometry journal [6-9, 17-21]. Several review articles [11-14, 21] summarized both the ocular manifestations of COVID-19 and the possible ocular side effects of COVID-19 vaccines (Tables 1-4). Above all, the core strategy of the IVORC accelerated the rapid publication of evidence-based articles, offering practical solutions while upholding rigorous quality standards and highlighting that accelerated dissemination must never compromise scientific integrity.

Table 1. Publication types, countries of origin, and key findings of COVID-19-related articles published in *Medical hypothesis discovery and innovation in ophthalmology* from Spring 2020 to Winter 2024 [3-5, 10-16]

Author (Year)	Publication type	Countries of origin	Key findings
Reviglio et al. (2020) [10]	Editorial	Argentina, United States	The article discusses implications of the COVID-19 pandemic for ophthalmology. It highlights the case of Dr. Li Wenliang, an ophthalmologist who first raised concerns about the coronavirus and later died of COVID-19, underscoring the risks faced by eye care professionals. The authors note that conjunctivitis may be an early symptom, increasing the risk of transmission in ophthalmic settings. They emphasize the need for ophthalmologists to implement stringent protective measures and to stay informed about the evolving situation.
Gharebaghi et al. (2020) [11]	Review	United States, Iran	The article provided guidelines for ophthalmic practices during the COVID-19 pandemic. It emphasizes the potential transmission of SARS-CoV-2 through ocular tissues and secretions, highlighting the importance of stringent infection control measures. Recommendations include the use of personal protective equipment, patient screening protocols, and modifications to clinical procedures to minimize contact. The authors advocate the adoption of telemedicine when feasible.
Pei et al. (2020) [12]	Review	China	The article examined the risks and preventive strategies for ophthalmologists during the COVID-19 pandemic. The authors conducted a literature review of studies from January to April 2020, highlighting that SARS-CoV-2 can be present in tears and that conjunctivitis may be an initial symptom of COVID-19, increasing transmission risk in ophthalmic settings. They emphasize the necessity for ophthalmologists to stay informed about the virus and implement effective measures to prevent its spread in clinical practice.
Heidary and Gharebaghi (2021) [3]	Editorial	United States	The COVID-19 pandemic significantly impacted research and publication ethics. Lockdowns led to a surge in manuscript submissions, prompting journals to expedite peer reviews, sometimes compromising quality. This rapid publication pace resulted in increased retractions and concerns over research integrity. Female researchers' publication rates declined, likely because of heightened domestic responsibilities during lockdowns. The authors advocate a balance between swift research dissemination and maintaining ethical standards, emphasizing the need for rigorous peer review and adherence to publication ethics.
Sanjay et al. (2021) [13]	Review	India	This comprehensive review contributes to the expanding body of research on the ocular sequelae of COVID-19, summarizing posterior segment complications involving the retina, uvea, and optic nerve. It synthesizes reported retinal and uveal abnormalities in patients during and following SARS-CoV-2 infection, encouraging vigilant ocular assessment in post-infectious care. The findings highlight critical gaps in current understanding and identify the need for further research into pathophysiological mechanisms and evidence-based management of these manifestations.
Madani (2022) [14]	Review	Iran	This systematic review analyzes studies involving 1358 children with confirmed COVID-19. Among 463 children with acute COVID-19, 72 (15.5%) exhibited ocular symptoms such as conjunctivitis, optic neuritis, and cranial nerve palsies. In 895 children with multisystem inflammatory syndrome in children (MIS-C), 469 (52.4%) presented with ocular issues, predominantly non-purulent conjunctivitis. The study suggests recognition of ocular symptoms, particularly conjunctivitis, as potential early indicators of MIS-C. Prompt diagnosis and treatment are emphasized.
Al-Namaeh (2022) [15]	Letter	United States	The article discusses the potential link between COVID-19 and increases in dry eye disease (DED) incidence. It highlights factors such as prolonged digital screen use, mask-wearing, and increased indoor time during lockdowns as contributors to DED symptoms. It also emphasizes the need for rigorous research methodologies to establish a causal relationship between the pandemic and DED, cautioning against conclusions based on studies with methodological limitations.
Lotfy et al. (2022) [4]	Original Study	Egypt	Among 412 participants, digital eye strain (DES) symptoms increased from 71.4% before the lockdown to 88.8% during, with 84 individuals developing new-onset DES. After lockdown, the participants had extended screen time, particularly at night, along with elevated anxiety and depression scores on the 4-item Patient Health Questionnaire. Multivariate logistic regression analysis identified studenthood and increased nighttime screen use as independent risk factors for DES. The findings highlight the need for awareness and preventive measures to mitigate DES during prolonged digital device use.

AlShamlan et al. (2023) [5]	Original Study	Saudi Arabia	The article reports the impact of increased screen time during COVID-19 lockdown on myopia progression in children. The study found that prolonged near-work activities and reduced outdoor exposure during confinement significantly contributed to the progression of myopia among school-aged children. The authors recommend monitoring children's screen time and encourage outdoor activities to mitigate the risk of myopia progression in similar future scenarios.
Rastegar (2024) [16]	Letter	Iran	This article explores the ocular manifestations of COVID-19 in children, a topic less studied than that of adults. Direct effects include neuro-ophthalmic issues such as optic neuritis and cranial nerve palsies, as well as orbital conditions such as mucormycosis and orbital cellulitis. Indirect effects stem from pandemic-related lifestyle changes, notably increased screen time, leading to a rise in myopia among school-aged children. The author emphasizes the need for more pediatric research to better understand and manage these ocular implications of COVID-19 in children.

Table 2. Direct and indirect effects of COVID-19 on eyes [16]

Direct effects of COVID-19 on the eye	
Cornea and anterior segment manifestations Dry Eye Disease* Corneal epitheliopathy* Keratitis* Conjunctivitis* Episcleritis* Keratoconjunctivitis Scleritis	Orbital manifestations Rhino-orbital cerebral mucormycosis* Orbital inflammatory disease (OID) * Orbital cellulitis and cavernous sinus thrombosis* Orbital myositis* Dacryoadenitis* Orbital abscess*
Retina, choroid, and uvea manifestations Asymptomatic retinal changes* Retinal vein thrombosis* Central retinal vein occlusion* Retinal vasculitis* Retinitis* Anterior uveitis* Acute retinal necrosis* Intermediate, posterior, and panuveitis Central retinal artery occlusion Papillophlebitis Vitritis Chorioretinitis Endophthalmitis Central serous chorioretinopathy (CSCR) Paracentral acute middle maculopathy (PAMM) Acute macular neuroretinopathy (AMN)	Neuro-ophthalmic manifestations Optic neuritis* Cranial nerve palsy* (involvement of 3,4, and 6th nerves) Neuromyelitis optica* Opsoclonus* Adie's tonic pupil Miller fisher syndrome Ocular myasthenia Non-arteritic anterior ischemic optic neuropathy (NAION) Opsoclonus-myoclonus-ataxia syndrome Eyelid manifestations Blepharitis Eyelid dermatitis
Indirect effects of COVID-19 on children's eye	
Increase in myopia incidence, prevalence, and progression* Increase in the axial length* Digital eye strain* Increase risk of amblyopia*	

Note: The asterisk indicates the manifestations noted in children's eyes. This table has been reused with the permission of *Med Hypothesis Discov Innov Ophthalmol* [16].

Table 3. Publication types, countries of origin, and key findings of COVID-19-related articles published in Medical hypothesis, discovery and innovation in optometry from Spring 2020 to Winter 2024 [6-9, 17-21]

Author (Year)	Publication type	Countries of origin	Key findings
Celik Dulger et al. (2021) [6]	Original study	Turkey	This retrospective study evaluated the impact of the COVID-19 pandemic on 3211 intravitreal injections (IVIs) at a tertiary hospital, comparing the pre-pandemic and pandemic periods (before and after March 15, 2020, respectively). A significant decrease of 90.8% in the number of IVIs was found during the pandemic (268 injections) compared to the pre-pandemic period (2943 injections). Diabetic retinopathy was the most common indication. With the reduction in treatments, no COVID-19 transmissions or complications from IVIs were reported. The study highlights the challenges COVID-19 posed to managing sight-threatening eye conditions.
Heidary and Gharebaghi (2021) [17]	Short communication	United States	COVID-19 vaccines, though widely administered under emergency use, have been linked to certain ocular side effects, including central serous chorioretinopathy (CSCR). This report reviewed published cases of CSCR following COVID-19 vaccination up to January 2022. Most cases developed within a week of vaccination and resolved spontaneously. While the timing suggests a possible link, the rarity of cases in light of the vast number of vaccinations makes a causal relationship uncertain.
Sallam MA et al. (2022) [7]	Original study	Egypt	This study assessed the impact of the COVID-19 stay-at-home measures on myopia progression in schoolchildren in the Suez Canal Area, Egypt. It involved 1650 students aged 8–15 years with annual vision examinations since 2018. The study found a significant increase in myopia, with cycloplegic spherical equivalents worsening from - 1.02 D in 2018 to - 3.50 D in 2021. The average duration of screen time at home also increased significantly. The study concluded that the pandemic stay-at-home measures accelerated myopia development in children, highlighting the need for further research on potential long-term effects.
Chande PK et al. (2022) [8]	Original study	India	This study examined the impact of the COVID-19 lockdown on myopia progression in children by comparing follow-up data before and after the lockdown. The study involved children who had at least 1 follow-up visit before and after the COVID-19 lockdown. The mean spherical equivalent values at baseline, first follow-up, and second follow-up were - 4.74 D, - 5.46 D, and - 6.42 D, respectively. The eyes with low myopia showed the most progression (- 1.26 D). The study suggests the need for preventive measures and further research to assess myopia management in children.
Sanjay et al. (2023) [18]	Case report	India	A healthy 24-year-old man developed unilateral paracentral acute middle maculopathy (PAMM) that progressed to central retinal artery occlusion (CRAO) in his right eye following COVID-19 vaccination. Despite oral corticosteroid treatment, his condition worsened, as confirmed through multimodal imaging. Vision then slightly improved over 2 months. This was the first reported case of PAMM evolving to CRAO post-vaccination in the absence of systemic risk factors, suggesting a potential but unproven link requiring further study.
Sanjay et al. (2023) [19]	Case report	India	A 44-year-old healthy woman developed non-progressive blurred vision in her right eye 1 month after COVISHIELD™ COVID-19 vaccination. Macular branch retinal vein occlusion was diagnosed; interleukin-6 levels were elevated, whereas other test results, including COVID-19 IgG and infectious disease screenings, were negative. SD-OCT showed inner retinal swelling and cystoid changes. She underwent a single intravitreal injection of bevacizumab, resulting in full visual recovery and resolution of retinal abnormalities within 2.5 months. This case suggests a possible temporal association between vaccination and vein occlusion, though causality cannot be confirmed based on a single case report.
Sanjay et al. (2024) [20]	Short communication	India	This report outlines the challenges faced by a tertiary private eye care center in India during the COVID-19 pandemic, emphasizing economic hardship and patient safety. Measures implemented included triage, prescreening, digitalization, teleophthalmology, staggered appointments, modified operating room protocols, and role-specific personal protective equipment. Though surgical training was temporarily impacted, the institution adapted well. The pandemic exposed vulnerabilities in private eye care but also offered insights and solutions for future crises, helping practices prepare for similar public health emergencies while maintaining care quality.
Alansari et al. (2024) [9]	Original study	Kuwait, Egypt	This retrospective study analyzed 5065 ocular trauma cases during and after the COVID-19 lockdown. The incidence of eye injuries increased from 18.9% during lockdown to 21.5% post-lockdown. Children younger than 18 years experienced significantly more injuries during lockdown, whereas work-related trauma increased afterward. Most injuries were mechanical, particularly from blunt objects. Anterior segment eye injuries were the most common, predominantly involving the superficial cornea and conjunctiva. The study highlighted how pandemic-related restrictions altered injury patterns.
Shahsuvaryan (2024) [21]	Review	Armenia	This review of 27 records identified 21 cases of central retinal artery occlusion (CRAO) and 4 cases of branch retinal artery occlusion (BRAO) in COVID-19 patients. Most CRAO patients were men, with a mean age of 54.1 years. Three cases featured bilateral CRAO, and the left eye was most commonly affected in unilateral cases. BRAO primarily occurred in women, often affecting the left eye within a month of COVID-19 diagnosis. Thromboembolic events were rare. Although a direct causal link is unconfirmed, clinicians should consider CRAO and BRAO as possible ocular complications of COVID-19, especially in asymptomatic patients.

Table 4. Ocular and neuro-ophthalmic findings after coronavirus disease vaccination [17]

Site	Sign/Diagnosis
Eyelid	Purpura Eyelid swelling Varicella-zoster virus reactivation
Ocular surface	Corneal graft rejection Episcleritis Keratoconjunctivitis Herpetic keratitis
Retina	Central serous chorioretinopathy Acute macular neuro retinopathy Ophthalmic vein thrombosis Retinal vein occlusion Retinal detachment Multiple evanescent white dot syndrome
Uvea and choroid	Uveitis (anterior, intermediate, or panuveitis) Pars planitis Reactivation of Vogt-Koyanagi-Harada disease Acute zonal occult outer retinopathy Choroiditis
Neuroophthalmic manifestations	Optic neuritis Ocular myasthenia gravis Facial nerve palsy Abducens nerve palsy Arteritic anterior ischemic optic neuropathy

Note: Recent articles have added ocular manifestations following COVID-19 vaccination, including thyroid eye disease, Miller Fisher syndrome, glaucoma, and superior ophthalmic vein syndrome [22]. This table has been reused with the permission of *Med Hypothesis Discov Innov Opom* [17].

DISCUSSION

During the COVID-19 pandemic, the IVORC adopted a rigorous editorial strategy, centered on the FES peer review model [3], to uphold research quality and integrity. Nineteen COVID-19-related articles [3–21] were published in IVORC-affiliated journals, showcasing international collaboration and including significant contributions from researchers in developing countries.

A recent systematic review and meta-analysis reported a 13.82% prevalence of ocular symptoms in COVID-19 patients [23]. Ocular transmission of COVID-19 is considered biologically plausible [24], and numerous studies, including those published in IVORC-affiliated journals, have reported a range of ocular manifestations or consequences associated with the disease [4–21].

Retraction of articles peaked in 2023, and COVID-19 publications may have higher retraction rates than others. Reasons may include manipulation, errors, and a more rapid pace in peer review, highlighting the need for stronger editorial screening to improve research integrity [3, 25]. We believe that our multidisciplinary FES framework [3], featuring a multilayered review process, not only enhances the overall quality and reliability of published articles, but also plays a crucial role in minimizing retractions. This has been particularly important during periods of high-volume, time-sensitive publication, as during the COVID-19 pandemic, when no articles were retracted from our affiliated journals.

In response to COVID-19, some publishers lifted paywalls for coronavirus-related research to support its dissemination. Traditional journals enhanced peer review through rapid reviews and flexible revision timelines while maintaining rigor and reproducibility. Additionally, many researchers turned to non-peer-reviewed preprint servers for swift sharing of information [26]. Preprints offered advantages such as prompt research dissemination, increased citations, early feedback, and potential for collaboration. However, preprints also have disadvantages, including lack of peer review, potential for premature data, quality concerns, risk of intellectual property breaches, and the spread of unverified information, which may harm public health or mislead the academic community [3]. Most scholarly journals stress that, despite aiming for rapid publication, ensuring the validity of research is crucial, as publishing incorrect results can damage public trust [27]. The objective of some journals during the COVID-19 pandemic was to maximize both accessibility and speed of publication. Many journals implemented fast-track publication processes to facilitate early

article reviews. Regardless, many questions related to COVID-19 remain unanswered. Journal editors face the challenge of encouraging researchers to publish solutions rather than merely raise questions, as progress depends on finding answers and not simply identifying problems [28]. However, in IVORC-affiliated journals [1], the strategy has focused on promoting solution-driven research articles [3-21] rather than letters and opinions or a collection of special issues.

A key strength of this brief report is its comprehensive synthesis of COVID-19-related ophthalmic publications from global and institutional perspectives. It offers a rare, structured overview of how an academic foundation mobilized resources, promoted scholarly output, and maintained research integrity during a prolonged global health crisis. However, this study has certain limitations. The number of IVORC publications pertaining to COVID-19 was relatively small in comparison to the large volume from other publishers. The journals affiliated with IVORC are published quarterly, with an average of 6 articles per issue, covering all topics in ophthalmology and optometry. Additionally, because these journals are indexed in different databases, this report lacks a full bibliographic, citation, and impact analysis of the published papers; this limitation should be addressed in further studies. The editorial teams of IVORC-affiliated journals are committed to the timely and rigorous evaluation of scholarly manuscripts, especially original studies that examine the ocular manifestations of contemporary diseases posing significant public health threats, as well as those that address future emerging public health challenges.

CONCLUSIONS

The proactive response of the IVORC during the COVID-19 pandemic highlights the essential role of academic responsibility in maintaining research continuity and scientific integrity during a pandemic. The diverse, internationally authored publications in the IVORC-affiliated journals during the pandemic reflect the IVORC commitment to collaboration and amplification of underrepresented voices from developing countries. This experience reinforces the need to prioritize the publication of original articles, particularly practical guidelines and studies on clinical manifestations, rather than focusing on publication volume and opinions. However, fast-track publication models must uphold rigorous editorial standards to ensure that scientific output during global health emergencies remains responsible and impactful.

ETHICAL DECLARATIONS

Ethical approval: Not required.

Conflict of interest: The authors of this article are staff members of the IVORC and its affiliated journals [1]. However, in accordance with journal policy [29], articles submitted by the board, staff, or editor-in-chief undergo peer review to maintain impartiality. These submissions are managed by a different editorial board member with no conflicts of interest, ensuring that those with potential conflicts are excluded from the process. Furthermore, the editor overseeing the review process remains blinded to the reviewers' identities.

FUNDING

None.

ACKNOWLEDGMENTS

None.

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