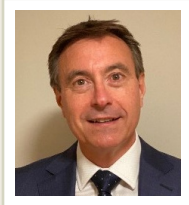


# Contact Lens Update

CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

## Pandemic-Associated Eye Problems: A Review of Five Issues for the ECP

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In December 2020, [Issue 57 of Contact Lens Update](#), titled “An Extraordinary Year” discussed the impact of the pandemic on eye care practitioners, their patients and how they needed to modify their practices to see patients in a safe and efficient way. Fast forward a year, and what is the latest knowledge relating to how the pandemic has affected the ocular health of patients?

Several review articles have addressed the potential ocular disease complications that occur in patients who develop COVID-19, with the most common complication being conjunctivitis (albeit relatively rare at around 5% averaged across many studies), with various neurological and retinal complications occurring to an even lesser degree.<sup>1-18</sup>

Aside from these disease complications, what other issues should eye care practitioners consider that are pandemic-related? This review addresses five highly relevant topics.

### 1. Has increased at-home education and increased indoor time resulted in an increase in myopia

In the early phase of the pandemic, the majority of children were educated at home due to school closures and this has continued for many, as some parents prefer to have their children educated in an environment that they consider “safer” until there is widespread adoption of vaccinations for children. This practice, coupled with increased indoor time due to self-quarantine and social distancing concerns and an increase in digital device use by children has brought with it concerns regarding an increased rate of myopia progression (MP).<sup>19-29</sup>

Aslan and colleagues<sup>20</sup> demonstrated that the rate of MP was greater in 2020 during the period when children were being homeschooled compared with the prior two years and that MP was statistically significantly less in children who participated in open-air activities for 2 hours a day. Using an online survey approach, Liu and co-workers<sup>21</sup> reported that each hour increase in digital device use was associated with a 1.25x increased risk of developing myopic symptoms. Ma and colleagues<sup>23</sup> demonstrated that children were at higher risk of MP during COVID-19 and the risk of MP was associated with baseline axial length, length of online education and amount of digital screen reading time. Another study out of China<sup>24</sup> demonstrated that of 201 myopes aged 7-12 years that children educated using television and projectors had significantly less myopic shift than those using tablets and mobile phones, suggesting that this increase in MP was linked to near work digital device exposure. They also found that more time spent on digital screens was associated with greater MP. A study conducted in Hong Kong<sup>26</sup> on children aged 6-8 years old from two separate longitudinal cohorts before and after the pandemic demonstrated a statistically significant increase in myopia and axial length, decrease in time spent on outdoor activities and an increase in digital screen time during the pandemic. The [Feature Article](#) in this issue of Contact Lens Update reports in detail on a large study in China on this very topic.<sup>27</sup>

In summary, a growing body of evidence serves to warn eye care professionals that home confinement, a reduction in time outdoors and extensive at-home online education may be linked to a rise in the rate of progression of myopia, especially in young children.

***Clinical Pearl: Eye care practitioners need to be on the lookout for the development and progression of myopia in children educated at home, especially those with risk factors such as an extensive family history of myopia.***

## **2. Has increased use of digital devices during the pandemic resulted in an increase in complaints of dry eye?**

Studies have shown that the pandemic has resulted in people turning to their digital devices to a growing extent, with people using them for working from home, online shopping, home-based workouts, video calls, entertainment and social interactions.<sup>30-32</sup>

Has this increased reliance on digital devices resulted in an increase in complaints of dry eye? [Issue 62 of Contact Lens Update](#) covered this topic in great detail and readers are referred to that issue for further details. One recent publication of note investigated the impact of extended screen time on dry eye reports among a younger-aged population. Attendees of a gaming convention in Auckland, NZ, completed an iPad-based survey on personal screen use habits and ocular symptoms using the 5-item Dry Eye Questionnaire (DEQ-5) and the Symptom Assessment in Dry Eye (SANDE) questionnaire. They found that symptoms were greater with increased screen use, elevated blink rates and reduced tear film stability. This is of interest, as the pandemic has resulted in an increase in digital device use, especially among younger individuals, and this appears to be resulting in dry eye symptoms and signs that have historically been associated with older individuals.

In summary, an extensive number of publications support the fact digital device use has increased during the pandemic and that this has correspondingly resulted in growing complaints of dry eye and an associated negative impact on ocular surface health.<sup>33-42</sup>

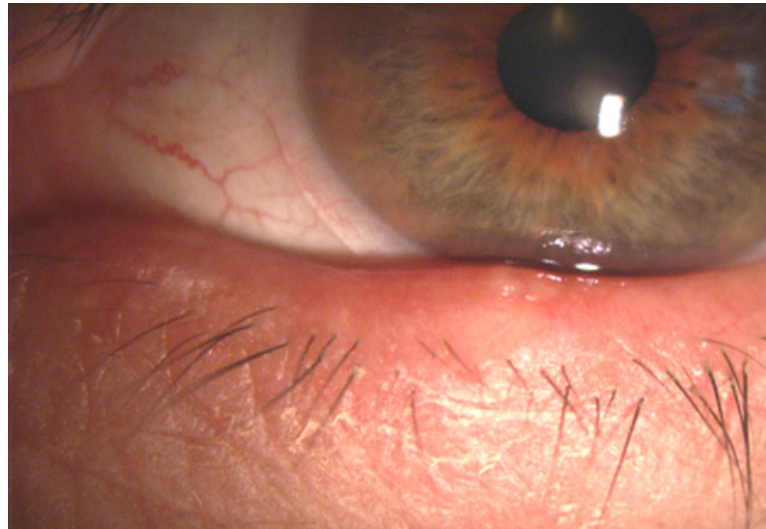
***Clinical Pearl: Eye care practitioners need to undertake a careful slit lamp examination of the ocular surface, including examination of the meibomian glands, in those patients who complain of ocular dryness when using digital devices.***

## **3. Has the wearing of masks resulted in an increase in the reports of hordeolum or chalazion?**

Clinical reports continue to grow regarding patients complaining of both painful, acute hordeolum (Figures 1 and 2) and long-lasting chalazion since the inception of widespread mask-wearing.<sup>43, 44</sup> This issue has been largely associated with poorly fitting masks that allow the upward travel of breath over the eye, increasing microbial exposure to the ocular surface which is potentially exacerbated by the poor hygiene of cloth, non-disposable masks that become contaminated with bacteria from the face and exhaled breath.<sup>43-45</sup>

The most comprehensive examination of this topic to date was a retrospective multicenter study in two ophthalmology practices in California.<sup>44</sup> All patients seen between 2016 – 2020 with a diagnosis of chalazion or hordeolum were identified. Incidence was determined for each month between January and August 2020 and this was compared to data from prior years to evaluate any changes after the onset of the pandemic. They were able to show a statistically significant rise in chalazion incidence in both centres since the start of the pandemic and linked this to widespread mask wear.

Preventive measures include mask removal when possible, use of lubricant drops to help rinse any attendant gram-positive exotoxins from the ocular surface and prevent their local build-up, daily ocular health hygiene to clean the lids and remove any excess debris or bacteria that could exacerbate the situation and to use either disposable masks or to frequently washcloth masks to ensure that bacteria do not accumulate on the mask and affect the ocular surface.



**Figure 1:** Acute lower lid hordeolum in a contact lens wearer with obvious signs of blepharitis



**Figure 2:** Acute upper lid hordeolum in a healthcare worker with blepharitis and meibomian gland dysfunction. Low-quality image due to picture being taken by the patient and submitted for remote tele-optometry consultation during the pandemic lock-down

***Clinical Pearl:*** When a patient presents with complaints of regular or recurring hordeolum or chalazia, consider whether this may be related to mask-wearing and provide clinical advice to alleviate the problem.

#### **4. Has the use of face masks resulted in dissatisfaction with spectacle wear?**

The wearing of face masks globally has become ubiquitous due to their proven ability to reduce COVID-19 infection.<sup>46-49</sup> One common complaint from spectacle wearers relates to the fogging of spectacles when wearing a mask due to the upward travel of warm air from exhaled breath towards the spectacle lenses (Figure 3).



Figure 3: Mask-induced spectacle fogging (image courtesy of Chau-Minh Phan, CORE)

These fogging reports are extremely commonplace on social media platforms and internet sites,<sup>50-53</sup> with relatively few peer-reviewed or clinical journals studies addressing this issue.<sup>44, 54-56</sup> Of note, is that while this issue has raised an enormous amount of interest during the pandemic, this has been a concern for surgeons for decades, with a number of publications describing this complication and suggesting methods to alleviate it.<sup>57-60</sup>

Data from a survey commissioned by CooperVision and conducted by YouGov on 8000 adult spectacle wearers and those using both spectacles and contact lenses (so-called “dual wearers”) across 8 countries provide more insight into this problem.<sup>61</sup> More than eight in ten people reported spectacle fogging when using a mask. A significant proportion of the dual wearers used their contacts as a solution for this fogging, with 38% using their lenses more frequently and 31% wore their lenses in situations where they would have previously relied on their spectacles. Spectacles-only subjects reported trying multiple actions to alleviate the problem. Thirty percent had removed their spectacles, of course risking poor vision as a result. And while 9% had taken off their mask completely, 21% said they had worn their masks incorrectly (e.g., leaving the nose uncovered) to solve the problem. A striking (and unfortunate) finding was that although about one in five people searched for a

solution online, only 2% of respondents had contacted their eye care professional for advice, demonstrating the opportunity for eye care practitioners to discuss this widespread problem with their patients.

This issue of an alternative refractive correction than spectacles when using a mask is also of great relevance. There has been a number of reports of ametropic patients turning to refractive surgery for their full-time correction,<sup>62, 63</sup> in addition to patients switching to contact lenses.<sup>56, 64</sup> **Maldonado-Codina and co-workers** randomised two groups of 15 participants to wear either a daily disposable contact lens or their regular spectacles when wearing a surgical face mask for at least one hour per day on four or more days per week.<sup>56</sup> After two weeks, participants completed a Quality-of-Life Questionnaire and graded ocular-related symptoms using 0-100 visual analogue scales. Differences in favour of the contact lens were seen for a variety of tasks. The results supported anecdotal reports that contacts are a preferred vision correction option than spectacles when used in conjunction with a face mask.

Remedies to overcome this complication include:<sup>50-53, 55, 56, 59, 61, 63, 64</sup>

- Ensuring that the mask creates an appropriate seal on its upper edge by using a well-fitting mask with a nose-bridge, tucking the mask under the lower edge of the spectacles or taping down the upper edge of the mask to seal off the upward travel of breath at the nose;
- Washing spectacles with soapy water and drying them prior to wear;
- Wiping spectacles with an anti-fog cloth or using an anti-fog spray on the spectacles;
- Discuss the option of switching to contacts or discussing refractive surgery options.

## **5. Has mask-wear resulted in an increase in the reports of dry eye?**

***Clinical Pearl: Eye care practitioners should consider asking all spectacle wearers if they are concerned with fogging of their spectacles when wearing a face mask and, if so, offer practical advice in addition to a contact lens trial to alleviate this annoying pandemic complication.***

Shortly after the start of the pandemic, reports began surfacing of a possible link between mask-wearing and reports of dry eye.<sup>65</sup> Soon after this, an online publication from CORE<sup>66</sup> discussed this issue in greater detail, describing the fact that this was essentially due to exhaled air being redirected upwards by the mask, its passage over the ocular surface resulting in increased evaporation of the tear film, producing symptoms of dry eye. Since these initial two publications, a number of other reports have been published concerning mask-associated dry eye, which has commonly become known as MADE.<sup>65-74</sup>

Boccardo and colleagues surveyed 3,605 subjects about the presence of MADE. Of the 2,447 having symptoms, 27% of respondents reported their symptoms were exacerbated when wearing a mask, thus 18% of all participants experienced MADE.<sup>68</sup> There was no significant association between perceived MADE and age, refractive correction, and pre-existing ocular discomfort, while a positive association was observed with female sex and retail work.<sup>68</sup> Krolo and co-workers found that MADE was most likely to be reported by females, subjects with a history of prior dry eye disease and if wearing a face mask longer than three hours per day.<sup>70</sup> MADE has been shown to reduce the comfort of contact lens wear.<sup>75</sup>

Arriola-Villalobos and co-workers used a non-invasive break-up time evaluation to show that the presence of the mask is able to reduce tear film stability.<sup>74</sup> This concept is further described in an [expansive case report in this issue of Contact Lens Update by Keyur Patel](#).

MADE appears most likely to affect:

- those with pre-existing dry eye symptoms;
- people with border-line dry eye for whom mask wearing disturbs the tear film to the point where it tips them into becoming symptomatic;
- those who need to wear a mask in an environment where they are undertaking a lot of digital device use, which is known to alter blinking patterns and produce an unstable tear film.
- Other groups of people who may be more at risk, including the elderly who already may have a lower quality tear film, and contact lens wearers whose tear film is physically disturbed by the lens on the eye.

MADE symptoms include dry, irritated and uncomfortable feeling eyes. People may also notice variable vision caused by instability of the tear film. Given that masks only cover the mouth and nose, it is quite possible a patient may not link any dry eye symptoms with mask-wearing. Hence, eye care practitioners should consider questioning patients on a routine basis about any dryness symptoms with mask wear, as they are the most appropriate professional to manage this condition. It may also be worth eye care practitioners reaching out to local pharmacy colleagues, as patients will often consult a pharmacist about eye drops and pharmacists will likely be unaware of the cause of MADE.

There are a number of simple steps that can take to help alleviate both issues, and these are summarised in a downloadable infographic at [COVIDEyeFacts.org](https://COVIDEyeFacts.org) and outlined below:

- ensure the mask fits closely, especially along the top edge;
- consider taping the top edge of the mask lightly to the face using surgical tape;
- use an ocular lubricant on a regular basis;
- take regular breaks from digital device use to re-establish a normal blink rate.

***Clinical Pearl: Eye care practitioners should consider asking all spectacle wearers if they notice any increased symptoms of dry eye when wearing a face mask and, if so, offer sound clinical advice on how to overcome this problem.***

The pandemic has induced the potential for a variety of ocular complications, with growing evidence in a number of areas. In many cases, these complications are relatively straightforward to manage and eye care practitioners are encouraged to be proactive in their history taking, clinical examination and advice to best identify patients who can be appropriately helped to overcome these issues.

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