The following information resources have been selected by the National Health Library and Knowledge Service Evidence Virtual Team in response to your question. The resources are listed in our estimated order of relevance to practicing healthcare professionals confronted with this scenario in an Irish context. In respect of the evolving global situation and rapidly changing evidence base, it is advised to use hyperlinked sources in this document to ensure that the information you are disseminating to the public or applying in clinical practice is the most current, valid and accurate.

YOUR QUESTION

What are the considerations regarding ophthalmic procedures with suspected or confirmed COVID-19 patients?

IN A NUTSHELL

Ocular symptoms may occur in severe COVID-19 pneumonia and the virus can be isolated from the conjunctival sac. Conjunctivitis is not a common manifestation of the disease, but contact with infected eyes can be a route of transmission. Ophthalmic practice carries some unique risks and clinicians must have effective prevention strategies in place.⁶⁴ ³²

For outpatient care, Lim et al⁵¹ recommend that a stringent screening and triaging process is carried out to identify high-risk patients, with proper isolation implemented for such patients. For surgical and laser procedures, 5% topical povidone-iodine applied pre-operatively inactivates virus on the ocular surface. It is not suitable for intra-ocular application. There is no evidence that the virus is present in aqueous or vitreous humour. Aerosol generation during cataract, glaucoma, and vitreo-retinal procedures is of low risk to the surgeon. External cauterity should be minimised to reduce the risk of aerosolising blood and if used should be combined with irrigation in order to dilute any aerosol produced.⁴⁰ ²⁰

For asymptomatic patients with no risk factors, the American Academy of Ophthalmology and the Royal College of Ophthalmologists recommend generic measures to protect ophthalmologists from infection; these include scrupulous disinfection practices, protective plastic slit-lamp breath shields, reducing or eliminating conversations with the patient during slit-lamp examination, limiting the time spent with the patient at the slit lamp, and considering whether ophthalmic investigations such as ocular imaging are critical to the decision-making process. Both organizations recommend cancelling non-urgent treatment.⁴¹
The role of telemedicine in mitigating risk of transmission of SARS-CoV-2 in eye care is an emerging theme in the literature. Digital communication technology is particularly relevant for two reasons: 1. prolonged exposure in close proximity on the slit lamp may increase the risk of transmission and viral load; and 2. the ability to make clinical decisions based on structured examination metrics such as palpebral aperture, intraocular pressure, cup-disc ratios, and images. Virtual video visits may be used to manage a range of ophthalmic complaints; remote within-clinic visual acuity testing and consultations can be undertaken with minimal specialist equipment and appears to provide useful information while being acceptable to patients.

IRISH AND INTERNATIONAL GUIDANCE

What does the Health Protection Surveillance Centre say?
Use of PPE to support infection prevention and control practice when performing aerosol generating procedures on confirmed or clinically suspected COVID-19 cases in a pandemic situation
HPSC guidance states that all staff working in an area where aerosol generating procedures are being performed must wear appropriate PPE. The minimum number of staff required must be present. The guidance includes a table entitled: “Aerosol generating procedures which have been associated with increased risk of transmission of respiratory infection.”
*There is no specific guidance provided relating to ophthalmic procedures.

What does the World Health Organization say?
The WHO-China Joint Mission on COVID-19 estimated the incidence of conjunctival congestion at 0.8%, based on a study in 55,924 laboratory-confirmed cases.

Irish College of Ophthalmologists (8 April 2020) [Press Release] Eye doctors call for action as they mark significance of 6 June, 2020
Professor William Power, Clinical Lead for Ophthalmology and member of the ICO, said: “Intensive discussions and planning is ongoing in the HSE regarding the return to the delivery of services to non-COVID patients and how to adapt services to the requirements of ongoing infection prevention
and control. The Clinical Programme is engaging with HSE clinical and management staff to provide guidance on the reconfiguration and acceleration of services. The integrated eye care team structure, outlined in the Clinical Programme for Ophthalmology Model of Care will ensure that specialised eye care is available to those who require it as far as possible in the primary care setting.”

**HSE National Clinical Programme for Ophthalmology**

The diagnosis and treatment of many chronic eye conditions is currently delivered in acute hospitals, whereas much of these interventions could be delivered in the primary care setting in a decentralised model. The National Clinical Programme (NCP) for Ophthalmology has determined that in line with government policies such as Future Health, the majority of services should be provided within the primary care setting. As such, integration of acute and primary care services is essential in order to allow for rebalancing of access and delivery of eye care services from acute hospitals to primary care. The aim is to provide high-quality, consistent, efficient and effective care.

**Royal College of Ophthalmologists (2020) COVID-19 Guidance on Restoring Ophthalmology Services**

This document aims to support decision making and, where possible, provide guidance on how to reopen ophthalmology services after the COVID-19 pandemic lockdown. The RCOpht has produced a prioritisation tool to allow services to plan re-opening of procedure and surgical care, which takes into account both the safe and appropriate timing and the risk of harm to patients if this timing cannot be adhered to.

**Royal College of Ophthalmologists (2020) Overview of digital transformation and telemedicine during COVID19**

The SARS-CoV-2 (COVID-19) global crisis has served as a catalyst for transformation of digital healthcare and telemedicine. By necessity, healthcare providers are having to accelerate development and implementation of these tools in order to maintain services. The World Health Organisation describes telemedicine — the ability to diagnose and treat patients remotely via telecommunications technology — as an essential service for clinical services and decision support. This is particularly relevant in ophthalmology for two reasons:
1. prolonged exposure in close proximity between doctor and patient on the slit lamp which may increase the risk of transmission and viral load; and
2. the ability to make clinical decisions on structured examination metrics such as palpebral aperture, intraocular pressure or cup disc ratios, and images.

American Academy of Ophthalmology (2020) Important corona virus updates for ophthalmologists
Due to the COVID-19 pandemic, the Academy finds it essential that all ophthalmologists cease providing any treatment other than urgent or emergent care immediately.

While the Academy made a national recommendation to curtail ophthalmic practice, the decisions to reopen more normal practice will be local and regional. They will be based on local and state governments, on public health authorities interpreting local patterns of disease, on testing availability, on institutional policies and ultimately on individual ophthalmologists.

American Academy of Ophthalmology (2020) List of urgent and emergent ophthalmic procedures
The American Academy of Ophthalmology has collated these procedures, along with their more common indications, into this single list. This list is not meant to cover all indications or all potential procedures but to include those, in the opinion of the major subspecialty societies listed, that are more commonly performed by ophthalmologists in practice.

As ophthalmologists resume the full spectrum of surgical practice, the Academy is offering guidance about how the COVID-19 pandemic will impact surgical decision-making, specifically around the indications for preoperative testing of patients and the use of personal protective equipment (PPE) by surgeon and staff during surgical procedures. In general, the scientific basis to estimate the risk of SARS-CoV-2 infection during most ophthalmic surgical procedures is early and evolving, and the observations and guidance here will expand and change as the science progresses.
Oxford University Centre for Evidence-Based Medicine (2020) Spreading SARS-CoV-2 through ocular fluids

The death of the Chinese ophthalmologist Li Wenliang in Wuhan recently raised many concerns. The close proximity between ophthalmologists and their patients has raised concerns because they are at risk of infection through transmission by droplets from coughs or sneezes. For asymptomatic patients with no risk factors, the American Academy of Ophthalmologists (AAO) and the UK Royal College of Ophthalmologists recommend generic measures to protect ophthalmologists from infection, and these include scrupulous disinfection practices, protective plastic slit-lamp breath shields, reducing or eliminating conversations with the patient during slit-lamp examination, limiting the time spent with the patient at the slit lamp, and considering whether ophthalmic investigations, such as ocular imaging are critical to the decision-making process. Both organizations have recommended that non-urgent treatments be cancelled.

POINT-OF-CARE TOOLS

What does UpToDate say?

Office Spirometry

Spirometry and other pulmonary function test maneuvers can promote coughing and aerosol generation and could lead to spread of SARS-CoV-2 by infected patients. In general, patients who have recently had abdominal, intracranial or eye surgery or a pneumothorax should not perform spirometry, although data are limited.
INTERNATIONAL LITERATURE
What does the international literature say?

NEW ARTICLES IN THIS UPDATE

Aiello et al (2020) Coronavirus disease 2019 (SARS-CoV-2) and colonization of ocular tissues and secretions: a systematic review
The majority of the available data regarding SARS-CoV-2 colonization of ocular and periorcular tissues and secretions have to be considered controversial. However, it cannot be excluded that SARS-CoV-2 could both infect the eye and the surrounding structures. SARS-CoV-2 may use ocular structure as an additional transmission route, as demonstrated by the COVID-19 patients' conjunctival secretion and tears positivity to reverse transcriptase-PCR SARS-CoV-2-RNA assay.

A review of the literature revealed that the results of some studies suggest that ocular symptoms commonly appear in patients with severe COVID-19 pneumonia and that it is possible to isolate the virus from the conjunctival sac of these patients. Conjunctivitis is not a common manifestation of the disease, but contact with infected eyes could be one route of transmission. Consequently, ophthalmologists need to have correct prevention strategies in place.

Bacherini et al (2020) The COVID-19 Pandemic from an Ophthalmologist’s Perspective
During this outbreak and in the future, further studies are warranted to investigate the usefulness and reliability of conjunctival or tear swab in patients affected by conjunctivitis, associated with or without systemic symptoms. If this procedure proves to be precise and reliable, it could be used to detect the virus in patients with prodromal symptoms of COVID-19, providing more information about the real incidence of SARS-CoV-2 conjunctivitis and the role of the conjunctiva in the transmission pathway.
In this study, a systematic review of current literature relevant to COVID-19 was performed with focus on modes of transmission, ocular manifestations related to infection and medications, as well as the control of infection in ophthalmic practice.

**Kalra et al (2020) Incorporating Video Visits into Ophthalmology Practice: A Retrospective Analysis and Patient Survey to Assess Initial Experiences and Patient Acceptability at an Academic Eye Center**\(^{27}\)
The purpose of our study was to assess the implementation and patient acceptability of video consultation for outpatient ophthalmic care at our institution. Virtual video visits may be used to manage a range of ophthalmic complaints. Patients participating in this survey found such video visits acceptable and timesaving, and the majority would consider using video consultations for future eyecare encounters.

**Saedon et al (2020) Video Conferencing in the Intravitreal Injection Clinic in Response to the COVID-19 Pandemic**\(^{18}\)
Along with standard recommendations for personal protective equipment and hand hygiene to contain viral spread and treating only urgent cases, remote within-clinic visual acuity testing and consultations can be undertaken with minimal specialist equipment and appears to provide useful information whilst being acceptable to patients.

**Saleem et al (2020) Virtual Ophthalmology: Telemedicine in a COVID-19 Era**\(^{19}\)
Recent patient and provider interest in telemedicine, the relaxation of regulatory restrictions, increased remote care reimbursement, and ongoing social distancing practices compel many ophthalmologists to consider virtualizing services.

**Shetty et al (2020) Propensity and quantification of aerosol and droplet creation during phacoemulsification with high-speed shadowgraphy amid COVID-19 pandemic**\(^{20}\)
Purpose: To study propensity of aerosol and droplet generation during phacoemulsification using high-speed shadowgraphy and quantify its spread amid COVID-19 pandemic.
Setting: Aerosol and droplet quantification laboratory.
Design: Laboratory study.
Methods: In an experimental set-up, phacoemulsification was performed on enucleated goat eyes and cadaveric human corneoscleral rims mounted on an artificial anterior chamber. Standard settings for sculpt and quadrant removal mode were used on Visalis 100. Microincision and standard phacoemulsification were performed using titanium straight tips (2.2 mm and 2.8 mm in diameter). The main wound incisions were titrated equal to and larger than the sleeve size. High-speed shadowgraphy technique was used to detect the possible generation of any droplets and aerosols. The visualization and quantification of size of the aerosols and droplets along with calculation of their spread were the main outcome measures.
Results: In longitudinal phacoemulsification using a peristaltic pump device with a straight tip, no aerosol generation was seen in a closed chamber. In larger wounds, there was a slow leak at the main wound. The atomization of balanced salt solution was observed only when the phacoemulsification tip was completely exposed next to the ocular surface. Under this condition, the nominal size of the droplet was approximately 50 µm, and the maximum calculated spread was 1.3 m.
Conclusions: There was no visible aerosol generation during microincision or standard phacoemulsification. Phacoemulsification is safe to perform in the COVID-19 era by taking adequate precautions against other modes of transmission.

Zhang et al (2020) The evidence of SARS-CoV-2 infection on ocular surface
Our findings suspect the incidence of SARS-CoV-2 infection through the ocular surface is extremely low, while the nosocomial infection of SARS-CoV-2 through the eyes after occupational exposure is a potential route. To lower the SARS-CoV-2 nosocomial infection, all health care professionals should wear protective goggles.

ARTICLES PREVIOUSLY INCLUDED

Presents an established practice protocol for safe and effective hospital-setting ophthalmic practice during the coronavirus disease 2019 (COVID-19) pandemic. An evidence-based ophthalmic practice protocol was
established and should be modified in the future to accommodate new insights on the COVID-19 pandemic. SARS-CoV-2 is capable of causing ocular complications such as viral conjunctivitis in the middle phase of illness. Precautionary measures are recommended when examining infected patients throughout the clinical course of the infection. However, conjunctival sampling might not be useful for early diagnosis because the virus may not appear initially in the conjunctiva.

Chen, L., Liu, M., Zhang, Z., et al. (2020) Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease\(^ {23}\) (Case Report) SARS-CoV-2 is capable of causing ocular complications such as viral conjunctivitis in the middle phase of illness. Precautionary measures are recommended when examining infected patients throughout the clinical course of the infection. However, conjunctival sampling might not be useful for early diagnosis because the virus may not appear initially in the conjunctiva.

Lai, et al. (2020) Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong\(^ {24}\) Infection control measures implemented in our ophthalmology clinic are discussed. The measures are based on detailed risk assessment by both local ophthalmologists and infection control experts.

Yu, et al. (2020) A comprehensive Chinese experience against SARS-CoV-2 in ophthalmology\(^ {25}\) Due to the face-to-face communication with patients, frequent exposure to tears and ocular discharge, and the unavoidable use of equipment which requires close proximity, ophthalmologists carry a high risk of contracting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Based on 33 articles published by Chinese scholars, guidelines and clinical practice experience in domestic hospitals, we have summarized the Chinese experience through the lens of ophthalmology, hoping to make a contribution to protecting ophthalmologists and patients around the world.

Tahiri Joutei Hassani, et al. (2020) The novel coronavirus COVID-19: What are the opthalmic risks\(^ {26}\) Lu et al have suggested the necessity of performing conjunctival scrapings in confirmed cases and those suspicious for COVID-19. It would also be useful
to take samples from patients in quarantine to determine, in patients who are still asymptomatic but will subsequently develop an infection at what point in time the virus appears in their tears and in what quantity. This may allow for a better understanding of the infectious risk via this mode of transmission.

Conclusions and Relevance: In this study, one-third of patients with COVID-19 had ocular abnormalities, which frequently occurred in patients with more severe COVID-19. Although there is a low prevalence of SARS-CoV-2 in tears, it is possible to transmit via the eyes.

In this article, the current evidence suggesting possible human CoV infection of ocular tissue is reviewed. The review article will also highlight animal CoVs and their associated ocular infections. We hope that this article will serve as a start for further research into the ocular implications of human CoV infections.

To provide useful guidelines, targeted at ophthalmology professionals, to minimize COVID-19 infection of both health-care workers and patients. Methods: In this review we present updated literature merged with our experience from hospitals in Bergamo, the epicenter of the COVID-19 European outbreak. Non-pharmaceutical interventions, hygienic recommendations and personal protective equipment to contain viral spread as well as a suggested risk assessment for postponement of non-urgent cases should be applied in ophthalmologist activity. A triage for ophthalmic outpatient clinic is mandatory.

The Vision Academy's Steering Committee of international retinal disease experts convened to discuss key considerations for managing patients with retinal disease during the COVID-19 pandemic. After reviewing the existing
literature on the issue, members put forward recommendations that were systematically refined and voted on to develop this guidance.


In this document, the expert panel clearly defines the range of activities for Indian ophthalmologists during the ongoing lockdown phase and precautions to be taken once the lockdown is lifted. Guidelines for triage, governmental guidelines for use of personal protective equipment from ophthalmologists' point of view, precautions to be taken in the OPD and operating room as well as care of various ophthalmic equipment have been described in detail. These guidelines will be applicable to all practice settings including tertiary institutions, corporate and group practices and individual eye clinics and should help Indian ophthalmologists in performing their professional responsibilities without being foci of disease transmission.


Challenges in different care settings in our ophthalmology practice have been identified and analyzed with practical solutions and guidelines implemented in anticipation of these challenges. First, to minimize cross-infection of COVID-19, stringent infection control measures were set up. These include personal protective equipment (PPE) for healthcare workers and routine cleaning of “high-touch” surfaces. Second, for outpatient care, a stringent dual screening and triaging process were carried out to identify high-risk patients, with proper isolation for such patients. Administrative measures to lower patient attendance and reschedule appointments were carried out. Third, inpatient and outpatient care were separated to minimize interactions. Last but not least, logistics and manpower plans were drawn up in anticipation of resource demands and measures to improve the mental well-being of staff were implemented.


Ophthalmic practice carries some unique risks and therefore high vigilance and special precautions are needed. We share our protocols and experiences in the prevention of infection in the current COVID-19 outbreak and the
previous severe acute respiratory syndrome epidemic in Hong Kong. We also endeavor to answer the key FAQs in areas of the coronaviruses, COVID-19, disease transmission, personal protection, mask selection and special measures in ophthalmic practices. Using our protocol and measures, we have achieved zero infection in our ophthalmic practices in Hong Kong and China.
Produced by the members of the National Health Library and Knowledge Service Evidence Team. Current as at 19 June 2020. This evidence summary collates the best available evidence at the time of writing and does not replace clinical judgement or guidance. Emerging literature or subsequent developments in respect of COVID-19 may require amendment to the information or sources listed in the document. Although all reasonable care has been taken in the compilation of content, the National Health Library and Knowledge Service Evidence Team makes no representations or warranties expressed or implied as to the accuracy or suitability of the information or sources listed in the document. This evidence summary is the property of the National Health Library and Knowledge Service and subsequent re-use or distribution in whole or in part should include acknowledgement of the service.

The following PICOIT was used as a basis for the evidence summary:

<table>
<thead>
<tr>
<th>Population</th>
<th>Patients undergoing ophthalmic procedures</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>Ocular transmission of COVID-19</td>
</tr>
<tr>
<td>Comparison</td>
<td>Cancellation of ophthalmic procedures</td>
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The following search strategy was used:

**EBSCOHOST RESEARCH DATABASES: MEDLINE 15/04/2020 20:59**

- **S1** (MH “CORONAVIRUS”*)
- **S2** COVID-19 OR CORONAVIRUS OR “CORONA VIRUS” OR (WUHAN N2 VIRUS) OR (’2019-NCOV’ OR “2019 NCOV”) OR “SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2” OR (’2019* AND (NEW OR NOVEL) AND CORONAVIRUS) )
- **S3** S1 OR S2
- **S4** (MH “OPHTHALMOLOGIC SURGICAL PROCEDURES*”) OR (MH “OPHTHALMOLOGY”) OR “OPHTHALMOLOGY”
- **S5** “EYE SURGERY” OR “OPHTHALMIC SURGERY” OR OPHTHAL * OR “EYE SYSTEM” OR “VISUAL SYSTEM” OR OCULAR
- **S6** “OCULOPLASTIC SURGERY” OR OCULOPLAST*
- **S7** S4 OR S5 OR S6
- **S8** S3 AND S7

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3 Irish College of Ophthalmologists [https://www.eyedoctors.ie/press-releases/]. [Accessed 22.06.2020].

4 HSE National Clinical Programme in Ophthalmology [https://www.hse.ie/eng/services/whs/cspd/rcps/oc/ophthalmology/].


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11 Robin E Ferner, Philip I Murray, d Jeffrey K Aronson, Centre for Evidence-Based Medicine (CEBM) Spreading SARS-CoV-2 through ocular fluids. [https://www.cebm.net/COVID-19/spreading-sars-cov-2-through-ocular-fluids/]. [Accessed 17.04.2020].


