



Original Contribution

**RISK PREVENTION AND MAINTAINING ACCESS TO EFFECTIVE
OPHTHALMOLOGY PRACTICE IN COVID-19 CONDITIONS AT
LOZENETZ HOSPITAL SOFIA**

S. Stoykova^{1,2*}, M. Platikanova³

¹Department of Surgery, Obstetrics and Gynecology, Faculty of Medicine,
Sofia University St. Kliment Ohridski, Sofia, Bulgaria

²Ophthalmology Department, Lozenetz Hospital Sofia, Bulgaria

³Department of Hygiene, Epidemiology, Microbiology, Parasitology and Infectious Diseases,
Faculty of Medicine, Trakia University, Stara Zagora, Bulgaria

ABSTRACT

During the Covid-19 pandemic, eye care professionals are at serious risk of contracting Sars-Cov-2. The reason for this is the specific examination course, requiring close contact with the patient's face, the presence of Sars-CoV-2 in the conjunctival secretions, the use of multiple instruments and equipment, which requires thorough and effective disinfection. The present paper describes the changes in the daily work of the Department of Ophthalmology at Lozenetz Hospital in Sofia for the period 2020-2022 carried out to provide a safe working environment for both medical staff and patients. The measures concern the reorganization of the offices and adjacent spaces, modification of the protocols for appointments, triage, follow-up, necessary procedures, especially for conditions with long-term control need - e.g., macular degeneration, glaucoma, diabetic retinopathy, etc. as well as rational management of medical personnel.

Key words: Covid-19; Sars-Cov-2 infection; Ophthalmology; Risk; Prevention; Triage; Safety

INTRODUCTION

The ocular surface can be both an entry point for Sars-Cov-2 and a source of infection spread through conjunctival secretions where Sars-Cov-2 has been established by real-time PCR. Ophthalmologists are exposed to direct contact with the infection and are at high risk even during a routine examination. (1, 2) In some clinics in Bulgaria, global practice has been studied and local solutions have been proposed, which maintained the patient eye care capacity (3, 4). New specific challenges adjacent to the current pandemic state and preventing risks in ophthalmic practice have been identified.

The presence of Sars-Cov-2 in tears and anterior eye segment (5) and the fact that about 30% of

those infected are asymptomatic (6) emphasize the need for increased vigilance in ophthalmic practice to prevent infection from spreading to visitors and to protect the personnel. Regardless of the redeployment of specialists, the overload of the health system with complicated cases alongside milder but potentially risky patients, we cannot allow the global Covid-19 pandemic to completely deprive the population of ophthalmic care. Neglecting eye diseases as non-life-threatening and limiting patients' access to an eye specialist can have irreversible and fatal consequences. All patients with ophthalmological complaints, including chronic conditions, e.g., glaucoma, macular degeneration, etc. are particularly vulnerable during the Covid-19 pandemic due to their limited access to eye consultation. Vision protection is an absolute right of patients and a commitment of eye care specialists. Its achievement needs developing and

***Correspondence to:** *Slavena Stoykova,*
Ophthalmology Department, Lozenetz Hospital
Sofia, Bulgaria, Koziak 1 Str, 1407 Sofia, Bulgaria;
stoykova_sl@abv.bg ; +359 888 898 850

implementing strategies to prevent the risk of infection in daily practice.

Globally, ophthalmic practices are carrying out measures to control Sars-Cov-2 and limit the transmission of the infection. (7) Such include restrain from contact procedures, thorough disinfection of the utensils used and placement of a barrier of protective panels between the doctor and the patient, etc. Although ocular manifestations are less common than respiratory ones, they may be a sign of the initial or the only symptoms of coronavirus infection. Assessing and managing patient contact risk in eye practices are crucial and prevention is indispensable.

PURPOSE

The current article shares the experience of the ophthalmologists at Lozenetz Hospital in Sofia for the period from 2020 to 2022. It describes the work optimization process for assuring maximal care for patients with eye diseases and conditions during the Covid-19 at minimal to no compromises. Taking appropriate measures limits and stops the spread of Sars-Cov-2, it prevents risks and gives access to effective eye care.

MATERIALS AND METHODS

In the period 2020-2021 measures were introduced to preserve patients' access to the specialists at the Ophthalmology Department of Lozenetz Hospital Sofia, following studies of experience in similar structural units in the country and abroad. Safe medical care and treatment of acute and chronic eye complaints was guaranteed. The risk of infection with the highly contagious Sars-Cov-2 has been reduced by implementing a number of changes. Arrangements regarding staff management, reorganization of daily activities, patient flow management, visitors' triage, strict implementation of disinfection recommendations, etc., ensured the safety of medical professionals, patients and their companions.

Personnel management

The fast-complicating pandemic situation forced ophthalmologists to face new unexpected tasks and challenges.

The lack of available hospital beds led to a shortage of personnel. Trainees, students, retired and non-practicing staff and those with various narrow specialties stood up on the front line. Ophthalmologists had been redirected to

emergency and triage sectors, to intensive care units, as well as to sectors for the treatment of non-intensive patients at the expense of ophthalmic clinics. (8-12)

For the period 2020-2021, several structural and organizational changes occurred in the Ophthalmology ward at Lozenetz Hospital in Sofia. One specialist has been directed for a long-term to the Department for the treatment of uncomplicated Covid patients. Given the reduced patient flow for scheduled activities and social distancing recommendations, the work schedule was covered by two specialists, crossing on a shift basis. There was no practical training for medical students and health care professionals; it has been transferred to an online platform according to the recommendations of the Dean's Management of the Faculty of Medicine at Sofia University. Limiting contacts between teams aimed on the one hand to reduce the infection risk, and on the other - the need for quarantine and a one-step exit from the working environment of many colleagues is eliminated.

Taking appropriate measures limited and stopped the spread of Sars-Cov-2. Strict compliance by the personnel in the ward included: keeping a distance, mandatory wearing of masks with a high degree of protection class KN95 FFP2 with tight face fit for optimal aerosol particles protection; wearing gloves; washing hands with antiseptic soap; applying alcohol-based disinfectant before and after applying eye drops; avoiding face touching; wearing safety goggles, helmets or both, as well as disposable protective overalls, changed hourly. (13) The regulated breaks for meals and recovery within the work shift happened in a separate room that was well ventilated. Medical professionals could rest at about 1.5m distance without personal protective equipment, after changing shoes and gowns, disinfecting hands and skin with HMI® SCRUB AL according to the general Lozenetz Hospital program.

Patient flow management

It is known that people can be carriers and therefore spreaders of Sars-Cov-2 before they have complaints or symptoms of Covid-19 infection. All patients were treated as potentially infectious to avoid contamination of the environment and medical personnel. It was a mandatory requirement for visitors to wear protective masks, properly fitted, covering their nose and mouth.

Those affected by Sars-CoV-2 have increased ocular morbidity (14). The most frequent symptoms on the side of the eyes are conjunctival injection, discharge, epiphora, foreign body sensation. (15). Conjunctivitis is the most common ocular manifestation of the disease, but cases of sight-threatening complications such as anterior and posterior uveitis, panuveitis, retinal vessel occlusions, and acute macular neuroretinopathy are being reported. (16). According to some analyses, the frequency of ocular manifestations totals up to 11.03%. (17) Patients' access to the diagnostic offices was carried out according to an established protocol

adapted from international sources. On the front line, they were met and triaged by a trained nurse. Patients were admitted according to a developed triage scheme, taken and adapted from international practice.

Patients' access to the diagnostic offices is carried out according to an established protocol adapted from international sources. At the front line, they were met and triaged by a trained nurse. Patients were admitted according to a developed triage scheme, adapted from international practice, preventing risk and giving access to effective ophthalmology consultation. **(Figure 1)**

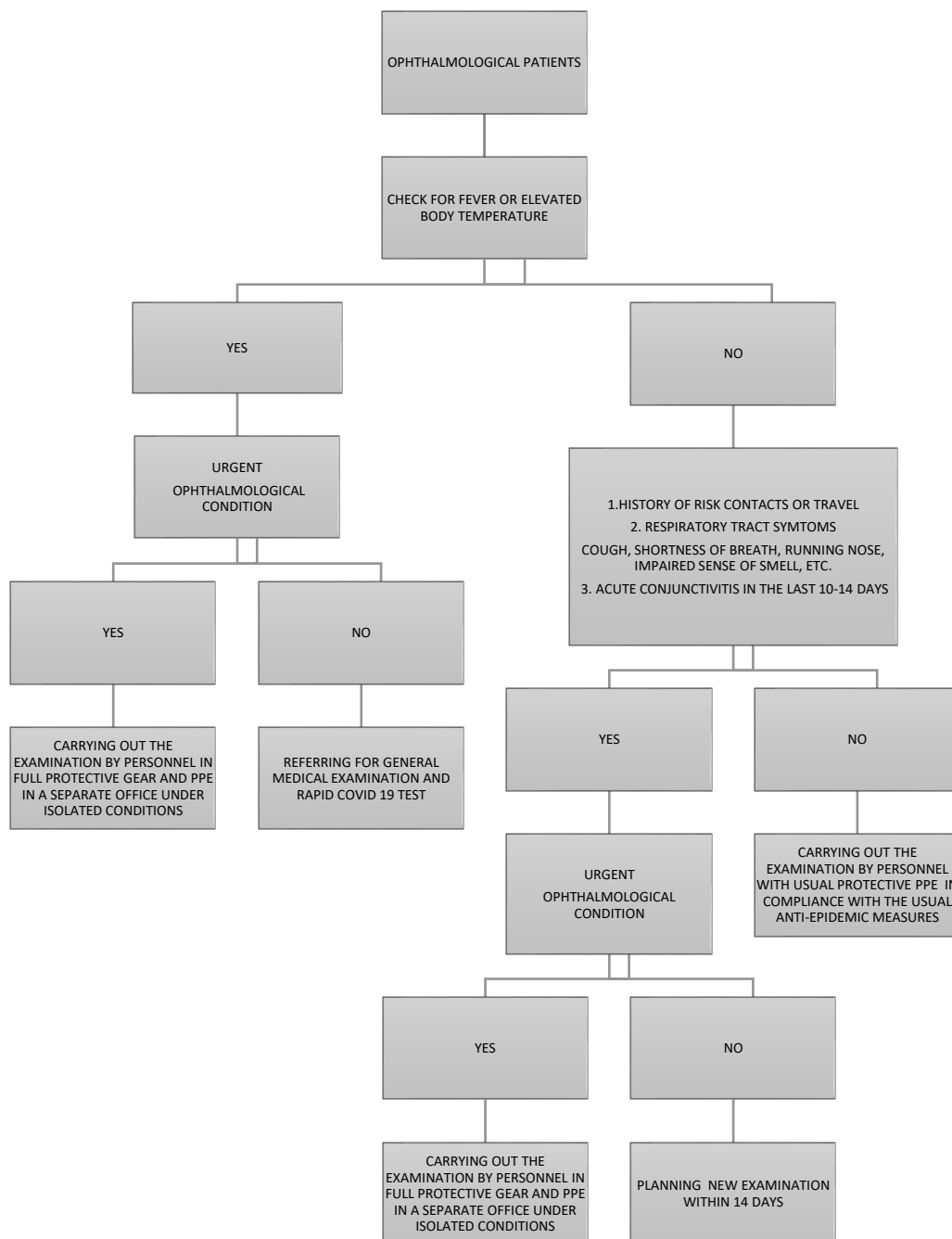


Figure 1. Chart for triage of patients in the ophthalmology department at Lozenetz Hospital adapted according to Lai THT et al 2020 (7)

The ward door opened and closed automatically by a contactless chip so there was no need to touch any handles or surfaces. Access to the ward was controlled and limited. At the entrance, both hands must be wiped with disinfectant according to the protocol accepted in Lozenetz hospital. No central air conditioning was used, air movement and exchange was ensured, as all windows of the diagnostic offices were almost permanently open. Patients with an elevated body temperature were not allowed into ophthalmology offices, as it was measured in a no-touch manner on the forehead or wrist already at the scanner located at the entrance to the medical facility. Patients with fever were isolated and awaited examination in a designated area (Figures 2, 3, 4).



Figure 2. Automatic door with electronic no-touch access after mandatory disinfection



Figure 3. Waiting room with a safe distance between patients' seats and optimal natural ventilation



Figure 4. Wrist or forehead no-touch body temperature measurement device at Lozenetz Hospital entrance

Measures to limit the Sars-Cov-2 spread, specific to ophthalmology practice

No accompanying persons were allowed in the eye outpatient clinic. When children were concerned, they entered with one companion only, same as people with mobility difficulties, patients with low vision and poor cooperation. Monitoring was done according to a pre-booked appointment schedule to avoid overcrowding in the waiting room. Additional seats were provided at a sufficient distance, as the specifics of eye consultations often require putting dilation drops for mydriasis and cycloplegia, respective wait time of 20-30 min and then completing the examination

Diagnostic devices in the department for highly specialized activities such as perimetry, optical coherence tomography, corneal topography, etc. were located in a separate room. It was mandatory ventilated for 10 minutes after each patient's visit. All forehead, chin rest areas and contact surfaces were cleaned according to the Lozenetz Hospital's disinfection program with an alcohol-based solution with no aldehydes and oxidizing agents HMI® IDO SPRAY. It had been specially selected as suitable for application in an eye clinic where sensitive optical equipment, digital devices and monitors were used. It contained a corrosion inhibitor to

protect treated objects. It was appropriate for cleaning small surfaces without aldehydes and oxidizing agents; it did not leave marks, did not require rinsing after treatment and had a short exposure time.

Special attention was paid to those parts of equipment which were in direct contact with visitors - chin and forehead rests of all autorefractometers, keratometers, biomicroscopes, tonometers, etc. Safety barriers were installed on the slit-lamps in order to prevent direct aerosol splash contact with the examiner's eyes and respiratory system. **(Figure 5)** The reason for its implementation was due to the lack of distance inbetween the patient and the physician during the biomicroscopy. A longer duration of some examinations such as indirect ophthalmoscopy, gonioscopy, examination of the retinal periphery was needed in order to achieve the best results. This was especially true for laser procedures - ALC retinal treatment, YAG capsulotomy, YAG iridotomy, etc. The removal of protective masks was not allowed for both the patient and the physician, no matter of reduced visibility due to fogging of eyepieces and the lenses used. This inconvenience was partially eliminated by treating the optical instruments with a suitable surface-active material which does not damage them or by the careful wiping of an assistant with a special microfiber cloth during the exam. Safety shields will never be a trustful substitution or a complete alternative of properly placed masks on the patient's face (18-20).

For intraocular pressure measurement, the noncontact air method by no-contact tonometer (NCT) was preferred. The room was provided with good ventilation and UV disinfection of the air by a special fan with a closed source of radiation. The instrumented specialist had to wear a high-grade KN95/FFP2 mask with a tight fit to the face for optimal protection from aerosol particles, safety goggles or a helmet. Particularly important is the question of whether the NCT creates risky tear aerosols containing virulent Sars-Cov-2 particles. Attempts have been made to visualize the micro aerosols formed during NCT with controversial results (21). During the Covid-19 pandemic, these studies are rekindling interest with no definite results. It is assumed that the risk of spread increases when NCT is performed without a protective face mask, with repeated

IOP measurements, also with poor air circulation, and decreases with a distance of more than 1.5m and disinfection of the nozzle with 75% ethyl alcohol. (22, 23)



Figure 5. Slit-lamp with transparent protective barrier installed

Although Goldmann applanation tonometry is the gold standard in IOP control, in the pandemic situation it was administered according to indications and at the discretion of the treating physician. Direct contact with the patient's ocular surface and staining of tears with a disposable sterile fluorescein stick was needed, which required use of gloves and mandatory securing of consumables as biological waste. The ward had no single-use tips due to their relatively high price and doubts about the reliability of the result. Two Goldmann prisms available were disinfected by soaking for 10 min in 10% solution of sodium hypochlorite (bleach) or in 6% hydrogen peroxide solution. Then they were rinsed with distilled water, dried, wiped with 70% solution of ethyl alcohol and ready to use after complete drying. Due to unreliable data on its effectiveness against the SarsCov2 and the complicated procedure of Goldmann prism sterilization, Goldmann applanation tonometry was limited. All instruments that came into direct eye surface contact underwent the above-described disinfection immediately after use incl. lenses for gonioscopy and examination of the retinal periphery and these not in direct

contact, e.g., 78 D and 90D indirect ophthalmoscopy lenses - routinely every 3 hours.

For examination of the eye fundus, we used methods that could be performed from a greater distance and the use of a direct ophthalmoscope in practice was reduced just to the transillumination technique. Posterior segment examination was done with a binocular indirect ophthalmoscope and a 20D converging lens, slit-lamp indirect ophthalmoscopy with a 78 or 90D converging lens or with a Hruby highly diffusing lens (-59D) mounted on a special attachment. Obtaining images of the eye fundus by a fundus camera was particularly appropriate in the pandemic situation or using the OCT set TOPCON 3D OCT 2000. It perfectly reached the eye bottom even through narrow pupils and with insufficient transparency of the eye media. All the above-described measures were adopted as a routine practice in the Ophthalmology Department of Lozenetz Hospital without putting additional financial burden on the patients during the Covid-19 pandemic 2020-2021. We provided a greater physician-patient distance on the one hand and a shorter time for the patient to spend in practice on the other, as well as an opportunity to review all documentaries in detail later. The photo documentation saved can be sent for consultation with other specialists, analyzed and tracked over time. These concepts are the basis of the developing telemedicine, especially useful and relevant in the field of chronic diseases such as glaucoma.

A study on virtual consultations and telemedicine within the first 13 weeks of the pandemic found that they were used by about 10% of ophthalmologists compared with over 67% of endocrinologists and 50% of cardiologists (24).

Conducting static automatic perimetry was also a challenge as the mask often limited the patient's field of vision and the correct performance of examination required its removal. For this purpose, the TOMEY AP2500 device used was situated as far away from computer peripherals as possible. Thus, the patient did not endanger the medical professional who observed and positioned his/her pupil according to the observation camera from a distance. It was preferable to use shorter programs applicable to avoid excessive

aerosol contamination of the perimeter hemisphere and the room.

CONCLUSION

The steps described in the presentation taken at the Lozenetz Hospital Sofia provide recommendations on how to safely assess patients' ophthalmic condition during Covid-19. Even minimal changes in medical professionals' routine behavior and the public attitude can help achieve safety significantly guaranteeing the right to sight of those affected. Risk prevention and management of environmental contamination and transmission of Sars-Cov-2 are accomplished with affordable measurements. These approaches can be implemented easily and ensure safe patient access to eye care professionals and ophthalmic care.

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