




## BRIEF REPORT

# Eye-related emergencies incidence at a tertiary referral center in Southern Italy during COVID-19 related lockdown

## [version 1; peer review: 1 not approved]

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### Abstract

**Background:** In order to contain the community spread of coronavirus disease (COVID-19) in Italy, a stringent lockdown was imposed, which also impacted the healthcare services. The purpose of this study is to investigate the drop in the number of outpatients in the Ophthalmic Emergency Service (OES) in the Eye Clinic of University of Bari during the COVID-19 lockdown.

**Methods:** A retrospective analysis of electronic medical records from a tertiary referral center in Southern Italy was performed. Demographics and medical characteristics of patients examined in the OES between March 10<sup>th</sup>, 2020 and May 3<sup>rd</sup>, 2020 were assessed and compared with records from the same period in 2019. We categorized the patients by sex, age group, and by the type of eye disease that was recorded as the principal diagnosis. The change (%) in the number of patients and diseases between the study periods was analyzed.

**Results:** We observed a reduction in the number of OES visits during the lockdown (-63.4%) compared to the number of visits in 2019. The greatest changes were observed in the youngest ( $\leq 20$  years; -76.6%) and the most elderly patients ( $\geq 81$  years; -70.9%). The decrease in the number of patients presenting with each pathology ranged from -82% to -28.5%, depending on the pathology, and mainly involved the orbital and palpebral pathologies, anterior segment disorders, non-specific visual symptoms, and minor injuries. The diagnosis of chronic pathologies, rhegmatogenous retinal detachment, and vitreous haemorrhage increased by 134%, 100%, and 75%, respectively.

**Conclusions:** Our results revealed the impact of the COVID-19 lockdown on OES activities in the Eye Clinic of University of Bari. A drop in number of visits across all age groups was observed. The number of patients presenting with minor and nonurgent conditions

### Open Peer Review

Reviewer Status 


Invited Reviewers

1

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report

1. **Grayson W. Armstrong** , Harvard Medical School, Boston, USA

Any reports and responses or comments on the article can be found at the end of the article.

decreased, whereas the number of patients presenting with chronic diseases and urgent but deferrable conditions increased.

### Keywords

COVID-19, Lockdown, Ophthalmic Emergency Service, Ocular pathologies

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**Author roles:** Niro A: Conceptualization, Formal Analysis, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; Sborgia G: Data Curation, Formal Analysis, Methodology; Favale R: Data Curation; Sborgia A: Data Curation; Pastore V: Data Curation; Taculli C: Supervision; Boscia F: Supervision, Validation, Writing – Review & Editing; Alessio G: Supervision, Writing – Review & Editing

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## Introduction

The coronavirus disease (COVID-19), was first reported in China, on December 31<sup>st</sup>, 2019.<sup>1</sup> The first case of COVID-19 in Italy was reported on February 21<sup>st</sup>, 2020.<sup>2</sup> The World Health Organization (WHO) declared COVID-19 a pandemic on March 11<sup>th</sup>, 2020.<sup>3</sup> The previous day, the Government of Italy had ordered a lockdown for a period of approximately two months. This involved introducing preventative measures such as closing schools and universities, halting non-essential industrial and commercial production activities, and limiting the movement of people throughout the country.<sup>4</sup> As a result of the lockdown, all outpatient services were stopped, but emergency healthcare services continued to operate. A stringent system of triaging and screening of outpatients was introduced to mitigate the community spread of COVID-19.

Primary care practices reported reductions in the use of healthcare services due to the lockdown, including a reduction in the number of patients accessing surgical specialties, such as ophthalmology.<sup>5</sup>

Around the world, eye-related complaints account for approximately 1–6% of the patients presenting to general emergency rooms.<sup>6</sup> In the Eye Clinic of University of Bari, all ophthalmologists on staff work on a rotational shift pattern in the OES, which is open 24 hours a day, 365 days a year. Given the high volume of patients (over 70,000 a year; >200 patients a day), the hospital has a triaging system similar to that of a general hospital emergency room. In this study, we retrospectively conducted database searches of all patients presenting to our OES during the COVID-19 related lockdown in 2020 and compared them to records from the same period in 2019.

## Methods

The study setting was the Eye Clinic of University of Bari, a tertiary referral center in Southern Italy. Electronic records of OES patients from March 10<sup>th</sup>, 2020 (i.e., the day in which the quarantine measures were applied in Italy) to May 3<sup>rd</sup>, 2020 (i.e., the day in which the quarantine measures were discontinued) were searched in the central database of the Azienda Ospedaliero Universitaria Consorziale Policlinico di Bari, and compared with those of the same period the previous year (from March 10<sup>th</sup>, 2019 to May 3<sup>rd</sup>, 2019). The search was conducted by masking personally identifiable information, and selecting sex, age, and diagnosis as search parameters. Patients included in the study were categorized by age into the following groups: 0 to 20 years, 21 to 40 years, 41 to 60 years, 61 to 80 years, and 81 years or older. Only the principal diagnosis of each patient, based on the best judgment of the physician, was extrapolated from the central database for the analysis.

In order to summarize the broad spectrum of diseases observed during the study periods we identified 14 categories, including non-specific visual symptoms, orbital and palpebral pathologies, conjunctival pathologies, corneal pathologies, acute angle-closure glaucoma, posterior vitreous detachment, vitreous haemorrhage, rhegmatogenous retinal detachment, optic nerve pathologies, neurological pathologies, major injuries, minor injuries, ambulatorial pathologies, and post-surgical complications.

The change (%) in the number (n) of patients between the two study periods was calculated as follows:  $[(n\ 2019 - n\ 2020)/n\ 2019] \times 100$ .

## Ethics statement

The patients involved in this study provided written informed consent for the publication of their clinical information. All the procedures were performed in agreement with the guidelines of the Declaration of Helsinki. The study was approved by the institutional review board of the Eye Clinic, Department of Medical Science, Neuroscience and Sense Organs, University of Bari on July 1<sup>st</sup> 2020.

## Results

All data that were accessed are available in [Table 1](#). During the 2019 study period, there were 2387 instances of patients presenting to the OES (21% of all patients presenting to the clinic). During the 2020 study period, the number of patients presenting decreased to 872 (48% of all patients presenting to the clinic). In both study periods, more male patients accessed the OES than women, and the mean age category (61-80 years) remained the same for both study periods.

In both study periods, the proportion of visits by age category was similar, demonstrating that patients between 21 and 80 years old presented to OES more frequently than other age groups.

The percentage change in the number of children, adolescents, and young adults (age group, 0-20 years) presenting at the OES was the greatest (–76.6%) of all the age groups. This was followed by the elderly (age group, ≥81 years) whose numbers reduced by –70.9% during the lockdown. The patient numbers in other age groups decreased by a range of –59% to –66.6% during the lockdown.

**Table 1.** Characteristics of patients and eye pathologies during the study periods, where n = number of patients; Change = [(n 2019 - n 2020/n 2019) × 100]; SD = standard deviation.

	2019 period	2020 period (lockdown)	Change
<b>Number of patients, n (%)</b>	<b>2387 (100.0%)</b>	<b>872 (100.0%)</b>	<b>-63.4%</b>
<b>Gender, n (%)</b>	<b>1645 (69.0%) males, 742 (31.0%) females</b>	<b>541 (62.0%) males, 331 (38.0%) females</b>	<b>-</b>
<b>Age, mean ± SD</b>	<b>72.3 ± 13.6</b>	<b>65.7 ± 12.3</b>	<b>-</b>
<b>Age group, n (%)</b>			
0-20	240 (10.0%)	56 (6.4%)	-76.6%
21-40	534 (22.4%)	178 (20.4%)	-66.6%
41-60	802 (33.6%)	319 (36.6%)	-60.2%
61-80	701 (29.4%)	287 (32.9%)	-59.0%
81	110 (4.6%)	32 (3.7%)	-70.9%
<b>Disease, n (%)</b>			
Non-specific visual symptoms	104 (4.3 %)	34 (3.9%)	-67.3%
Orbital and palpebral pathologies	276 (11.6%)	86 (9.86%)	-68.8%
Conjunctival pathologies	1054 (44.2%)	189 (21.6%)	-82.1%
Corneal pathologies	345 (14.4%)	133 (15.2%)	-61.4%
Acute angle-closure glaucoma	1 (0.04%)	2 (0.2%)	100.0%
Posterior vitreous detachment	119 (5%)	58 (6.6%)	-51.2%
Vitreous haemorrhage	16 (0.7%)	28 (3.2%)	75.0%
Rhegmatogenous retinal detachment	0 (0.0%)	52 (6.2%)	100.0%
Optic nerve pathologies	16 (0.7%)	9 (1.0%)	-43.7%
Neurological pathologies	27 (1.1%)	14 (1.6%)	-48.1%
Major injuries	7 (0.29%)	5 (0.57%)	-28.5%
Minor injuries	336 (14.07%)	141 (16.17%)	-58.0%
Ambulatorial pathologies	43 (1.8%)	101 (11.6%)	134.0%
Post-surgical complications	43 (1.8%)	20 (2.3%)	-53.4%

Considering the disorders affecting at least five patients in the study periods, the largest drop in number (-82%) was recorded in patients affected by conjunctival pathologies including bacterial and viral conjunctivitis, allergic conjunctivitis, and, rarely, granulomatous and neoplastic conjunctivitis. The percentage of patients complaining of orbital and palpebral pathologies and non-specific visual symptoms including blurred vision, reading difficulties, and metamorphopsia without a related pathology, had a considerable decrease (-68.8% and -67.3%, respectively).

Minor injuries including chemical injuries or foreign bodies on the external eye decreased by -58% while major injuries including lid or corneal laceration and globe rupture decreased by only -28.5%. The percentage of post-surgical complications decreased by -53.4%.

Conversely, the number of patients with chronic diseases that are usually managed with outpatient follow-up (cataract, diabetic retinopathy, age-related macular degeneration, central serous chorioretinopathy, epiretinal membrane, glaucoma, uveitis, etc.) increased by 134%. In addition, the number of cases of vitreous haemorrhage and rhegmatogenous retinal detachment remarkably increased by 75% and 100%, respectively.

## Discussion

This report aims to compare the number of patient accesses to an emergency department of a tertiary referral center, during the COVID-19 lockdown, compared to the same period in 2019.

As previously observed,<sup>7,8</sup> there was a decreased number of OES visits across all age categories of the population during the lockdown. The number of patients presenting with acute diseases decreased, while the number of patients presenting with chronic and deferrable urgency conditions increased.

As previously reported,<sup>9</sup> adults between 21 and 80 years old presented more frequently to the OES than any other age category of the population. However, during the lockdown, restrictions in mobility<sup>3,4</sup> and the fear of being infected with COVID-19<sup>10</sup> may have led to fewer OES visits.

The greatest percentage decrease in the number of patients presenting was in the vulnerable age groups of the population, i.e., the youngest and the elderly. The youngest people were limited in mobility because they carry a high viral load, meaning they are more contagious,<sup>11</sup> and the older patients were limited in mobility because they are at a higher risk of severe illness from COVID-19.<sup>12</sup>

As was the case with previous studies,<sup>7,13</sup> the most common eye conditions reported in the OES were conjunctivitis, ocular injuries, and palpebral pathologies. Within the 14 categories of diseases, the largest decrease was observed in the conjunctival disorders. It is likely that this is because acute conditions were managed at home, and people with non-acute conditions delayed their OES visit.

The reduction in patient numbers varied depending on the ocular injury, as is in line with previous reports.<sup>14–16</sup> This could be explained by the change of the injury setting, i.e., the types and frequency of injuries typically occurring in workplaces, schools, and during social activities may differ to the those occurring at home during the lockdown.<sup>15,16</sup>

During the lockdown, there was a considerable decrease in the percentage of patients complaining of non-specific visual symptoms without a related pathology, demonstrating that many patients that usually present to the OES, probably do not need emergency care.<sup>9</sup>

The percentage of post-surgical complications decreased due to the deferring of elective surgical procedures during the lockdown.<sup>17</sup>

It is likely that patients with chronic conditions, that are usually managed by outpatient follow-up, presented to the OES due to the closing of all non-essential outpatient activities during the lockdown. The increase in vitreous haemorrhage cases may be due to unbalanced hemostasis in vasculopathy patients taking oral anticoagulants, or the progression of retinal vascular pathologies as diabetic retinopathy. Due to the temporary suspension of surgical activities or the conversion of other nearby hospitals to COVID-19 centers, a large number of cases of rhegmatogenous retinal detachment may have been referred to our clinic as a tertiary referral center.

A report on the health care services of the Commonwealth Area during the COVID-19 lockdown showed that surgical specialties such as ophthalmology were most affected by the drop of visits, with a -79% decrease in the volume.<sup>5</sup> The reduction in the number of OES visits could be due to the limitations imposed by the government as well as the risk-stratification guidelines introduced by ophthalmic departments to limit and optimize the treatment and care of ocular disorders.<sup>18,19</sup> Furthermore, some patients may have intentionally avoided medical care rather than risking coronavirus exposure at hospitals.<sup>10</sup>

On the other hand, the suspension of outpatient services may have led to the progression of some systemic<sup>20–22</sup> and ocular diseases<sup>17</sup> which, in turn, may have prompted patients to go to the emergency services.

The impact of the government's acts, hospital risk-stratification guidelines, and population anxiety on OES activity during the COVID-19 lockdown could be an indicator of the short-term effects that the lockdown has on public health. To date, there is also uncertainty over the possibility of a reboot of the lockdown, due to a new increase of the contagion curve, despite the beginning of coronavirus vaccination campaign in Europe on December 27<sup>th</sup>, 2020. Therefore, an analysis of ophthalmic emergency service activities, such as the one presented here, may prove useful in defining new guidelines to reorganize and rationalize outpatient access to public health services.

### Data availability

All data underlying the results are available as part of the article and no additional source data are required.

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# Open Peer Review

Current Peer Review Status: 


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Version 1

Reviewer Report 17 May 2021

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 **Grayson W. Armstrong** 

Department of Ophthalmology, Massachusetts Eye and Ear, Harvard Medical School, Boston, MA, USA

The authors present a study evaluating the changes in patient demographics and diagnoses during the lockdown in Italy at a single eye center at the University of Bari.

There are a few major revisions necessary in order to make the manuscript scientifically sound:

- You must evaluate the statistical significance of any changes reported in the article. Proportions and percentages alone are insufficient.
- The diagnostic groupings used seem to be created by the authors for this individual study. If these same diagnostic groupings were used prior, please cite that paper. Otherwise, they are inappropriate as written. The diagnostic groupings will have a major impact on the outcomes of the paper, but the reasoning behind the diagnostic groupings is not ever spelled out and is unclear. The diagnoses that account for each grouping are not listed for the reader and should be made transparent. Additionally, the listing of some individual diagnoses (vitreous hemorrhage, RRD, PVD, angle closure glaucoma) seem to be provided out of convenience as these showed major changes, while others are grouped into massive categories (ambulatorial pathologies). Lastly, no evaluation of urgent versus non-urgent diagnoses is provided, as some optic nerve pathologies are urgent (i.e. optic neuritis, papilledema), while others are not (optic nerve drusen). I would recommend using previously published diagnostic groupings or explain the rationale for the groups, as well as the diagnoses included in each group.
- Please indicate whether source data would be available in a repository or publicly available. Currently, the percentages provided are not sufficient to ensure reproducibility.

Less major revisions that should be included are as follows:

- In the introduction, an effort should be made to cite all relevant literature that shows reductions in ophthalmic emergencies presenting to hospitals across the world. I have included four articles that should be included<sup>1,2,3,4</sup>, but this is not an exhaustive list. Please



include these and others.

- The final sentence of the introduction is better suited for the methods section than the introduction.
- The methods section should clearly state that this is a retrospective cross sectional study. It should also clearly delineate inclusion criteria (these are mentioned but not described as such) and exclusion criteria (if none, say so).
- Was there any evaluation for duplicate patients coming in multiple times for the same diagnosis?
- When you say 'best judgement of the physician', is this the treating physician or the physician reviewing the chart retrospectively?
- I believe the calculation you provided should say  $[(n_{2020} - n_{2019})/n_{2019}]$ . Is that correct?
- In the results section, you state that these patients represent a percentage of patients presenting to the clinic. Did the other patients present to the ambulatory clinic instead of the emergency dept? Make this clear.
- When you talk about male patients you should provide percentages and p-values.
- What do you mean by 'mean age category'? The category that contains the mean age of patients? Please explain.
- Table 1: Please calculate statistical significant for all values presented.
- Were there truly zero RRDs at your institution during the time period of 2019?
- In the Discussion section, in first sentence, please change 'patient accesses to an' to 'patients who accessed the'.
- Some of the conclusions seem to be going beyond the data presented and should either be removed or the study changes to support the conclusions. Examples include: '*number of patients with acute diseases decreased*' - you did not subcategorize all diagnoses based on acute versus chronic; '*chronic and deferrable urgency conditions increased*' - same as above; '*acute conditions were managed at home*' - this is not supported by your study similar to the above; '*people with non-acute conditions delayed their OES visit*' - this goes against what you were saying above, and is further not supported by data; '*many patients that usually present to the OES, probably do not need emergency care*' - this is not supported by the study, as it is unclear if the patients who avoided the emergency dept did not need to be seen.
- For the comment on vitreous hemorrhage, did you evaluate whether these patients were on blood thinners or if they had diabetic retinopathy as a cause? This data is not presented, and therefore the assumption goes beyond the scope of the data presented.
- The report of the 'Commonwealth Area' should instead refer to the United States. The



Mehrotra *et al.* study is a US-wide survey published by the commonwealth fund.

- Remove reference to the potential reboot of the pandemic lockdown as this is speculative.

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**Is the work clearly and accurately presented and does it cite the current literature?**

Partly

**Is the study design appropriate and is the work technically sound?**

No

**Are sufficient details of methods and analysis provided to allow replication by others?**

Partly

**If applicable, is the statistical analysis and its interpretation appropriate?**

No

**Are all the source data underlying the results available to ensure full reproducibility?**

No

**Are the conclusions drawn adequately supported by the results?**

No

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Ophthalmology, epidemiology, eye trauma

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.**

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