Public Health and Epidemiology of COVID-19 for Doctors of Optometry

Updated July 27, 2020

The American Optometric Association (AOA) Health Policy Institute (HPI) is providing information relevant to the eye health and vision care community regarding the novel coronavirus (SARS-CoV-2) and COVID-19. Every doctor of optometry should understand the risks associated with this outbreak to ensure continued ability to care for patients.

Historical Background:


On March 30, 2020, the WHO reported that the rapidly increasing demand on health facilities and health workers threatens to leave health systems worldwide overstretched and unable to operate effectively. The focused message was that physical distancing measures are necessary to slow the transmission of the virus to aid the health care system and mitigate the risk of systems collapse. Adding, "to suppress and control COVID-19 epidemics, countries must isolate, test, treat and trace. If they don't, transmission chains can continue at a low level, then surge once physical distancing measures are lifted. Don't assume your community won't be affected. Prepare as if it will be. Don't assume you won't be infected. Prepare as if you will be."

The U.S. Centers for Disease Control and Prevention (CDC) stresses that COVID-19 can result in severe disease, including hospitalization, admission to an intensive care unit, and death, especially among older adults (ages 55 and over) and adults with certain underlying health conditions. Everyone can take actions, such as social distancing and staying home, to help slow the spread of COVID-19 and protect older adults from severe illness.

COVID-19 in the U.S.

According to a July 27, 2020 New York Times data base, 4,244,600 people across every state, plus Washington, D.C., and three U.S. territories, have tested positive for COVID-19, and at least 146,754 people with the virus have died. Cases are now rising in 34 states. In California, the state with the most known cases, more than 459,338 people have had COVID-19 and 67,878 of those were in the last seven days.
Florida now with 423,847 COVID-19 cases has passed New York with 416,443 cases. You can find nationally where cases are rising the fastest here.

Disease Transmission:

COVID-19 is of high concern because it is a novel virus, meaning it has never occurred before in humans. It is important to note that the virus is transmitted person-to-person through either direct contact or an exchange of bodily fluids. A study published in the New England Journal of Medicine on March 17, 2020, found that viable virus could be detected up to three hours later in the air, up to four hours on copper, up to 24 hours on cardboard and up to two to three days on plastic and stainless steel. With airborne transmission still not, to date, fully incorporated into public health directives, 239 scientists in 32 countries have outlined the evidence showing that smaller airborne particles can float in the air and infect people, and are calling for the WHO to revise its recommendations which accepted the evidence on July 7, 2020. This evidence shows that SARS-CoV-2 can stay in the air longer and travel farther in tinier bits, called aerosols, and that these aerosols can be generated by people talking, breathing or singing.

On June 3, 2020, it was reported in the Annals of Internal Medicine that asymptomatic persons account for approximately 40% to 45% of SARS-CoV-2 infections. This highlights the necessity of assuming all people as possibly being carriers. Dr. Thomas Frieden, chief executive at Resolve to Save Lives, an initiative of Vital Strategies to prevent epidemics and cardiovascular disease, and former director of the CDC, adds that superspreading events may involve people with symptoms that linger but who are not sick enough to stay home. The secondary attack rate of transmission of a virus is therefore an important number to monitor. This number ($R_0$, pronounced R-nought or r-zero) serves as an indicator of how easy the disease spreads from person-to-person, as indicated by its reproductive number, which represents the average number of people who will catch the disease from a single infected person. An outbreak with a reproductive number of below 1.0 will gradually disappear. Early in the pandemic the $R_0$ of COVID-19 has been reported as high as 4.08 while other studies estimating the $R_0$ to be between 1.5 and 3.5.

Based on these numbers, on average every case of COVID-19 would create three to four new cases. Recent reports now present State-by-State estimates of $R_0$ and confirm in New York State the $R_0 = 6.4$, explaining what is known about COVID-19, that it has the potential to spread rapidly, especially in urban areas. Estimates of $R_0$ reveal potential challenges for vaccination campaigns: using the rule of thumb that a proportion $1 - 1/R_0$ of a population needs to be vaccinated, vaccination coverage will have to be roughly 60% on average among the States. However, when the $R_0$ variation among States is considered, the $R_0 = 6.4$ for New York State suggests a vaccination coverage rate of 85%.

Morbidity and Mortality

The CDC believes that symptoms of COVID-19 may appear in as few as two days or as long as 14 days, with median estimates of five to six days after exposure. American adults of all ages—not just those in their 70s, 80s and 90s—are being seriously sickened by the coronavirus. On April 8, 2020 the CDC released Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 — COVID-NET, 14 States, March 1–30, 2020.
Figure 1. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019—COVID-NET, 14 States, March 1–30, 2020

Abbreviation: COVID-NET = Coronavirus Disease 2019–Associated Hospitalization Surveillance Network.

* Number of patients hospitalized with COVID-19 per 100,000 population.
COVID-19–associated hospitalizations in the United States are highest among older adults, and nearly 90% of persons hospitalized have one or more underlying medical conditions. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 — COVID-NET, 14 States, March 1–30, 2020. (Adapted by HPI)
Figure 3. Underlying conditions among adults aged ≥18 years with coronavirus disease 2019 (COVID-19)–associated hospitalizations—COVID-NET, 14 states,* March 1–30, 2020. (Adapted by HPI)

From the beginning of the spread of the coronavirus, public health officials have repeatedly warned that health complications of COVID-19 are more severe among people with underlying health conditions, of which diabetes, cardiovascular disease, and obesity are prominent. New data from CDC researchers showed that people with underlying health conditions were 6 times more likely to be hospitalized than those with no such conditions (45.4% versus 7.6%) and deaths were 12 times higher (19.5% versus 1.6%).

Analysis of COVID-19 cases by race and ethnicity showed incidence out of proportion to percent of the overall U.S. population for Hispanic (33% COVID-19 vs. 18% Population), Black (22% COVID-19 vs. 13% Population), and American Indian/Alaskan Native populations (1.3% COVID-19 vs. 0.7% Population). Among those aged 65 years or older, a population at higher risk for death from COVID-19, 26.8% have DM. Hypertension and severe obesity are present in 68.4% and 15.5% of individuals diagnosed with DM. Among people with diabetes with COVID-19, it is possible that higher BMI and A1c levels are linked to worse outcomes. Also, researchers believe that disruptions caused by the pandemic, including increased stress and changes to care, diet and physical activity routines, could contribute to worse outcomes for people with diabetes, and could exacerbate health disparities.

New research also suggests that COVID-19 and diabetes may be a two-way street. Not only do people with diabetes and COVID-19 suffer disproportionately higher rates of severe outcomes, it is also possible that COVID-19 is triggering new cases of type 1 and type 2 diabetes or a new type of diabetes, and among
people with existing diabetes, it may be triggering severe metabolic complications, such as diabetic ketoacidosis.\textsuperscript{xx} Other new studies show that nearly half of hospitalized COVID-19 patients without a prior diabetes diagnosis have hyperglycemia, and the latter is an independent predictor of mortality at 28 days.\textsuperscript{xi}

To help assess this bi-directional hypothesis, a new global registry to track COVID-19-related diabetes, called CoviDiab, has been started by Kings College London and Monash University.\textsuperscript{xxi}

Most recently (June 22, 2020), CMS reported new data on Medicare and dual eligible beneficiaries and COVID-19. Key highlights:

- More than 325,000 Medicare beneficiaries have been diagnosed with COVID-19 this year through May 16, translating to 518 cases per 100,000 beneficiaries.\textsuperscript{xxiii}

- The 110,000 Medicare beneficiaries hospitalized with a COVID-19 diagnosis this year through May 16 translates to 175 hospitalizations per 100,000 beneficiaries. Among those hospitalized with COVID-19, the five most prevalent chronic conditions for Medicare fee-for-service beneficiaries were: hypertension (79%); hyperlipidemia (60%); chronic kidney disease (50%); anemia (50%); and diabetes (50%).\textsuperscript{xxiv}

- Preliminary Medicare COVID-19 Data Snapshot: Only 27% of hospital discharges of beneficiaries were able to return home unaided; 28% expired at the hospital. The remainder required skilled nursing at a facility (34%) or at home (11%). Average cost of hospitalization (at discharge) per beneficiary $23,094. Fifty percent of hospitalized beneficiaries had diabetes.\textsuperscript{xxv}

**Conclusion:**

Global concern has escalated due to the rapid spread of the disease internationally including alarmingly high numbers of cases identified and presenting in the U.S. Evolving information from the CDC on the outbreak can be found at [cdc.gov/coronavirus/2019-ncov/about/index.html](https://www.cdc.gov/coronavirus/2019-ncov/about/index.html).

As discussed above, this information is evolving as public health organizations track and learn more about the spreading COVID-19 coronavirus. It is important to monitor for changes in information from the [CDC](https://www.cdc.gov) and [WHO](https://www.who.int) to best protect against infection.

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\textsuperscript{i} On Feb. 11,2020 the WHO renamed 2019-nCoV to COVID-19.
\textsuperscript{iv} \url{https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---18-march-2020}
\textsuperscript{v} \url{https://www.cdc.gov/coronavirus/2019-ncov/hcp/ambulatory-care-settings.html}
\textsuperscript{vi} \url{https://www.nytimes.com/2020/07/04/health/239-experts-with-one-big-claim-the-coronavirus-is-airborne.html}
Oran D: Prevalence of Asymptomatic SARS-CoV-2 Infection, A Narrative Review, Annals of Internal Medicine, June 3, 2020 https://doi.org/10.7326/M20-3012


Report 3: Transmissibility of 2019-nCoV - 25 January 2020 - Imperial College London
https://www.medrxiv.org/content/10.1101/2020.05.17.20104653v3.full.pdf

https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e3.htm?s_cid=mm6915e3_e


