



# How Oxygen Masks in Upper Endoscopies Can Improve Patient and Staff Safety

By Rene M. Gonzalez, MD, and Julie Johnson

It's no secret that the COVID-19 pandemic has accelerated concerns about airborne aerosol transmission and increased demand for enhanced barrier protection. To help protect patients and staff during medical procedures—such as upper endoscopies—it's important to consider solutions that mitigate the risk of airborne droplets.

In addition to the call for barrier protection, the COVID-19 pandemic has reinforced the clinical need for improved patient care. The risk of hypoxia during an upper endoscopy has been a serious problem for decades, and the COVID-19 pandemic has brought attention to this issue. Therefore, medical practitioners must continue to explore options that help them navigate the issues of both patient and staff safety during and after the pandemic.

## Staff Safety and the Pandemic

In early 2020, COVID-19 was identified as a respiratory virus primarily transmitted via airborne aerosols. When it was learned that coughing produced invisible aerosol clouds traveling for meters—lingering in the air, infecting staff and equipment, and surviving as pathogens on surfaces for hours—attention quickly shifted to the dangers of coughing and aerosol-generating procedures (AGPs). Upper endoscopies were identified in medical literature as among the highest-risk AGPs since they entail instrumentation of the upper airway, almost always resulting in vigorous coughing (Abola, Schwartz, Forrester).

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This is especially true for upper endoscopies, which are one of the most frequently performed procedures in modern medicine. In 2012, more than 7.1 million upper gastrointestinal (GI) endoscopies were performed in the United States, greatly outnumbering joint replacements, appendectomies, and tonsillectomies combined (Peery, Dellon).

distance. But patients must remove their masks to undergo upper endoscopy, and social distancing from the patient is also not an option for staff during endoscopies and in the recovery room. So, it was identified that upper endoscopies present a very serious occupational and environmental safety issue. And it became evident early in the pandemic that endoscopy oxygen face masks provided

an important barrier method of source containment and infection control.

The standard general strategies for protecting staff from COVID-19 include the following:

- Pre-procedure testing to attempt to identify infectious patients
- Personal protective equipment
- Room ventilation systems
- Room cleaning
- And more recently, vaccines

setting, which will continue for years to come. Along with that, our next normal has also demanded a safer environment of care for patients, staff and visitors.

#### **Patient Safety and Hypoxia**

Hypoxia is a common, unpredictable, and very serious patient-safety risk during upper endoscopy. It can lead to case interruptions, cancellations, and even devastating consequences, such as cardiopulmonary arrest, brain damage, and death. Anybody who has worked in an endoscopy suite knows that oxygen desaturations occur quite frequently and can be prolonged and severe. Multiple published analyses of malpractice lawsuits have demonstrated that hypoxia is by far

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While all these strategies are very important, it should be emphasized that none of these strategies is 100 percent effective. So, there remained a need for additional simple, complementary, and universally applicable methods to reduce aerosol-borne pathogen load of COVID-19 and all other respiratory pathogens, particularly during upper endoscopy.

Therefore, after the onset of the pandemic, my team and I decided to use the procedural oxygen mask (POM) as the routine oxygen delivery system to reduce viral load in the endoscopy suite.

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the leading cause of major lawsuits arising from the endoscopy suite (Walls, Weiss).

There are several reasons for hypoxia during upper endoscopy. Most upper endoscopies are done under intravenous sedation and therefore require supplemental oxygen. Oxygen masks (which can deliver oxygen concentrations of up to 40-95 percent, depending on the oxygen flow rate and specific type of oxygen mask used) are by far the most effective oxygen delivery systems.

Unfortunately, the dome of standard oxygen masks prevents the insertion of the endoscope into the patient's mouth. As a result, most endoscopies for decades have been performed using nasal or oral oxygen cannula, which provide an "open

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Both staff and patient safety is the top priority for us. There has been an increase in the procedures moving to the outpatient

face" and easy access for the endoscope, but which deliver a maximum of only 25-40 percent oxygen.

As a remedy, some practitioners resort to cutting an aperture in a standard oxygen mask. However, this approach has several





significant limitations. If the aperture is cut large, entrained room air dilutes the oxygen concentration to levels not much superior to that of a nasal cannula. If not cut large, the stiff plastic edges of the cut aperture can restrict the mobility of, and damage the skin of, the probe, which can be very expensive to repair. Traditional oxygen masks also do not provide capnography monitoring, which is a standard of care for sedation. Cutting the aperture is inconvenient and time-consuming. And finally, once modified, these are not FDA-approved devices.

In early 2019 (pre-pandemic), as a patient safety initiative, we adopted the use of the FDA-approved oxygen delivery system, the POM Mask, that delivers oxygen concentrations of 40–95 percent, much higher than that delivered by nasal cannula or cut-out standard oxygen masks. We observed marked decreases in severe and prolonged hypoxic episodes; Ambu bag ventilatory resuscitations; and in-case interruptions, delays, and cancellations. All had successful, uneventful endoscopies with no hypoxia.

For decades, we had come to tolerate and accept patients coughing in proximity and directly into our faces during upper endoscopy. It is imperative that we learn from the pandemic and adopt and retain new and better strategies, work habits, and standards than we had pre-pandemic.

Our colleagues, our patients, and their families deserve no less.

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