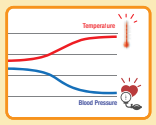

Perioperative Infection Control – We Have A Role!

Mitigation of Perioperative COVID-19 Infection

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The current Omicron BA.2 surge has increased the likelihood that infected patients will undergo surgery. A study from March through August 2020 found that the 30-day risk of pulmonary complications, sepsis, and ischemic stroke was increased among patients positive for COVID-19 preoperatively (*Am J Surg* 2021;222:431-7). Higher risk for pulmonary complications and sepsis persisted at least one month after the positive test (*Am J Surg* 2021;222:431-7).

Increased risk for health care providers

Patients with COVID-19 pose a risk to health care providers. A 2020 study in *The Lancet* compared the incidence of COVID-19 in the general population (2 million) and front-line providers (100,000) (*Lancet Public Health* 2020;5:E475-83). The incidence in health care providers was twice that of the general population. A multicenter international study early in the pandemic (March-June 2020) looked at the incidence of COVID-19 in health care providers who performed intubation (*Anaesthesia* 2020;75:1437-47). The authors gathered data from 1,718 health care providers in 17 countries (U.K., Europe, U.S.) who self-reported 5,148 tracheal intubations. Over the subsequent three weeks, 8.5% of the providers developed COVID-19.

Non-pharmaceutical interventions

Non-pharmaceutical interventions are the first step to mitigate transmission risk. A meta-analysis showed that increasing the distance between individuals to greater than one meter reduced the risk of transmission from 12.8% to 2.6% (*Lancet* 2020;395:1973-87). Each additional meter of distance roughly doubled the benefit.

Face masks substantially reduce the risk of transmission. A paper in Science documented a 10% decrease in both symptomatic COVID-19 and seropositivity from a community masking study involving 600 villages in Bangladesh (*Science* 2022;375:eabi9069). Tight-fitting masks reduce leakage from the side and are critical to maximizing the fitted filtration efficiency (*JAMA Intern Med* 2020;180:1607-12). N95 particulate-filtering facepiece respirators filter 95% of 0.3 µm particles, substantially better protection from aerosols than a standard surgical mask (*Nat Med* 2020; 26:676-80). Face shields or goggles for eye protection also reduce the risk of transmission from 16% to 5.5% (*Lancet* 2020;395:1973-87). Prescription eyeglasses are inadequate.

Optimizing anesthesia procedures

Regional anesthesia in infected patients should be performed in the OR instead of a block room or holding area with less adequate ventilation.

Intravenous induction and cuffed endotracheal tubes minimize the risk of transmission from infected children (*Anesth Analg* 2020;131:61-73). Videolaryngoscopy is preferred to direct laryngoscopy to increase the operator's distance from the airway. Coughing should be avoided during extubation. Supplemental oxygen should be minimized and administered via a mask rather than a nasal cannula. Only essential personnel should be allowed in the OR (*Orthop Trauma* 2020;34:333-40).

Transmission of SARS-CoV-2

Exhalation generates an aerosol comprising a moist, warm cloud of droplets with virions (JAMA 2020;323:1837-8). The cloud can propel the droplets up to 7-8 meters with vigorous exhalation. Aerosols are droplets smaller than 5 µm. Aerosols remain airborne for many hours. SARS-CoV-2 was initially thought to spread primarily through droplets, like influenza. However, the primary mode of transmission is via aerosols (*Annu Rev Chem Biomol Eng* February 2022).

The reproduction number R0 of influenza is 1.2. The reproductive number of the ancestral (Wuhan) strain of SARS-CoV-2 was approximately 3 (*Medicine (Baltimore)* 2021;100:e25837). Thus, the average number of persons who would have contracted COVID-19 from one infected person with COVID-19 was about 3 in March 2020. R_0 for the BA.2 Omicron variant may be as high as 12, similar to measles.* This is a hypothetical estimate of transmission in a susceptible population. This population no longer exists, as nearly the entire global population has acquired some immunity through infection, vaccination, or both.

Mitigation of transmission

The OR should have 15 or more air exchanges per hour. Every air exchange removes up to two-thirds of the airborne virus. ORs can supplement limited air change with ultraviolet-C germicidal irradiation. Despite initial concerns, the risk of transmission of SARS-CoV-2 by fomites is very low (*J Infect Dis May* 2022). Nevertheless, surfaces should be cleaned with a disinfectant between cases.

Patient preparation

SARS-CoV-2 on the skin is readily inactivated by povidone-iodine (7.5%-10%) or alcohol (isopropyl or ethyl 70%) with or without chlorhexidine (*Australas J Dermatol* 2021;62:37-40). Two doses of nasal povidone-iodine swabs within one hour before incision may be utilized to decolonize the nares (*JAMA Otolaryngol Head Neck Surg* 2020;146:787-8).

PPE guidelines

Guidelines published in November 2021 recommend surgical mask and eye protection when caring for patients with suspected or diagnosed COVID-19 (*Clin Infect Dis* July 2020; *Crit Care Med* 2021;49:e219-34). For health care providers performing aerosol-generating procedures, the guidelines recommend an N95 or better respirator. A face shield or surgical mask may be used as a cover for the N95 respirator to permit extended use.

Barrier enclosures

Several airway barrier enclosures made in part of transparent plastic sheets of varying stiffness, often on a frame for placement around the head and upper torso, have been described (*Anesth Analg* 2020;131:e135-6; *J Cardiothorac Vasc Anesth* 2021;35:966-7). Barriers may complicate and delay laryngoscopy and intubation while increasing the risk of transmission.

Obstetrics

Infected but not severely ill mothers may stay in the same room as newborns while utilizing infection control precautions (*Curr Opin Pediatr* 2021;33:188-94). Breastfeeding has not been demonstrated to transmit infection. ■

* See twitter.com/DrIanWeissman/status/1529660702947950593.