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Protection of anesthesia providers from silent carriers of COVID-19 while minimizing disposable PPE utilization

One of the major challenges associated with containing the coronavirus disease of 2019 (COVID-19) and minimizing the effects of exposure is the understanding that asymptomatic transmission can occur [1]. Based on guidance from the Center for Disease Control (CDC), hospitals have implemented source control techniques such as face coverings and active symptom screening for everyone entering healthcare facilities. These and other measures are designed to reduce facility risk and protect healthcare personnel [2–4]. Asymptomatic transmission in healthcare personnel is particularly concerning due to the inherent exposure that frontline providers have with multiple patients and other providers on a daily basis — making them ideal vectors for disease transmission. In the absence of near universal, rapid testing, it is paramount that health care workers minimize their risk of exposure, especially during high-risk exposures such as airway management of a patient with unknown COVID-19 status [5,6].

This need to minimize healthcare provider exposure also must be viewed in the limited PPE reality that many institutions currently find themselves. Ideally, every healthcare worker would have access to universal personal protective equipment (PPE) for the entirety of their time in hospital, but this is not a practical or appropriate use of a finite resource [7]. With this understanding, it becomes paramount to identify episodes of care associated with high exposure risk and ensure that all efforts are being made to limit risk of transmission during these episodes [8].

Understanding that the highest risk of a non-high risk surgical encounter occurs during the AGP (aerosol generating procedure) of intubation and extubation, our department developed specific Intubation Teams to mitigate risk of viral transmission in surgical patients who are asymptomatic with unknown COVID- 19 status. These teams include:

- Anesthesiologist Intubating/extubating Partner
- Laryngoscopist – Can be anesthesiologist/CRNA/House officer – who will continue to care for the patient following intubation and for the remainder of the operation
- Supervising Anesthesiologist
- Respiratory Therapist

The American Society of Anesthesiologists (ASA), Anesthesia Patient Safety Foundation (APSF), American Academy of Anesthesiologist Assistants (AAAA) and American Association of Nurse Anesthetists (AANA) have developed recommendations for personal protective equipment (PPE) usage for providers at increased risk of exposure during the COVID-19 pandemic [9]. Evolving understanding of the infectious nature of the COVID virus, incubation time, and potential for asymptomatic spread has solidified the recommendations that all providers involved in high risk encounters – namely aerosol generating procedures (AGP) – should utilize PPE appropriate for this encounter such as N95 and faceshield or Powered Air Purifying Respirators (PAPRs) for all patients when working near the airway [10,11].

Subsequently, perioperative leadership at our institution sought to optimize our protection of providers while also decreasing our utilization of disposable PPE using engineering controls, administrative controls and defined PPE controls. Despite the postponement of elective procedures, healthcare facilities continue to perform a number of urgent or emergent operative cases with associated AGP — namely intubation and extubation. Due to current constraints associated with COVID-19 testing, many of these patients present with unknown COVID-19 status. Our department sought to establish guidelines to mitigate risk associated with high risk AGP in this COVID-19 uncertain population using engineering, administrative and PPE controls in the perioperative area.

Workflow for intubation of COVID-19 uncertain patient undergoing a non-high-risk procedure:

Identification of cases: The Clinical Director (CD) identifies all asymptomatic patients undergoing non-high risk procedures who have not had COVID-19 testing, unknown COVID-19 status. These patients will require utilization of an intubation team. Operating room (OR) case starts are staggered 30 min to ensure intubation teams' availability for all COVID-19 unknown cases with AGP associated with these cases.

Pre Airway Huddle: Prior to airway intervention, the anesthesiologist intubating partner will confer with the anesthesia team (supervising anesthesiologist and OR laryngoscopist) to identify any potential issues related to airway management.

Ingress to OR: Patient arrives in operating room and standard monitors are placed. All members of OR team in standard OR attire (surgical masks and eyewear). In the hallway outside the OR, the anesthesiologist intubating partner dons PAPR, gown and double gloves with RT as donning partner and then enters OR. The laryngoscopist then similarly dons PAPR in hallway with RT and returns to OR. At this time, prior to any airway manipulation or escalation of O2 delivery, all members of the OR team other than the anesthesiologist intubation partner and laryngoscopist depart the OR.

Intubation: Preoxygenation begins and novel intubation box is placed to create a second barrier protection (Figs. 1 and 2). Rapid sequence induction (RSI) with video laryngoscopy is universally employed to minimize likelihood of aerosolization, unless there are absolute contraindications to RSI. Following visual confirmation of successful intubation, the laryngoscopist removes outer gloves to avoid anesthesia workstation contamination. Successful intubation is then further confirmed by the presence of end-tidal carbon dioxide (ETCO2). Laryngoscopist then secures the endotracheal tube (ETT) and team begins decontamination phase.

Decontamination: Following consultation with our hospital

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Fig. 1. Adult mannequin being intubated with Intubation Shield and video laryngoscopy.

Fig. 2. Pediatric mannequin being intubated with Pediatric Intubation Shield and video laryngoscopy.

infection control team, it was determined that a period of 15 min is necessary following AGP for the air turnover within a standard OR. During this time, the intubation team continues to be the only individuals allowed in OR with the patient. The team wipes down all surfaces at risk for potential contamination including novel intubation box, video laryngoscope, wires, cords etc. After 15 min, the intubation team begins the doffing process by wiping all door handles and each other's PAPR using antiviral wipes. Intubation team then doffs gowns and gloves. At this time, the remainder of OR team enters the OR. Respiratory therapist then wipes down both intubation team members PAPR a second time and helps doff the laryngoscopist's PAPR. Laryngoscopist, in standard surgical mask and attire, continues to care for patient in OR.

Team transition to next OR: The anesthesiologist intubation partner does not doff PAPR after first intubation, but proceeds directly to the next OR in cue for team intubation where he dons a new gown and double gloves. Ideally, the laryngoscopist for this room is already appropriately donned in PAPR and all OR personnel are prepared to depart OR, and intubation process proceeds.

Extubation: Laryngoscopist in OR with patient notifies CD when procedure is near completion. The CD coordinates with one of the Anesthesiologist Intubating Partners to prepare for extubation. The Anesthesiologist Intubating Partner and the Laryngoscopist again fully don PAPR, gowns and double gloves with the help of RT. The OR is cleared all other personnel and the team proceeds with extubation, followed by another 15 minute period for OR air turnover. During this time, the laryngoscopist continues to care for the patient while the Anesthesiologist intubating partner wipes down all equipment and is

available for assistance in patient care.

The goal of structuring the OR workflow in this manner is to optimize provider safety while ensuring good stewardship of finite disposable PPE. By implementing this process at our institution, perioperative services have seen a dramatic decrease in N-95 mask and face shield utilization. This resulted in a decrease usage of 600 N95 masks over the initial two-day period, allowing these vital resources to be deployed in other high-risk units within the hospital. Additionally, the consistent management of perioperative intubations has helped alleviate provider angst, and set expectations for patient throughput in the OR.

Utilization of the Intubation Team strategy incorporates designed inefficiencies such as staggered operating room starts, sometimes delays in emergence from general anesthesia, and is counterintuitive to our typical efforts aimed at increasing perioperative efficiency. However, during this time of uncertainty, it is clearly rational to err on the side of safety in order to minimize the likelihood of viral spread and to keep our vital health care work force intact [12].

We recognize that our department was fortunate to gain access to reusable PAPR that we could utilize in this fashion.

Declaration of competing interest

All authors listed have participated in the preparation of this manuscript. They have all participated in the production of the Intubation Team, that this article is written about.

Every author has no financial conflicts of interest with anything mentioned in this manuscript.

Due to social distancing, please accept each of this electronic signatures as authentic. The senior author has published multiple times with this prestigious Journal of Clinical Anesthesia, so accepts these as truth.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclinane.2020.109930.

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