

One Size Does Not Fit All: How to Rapidly Deploy Intubation Practice Changes in a Pediatric Hospital During the Coronavirus Disease 2019 Pandemic

To the Editor

In the time of an airborne pandemic, institutions must adapt and launch innovative strategies to keep patients and staff safe. This is challenging given the novelty of coronavirus disease 2019 (COVID-19), threat of dwindling hospital supplies, and limited knowledge of new airway management recommendations—all with the added barrier of social distancing. Anesthesiologists are uniquely positioned to create and implement strategies for safe airway management of patients with COVID-19 to minimize exposure to aerosolization.¹

To address these issues, we worked with a multidisciplinary team consisting of anesthesiologists, intensivists, emergency medicine faculty, otolaryngologists, nurses, and respiratory therapists. Our goal was to create safe, standardized processes to implement current recommendations³ for airway management of COVID unknown or positive patients throughout the hospital. While innovations such as the COVID Kit⁴ are necessary, we focused on a system able to adapt to the nuances of significantly varying environments ranging from the radiology induction area to the neonatal intensive care unit (ICU). We created our guidelines with the intention of hospital-wide generalizability as well as for the wide range of ages served by our pediatric institution.

To accomplish these goals, our multidisciplinary team held daily video conferences to implement recommended airway management practices.⁵ We focused on uniform availability of video laryngoscopes, in-line suction catheters, and high-efficiency particulate absorbing (HEPA) filters across the hospital. In addition, we created and distributed “COVID Packs” containing a novel plastic drape barrier system for airway management.⁶

We also created original checklists and job aids with recommendations for required personnel and supplies to minimize staff exposure as well as waste. We conducted several simulated intubations in the operating room (OR), emergency department (ED), and ICU. These simulations helped us to prepare⁵ for the surge of COVID-positive patients and to create

a space for problem solving and innovation and, in both cases, incorporating each locations’ needs, capabilities, and limitations.

Our guideline (Figure) for airway management of COVID positive or unknown patients includes a job aide for OR set up, a preintubation checklist, and a stepwise intubation sequence incorporating use of a novel plastic barrier drape system.⁶ These tools are currently being adapted for intubations outside the OR at our hospital.

The job aide (Figure A) emphasizes the need for appropriate personal protective equipment and delineates which supplies should be brought into the room versus kept immediately available outside with images to standardize equipment setup. It defines specific roles during intubation such as intubator, assistant to intubator, and medication administrator who are allocated to “dirty” and “clean” tasks. These tools are also being adapted for intubations in the ED and ICU.

We designed our preintubation checklist for COVID positive or unknown patients with a verbal challenge-response format to ensure availability of essential intubating equipment (Figure B). Our intubation sequence (Figure C) incorporates American Society of Anesthesiologists (ASA) recommendations³ for rapid sequence induction, video laryngoscopy, inline suction, HEPA filtration, and disposable covers for containment of aerosolization.⁶

Multidisciplinary simulation sessions highlighted several considerations surrounding the use of devices such as HEPA filters and inline suction catheters. These devices should ideally be connected to the oxygen delivery device before intubation to minimize future circuit disconnects. The team reviewed details regarding HEPA filter deadspace (important for neonates), filter lifespan in an intubated patient, and potential scarcity before implementation. Additional information about in-line suction catheters (eg, deadspace and sizing to the endotracheal tube) was gleaned and staff education was disseminated in these sessions. Simulations of intubations and transfers to the ventilator using these devices demonstrated the importance of the sequence of these attachments relative to the endotracheal tube and reduction of prefilter disconnections.

Deployment of recommended practice changes and education of staff about best use of new devices are challenging in the context of social distancing. In lieu of typical large group simulations or departmental meetings, we streamed and recorded simulated intubations incorporating these new recommendations³; these were followed by real-time question and answer sessions. These sessions included explanation of the job

Funding: Institution support in simulator use, airway equipment use.

A full list of contributors can be found at the end of the article.

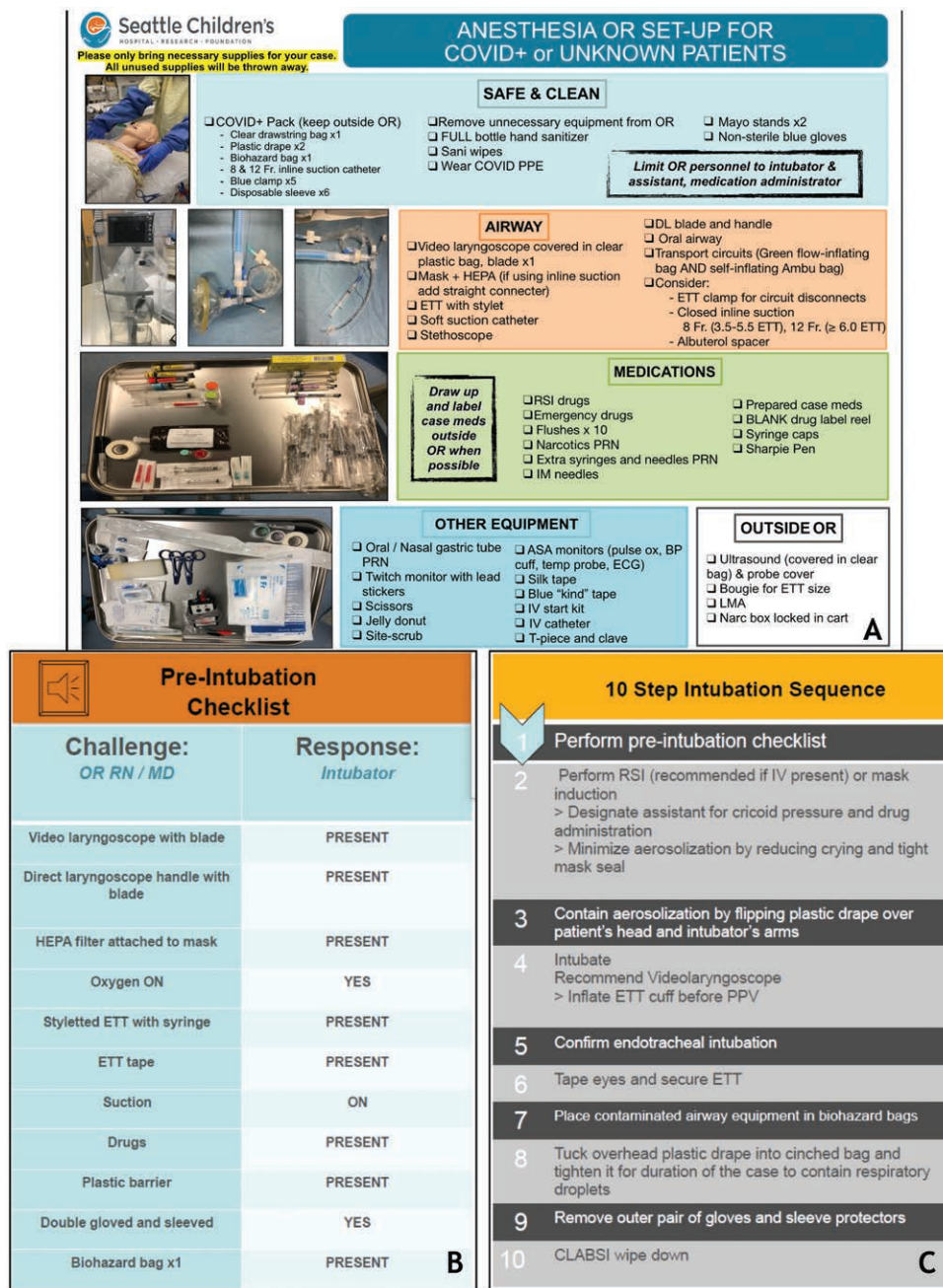


Figure. Guidelines for OR intubation of a COVID positive or unknown patient. A, Job Aide for OR Anesthesia Equipment Set-up for a strict isolation patient. B, Preintubation challenge-response checklist ensures essential intubating equipment is available before bringing patient to OR. C, Intubation sequence incorporates ASA recommendations³ for safely intubating a COVID positive or unknown patient. ASA indicates American Society of Anesthesiologists; BP, xxx; CLABSI, xxx; COVID, coronavirus disease; DL, xxx; ECG, xxx; ETT, xxx; HEPA, high-efficiency particulate absorbing; IM, xxx; IV, xxx; LMA, xxx; MD, xxx; OR, operating room; PPE, xxx; PPV, xxx; PRN, xxx; RN, xxx; RSI, xxx.

aides, details of airway set up involving an in-line suction catheter and HEPA filter, demonstration of a rapid sequence induction utilizing a plastic drape barrier system, and methods to minimize circuit disconnections. Smaller-scale, simulated intubation sessions were held in multiple locations throughout the hospital.

We are currently implementing the above-mentioned guidelines and devices with the help of a multidisciplinary team and ongoing video

demonstrations and simulations. The particular challenges of an airborne pandemic and requisite social distancing forced us to modify not only our practice of airway management but how we test and deploy new and dynamic guidelines. Our goal is to share these experiences and resultant novel resources so that they may benefit other institutions in helping keep patients and staff safe in current and future pandemics.

Sarah Brown, MD
Shilpa Verma, MBBS
Alexa Lean, MD
Fiona Patrao, MBBS

*Department of Anesthesiology & Pain Medicine
Seattle Children's Hospital
University of Washington
sarah.brown@seattlechildrens.org*

CONTRIBUTORS

Collaborators: Joan S. Roberts, MD (Pediatric Critical Care) and Jennifer R. Reid (Pediatric Emergency Medicine).

REFERENCES

1. Liu Y, Yan L, Wan L, et al. Viral dynamics in mild and severe cases of COVID-19. *Lancet Infect Dis*. 2020. Epub ahead of print.

2. Coronavirus Disease 2019 (COVID-19). Centers of Disease Control and Prevention. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assessmenthpc.html>. Accessed March 28, 2020.
3. COVID-19: Information for Health Care Professionals. American Society of Anesthesiologists. Available at: <https://www.asahq.org/about-asa/governance-and-committees/asa-committees/committee-on-occupational-health/coronavirus>. Accessed March 28, 2020.
4. Lopez R, Anthony A, Zuo L, Enomoto T, Aziz M. Your COVID-19 Intubation Kit: the multidisciplinary use of simulations to prepare for out-of-operating room COVID intubations. *Anesth Analg*. 2020.
5. Abrahamson SD, Canzian S, Brunet F. Using simulation for training and to change protocol during the outbreak of severe acute respiratory syndrome. *Crit Care*. 2006;10:R3.
6. Brown S, Patrao F, Verma S, et al. Barrier system for airway management of COVID-19 patients. *Anesth Analg*. 2020.

DOI: 10.1213/ANE.0000000000004907