



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Ethics in Emergency Medicine

The Ethics of Procedural Education Under Pandemic Conditions

Joshua W. Joseph, MD, MS, MBE,^{*,†} Leslie A. Bilello, MD,^{*,†} Alden M. Landry, MD, MPH,^{*,†}
Mary C. O'Brien, MD,^{‡,§} and Kenneth D. Marshall, MD, MA^{||,¶}

^{*}Department of Emergency Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts, [†]Harvard Medical School, Boston, Massachusetts, [‡]Department of Emergency Medicine, Wake Forest Baptist Medical Center, Winston-Salem, North Carolina, [§]Wake Forest School of Medicine, Winston-Salem, North Carolina, ^{||}Department of Emergency Medicine, University of Kansas Health System, Kansas City, Kansas, and [¶]University of Kansas Medical School, Kansas City, Kansas
Corresponding author.

Abstract— Background: The COVID-19 pandemic significantly disrupted emergency medicine residents' education. Early in the pandemic, many facilities lacked adequate personal protective equipment (PPE), and intubation was considered particularly high risk for transmission to physicians, leading hospitals to limit the number of individuals present during the procedure. This posed difficulties for residents and academic faculty, as opportunities to perform endotracheal intubation during residency are limited, but patients with COVID-19 requiring intubation are unstable and have difficult airways. **Case Scenario:** When PPE is being rationed, who should be the one to perform an intubation on a patient with respiratory failure from severe COVID-19? **Discussion:** We examined this case scenario using the ethical frameworks of bioethical principles and virtue ethics. Bioethical principles include justice, beneficence, nonmaleficence, and autonomy, and virtue ethics emphasizes the provision of moral exemplars and opportunities to exercise practical wisdom. Arguments for an attending-only strategy include the role of the attending as a truly autonomous decision maker and the importance of providing residents with a moral exemplar. A resident-only strategy benefits a resident's future patients and provides opportunities for residents to exercise character. Strategies preserving the dyad of attending and resident maintain these advantages and mitigate some drawbacks, while intubation teams may provide the most parsimonious use of PPE, but may elide resident involvement. **Conclusions:** There exist compelling motivations for involving senior residents and

attending in high-risk intubations during the COVID-19 pandemic. A just strategy will preserve residents' role whenever possible, while maximizing supervision and providing alternative routes for intubation practice. © 2022 Elsevier Inc. All rights reserved.

Keywords—COVID-19; intubation; emergency medicine; personal protective equipment; bioethics; virtue ethics

Introduction

The COVID-19 pandemic resulted in a significant disruption throughout undergraduate and graduate medical education, particularly within emergency departments (EDs). Beginning in the initial wave of the pandemic during the spring of 2020, many emergency medicine student clerkships were cancelled completely by virtue of medical schools cancelling all clinical rotations and in-person teaching for the duration of the pandemic (1,2). However, academic EDs, as well as community-hospital EDs that host resident physicians, were left with a significant ethical and practical problem: To what extent should the risks involved in caring for critically ill patients during a pandemic impact resident physicians' clinical responsibilities?

This might now seem to be a question of historical rather than practical interest. Our perception of the risks

associated with COVID-19 have changed dramatically since the advent of the pandemic. Compared with early 2020, we better understand the risks of transmissibility, personal protective equipment (PPE) is more widely available, and progress in vaccination has significantly changed the dynamics of the pandemic (3). Together, this would suggest that the risks faced by resident physicians in the current pandemic, although still concerning, are mitigable with adequate planning and resources.

However, significant risks remain. Although many attending and resident physicians received priority vaccination for COVID-19 and now are eligible for booster doses, physicians with contraindications to vaccination remain at risk. The advent of more contagious and potentially more lethal variants of COVID-19, including those with vaccine-escape mutations, has proven a recurrent issue, as vaccination remains broadly unequal on a global scale (4,5). Supply chain issues and local demands may also lead to acute shortages of PPE. Finally, continued globalization, climate change, and encroachment on animal habitats together continue to raise the risk of future pandemics, ensuring an enduring need for ethical principles to guide resident physicians' responsibilities under these conditions.

Several principles govern the needs and responsibilities of resident physicians, which we will describe in detail. We believe that the importance of residents' duties to patients, both those currently under their care and those in the future who will be dependent on their training, remains the primary consideration in determining residents' responsibilities. However, because residents are trainees and necessarily in a subordinate role, residency programs and hospitals that host resident physicians have a duty to protect them from undue risks, and may need to provide alternative opportunities, particularly for skills-based training, when risk reduction for residents limits their training experiences.

Case Scenario

Early in the COVID-19 pandemic, many EDs in the United States lacked adequate PPE, and the risks of intubating patients presenting with severe COVID-19 infections were unknown but suspected to be extremely high, based on case reports and data from the earlier SARS pandemic (6,7). Compounding this, intubations of patients with severe COVID-19 infections are classified as both physiologically and technically difficult airways. This is due to a variety of factors, including impaired respiratory mechanics complicating preoxygenation, infection risks from using positive pressure ventilation as a bridge to intubation, and airway edema. Many authorities recommend that the most experienced proceduralist

make the initial attempt, with additional assistance available for backup methods of ventilation (i.e., laryngeal mask airway) (8,9). This created a difficult question: in an academic medical center with scarce PPE, who should perform the intubation, and who should be in the room?

Discussion

Proposal 1: Have the Attending Perform the Intubation Without Residents

There are several compelling reasons why, under exigent circumstances, an attending emergency physician within an academic program should be the primary laryngoscopist. Practically, by virtue of having graduated from a residency training program, an attending physician should be more experienced at the procedure of intubation than residents who are still in training. The rates of intubations performed by attending physicians within academic training programs may vary considerably based on the average acuity of their practice site, the proportion of clinical shifts they perform outside the academic setting, and their attendance of workshops dedicated to skill-building and refinement. However, what some attendings may lack in muscle memory, they are likely to make up for in terms of experience with the mechanics and strategy of intubation, such as knowing when to halt an attempt and when to transition to a backup or failed airway strategy (10–12).

From the standpoint of bioethical principles, the case for the attending physician to intubate is also straightforward. As the definitive clinical decision maker, the attending physician has the greatest autonomy in deciding to intubate the patient and can fully accept the potential risks caused by performing the intubation (13,14). The attending has the greatest autonomy in choosing their working conditions and the patients for whom they care. Conversely, the resident's presence is prescribed, as they are contractually obligated to their residency (and cannot practice independently), and they have little to no agency in choosing when they work and under whom (15,16).

That the senior resident (and any junior residents) should not be within the room can be understood under the principles of nonmaleficence and justice. Although it is important that residents receive as many exposures to intubation as possible (even if they are not the ones performing the procedure), the benefit of observing any single instance of the procedure is limited. If performing the procedure entails risks that outweigh their performance of the procedure, *a fortiori*, residents should not take undue risks merely to observe intubation. Likewise, in the setting of scarce PPE, the small benefit of observing the procedure is unlikely to justify the increased utilization of limited resources (17).

Finally, with respect to virtue ethics, the essential place of the moral exemplar suggests that the attending should be doing the procedure and taking the risks of infection upon themselves and themselves alone. Doing so sets a positive example for residents who might already be disqualified from performing the procedure based on their inexperience. In this scenario, the attending demonstrates through their actions the importance of being willing to sacrifice a measure of personal safety on behalf of the patient, a voluntary but necessary effacement of self-interest that an emergency physician would be expected to take upon themselves once they had finished their training (18,19). Notably, this obligation does not hold in the case when adequate PPE is completely unavailable, as the risks to both the attending physician and to those around her might outweigh the benefit to the individual patient (20).

Proposal 2: Let the Senior Resident Perform the Intubation Alone

From a pragmatic standpoint, at many academic medical centers, senior residents (i.e., postgraduate years 3/4) are the most facile laryngoscopists in the ED, thanks in part to the fact that many of them will have had the benefit of ED intubations under the supervision of multiple attending physicians, as well as significantly more recent experience as primary laryngoscopists compared with academic attending physicians. Although some attending physicians who spend a significant portion of time in community practice may be extremely capable laryngoscopists, the same cannot be said for academic faculty uniformly (21). Some older attendings may also be at increased risk of mortality from infection by virtue of their age.

Ethically, it is important to observe that although residents are trainees, they are physicians with concrete responsibilities for patient care. Within academic health care systems, resident physicians form a core component of the clinical workforce. Without residents, many EDs could not function under regular operating constraints, and even less so during the added stresses of a pandemic (22). Although there exist a range of attitudes on where the balance should be between the volume of work residents undertake on clinical shifts, relative to the amount of direct clinical teaching they receive, much of residency training is experiential, and the act of patient care entails gaining clinical experience (23,24).

Losing the opportunity to intubate in the clinical setting would abrogate the ethical principles of justice and beneficence by disadvantaging senior residents' future patients and short-changing residents the education they earn by working at an academic site. Although the circumstances of the pandemic may have sapped many educational opportunities for residents (reduced ED patient

volumes among the contributing factors), extending residency training to "make up" for opportunities lost by trainees would be a practical and moral quagmire. Thus, it is imperative that residents not be excluded from the already constrained opportunities to practice intubation available during the pandemic.

Losing out on opportunities to intubate patients during the pandemic could also rob residents of opportunities to build moral character. The development of practical reason and dispositions of character that undergird virtue require the development of perceptual and emotional capacities to reason in challenging settings (25,26). By telling residents that they are exempt from taking risks by virtue of having an attending physician be responsible instead, we provide them with a moral example, but implicitly train them to move away from, rather than toward, a patient in extremis when their own well-being is threatened. This attitude is antithetical to the virtues desirable in a member of our profession (27).

Proposal 3: The Attending and Senior Resident Together

Although including both an attending physician and senior resident in every intubation could markedly increase the "burn rate" of PPE, doing so effectively elides some the risk of the senior resident performing the procedure unsupervised, and completely avoids the potential experiential and educational loss experienced by the senior resident by preserving the attending-resident teaching dyad (28).

From an ethical perspective, preserving the attending-resident teaching dyad has multiple appealing features. From the standpoint of promoting justice and nonmaleficence, maintaining the presence of both the attending and senior resident ensures that the care provided to the patient is closest to prepandemic standards, avoiding the risks to the patient posed by an unsupervised trainee or an unpracticed attending. However, the ethical principle of beneficence is also best satisfied by this arrangement, as providing the senior resident with the best possible teaching ensures a continuity of benefit toward the senior resident's future patients. Finally, from a virtue ethics perspective, the dyad provides the resident with an exemplar, but also with the opportunity to exercise practical wisdom by accepting risk in the act of treating the patient.

Proposal 4: A Dedicated Intubation Team

During the height of the first wave of the pandemic within the United States, a number of hospitals instituted dedicated intubation teams. This had the appeal of limiting the number of potentially exposed individuals, while maximally preserving PPE—a dedicated team could use a single powered air-purifying respirator for each member

for an entire shift. It also had the added benefit of reducing the potential exposure risk to clinicians from donning and doffing less comprehensive PPE between procedures (29). Likewise, physicians with existing comorbidities could avoid the need for a last-minute opt-out by not volunteering for such teams in the first place.

For institutions rationing PPE, the practical calculus of using such teams was clear, as is the principle of non-maleficence by exposing fewer clinicians to the virus. However, without the participation of emergency physicians, particularly senior residents, the potential educational hazards posed by these teams are also clear. From the standpoint of virtue ethics, this risks inadvertently teaching residents that it is someone else's responsibility to intubate the patient—which is quite the opposite of the response residents will need to exercise once in independent practice. Although the impetus for creating these teams may have been outside of the control of many EDs, the responsibility of advocating for the inclusion of senior emergency medicine residents lies squarely within the responsibility of emergency residency programs. Finally, allowing such teams to exclude emergency physicians tacitly repudiates several generations of emergency physicians' efforts to establish our field's expertise in the practice.

Recommendations

There is no single best strategy for residency programs facing this scenario. As with many dilemmas within clinical ethics, context matters significantly, and the resources and needs of some programs may make some strategies more tenable than others. Yet, there is a need for all residency programs to have clear plans to address this scenario, as there remains a significant threat from new variants of COVID-19, and the likelihood of similar pandemics continues to increase. From this ethical analysis, several practical lessons can be drawn for any residency in creating a pandemic intubation plan.

Senior residents need adequate opportunity to practice intubation for their training as well as for the sake of their future patients. Ideally, senior residents will either continue to perform intubations under attending supervision, whether with their emergency medicine attending in a traditional dyad format, or as part of a dedicated intubation team. In cases when this is not feasible, additional effort should be made to help find opportunities for residents to practice, whether in the operating room, simulation, or less-traditional settings, such as the cadaver laboratory or a postgraduate airway course. For junior residents whose need for intubation experience is less urgent to their independent practice, but still important, these alternative venues should be pursued aggressively and proactively. This will ensure that opportunities lost during the pan-

dem are compensated, and that they are as prepared as possible going forward.

Attending physicians supervising residents should be prepared to intubate their patients alone when exposure remains a high risk. Although there may be technological workarounds, such as videolaryngoscopy, which can practically allow an attending to supervise a resident volunteering to perform an intubation alone, the responsibility for intubating the patient should not default to the senior resident because of an attending physician's skill atrophy. Accordingly, academic departments have a responsibility to help attendings maintain their skills through similar opportunities to those provided to residents outside of the ED setting.

Conclusions

Ultimately, residency programs need to have open dialogue with their residents and faculty about the rationale behind their policies and outline clear plans to help residents attain excellent procedural skills. Although this case scenario addresses intubation, which is the highest-risk procedure for both patients and clinicians during the pandemic, the same principles may apply to other procedures. Inevitably, the loss of opportunities for residents to train in skills that are essential to the practice of emergency medicine, and often intertwined with the identity of practicing emergency physicians, adds to the potential for moral injury among residents during the ongoing pandemic. Our residents have continued to work under unusually stressful conditions throughout the pandemic, and should not be made to feel that, in exchange for their forbearance, they have been short-changed the opportunity to build their essential skills as well.

References

1. Theoret C, Ming X. Our education, our concerns: The impact on medical student education of COVID-19. *Med Educ* 2020;54:591–592.
2. Katirji L, Smith L, Pelletier-Bui A, et al. Addressing challenges in obtaining emergency medicine away rotations and standardized letters of evaluation due to COVID-19 pandemic. *West J Emerg Med* 2020;21:538.
3. Lipsitch M, Kahn R. Interpreting vaccine efficacy trial results for infection and transmission. *Vaccine* 2021;39:4082–8.
4. Twohig KA, Nyberg T, Zaidi A, et al. Hospital admission and emergency care attendance risk for SARS-CoV-2 delta (B. 1.617. 2) compared with alpha (B. 1.1. 7) variants of concern: a cohort study. *Lancet Infect Dis Lancet Infect Dis* 2022;22:35–42.
5. Tatar M, Shoorekchali JM, Faraji MR, et al. International COVID-19 vaccine inequality amid the pandemic: perpetuating a global crisis? *J Glob Health* 2021;11:03086.
6. Fowler RA, Guest CB, Lapinsky SE, et al. Transmission of severe acute respiratory syndrome during intubation and mechanical ventilation. *Am J Respir Crit Care Med* 2004;169:1198–202.

7. Raboud J, Shigayeva A, McGeer A, et al. Risk factors for SARS transmission from patients requiring intubation: a multicentre investigation in Toronto, Canada. *PLoS One* 2010;5(5):e10717.
8. McGrath BA, Wallace S, Goswamy J. Laryngeal oedema associated with COVID-19 complicating airway management. *Anaesthesia* 2020;75:972.
9. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-n-CoV) patients. *Can J Anaesth* 2020;67:568–76.
10. Gillett B, Saloum D, Aghera A, et al. Skill proficiency is predicted by intubation frequency of emergency medicine attending physicians. *West J Emerg Med* 2019;20:601–9.
11. Clyne B, Barber-Doucet H, Brown L, et al. Maintaining procedural skills for academic emergency medicine faculty: a needs assessment. *AEM Educ Train* 2021;5(4):e10648.
12. Bell E, Fischer MA, Sinatro H. Procedural competency in academic emergency medicine attending physicians: how is competency maintained and evaluated by academic institutions in the US? *Cureus* 2021;13(7):e16719.
13. Childress JF. The place of autonomy in bioethics. *Hastings Cent Rep* 1990;20:12–17.
14. McAndrew S. Internal morality of medicine and physician autonomy. *J Med Ethics* 2019;45:198–203.
15. Hashimoto DA, Bynum WE, Lillemoe KD, et al. See more, do more, teach more: surgical resident autonomy and the transition to independent practice. *Acad Med* 2016;91:757–60.
16. Allen M, Gawad N, Park L, et al. The educational role of autonomy in medical training: a scoping review. *J Surg Res* 2019;240:1–6.
17. Yorio PL, Fisher EM, Kilinc-Balci FS, et al. Planning for epidemics and pandemics: assessing the potential impact of extended use and reuse strategies on respirator usage rates to support supply-and-demand planning efforts. *J Int Soc Respir Prot* 2020;37(1):52.
18. Pellegrino ED. Toward a virtue-based normative ethics for the health professions. *Kennedy Inst Ethics J* 1995;5:253–77.
19. Perkins J, Hamilton M, Canniff C, et al. Resuscitation during the pandemic: Optional obligation? or supererogation? [published online ahead of print July 30, 2020]. *Clin Ethics* 2022. doi:10.1177/1477750920946684.
20. Sokol DK. Virulent epidemics and scope of healthcare workers' duty of care. *Emerg Infect Dis* 2006;12:1238–41.
21. Carlson JN, Zocchi M, Marsh K, et al. Procedural experience with intubation: results from a national emergency medicine group. *Ann Emerg Med* 2019;74:786–94.
22. Vinton D, Sanchez LD. Management of the academic emergency department. *Emerg Med Clin North Am* 2020;38:715–27.
23. Joseph JW, Henning DJ, Strouse CS, et al. Modeling hourly resident productivity in the emergency department. *Ann Emerg Med* 2017;70:185–90.
24. Joseph JW, Chiu DT, Wong ML, et al. Experience within the emergency department and improved productivity for first-year residents in emergency medicine and other specialties. *West J Emerg Med* 2018;19:128.
25. McDowell J. Virtue and reason. *Monist* 1979;62:331–50.
26. Hofman B. Medicine as practical wisdom (phronesis). *Poiesis Prax* 2002;1:135–49.
27. Pellegrino ED, Thomasma DC. *The Virtues in Medical Practice*. Oxford University Press; 1993. p. 36–7.
28. Volz S, Stevens TP, Dadiz R. A randomized controlled trial: does coaching using video during direct laryngoscopy improve residents' success in neonatal intubations? *J Perinatol* 2018;38:1074–80.
29. Ahmad I, Jeyarajah J, Nair G, et al. A prospective, observational, cohort study of airway management of patients with COVID-19 by specialist tracheal intubation teams. *Can J Anaesth* 2021;68:196–203.