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SPECIAL FEATURE

Organ Donation: Perspective for the Intensivist

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Dr. Chen reports no financial relationships relevant to this field of study.

She was 21 years old, and the first in her family to go to college. She had asthma that was generally well controlled. That day, she had been exposed to an extra amount of dust as she helped her friends pack up for their move. She went home and started wheezing. She reached for her albuterol inhaler and pumped, and pumped, but nothing came out. The inhaler was broken; her neighbor's dog had chewed it. She called for help. The neighbor called 911, and an ambulance came quickly. But it was too late. By the time she arrived at the hospital, there was irreversible brain damage. Over the next few days, it became clear that she had died. Her family agreed that she would want to be an organ donor, and she was able to donate her kidneys, liver, pancreas, lungs, and heart. This is the case of a patient I cared for, only one of the myriad heartbreaking yet inspiring stories of organ donors, many of which can be found on donation and transplantation websites.

BACKGROUND

Organ transplants are amazing and lifesaving treatments. In 2018 in the United States, 36,528 organ transplants were performed. This number has been increasing steadily, and more than 750,000 transplants have taken place since 1988. However, 6,140 people died in 2018 while awaiting a transplant, and more than 113,000 people currently are awaiting transplant; this number has been increasing at a much more rapid rate than the number of donors and transplants.

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[INSIDE]

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Organ donors may be living or deceased. In 2018, organs were recovered from 17,568 donors, of which 10,721 were deceased donors and 6,847 were living donors. Of the deceased donors, 8,589 donations occurred after neurologic death and 2,132 occurred after cardiac death.[1] Deceased organ donors have the potential to donate kidneys, liver, lungs, heart, pancreas, and intestines, in addition to corneas and tissues. Since 2005, hands and faces have been transplanted in complex surgeries called vascularized composite allograft (VCA) transplants that include grafting of bone, muscle, nerve, skin, and blood vessels. 2 Approximately 58% of adults in the United States are registered as organ donors on state registries,[3] up from 46% in 2010.[4]

The first successful solid organ transplant was a kidney transplant that took place in Boston in 1954. This transplant was followed by successful liver, heart, and pancreas transplants in the 1960s, and lung and intestine transplants in the 1980s. Laws and policies in the United States have evolved to support transplantation. In 1968, all 50 states adopted the Uniform Anatomical Gift Act (UAGA). It was the first national law passed to regulate transplantation; prior to that, the laws varied substantially from state to state. This was further strengthened in 1972, when uniform donor cards were recognized as legally binding in all 50 states.

In 1984, Congress passed the National Organ Transplant Act. This act called for an Organ Procurement and Transplantation Network to be created and run by a private, nonprofit organization under federal contract. The United Network for Organ Sharing (UNOS) was established and awarded the OPTN contract in 1986 by the U.S. Department of Health and Human Services; UNOS has held this contract continuously. Organ procurement organizations (OPOs) are regionally run nonprofit organizations that manage and coordinate the evaluation and procurement of deceased donor organs for transplant. Currently, the United States has 58 OPOs, all of which are certified by the Centers for Medicare and Medicaid Services, members of UNOS, and the Association of Organ Procurement Organizations. The OPO is the front-line contact with the hospital and the family of the potential donor and coordinates with the transplantation team.[2,5] In 2015, the Society of Critical Care Medicine, the American College of Chest Physicians, and the Association of Organ Procurement Organizations published a joint consensus statement with recommendations for the management of the potential organ donor.[3]

ORGAN DONORS IN THE INTENSIVE CARE UNIT

The ICU is important in the consideration of organ donation because all deceased donors enter the ICU at some point during treatment. Whether donation occurs after determination of death by neurologic or circulatory criteria, those patients are maintained on life support, including mechanical ventilation. The intensivist is of utmost importance, caring for the patients both before and after organ donation is considered, and collaborating with the OPO. In the setting of catastrophic brain injury, the intensivist's initial goal is to optimize cerebral perfusion. However, if restoring neurologic function is deemed impossible, the intensivist's goals shift to include maintaining hemodynamic stability, preparing the family for devastating news, counseling them on end-of-life issues, and preserving the option of organ donation.

In 2011, Singbartl et al from the University of Pittsburgh showed that an intensivist-led donor management program for all consented adult brain-dead patients led to a significant increase in the number of transplantable organs recovered, highlighting the importance of intensivist collaboration with the OPO.[6] In their retrospective analysis, in the one year before the program began, 66 of 210 potentially available organs from 35 decedents were recovered. These numbers increased to 113 of 258 potentially available organs from 43 decedents. The significant increases were seen in kidney and lung transplants, specifically, but because of the small number of donors, specific contributing factors could not be identified.

There are two methods for determining death prior to transplantation: by neurologic or circulatory criteria. Traditionally, the phrases and acronyms "donation after brain death" (DBD) and "donation after cardiac/circulatory death" (DCD) were used to describe donors. However, because there were many colloquial and lay misinterpretations of the phrase "brain dead," the newer terms "death by neurologic criteria" (DNC) and "neurologic determination of death" (NDD) are preferred by neurologists and intensivists. Neurologic determination of death has not been without controversy, and many physicians are not comfortable with the complex process of examination and testing. This is complicated further by variability in standards among practice sites and evolving criteria requiring physicians to keep up to date on the criteria.[7] Determination of death by neurologic criteria should adhere to the recommendations provided by the Quality Standards Subcommittee of the American Academy of Neurology, which were developed in 1995 and updated and revised in 2010.[8] They include a checklist for clinical examination, methods of ancillary testing (including cerebral angiography, electroencephalography, transcranial Doppler ultrasonography, and cerebral scintigraphy), and an apnea test. Despite these detailed recommendations, differences in the practice of NDD still exist, such as the number of physicians required, the type and need for confirmatory tests, and the performance of the apnea test that can vary by institution, and as well as among and within countries.

Deceased donors who have devastating clinical conditions but do not fulfill criteria for DNC may have the option for donation after withdrawal of life support. Donation after death by circulatory criteria (DCC) or circulatory determination of death (CDD) involves a separate and complex set of challenges. This pathway has the potential to recover kidneys, livers, pancreases, and even lungs and hearts for transplant. Transplant outcomes associated with CDD donors and NDD donors are similar overall, but may be more challenging, costly, and time-consuming with CDD donors.[3] For instance, kidney transplants have a higher prevalence of delayed graft function, and lung grafts may undergo a process of ex vivo "conditioning" between recovery and implantation to improve function. Many institutions have developed standardized protocols for this process, which includes transferring to an operating room and monitoring hemodynamic criteria, followed by withdrawal of life support. Generally, patients are monitored following withdrawal; if circulatory cessation occurs within 60 minutes, then organ procurement occurs. If death by circulatory criteria does not occur within 60 minutes, then the patient is returned to the ICU for further comfort measures.

Predicting the time to death in potential donors after CDD is crucial for selecting candidates. Many studies and tools have proposed various methods of assessing the prognosis after withdrawal of life support. A UNOS DCDD consensus committee developed and validated criteria for prediction of death within 60 minutes. Of the 533 patients studied, a total of 29%, 52%, 65%, and 82% of patients with zero, one, two, and three criteria, respectively, died within 60 minutes of life support withdrawal.[9] A Dutch study found that intensivist prediction of death within 60 and 120 minutes, independent of any prediction tools, had a sensitivity of 73% and 89%, with a specificity of 56% and 23%.[10] Guidelines recommend using scoring systems together with expert clinician judgment for the selection of appropriate candidates. Although there is no specific threshold recommendation for the number of successful cases, an increased number of unsuccessful cases must be acceptable to maximize the number of potential donors.

Interactions with families and the OPOs involve sensitivity and complex communication skills. Early notification of the OPO is essential and should be standardized as much as possible to provide all patients with equal opportunities for organ donation. Notification of brain death need not be separated from discussions of organ donation. However, while organ donation can be a consideration in end-of-life discussions, decisions for withdrawing life-sustaining therapies should be separate from decisions to donate organs.[11] As a result of the UAGA, first-person authorization provides sufficient grounds for organ procurement, and surrogates are prohibited from overriding such consent.[3]

In the absence of first-person authorization, OPO representatives or designated requestors collaborate with the healthcare team to request family or surrogate authorization for donation. Siminoff and colleagues demonstrated significantly higher conversion rates when the requesting personnel had substantial experience and interest in helping families navigate the organ donation process, when families had more contact with the OPO, and when efforts between the requestor and the primary clinical team were well coordinated.[12]

Potential donors with certain clinical conditions are less optimal candidates. For example, cancer transmission from donor to recipient has been documented. In one retrospective study of 296 donors who were found to have malignancy, researchers found that choriocarcinoma, melanoma, lung cancer, and renal cell carcinoma all had a high rate of transmission greater than 40%.[13] In contrast, in a 2007 UNOS database report, there were no cases of transmission of any tumor other than malignant melanoma, including breast, lung, ovarian, and colon cancers.[14] However, in this report, tumor stage was not provided, and many donors had been cancer-free for more than 10 years. Thus, transplanting any donor with melanoma is not recommended, but there are no absolute contraindications to organ donation from a cancer patient. However, the risk of transmission must be weighed against the risk of not receiving a transplant. Patients with active bacteremia, sepsis, and bacterial meningitis can be considered for donation, but delaying procurement to allow for at least 24-48 hours of appropriate antibiotics is recommended. Patients with an undiagnosed febrile illness, encephalitis, meningitis, or flaccid paralysis should not donate their organs because of reports of transmission of rabies virus and lymphocytic choriomeningitis virus that were discovered after recipients fell ill. HIV positive status is considered an absolute contraindication for donation to HIV-negative recipients. Seronegative patients at risk for HIV can be considered for donation after nucleic-amplification testing for HIV RNA, with an understanding that a small risk for occult infection still exists.[3]

Once DNC has been determined or donation after DCC is being considered, maintaining adequate perfusion of organs is important for optimizing the number of potentially transplantable organs. Hemodynamic alterations often accompany DNC. Volume resuscitation with isotonic crystalloid is recommended to maintain euvolemia.[3] Dopamine is the preferred first-line vasoactive agent in the pre-procurement period, because of its inotropic and vasopressor effects. Dopamine is associated with improved outcomes in kidney transplantation.[15,16] It is preferred over norepinephrine and phenylephrine because the alpha-agonism in these drugs predisposes to increased pulmonary capillary permeability, leading to increased pulmonary edema as well as coronary and mesenteric vasoconstriction. Vasopressin counteracts diabetes insipidus and improves organ recovery rates. Often it is used as the second-line, or even first-line, agent in hemodynamic management after DNC.[17]

CARE OF THE DONOR AND FAMILY AFTER THE DONATION ATTEMPT

For families, the organ donation process does not end after donation is authorized or even after organs are procured. For successful donations, the grieving family and friends need care. The OPO provides bereavement care and other support to the families of each donor and follows up with letters documenting the progress of organ recipients.[18] In DCDD cases, if death does not occur within 60 minutes, the patient returns to the ICU, and comfort care resumes. Hospice should be an available option for these patients, since survival can range from hours to days or even weeks.

Organ donation and its attempt can lead to significant benefits and challenges to the donor family. In 2007, Merchant and colleagues studied the post-donation psychological sequelae of organ donation. They surveyed Canadian donor families about their bereavement experience, including depression, post-traumatic stress, and the donation experience. Of 196 questionnaire packages mailed, 73 were returned. The authors found an overall positive impression from donor families about the donation process and that donation may have a beneficial effect on the bereavement process. Those who viewed the donation process positively and felt comforted by the donation process reported fewer symptoms of depression.[19] Conversely, attempted but unsuccessful donation after circulatory death can lead to harm.

Taylor and colleagues conducted face-to-face interviews with 15 family members who had direct experience with unsuccessful DCD.[20] They described a broad spectrum of harm associated with unsuccessful donation, including the waste of precious organs, a lost opportunity to honor their loved one, and an inability to harness comfort from donation to ease their grief. Family members also reported distress and disrupted bereavement as a result of unsuccessful donation, as well as difficulty understanding the difference between brain death and cardiac death. However, they felt that the harms were worth the benefits of trying to donate.

CONCLUSION

Organ donation and transplantation are important and lifesaving procedures. The processes have undergone significant clinical and legal evolution since the first successful organ transplants in the 1950s and 1960s, and demand for organs continues to outpace availability. The process involves collaboration from intensivists, neurologists, and OPOs, with both regional and national oversight. The complexities of management include determination of death, communication with families, pre-procurement optimization of potential donors, and bereavement support for families, especially after an unsuccessful donation attempt. ■

REFERENCES

1. Based on OPTN data. Available at: https://optn.transplant.hrsa.gov/data/view-data-reports/national-data/. Accessed Sept. 1, 2019.
2. U.S. Government Information on Organ Donation and Transplantation. Health Resources & Services Administration. Available at: www.organdonor.gov. Accessed Aug. 31, 2019.
3. Donate Life America web site. Available at: www.donatelife.net. Accessed Aug. 27, 2019.
4. Kotloff RM, Blosser S, Fulda GJ, et al. Management of the potential organ donor in the ICU: Society of Critical Care Medicine/American College of Chest Physicians/Association of Organ Procurement Organizations Consensus Statement. *Crit Care Med* 2015;43:1291-1325.
5. United Network for Organ Sharing. Available at: www.unos.org. Accessed Aug. 31, 3019.
6. Singbartl K, Murugan R, Kaynar AM, et al. Intensivist-led management of brain-dead donors is associated with an increase in organ recovery for transplantation. *Am J Transplant* 2011;11:1517-1521.
7. Braksick SA, Robinson CP, Gronseth GS, et al. Variability in reported physician practices for brain death determination. *Neurology* 2019;92:e888-e894.
8. Wijdicks EF, Varelas PN, Gronseth GS, Greer DM. Evidence-based guideline update: Determining brain death in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 2010;74:1911-1918.
9. DeVita MA, Brooks MM, Zawistowski C, et al. Donors after cardiac death: Validation of identification criteria (DVIC) study for predictors of rapid death. *Am J Transplant* 2008;8:432-441.
10. Wind J, Snoeijs MG, Brugman CA, et al. Prediction of time of death after withdrawal of life-sustaining treatment in potential donors after cardiac death. *Crit Care Med* 2012;40:766-769.
11. DuBois JM, DeVita M. Donation after cardiac death in the United States: How to move forward. *Crit Care Med* 2006;34:3045-3047.
12. Siminoff LA, Gordon N, Hewlett J, Arnold RM. Factors influencing families' consent for donation of solid organs for transplantation. *JAMA* 2001;286:71-77.
13. Buell JF, Beebe TM, Trofe J, et al. Donor transmitted malignancies. *Ann Transplant* 2004;9:53-56.
14. Kauffman HM, Cherikh WS, McBride MA, et al. Deceased donors with a past history of malignancy: An organ procurement and transplantation network/united network for organ sharing update. *Transplantation* 2007;84:272-274.
15. Schnuelle P, Gottmann U, Hoeger S, et al. Effects of donor pretreatment with dopamine on graft function after kidney transplantation: A randomized controlled trial. *JAMA* 2009;302:1067-1075.
16. Schnuelle P, Benck U, Yard BA. Dopamine in transplantation: Written off or comeback with novel indication? *Clin Transplant* 2018;32:e13292.
17. Plurad DS, Bricker S, Neville A, et al. Arginine vasopressin significantly increases the rate of successful organ procurement in potential donors. *Am J Surg* 2012;204:856-860.
18. Association of Organ Procurement Organizations. Available at: www.aopo.org. Accessed Sept. 1, 2019.
19. Merchant SJ, Yoshida EM, Lee TK, et al. Exploring the psychological effects of deceased organ donation on the families of the organ donors. *Clin Transplant* 2008;22:341-347.
20. Taylor LJ, Buffington A, Scalea JR, et al. Harms of unsuccessful donation after circulatory death: An exploratory study. *Am J Transplant* 2018;18:402-409.

ABSTRACT & COMMENTARY

Difficult Airway Intubation With Flexible Bronchoscope as a Guide

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Dr. Sharma reports no financial relationships relevant to this field of study.

SYNOPSIS: In this prospective study, use of a flexible bronchoscope as a flexible stylet and a Glidescope to provide visual guidance while intubating patients in the operating room was associated with shorter time to intubation than the use of Glidescope alone.

SOURCE: Mazzinari G, Rovira L, Henao L, et al. Effect of dynamic versus stylet-guided intubation on first-attempt success in difficult airways undergoing Glidescope laryngoscopy: A randomized controlled trial. *Anesth Analg* 2019;128:1264-1271.

In this prospective study, researchers randomized patients with a predicted difficult airway to either a Glidescope only (G-only) intubation or Glidescope and fiberoptic bronchoscope (G-FOB) group. Overall, 219 patients were evaluated for eligibility, with 160 patients randomized in 1:1 fashion. All patients were scheduled to undergo surgery and were intubated in the operating room. All patients provided written informed consent, after which randomization allocation was revealed. The investigators excluded patients who had mouth opening ≤ 2 cm, planned awake intubation, planned nasal intubation, or those who were ≤ 18 years of age. Difficult airways were assessed quantitatively and assigned an Arné score by a single investigator based on the following parameters:

1. Thyromental distance (< or ≥ 6.5 cm);
2. Prior history of difficult intubation (Yes/No);
3. Mallampati score;
4. Clinical symptoms of airway pathology (Yes/No);
5. Pathologies associated with difficult intubation (Yes/No);
6. Inter-incisor gap and mandible luxation;
7. Maximum range of the head and neck movement.

The Arné score[1] was developed as a guide to difficult airways in both the ear, nose, throat and general surgery populations. The criteria that determine the Arné score are instructive with respect to assessment of the airway for intubation difficulty. The score assigns most points to limited mouth opening/mandibular luxation (13 points for inter-incisor gap < 3.5 cm and mandibular luxation < 0), previous knowledge of difficult intubation (10 points), presence of pathologies associated with difficult intubation (5 points), and Mallampati Class IV airway (8 points).

An Arné score > 11 (out of maximum possible 48) or neck circumference to thyromental distance ratio > 4 cm or both were required to enter randomization procedures. The G-only group was intubated using a malleable stylet after the Glidescope had been used to obtain an acceptable view. For the G-FOB group, a two-step procedure was used. The first step was performed by an anesthesiologist and involved insertion of the Glidescope to obtain a view of the glottis. The second step involved handing off the Glidescope to an assistant, followed by using a flexible single-use bronchoscope loaded with an endotracheal tube to guide tube into the trachea. Visualization of the bronchoscope tip was performed using the Glidescope video display only. The bronchoscope was used solely to access the trachea across the vocal cords. Once the tip was safely across, the endotracheal tube loaded onto the bronchoscope was passed in over the scope.

All patients were preoxygenated using standard 100% nonrebreather masks; obese patients were preoxygenated using 100% oxygen and 10 cm H_2O continuous positive airway pressure. Neuromuscular blockade was used in all patients. End points for the study were as follows: 1) first-pass intubation success (primary endpoint); 2) time to successful intubation (time from Glidescope blade insertion to inflation of endotracheal cuff); 3) airway injury rate; 4) need for alternative rescue techniques.

The study is remarkable for the recruitment of patients with predicted difficult airways. In total, 97% of patients had a large neck circumference (cervical circumference/thyromental distance of > 4), and 65% had a Mallampati score of III or IV. Almost half of the patients had limited mouth opening (42%) or neck movement (43%). All patients recruited had at least two criteria associated with a difficult airway, and approximately one in 10 had a prior history of a difficult airway. At the onset of the procedure, both groups were matched for total Arné score and Arné score subgroups (as delineated earlier). Oxygen saturation at the onset of laryngoscopy was no different between the groups. The authors performed a logistic regression analysis to generate relative risk ratios for successful intubation at first attempt, with the Arné score subgroups and other variables (including age) as independent factors.

With respect to the primary end point, the G-FOB group was intubated successfully on the first attempt 91% of the time, compared to approximately 61% of the time in the G-only group. Most failures were due to a requirement for repeat laryngoscopy to obtain a better view of the glottis (94%), and the rest (6%) were due to desaturation to below 90%.

The median time to successful intubation was 50 seconds (interquartile range [IQR], 80 seconds) in the G-FOB group compared to 64 seconds (IQR, 24 seconds) in the G-only group. Logistic regression yielded a first-attempt tracheal intubation success relative risk of 3.7 (95% confidence interval [CI], 1.7-8.0) with the G-FOB technique. The airway injury rate was lower in the G-FOB group (1% vs. 10%), as was the need for alternative rescue techniques (4% vs. 24%), both statistically significant with $P < 0.035$.

■ COMMENTARY

Mazzinari et al studied patients who were being intubated in the controlled setting of an operating room and, for this reason, the results of this study cannot be extrapolated to the patient population in the medical intensive care units. Nevertheless, it is instructive to be aware of the techniques described here for use in the difficult airway setting in the medical intensive care unit. Severe complications are frequent in ICUs, regardless of operator type (anesthesiologist vs. non-anesthesiologist).[2,3] The "physiologically difficult airway"[4] is a more relevant descriptor of scenarios that an intensivist might encounter, and this study opens up a technique that has been described only in the operating room setting for consideration in difficult airway scenarios in the ICU.

The MACOCHA score[5] has been used to predict difficult airways in the intensive care unit, and it shares similarities to the Arné score described here, with elements receiving maximal scores being identical (Mallampati III or IV airway, reduced cervical spine mobility, limited mouth opening). The major differences between these two scores are the use of prior difficult airway (frequently difficult if not impossible to gauge in the intensive care unit) and the presence of clinical symptoms of airway pathology or pathologies associated with difficult intubation in the Arné score. Unfortunately, it may be difficult to determine the Mallampati score or other components of the MACOCHA score in the medical intensive care unit. In addition, the physiology of patients in the ICU is necessarily different from that of those in the operating room, and a high level of vigilance is necessary to ensure that every intubation is performed with a backup plan for a failed airway.

Options for difficult airway management in the intensive care unit include ketamine-assisted intubations[6] and awake fiberoptic bronchoscopy (FOB)-assisted intubations. Awake FOB intubations in the medical intensive care unit have been described and may be the preferred mode of intubation for critically ill patients at risk for hemodynamic collapse.[7] While expert anesthesiology assistance for intubation of difficult airways in the medical intensive care unit may be the standard of care in some institutions, intensivists experienced in the use of video laryngoscopes working in hospitals with limited support staff especially during off hours may find this technique useful. The major limitation with respect to the wide applicability of this study is that the use of disposable single-use bronchoscopes is not commonplace.

In conclusion, intensivists who regularly intubate patients using video laryngoscopes would benefit from reviewing the technique described here to consider it for use in a predicted difficult airway setting. While the technique described in this paper cannot be recommended yet for routine use in difficult airway management in the intensive care unit, it remains an important "backup" for a difficult airway scenario in the right clinical setting. ■

REFERENCES

1. Arne J, Descoins P, Fusciardi J, et al. Preoperative assessment for difficult intubation in general and ENT surgery: Predictive value of a clinical multivariate risk index. *Br J Anaesth* 1998;80:140-146.
2. Jaber S, Amraoui J, Lefrant JY, et al. Clinical practice and risk factors for immediate complications of endotracheal intubation in the intensive care unit: A prospective, multiple-center study. *Crit Care Med* 2006;34:2355-2361.
3. Griesdale DE, Bosma TL, Kurth T, et al. Complications of endotracheal intubation in the critically ill. *Intensive Care Med* 2008;34:1835-1842.
4. Mosier JM, Joshi R, Hypes C, et al. The physiologically difficult airway. *West J Emerg Med* 2015;16:1109-1117.
5. De Jong A, Molinari N, Terzi N, et al. Early identification of patients at risk for difficult intubation in the intensive care unit: Development and validation of the MACOCHA score in a multicenter cohort study. *Am J Respir Crit Care Med* 2013;187:832-839.
6. Merelman AH, Perlmutter MC, Strayer RJ. Alternatives to rapid sequence intubation: Contemporary airway management with ketamine. *West J Emerg Med* 2019;20:466-471.
7. Johannes J, Berlin DA, Patel P, et al. A technique of awake bronchoscopic endotracheal intubation for respiratory failure in patients with right heart failure and pulmonary hypertension. *Crit Care Med* 2017;45:e980-e984.

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CME/CE QUESTIONS

1. **Which of the following vasoactive agents is the preferred first-line vasopressor when used in the management of a potential organ donor?**
   a. Norepinephrine
   b. Phenylephrine
   c. Dopamine
   d. Dobutamine

2. **Which of the following statements is true about organ donation?**
   a. Most organs are recovered after death by circulatory criteria.
   b. A healthcare power of attorney can overturn a first-person consent for organ donation.
   c. Donation after death by circulatory criteria can occur only after a potential donor is monitored for 120 minutes after withdrawal of life support.
   d. Close collaboration between the intensivist and the organ procurement organization leads to increased donor conversion rates.

3. **In the study by Mazzinari et al, use of Glidescope plus fiberoptic bronchoscope as a stylet compared with Glidescope alone was associated with which of the following outcomes?**
   a. Longer time to intubation
   b. Greater first-pass success rate
   c. More airway injury
   d. Greater need for alternative airway technique

4. **Which of the following patients were excluded from the Mazzinari study?**
   a. Obese patients
   b. Patients with a large neck circumference
   c. Patients with a prior history of a difficult airway
   d. Patients with mouth opening of ≤ 2 cm

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Upon completion of this educational activity, participants should be able to:

- identify relevant topics in the practice of critical care medicine;
- utilize recommendations from current clinical guidelines; and
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