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A survey of physician attitudes toward decision-making authority for initiating and withdrawing VA-ECMO: Results and ethical implications for shared decision-making

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Abstract

Objective—In spite of the rise of patient autonomy and the promotion of shared decision-making as the preferred model for doctor-patient engagement, tensions still exist in clinical practice about where the primary locus of decision-making authority for complex, scarce, and resource intensive medical therapies ought to reside: with patients and their surrogate representatives, or with physicians. We assessed physicians' attitudes toward decisional authority for adult venoarterial extracorporeal membrane oxygenation (VA-ECMO), hypothesizing they would favor a medical locus.

Design, Setting, Participants—This is a cross-sectional survey of resident/fellow physicians and internal medicine attendings completed at an academic medical center from May to August 2013.

Measurements—A 24-item IRB-approved, Internet-based survey assessing physician respondent demographic characteristics, knowledge, and attitudes regarding decisional authority for adult VA-ECMO; qualitative narratives were also collected.

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Dr. Ellen C. Meltzer and Dr. Paul Christos had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Main Results—A total of 179 physicians completed the survey (15% response rate), 48% attendings/52% residents/fellows. Only 32% indicated that surrogate consent should be required to discontinue VA-ECMO; 56% felt that physicians should have the right to discontinue VA-ECMO over surrogate objection. Those who self-reported as "knowledgeable" about VA-ECMO, compared to those who did not, more frequently replied that there should not be presumed consent for VA-ECMO (47.6% vs 33.3%, p=0.007), that physicians should have the right to discontinue VA-ECMO over surrogate objection (76.2% vs 50%, p=0.02) and that, given its cost, VA-ECMO use should be restricted (81.0% vs 54.4%, p=0.005).

Conclusions—Surveyed physicians, especially those who self-report as knowledgeable about VA-ECMO and/or are speciliasts in pulmonary/critical care, favor a medical locus of decisional authority for VA-ECMO. VA-ECMO is complex, and the data may reflect physician hesitance to cede authority to presumably less knowledgeable patients and surrogates, may stem from a stewardship of resources perspective, and/or may point to practical efforts to avoid futility and utility disputes. Whether these results are indicative of a more widespread reversion to paternalism, or a more circumscribed usurping of decisional authority occasioned by VA-ECMO, necessitates further study.

Introduction

In spite of the rise of patient autonomy and the promotion of shared decision-making as the preferred model for doctor-patient engagement, tensions still exist in clinical practice about where the primary locus of decision-making authority ought to reside: with patients or physicians.[1] Historically physicians were charged with deciding when to initiate or withhold/withdraw life-sustaining therapies, but with the rise of patient autonomy the locus of authority largely shifted to patients or, when they lacked capacity, their surrogate decision-makers (surrogates).[2] One example of such a therapy is adult venoarterial extracorporeal membrane oxygenation (VA-ECMO), a form of mechanical circulatory and oxygenation support. In our practices we have observed that both the withholding and the terminal withdrawal of VA-ECMO engenders tensions among physicians regarding where decisional authority ought to reside – with some physicians expressing a preference to retain ultimate decisional authority. (For the purpose of this study we define "decisional authority" as the right to make medical decisions.)

To briefly review, VA-ECMO provides temporary oxygenation and perfusion to patients with cardiopulmonary failure, affording time for native cardiopulmonary recovery or serving as a bridge to transplantation or implantation of a longer-term mechanical support device.[3] With VA-ECMO, venous blood is drained into the extracorporeal membrane oxygenation circuit via catheters implanted through either transthoracic or percutaneous cannulae.[4] Gas exchange occurs across a semipermeable membrane, and oxygenated blood is returned to the arterial circulation via a mechanical pump that takes the place of native cardiac function.[5] This is not to be confused with venovenous extracorporeal membrane oxygenation (VV-ECMO) for respiratory failure, in which oxygenated blood is returned to the venous circulation to be pumped by the patient's own heart.[6] Given the invasive mechanics of the technology, as well as the need for anticoagulation therapy, major complictions for patients on VV and VA-ECMO include stroke, bleeding, thrombosis and infection.[7] A detailed

description of machines/circuitry, indications for therapy, outcomes, and complications is beyond the scope of this article, but available in several review articles.[8] Possible outcomes of VA-ECMO include: patient recovers native cardiopulmonary function and weans off the ECMO; patient fails to recover and VA-ECMO serves as a provisional link to a ventricular assist device (VAD) or heart transplant; or patient fails to recover and dies.[9] Patients on VA-ECMO are frequently (but not always) intubated and generally (although not uniformally) sedated. As such, their participation in goals of care discussions can be difficult, if not impossible, and physicians must often work with surrogates to craft treatment decisions.[10]

In our experience, conflicts can arise between physicians and surrogates during end-of-life discussions about adult VA-ECMO.[11] When patients are neurologically devastated and/or prospects for recovery on VA-ECMO vanish, and transplantation or VAD are not viable options, physicians may recommend terminal discontinuation (withdrawal at end-of-life) of VA-ECMO. While such recommendations are in accordance with current guidelines, physicians may nonetheless face conflicts with surrogates who oppose withdrawal.[12] In New York City, where surrogate consent is required to withhold or withdraw life-sustaining therapy, a futility dispute can arise, which may yield moral distress among the entire health care team, including physicians, and may compromise optimal clinical care.[13]

Thus, in an effort to improve shared decision-making with VA-ECMO and reduce moral distress for physicians, healthcare team members, patients and families, we set out to take a baseline assessment of physician attitudes towards decision-making for VA-ECMO. Specifically, we sought to evaluate where physicians believed the locus of decisional authority ought to rest, and why. We hypothesized that physicians would favor a medically based locus of decisional authority.

Methods

Survey

From August 2012 to March 2013, content and methodology experts worked together to create, pilot and refine a 24-item, structured, Internet-based survey to assess physicians' knowledge and attitudes regarding decisional authority for adult VA-ECMO for total cardiopulmonary support and, for another line of inquiry, cardiopulmonary resuscitation (CPR); demographic data and qualitative narratives were also collected. Questions spanned five domains in which physicians and surrogates make medical decisions: 1) Consent for VA-ECMO; 2) Initiation of VA-ECMO; 3) Discontinuation of VA-ECMO; 4) Administration of CPR; 5) Do not resuscitate (DNR) orders and VA-ECMO; 5) VA-ECMO Utilization. Experts in medical ethics, internal medicine and critical care reached consensus about the five domains through brainstorming and the creation of a conceptual framework for decision-making for VA-ECMO.[14] A pilot survey was completed by 10 clinicians and ethicists and revised to ensure consistency and validity.

Physicians were instructed that, for the purposes of the survey, "ECMO" referred to total cardiopulmonary support (i.e.: VA-ECMO) and that questions should be answered based on physicians' own beliefs, not state law or institutional policies or procedures. Physicians were instructed to express their opinion by selecting one answer from a 6-point Likert scale

(definitely no, probably no, possibly no, possibly yes, probably yes, definitely yes). In an effort to avoid concealing respondents' true sentiments, a neutral option was excluded. Although researchers debate whether or not to include a neutral option in surveys, this response was omitted to promote meaningful engagement with the survey and reporting of true attitudes, and to minimize "survey satisficing".[15] Demographic data included questions on gender, age, religion, self-report of religiosity, medical specialty/subspecialty, practice level (attending vs resident vs fellow), and self-report of ECMO knowledge and experience. At the conclusion of the survey, participants were provided with a text box to submit any narrative comments about VA-ECMO for total cardiopulmonary support. The Institutional Review Board approved the study. (The complete survey is available in Appendix I.)

Data Collection

From May to August 2013, internal medicine attendings and resident/fellow physicians at an urban, academic medical center were sent email invitations with a link to take the survey. Reminder emails (3 total) were sent at three-week intervals during this period. Investigators did not email participants directly, rather administrators with access to Department of Medicine and Graduate Medical Education list-serves forwarded emails on behalf of the investigators.

Statistical Analyses

Descriptive statistics (including mean, standard deviation, median, minimum, maximum, frequency, and percent, as appropriate) were calculated to characterize physician respondent demographic characteristics and physician responses to 15 questions based on the five medical decision-making domains. All medical decision-making questions were then cross-tabulated with demographic variables and these relationships were analyzed using Fisher's exact test or the chi-square test, as appropriate. Question response data were analyzed using the six-point Likert scale but, for the sake of ease with reporting and to facilitate statistical analysis, were also collapsed to a three-point scale: yes (definitely yes, probably yes); no (definitely no, probably no); unsure (possibly yes, possibly no). All p-values are two-sided with statistical significance evaluated at the 0.05 alpha level. All analyses were performed in SPSS Version 22.0 (SPSS Inc., Chicago, IL).

Results

In all, 1200 physicians received the survey, and 179 physicians completed the instrument, 48.7% attending and 51.3% resident/fellow physicians, yielding a 15% response rate. The majority of respondents were male (63%) with a mean age of 38 (+/−13) years. Just over 60% of respondents reported a primary medical specialty of internal medicine, and nearly 33% of all participants considered themselves religious. Over half (57.4%) of all respondents reported that they provide some critical care, with 48.8% reporting that they have participated in the care of 1–10 patients on VA-ECMO. Only 26.9% of respondents considered themselves knowledgeable about VA-ECMO. (Table 1.)

Percentages across four domains related to VA-ECMO are presented for reference. (Table 2.) A minority of physicians (35.3%) responded that consent for VA-ECMO should be

presumed. Only 32.3% responded that surrogate consent should be required to discontinue VA-ECMO, while 56.8% felt that physicians should have the right to discontinue VA-ECMO over surrogate objection. Nearly 62% of respondents felt that VA-ECMO use should be restricted given its cost; similarly 61.6% felt VA-ECMO should be used to perfuse organs for transplantation.

There were only a few differences across domains based on demographic factors. For example, respondents who self-reported as "knowledgeable" about VA-ECMO, compared to those who did not, answered more frequently that there should not be presumed consent for ECMO (47.6% vs 33.3%, p=0.007); that a physician should have the right to discontinue VA-ECMO treatment over surrogate objection (76.2% vs 50%, p=0.02); and that, given its cost, VA-ECMO use should be restricted (81.0% vs 54.4%, p=0.005). Among subspecialties, those in pulmonary/critical care more frequently replied that surrogate consent should not be required to discontinue VA-ECMO (71.4%), compared to general internists (52.8%), cardiologists (52.4%) and others (15.8%) (p=0.03). There were no differences based on gender, religion, or self-report of religiosity.

Discussion

In an effort to understand and improve the state of shared decision-making for VA-ECMO at our own institution, we studied physician attitudes towards the locus of decisional authority for initiation and discontinuation of this complex therapy. We hypothesized that, strides toward patient autonomy and shared decision-making notwithstanding, physicians would favor themselves, more so than patients and surrogates, as the locus of decisional authority for initiation and discontinuation of VA-ECMO. Our data largely supported this hypothesis, as a substantial number of physicians believed that they ought to retain control over initiation and discontinuation, including terminal discontinuation, of adult VA-ECMO.

While many physicians surveyed had limited experience with VA-ECMO, those who self-reported as "knowledgeable" about VA-ECMO did respond more frequently that physicians ought to retain decisional authority and should have the right to discontinue VA-ECMO treatment over surrogate objection. Similarly, those in pulmonary/critical care more frequently replied that surrogate consent should not be required to discontinue VA-ECMO. While attitudes are not necessarily indicative of behaviors and actions, the data demonstrate the need for further exploration of these attitudes and their implications for shared decision-making and clinical practice. It is likely that those in pulmonary/critical care and those "knowledgeable" about VA-ECMO have these attitudes as a result of their direct experiences working with patients and families. VA-ECMO is complex, and physicians may be hesitant to cede authority to patients and surrogates who are presumably less knowledgeable about this therapy. Some of the qualitative narratives provided by participants supported this idea, with one respondent noting,

> "Patients and families most often do not have the medical knowledge to make informed decisions regarding ECMO therapy - considering its complexity and the multimodal specialties involved, there should be deference to the physician teams on whether to initiate or discontinue therapy."

The perceived complexity of VA-ECMO may present a barrier to shared decision-making. After all, a patient or surrogate cannot genuinely make an informed decision about VA-ECMO unless they really understand what it is and what it does, including its risks and benefits, advantages and limitations. While such an opinion is entirely understandable in the complex context of VA-ECMO, this sentiment is not new. In fact, this view has historically been provided as a general, conventional objection to informed consent.[16] With recent strides toward shared decision-making, this attitude is now countered by current, normative practice and, in some instances, the law. Indeed, the Institute of Medicine (IOM) of the National Academy of Sciences recently emphasized patient-centered medical decision-making, in which patients are "given the necessary information and opportunity to exercise the degree of control they choose over health care decisions that affect them", as a preferred decisional model.[17] So while it might be understandable, and even expected, that some physicians feel that patients and surrogates lack sufficient knowledge to make decisions about VA-ECMO, we must move forward and determine how to best educate these individuals so as to ensure that they can make informed decisions. Patient decision aids, crafted with the input of patients and surrogates who have experienced VA-ECMO, may be helpful in this context.[18] Additional research, in the form of focus groups or surveys of surrogates, to understand the ECMO decision making process from the vantage point of patients and families, would add considerably to the knowledge base and may serve to fortify the prospects for implementing shared decision making in this complex realm. Lastly, as it pertains to patient and family perspectives, as the use of VA-ECMO becomes more commonplace, discussions about advance directives will likely need to include VA-ECMO as a topic for individual reflection and consideration.

Another plausible explanation for these results is that physicians may prefer to retain decision-making authority for more practical reasons, specifically in order to avoid end-of-life conflicts and futility disputes with patients and surrogates. Patients on VA-ECMO who fail to recover and are not candidates for transplant or VAD, have no long-term options for support; the VA-ECMO must ultimately be terminally discontinued in accordance with guidelines set forth by the Extracorporeal Life Support Organization (ELSO).[19] This is somewhat in contrast to patients receiving other types of LST. Take for example a patient intubated on mechanical ventilation with severe anoxic brain injury. This patient may have no hope for meaningful neurologic recovery, but could receive a tracheostomy and continue to receive LST (i.e. ventilation) for a prolonged period of time, for years even, if that is the goal of care. While physicians may disagree with this goal of care and even view the continuation of LST in this context as inappropriate, futile, or a misuse of resources, some Courts have privileged surrogate decision makers to make these decisions, citing the best interests of patients and promotion of patient autonomy.[20] With VA-ECMO, however, there is no long-term option, owing to the technology itself, for patients who fail to recover and are not eligible for VAD or transplantation; there is only terminal discontinuation. Thus, there is a significant difference when it comes to end-of-life decisions in this realm, as presently patients cannot simply be continued on ECMO for a prolonged period (i.e. months to years) if that is the goal of care. This can present a dilemma for treating physicians who generally need surrogate consent to withdraw life-sustaining therapy, including VA-ECMO.

Unfortunately, and all too often, end-of-life conflicts arise between physicians and surrogates, leaving physicians wanting a greater degree of professional autonomy.[21]

Concerns for the prospect of a futility dispute indeed were reflected in the respondents' qualitative responses, with one physician commenting,

> "I think we need to be careful about our cases, but also make sure that physicians are empowered to discontinue the therapy when it is not working."

Another physician expressed similar sentiments, writing:

> "Pandora's box is now open for business yet again! We have not solved the problem of futility of care even now. We own this machine; We should NOT give it away to families. It should be the attending's decision who gets the treatment and for how long."

Whether this degree of expressed discretion stems from firmly entrenched beliefs and perhaps broad frustrations with perceived incursions on physician authority, or is simply reflective of a desire to avoid conflict in this specific context remains unknown; regardless, this narrative is of concern. Importantly, it raises concerns about the moral distress of physicians and the strong desire to avoid conflict and ambiguity of decisional authority at the end of life. As we strive to include patients and surrogates in medical decision-making, there remains a need to better support our colleagues as they face difficult end-of-life decisions and futility disputes. We have written previously on strategies to manage ethical issues with VA-ECMO and, in general, we suggest early involvement of the clinical ethics team, skilled mediation, and anticipatory or preventive ethics to ideally foresee and forestall, or at least manage and minimize, difficult ethical conflicts at end of life.[22] Further research is needed, however, on strategies to recognize moral distress amongst our colleagues. For left unaddressed, it can lead to dissatisfaction, burnout, and medical errors.[23]

Finally, of considerable import were findings regarding physician attitudes toward the cost and utilization of VA-ECMO. Overall, respondents (particularly those who self-report as "knowledgeable") indicated that use of VA-ECMO ought to be restricted, given its cost. Given widespread concerns for rising system costs, particularly expenditures at end of life, these results are not particularly surprising. Nestled within this cost-containment trend, however, lurked a curious inconsistency. Of those surveyed, 61.9% felt that VA-ECMO ought to be used to perfuse organs for transplantation. While additional research is needed to better understand this apparent inconsistency, it does suggest a utilitarian perspective. Perhaps respondents felt that the substantial costs of VA-ECMO are justified when the benefit extends beyond one individual directly receiving ECMO to include the many organ recipients that might benefit; a form of a utilitarian *greatest good for the greatest number* calculus. Overall, however, respondents indicated that VA-ECMO use ought to be constrained. Accordingly, many respondents believed that there should not be presumed consent to initiate VA-ECMO. Two respondents commented on this matter, invoking costs/resources as a justification:

> "Candidates for ECMO should be designated a priori and relatively limited given the amount of resources involved."

> "It is a costly and invasive life-sustaining therapy, which should only be initiated in FULL CODE patients with a high probability of coming off of it."

Most prominently, this examination makes apparent that further research is needed to understand why physicians expressed these views, particularly as the normative standard is presumed consent for life-sustaining therapy. Given these results, one wonders whether complex therapies such as VA-ECMO justify a departure from customary conventions. Should we endorse a return to paternalism for this single, complex therapy? As medical technology advances, will other life sustaining therapies ultimately need their own set of ethical standards?[24] If a case cannot be made for a form of "ECMO-exceptionalism," perhaps efforts to convey, adapt, and apply the foundations of bioethics – respect for personhood, informed consent, and informed refusal – must be enriched to address the technological and decisional challenge that is VA-ECMO.

Importantly, while this research is advantaged by being the first study of physicians' attitudes towards decision-making with VA-ECMO, like any other study it does carry some limitations. Our response rate of 15% was low, likely because we were not permitted to directly contact participants and instead had to rely on administrators with access to Department of Medicine and Graduate Medical Education list-serves to forward emails on our behalf. It is possible that survey non-responders have different attitudes towards VA-ECMO than those expressed by study participants. Next, our data was collected at one institution in New York, and thus may not be representative of attitudes in locales beyond. In addition, while our relatively small sample included both those experienced and inexperienced with ECMO, those who self-reported as "knowledgeable" more strongly endorsed physician retention of decisional authority. While the inclusion of those who do not directly work in this realm might be thought to attenuate the results, it does serve to provide an important comparator. Importantly, while the study included physicians with differing involvement in VA-ECMO, it did not include other members of the healthcare team including nurses, physician assisants, and other vital healthcare professionals; thus, the results cannot be extrapolated to characterize the attitudes of these team members. Finally, with respect to making the leap from an attitudinal survey to actual clinical practice, futher research is needed to better understand how physician attitudes toward VA-ECMO may shape the provision of care, shared decision-making, and the patient/surrogate experience. Overall, this was a baseline survey of physician attitudes intended to help understand the current state of, and ultimately improve, shared decision-making. Further research is needed to assess the generalizability of these findings, as well as to investigate and understand the rationales behind these views.

Conclusion

Our data demonstrate that shared decision-making in the realm of VA-ECMO remains substantially in flux, with surveyed physiciains, especially those who self-report as knowledgeable about VA-ECMO and/or are speciliasts in pulmonary/critical care, strongly endorsing clinician discretion in decisions regarding initiation and discontinuation of this therapy. Given that VA-ECMO is a complex technology, the data may reflect physician reluctance to cede authority to presumably less informed surrogates. Likewise, as end of life

conflicts are burdensome to the healthcare team including physicians, respondents' preferences for greater decisional control may be reflective of a desire to avoid complex futility disputes. Further, as aggregate healthcare costs continue to rise, and physicians are enjoined to manage resources and be thoughtful stewards of the system, participants' responses may further reflect a larger push for judicious use of a costly technology. Lastly, while attitudes are not necessarily synonymous with actions, the data suggest that our respondents, particularly those most knowledgeable about the therapy, have adopted both an authoritative attitude and a prudential ethic with respect to VA-ECMO.

While analysis of the survey results can demonstrate these noteworthy effects, what the present data cannot yield, and what is left largely to conjecture, is the reasoning behind the observed findings. Perhaps the stress and reality of working with patients and families changes physicians' attitudes towards medical decision-making, as might be suggested by the differences in results between those in pulmonary/critical care, versus others, and those "knowledgeable" about VA-ECMO, compared to others; or perhaps those with certain views towards medical decision-making gravitate toward particular medical specialties or work. What is clear, however, is that there is a need for further inquiry to better understand and improve the dominion of shared decision-making, not only in spheres of everyday medical care, but also in the province of life and death decisions amidst complex medical technology. Perhaps VA-ECMO, a setting in which physicians, patients and families have the potential to spar in the shadows of technology, seems an awfully good place to start -- or continue, as the case may be -- this vitally important work.

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Appendix I

Survey instrument

ECMO (venoarterial extracorporeal membrane oxygenation) for total cardiopulmonary support in adults is a developing technology that serves to both oxygenate and circulate the

blood. Variation exists, both among clinicians and across hospitals, with respect to its clinical applications and guidelines for use. Accordingly, we are conducting a survey of physicians' opinions and perspectives on venoarterial ECMO and cardiopulmonary resuscitation (CPR).

Throughout the survey, all references to ECMO refer to total cardiopulmonary support.

Please answer the following questions based on *your own beliefs* and <u>not</u> your state law or your institution's current policies/procedures.

1. Should a physician have the right to withhold CPR, even if a surrogate wants resuscitation?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

2. Should ECMO be initiated in a DNR patient?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

3. Should there be presumed consent for ECMO?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

4. Should initial consent for ECMO contain a provision that it may be discontinued if deemed futile?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

5. Should a religious objection to ECMO discontinuation preclude its initiation?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

6. A patient on ECMO becomes asystolic. Should CPR be initiated?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

7. A patient on ECMO is DNR and becomes asystolic. Should CPR be initiated?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

8. Should ECMO support be increased if a patient has a DNR order?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

9. Should surrogate consent be required to discontinue ECMO?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

10. Should a physician have the right to discontinue ECMO over surrogate objection?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

11. Should a surrogate have the right to discontinue ECMO over physician objection?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

12. A patient on ECMO is made DNR. Should ECMO be discontinued?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

13. Should ECMO be used to maintain perfusion and preserve organs for transplantation?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

14. Given the cost of ECMO, should its use be restricted?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

15. Should a physician conduct a "slow code" when surrogates demand futile resuscitation?

Definitely no Probably no Possibly no Possibly yes Probably yes Definitely yes

The survey concludes with a few demographic questions.

16 What is your gender?

a. Male

b. Female

c. Prefer not to answer

17 What is your age?

18 What is your religion?

a. Protestant

b. Catholic

c. Jewish

d. Muslim

e. Hindu

f. None

g. Other (Enter)

h. Prefer not to answer

19 Do you consider yourself religious?

a. Yes

b. No

20 What is your primary medical specialty?

a. Internal Medicine

b. Surgery

c. Neurology

d. Emergency Medicine

e. Obstetrics/Gynecology

f. Pediatrics

g. Anesthesiology

h. Psychiatry

i. Dermatology

j. Other

21 Do you provide critical care?

a. Yes

b. No

22 What is your practice level?

a. Resident

b. Fellow

c. Attending

23 In approximately how many ECMO cases have been involved?

a. 0

b. 1–5

c. 6–10

d. 11–25

e. >25

24 Do you consider yourself knowledgeable about ECMO?

a. Yes

b. No

Thank you. The survey is now complete.

Feel free to provide any thoughts or comments that you may have about ECMO for total cardiopulmonary support below.

Table 1

Characteristics of Respondents (N=179)

Characteristic	%
Male Gender	63
Mean Age (SD)	38 (13)
Religious Affiliation	
Protestant	12.8
Catholic	21.2
Jewish	35.3
Muslim	.6
Hindu	3.2
None	14.1
Other	6.4
Prefer not to answer	6.4
Considers Self Religious	
No	67.1
Yes	32.9
Primary Medical Specialty	
Internal Medicine	60.6
Surgery	7.1
Neurology	1.3
Emergency Medicine	4.5
Obstetrics/Gynecology	.6
Pediatrics	5.8
Anesthesiology	9.7
Psychiatry	1.9
Other	8.4
Subspecialty	
General Medicine	40.0
Cardiology	23.3
Gastroenterology/Hepatology	1.1
Pulmonary/Critical Care	15.6
Infectious Disease	6.7
Hematology/Oncology	3.3
Endocrinology	2.2
Nephrology	3.3
Rheumatology	4.4
Provider of critical care	
No	42.6

Characteristic	%
Yes	57.4
Practice Level	
Resident/Fellow	51.3
Attending	48.7
Number of ECMO cases	
0	48.1
1–10	48.8
>11	3.1
Knowledgeable about ECMO	
No	73.1
Yes	26.9

Table 2

Physician Attitudes Across Four Domains (N=179)

Domain & Questions	%Yes	% No	% Unsure
1. VA-ECMO Consent			
Should consent for VA-ECMO be presumed?	35.3	37.1	27.5
Should consent for VA-ECMO include a provision that it may be discontinuation if deemed futile?	95.2	1.2	3.6
2. Initiation of VA-ECMO			
Should religious objection to discontinuing VA-ECMO preclude its initiation?	52.1	20.4	27.5
Should VA-ECMO be initiated in a DNR patient?	3.6	77.1	19.3
3. Discontinuation of VA-ECMO			
Should surrogate consent be required to discontinue VA-ECMO?	32.3	40.4	27.3
Should physicians have the right to discontinue VA-ECMO over surrogate objection?	56.8	11.1	32.1
Should surrogates have the right to discontinue VA-ECMO over physician objection?	60.2	11.2	28.6
4. VA-ECMO Utilization			
Should VA-ECMO be used to perfuse organs for transplantation?	61.9	4.4	33.8
Given the cost of VA-ECMO, should its use be restricted?	61.6	12.6	25.8