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Comparative Decision-Making Analysis of Extracorporeal Membrane Oxygenation Candidacy Among Pediatric Critical Care Fellow and Attending Physicians

--Manuscript Draft--

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Abstract:	Background: Extracorporeal membrane oxygenation (ECMO) candidacy decisions for children with respiratory failure can be variable among pediatric critical care attending physicians and prior studies showed that baseline functional status and underlying neurological conditions influence this decision. However, there are limited data regarding factors influencing pediatric critical care fellows' ECMO candidacy decisions and their alignment with attending physicians. This study aimed to identify patient characteristics influencing fellows' ECMO candidacy decisions and measure concordance with attending decisions. Methods: This was a planned secondary analysis of a prospective, single-center, cross-sectional study at a quaternary pediatric ECMO referral center. Pediatric critical care fellows and attending physicians caring for children admitted with acute respiratory failure were surveyed within 72 hours of initiation or escalation of respiratory support. The primary exposure was patient functional status at admission, measured by the functional status score (FSS), and was categorized as Normal/Mild Dysfunction (FSS 6-9) or Moderate/Severe Dysfunction (FSS >10). Multivariate logistic regression clustered by fellow evaluated factors influencing ECMO candidacy assessments. Cohen’s kappa measured concordance between fellow and attending decisions. Results: Eighty surveys were completed by 21 pediatric critical care fellows. Fellows identified 19% of patients as ECMO non-candidates. After adjustment for age, moderate/severe admission dysfunction significantly reduced the odds of ECMO

	candidacy (aOR 0.11, 95% CI 0.03-0.51, p=0.005). Overall, concordance between fellows and attendings was moderate (κ=0.56) with junior fellows having minimal agreement (κ=-0.12). Fellows focused primarily on baseline functional status and comorbidities while attendings considered additional factors, including long-term prognosis, organ failure irreversibility, and ECMO-related risks in candidacy assessments. Conclusion: Admission functional status influences pediatric critical care fellows' ECMO candidacy decisions, with moderate concordance observed between fellows and attending physicians. The identified discrepancies emphasize the importance of structured education and targeted mentorship programs to enhance consistency in ECMO candidacy assessments, especially among junior trainees.
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KEYWORDS: Extracorporeal Membrane Oxygenation; Critical Care; Decision Making; Pediatric Intensive Care Units; Education, Medical, Graduate

This work was presented at the Society of Critical Care Medicine's 2025 Critical Care Congress, February 23-25, 2025, in Orlando, Florida.

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ABSTRACT

Background: Extracorporeal membrane oxygenation (ECMO) candidacy decisions for children with respiratory failure can be variable among pediatric critical care attending physicians and prior studies showed that baseline functional status and underlying neurological conditions influence this decision. However, there are limited data regarding factors influencing pediatric critical care fellows' ECMO candidacy decisions and their alignment with attending physicians. This study aimed to identify patient characteristics influencing fellows' ECMO candidacy decisions and measure concordance with attending decisions.

Methods: This was a planned secondary analysis of a prospective, single-center, cross-sectional study at a quaternary pediatric ECMO referral center. Pediatric critical care fellows and attending physicians caring for children admitted with acute respiratory failure were surveyed within 72 hours of initiation or escalation of respiratory support. The primary exposure was patient functional status at admission, measured by the functional status score (FSS), and was categorized as Normal/Mild Dysfunction (FSS 6-9) or Moderate/Severe Dysfunction (FSS >10). Multivariate logistic regression clustered by fellow evaluated factors influencing ECMO candidacy assessments. Cohen’s kappa measured concordance between fellow and attending decisions.

Results: Eighty surveys were completed by 21 pediatric critical care fellows. Fellows identified 19% of patients as ECMO non-candidates. After adjustment for age, moderate/severe admission dysfunction significantly reduced the odds of ECMO candidacy (aOR 0.11, 95% CI 0.03-0.51, p=0.005). Overall, concordance between fellows and attendings was moderate (κ=0.56) with junior fellows having minimal agreement (κ=-0.12). Fellows focused primarily on baseline functional status and comorbidities while attendings considered additional factors, including

long-term prognosis, organ failure irreversibility, and ECMO-related risks in candidacy assessments.

Conclusion: Admission functional status influences pediatric critical care fellows' ECMO candidacy decisions, with moderate concordance observed between fellows and attending physicians. The identified discrepancies emphasize the importance of structured education and targeted mentorship programs to enhance consistency in ECMO candidacy assessments, especially among junior trainees.

INTRODUCTION

Extracorporeal membrane oxygenation (ECMO) is a therapeutic option for many patients experiencing severe or refractory acute respiratory failure (1,2). Despite its life-saving potential, ECMO is not universally applicable to all critically ill pediatric patients and is associated with significant risks and expenditure of resources (3,4). The decision to initiate ECMO involves numerous complex factors, highlighting the need for careful, individualized consideration (5). While guidelines from the Extracorporeal Life Support Organization (ELSO) provide general indications and contraindications for ECMO, these guidelines are not prescriptive or comprehensive. The lack of standardized criteria and different resources leads to variability in ECMO candidacy decisions across institutions and among healthcare providers (6), which may lead to inequities in the application of this therapy (7).

Previous research has highlighted that baseline quality of life and preexisting neurological conditions significantly influence decisions about ECMO candidacy for pediatric critical care attending physicians (8–11). Further, ECMO candidacy decisions remain highly variable, with substantial provider-dependent differences in selection criteria. A recent study of adult ECMO decision-making found that even within a single institution, ECMO denial criteria were inconsistently applied, and 90% of candidates had at least one characteristic that was considered a prohibitive contraindication for another patient (12).

While prior research has explored decision-making variability at the institutional level and by attending physicians, it is unknown what pediatric critical care physician trainees view as important factors in considering of ECMO candidacy and how this perception compares to attending physicians. Understanding the potential differences in ECMO candidacy decision-making across physician experience levels, and between multidisciplinary team members, is a

crucial step in creating consistent decision-making guidelines to optimize patient- and family-centered outcomes.

The primary objective of this study was to determine the association between patient characteristics and pediatric critical care fellow physician perception of ECMO candidacy for patients with acute respiratory failure. The secondary objective was to examine concordance in the decision-making between fellows with that of pediatric critical care attending physicians. We hypothesized that worse patient admission functional status scale (FSS) would be negatively associated with pediatric critical care fellow physician assessment of ECMO candidacy, and that fellows and attendings would have high concordance when assessing candidacy.

MATERIALS AND METHODS

Study Design

This study was a planned, secondary analysis of a prospective, single-center, cross-sectional study conducted at the Children's Hospital of Philadelphia (CHOP) Pediatric Intensive Care Unit (PICU). A waiver of informed consent was approved by the CHOP Institutional Review Board (IRB 20-018234).

Subject Eligibility

The primary study protocol has been previously published (11). For this study, pediatric critical care medicine fellow physicians were eligible to participate if directly involved in the care of a qualifying patient at the time of initiation or escalation of ventilatory support. Patients were included in this study if they were less than 18 years of age on admission to the CHOP PICU, had acute respiratory failure requiring invasive mechanical ventilation, and were within 72 hours of endotracheal intubation or, if tracheostomy present, within 72 hours from escalation from baseline respiratory support.

Board-certified or board-eligible pediatric critical care attending physicians (11) and pediatric critical care medicine fellow physicians were eligible to participate if directly involved in the care of a qualifying patient. Participants were unaware of the primary hypothesis of this study. An online Research Electronic Data Capture (REDCap)-based survey was sent to eligible physicians via email. The survey design, structure, and content are detailed in the primary study publication (11). The fellow physician involved with the study design and implementation (B.C.M.) did not participate in the surveys.

Data Collection

Functional status at PICU admission was measured by FSS and was not available to the pediatric critical care fellow or attending physicians at the time of survey participation (9–11). Trained nurses who were independent of patient care abstracted data for FSS domains. For this analysis, FSS scores were divided into 2 categories: 1) Normal/Mild Dysfunction (Admission FSS 6-9); 2) Moderate/Severe Dysfunction (Admission FSS > 10). Additional patient data, such as PIM3 scores and comorbidities, were abstracted from the electronic heath record and Virtual PICU Systems (VPS) standardized data elements.

Statistical Analyses

Nonparametric summary and comparative statistics were used to analyze both patient and fellow physician information. Univariable and multivariate logistic regression analyses, clustered by individual pediatric critical care fellow, were performed for the primary outcome of ECMO candidacy. Given the number of patients not considered ECMO candidates, we used only the variables of patient age and admission FSS category in the multivariable logistic regression analyses to avoid overfitting the model. Age was specifically chosen as it may influence a

clinician's decision on ECMO candidacy when considering a patient's future quality of life and recovery potential from acute critical illness.

We used Cohen's Kappa to measure the concordance between the ECMO candidacy assessments for patients assessed by both fellow and attending physicians. All analyses were performed using R Statistical Software (v4.4.2; R Core Team 2025).

RESULTS

Characteristics of Physicians and Patients

Of 176 eligible patient encounters, 80 surveys were completed by pediatric critical care fellow physicians (response rate 45%). All patients had corresponding surveys completed by attending physicians. There were 21 individual fellow responders and 31 individual attending responders, with an average of 3.8 responses per fellow and 2.6 responses per attending; 18 fellows and 19 attendings participated in the survey more than once. More than 50% of attendings had > 5 years of experience, while the median experience level in pediatric critical care for fellows was two years (Supplemental Table 1). First-year fellows responded most frequently to the survey (Figure 1).

The median patient age was 3.5 years (IQR 1.1–9.0 years) and 60% of patients were male (n=48). The median admission FSS was 7 (IQR 6-12). The most common FSS category was normal/mild dysfunction (75%) with the moderate/severe dysfunction category comprising 25% (Table 1). Sixty-eight patients (85%) had at least one comorbidity, and the most common comorbidities were chronic respiratory failure (31%), developmental delay or disorder (31%), and epilepsy or history of seizures (23%) (Table 1).

Patient Characteristics Associated with ECMO Candidacy

Of the 80 patients who had fellow survey responses, 65 (81%) were perceived to be ECMO candidates and 15 (19%) to not be ECMO candidates. These patients differed from each other in age and admission FSS category (Supplemental Table 2).

In univariate logistic regression analysis, older patient age and higher admission PIM3 scores were associated with lower odds of perceived ECMO candidacy (OR 0.89 and 0.61, [p=0.003] and [p=0.02], respectively). An admission FSS category of moderate/severe dysfunction (OR 0.09, [p=0.001]), and comorbidities including endocrinopathy (OR 0.08, [p=0.0001]), kidney disease (OR 0.24, [p=0.03]), and chronic respiratory failure (OR 0.31, [p=0.003]) were also associated with lower odds of perceived ECMO candidacy (Supplemental Table 3). After adjusting for age, multivariate logistic regression demonstrated that patients with admission FSS category of moderate/severe dysfunction had lower odds of being considered an ECMO candidate compared to patients who had an admission FSS category of normal/mild dysfunction (aOR 0.11, 95% CI 0.03-0.51 [p=0.005], Figure 2).

Concordance between fellows and attendings

Fellows identified 15 patients (19%) as non-candidates for ECMO, while attendings identified 16 patients (20%) as non-candidates. Overall, there was only moderate level of agreement between the fellows and attendings ($\kappa = 0.56$, Figure 3). Specifically, 5/15 (33%) patients considered non-candidates by fellows were considered candidates by attendings and 6/16 (38%) patients considered non-candidates by attendings were considered candidates by fellows. When comparing concordance between attendings and fellows by years of experience, senior (2^{nd}-year and 3^{rd}-year) fellows had high agreement ($\kappa = 0.72$), while junior (1st-year) fellows showed little to no agreement ($\kappa = -0.12$). Junior fellows reported an average confidence

score of 2.80/4, senior fellows reported an average confidence score of 3.10/4.00, with fellows overall reporting an average confidence score of 3.01/4.00 vs 3.29/4.00 amongst attendings [p = 0.1].

Compared to cases in which both fellows and attendings agreed on ECMO candidacy, for cases in which there was disagreement, the patients had worse admission functional status (median admission FSS 14 [IQR 10-21] versus median admission FSS 6 [IQR 6-11], p=0.024). There were no differences in patient age or severity of illness as measured by PIM 3 scores between agreement and disagreement cases.

ECMO Candidacy Factors Considered by Fellow and Attending Physicians

Fellows most frequently cited poor prognosis of a chronic illness or genetic condition (36.4%), severity of pre-existing comorbidities (36.4%), and abnormal baseline functional status (36.4%) as reasons for not considering a patient an ECMO candidate (Figure 4). Similarly, attendings identified poor prognosis of a chronic illness or genetic condition (45.5%) and severity of pre-existing comorbidities (36.4%) as key factors in their decisions. However, attendings also incorporated additional nuanced factors, potentially more subjective, such as active malignancy (9.1%), irreversibility of organ failure (9.1%), and higher-than-average risk of ECMO-related complications (9.1%).

DISCUSSION

Patient admission FSS category of moderate or severe dysfunction was associated with decreased odds of being perceived as an ECMO candidate by pediatric critical care fellows in this secondary analysis of a prospective, cross-sectional study. There was only moderate concordance between fellows and attendings, with senior fellows having the highest concordance and junior fellows having the lowest concordance. Approximately one-third of patients were

differentially considered candidates or non-candidates between attendings and fellows. Patients who were younger and those with less severe functional impairment were more likely to be considered ECMO candidates for both fellows and attendings but self-reported factors that influenced ECMO candidacy decisions differed between the physician groups.

Prior research has consistently emphasized that baseline functional status and pre-existent neurological conditions are pivotal factors in ECMO candidacy decisions and trained providers often weigh their perceptions of a patient's pre-illness quality of life heavily when deciding whether to recommend ECMO, especially in pediatric populations (8–11). Our study is the first extend this understanding to pediatric critical care trainees and suggests that, while there is an expected progression of learning amongst trainees to generally align assessments of ECMO candidacy with experienced attendings, discrepancies may arise in more complex cases involving older children or for patients with significant comorbidities. Attendings prioritized poor prognosis, irreversible organ failure, high complication risks, and alignment with goals of care more than fellows when assessing ECMO candidacy.

Prior studies have shown substantial differences in ECMO candidacy decision between experienced ECMO program directors at different institutions and adult clinicians at the same institution (12). Similarly, our study demonstrated variability in ECMO candidacy decisions between fellows and attendings in a single center study without variability in institutional culture or resource availability. The variability in candidacy decisions between fellows and attendings highlights the opportunity for educational initiatives that ensure consistency of ECMO candidacy assessments both within and across institutions. Training programs should focus on equipping fellows to make informed decisions, ideally in a patient- and family-centered manner with inclusion of patients (as able), families, and multidisciplinary medical and surgical teams within

the context of their institutional resources and environment. Future research should focus on developing targeted educational interventions, such as simulation-based training and mentorship, to enhance fellows' decision-making and communications skills to improve consistency in ECMO candidacy assessments. This education may be particularly applicable to training programs that do not have a high ECMO patient volume. Additionally, exploring the influence of institutional factors on decision-making could help create adaptable and more standardized guidelines.

We observed only moderate concordance between fellow and attending assessments of ECMO candidacy in this study with junior fellows having minimal concordance. Although this is a widely acknowledged reality in training programs and intuitively makes sense, our study quantifies differences between junior and senior trainees. During the timeframe of this study, most of the first-year fellow responders were in their first 6 months of fellowship. As expected, concordance did increase between attendings and senior fellows. Furthermore, fellows prioritized baseline functional status and pre-existing comorbidities, while attendings incorporated additional considerations such as long-term prognosis and ECMO-specific risks. This mirrors the finding from Rubin et al. that providers interpret ECMO contraindications differently, even when faced with similar cases (12). Longitudinal studies following trainees throughout their fellowship and early post-fellowship practice could provide valuable insights into how decision-making evolves with the transition to unsupervised practice.

LIMITATIONS

Our study has several limitations. Our relatively small sample size and single-center design may limit the generalizability of our findings to other institutions and may not reflect

geographic or institutional variability. Further, no critical care advanced practice providers, non-PICU pediatric subspecialists, or parents were included in this survey. There is a potential for sampling bias as there were variable amounts of repeated participation for both fellow and attending physicians, which we attempted to mitigate by clustering the logistic regression by fellow. The response rate for the survey from fellows was 45% and it is possible that response bias could result if fellows were less likely to respond to a survey if they considered their patient a non-candidate or more likely to respond if they had particularly strong inclinations regarding candidacy. We did not measure or survey parental or family considerations of quality-of-life assessments which may or may not correlate with FSS scores. Family perspectives on quality-of-life are important considerations in the discussion of ECMO candidacy for any pediatric patient. Finally, while our study did ask opinions about actual patients, the consideration of ECMO was hypothetical and may have biased some fellow and attending responses.

CONCLUSION

In conclusion, patient functional status on admission and age are significant factors that pediatric critical care fellows consider when assessing ECMO candidacy for pediatric patients with severe acute respiratory failure. Although agreement with pediatric critical care attendings did increase throughout training, overall, there was only moderate concordance between fellows and attendings and there were differences in the factors that attendings prioritize compared to fellows when making ECMO candidacy decisions. These findings highlight the need to better understand how decision-making evolves with experience and to better standardize and optimize decision-making processes of the multidisciplinary critical care team and families.

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None

Authors' Contributions

IS, BM, RWM, WEM, and ASH were responsible for study design and conception. BM was responsible for data acquisition. IS and ASH were responsible for data analysis. BM was involved with data acquisition. IS, BM, RWM, WEM, SR, JF, and ASH were involved with data interpretation. IS and ASH drafted the manuscript. BM, RWM, WEM, SR, and JF provided critical revision of the manuscript for important intellectual content. All authors approved the final version of the manuscript.

Availability of Data and Materials

The data set used for this manuscript are available upon reasonable request to the corresponding author (ASH).

Consent for Publication

Not applicable

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Approval and Consent to Participate

A waiver of informed consent was approved by the CHOP Institutional Review Board (IRB 20-018234 "Determining ECMO Candidacy for Pediatric Patients with Acute Respiratory Failure," approved March 8, 2021). Study procedures were followed in accordance with the ethical standards of the CHOP IRB and with the Helsinki Declaration of 1975.

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Supplemental Materials

Supplemental materials for this manuscript are available online.

LEGENDS

Figure 1: Frequency of fellow survey responses by year of pediatric critical care medicine (PCCM) fellow experience.

Table 1: Patient characteristics of all pediatric critical care fellow physician responses (N = 80)

Table 1 Notes:

Abbreviations: BPD: bronchopulmonary dysplasia; ECMO: extracorporeal membrane oxygenation; FSS: functional status score; IQR: interquartile range; PICU: pediatric intensive care unit; PIM3: Pediatric Index of Mortality; PRISM: Pediatric Risk of Mortality

[a] Binary gender was collected

Figure 2: Multivariate regression for factors associated with ECMO candidacy for fellows (N=80).

Figure 3: Concordance between pediatric critical care fellow and attending physician assessment of ECMO candidacy.

Figure 4: Frequency comparison between fellow-attending dyads of self-identified reasons for patient non-candidacy for ECMO (N=80)**.**

Supplemental Table 1: Characteristics of pediatric critical care fellow and attending physician study participants.

Supplemental Table 2: Patient demographics and characteristics comparison of non-ECMO and ECMO candidates as assessed by pediatric critical care fellow physicians.

Supplemental Table 2 Notes:

Abbreviations: BMT: bone marrow transplant; ECMO: extracorporeal membrane oxygenation; FSS: functional status score; HIE: hypoxic-ischemic encephalopathy; IQR: interquartile range; PICU: pediatric intensive care unit; PIM3: Pediatric Index of Mortality; PRISM: Pediatric Risk of Mortality; SCT: stem cell transplant

Supplemental Table 3: Univariable logistic regressions for the outcome of ECMO candidacy.

Supplemental Table 3 Notes:

Abbreviations: BPD: bronchopulmonary dysplasia; FSS: functional status score; IVH: intraventricular hemorrhage; PIM3: Pediatric Index of Mortality; Ref: Reference

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Figure 1

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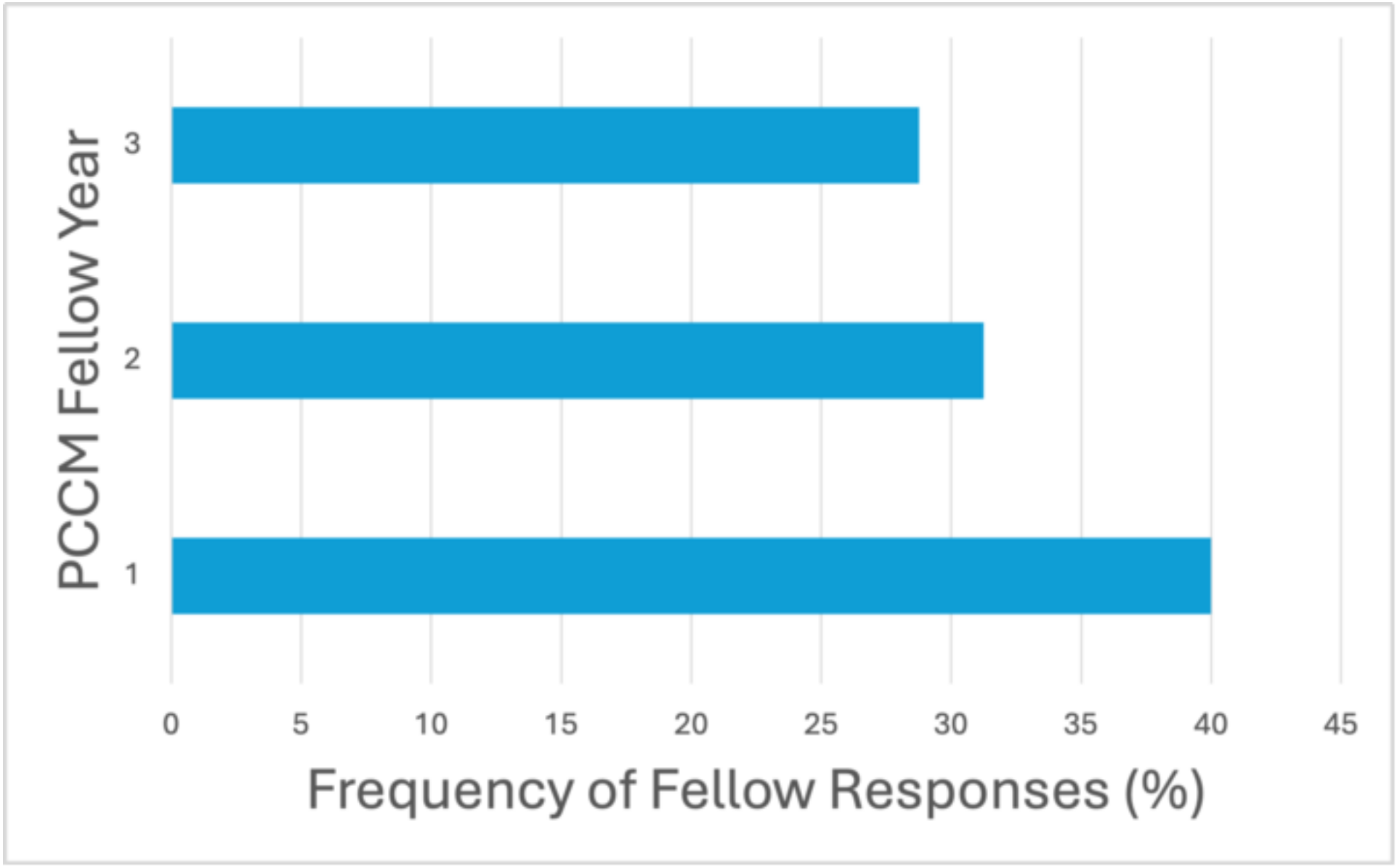

Figure 2

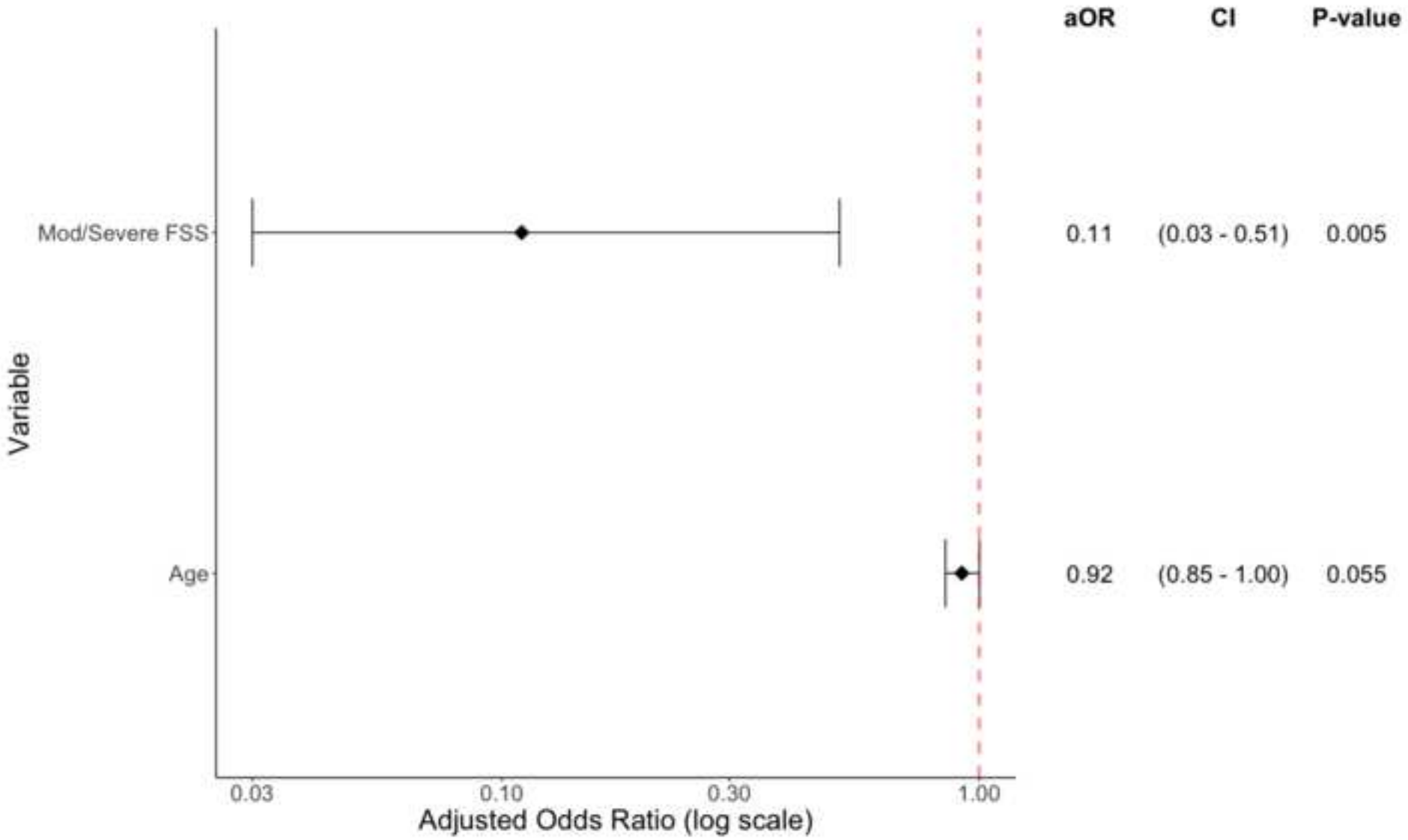

Figure 3

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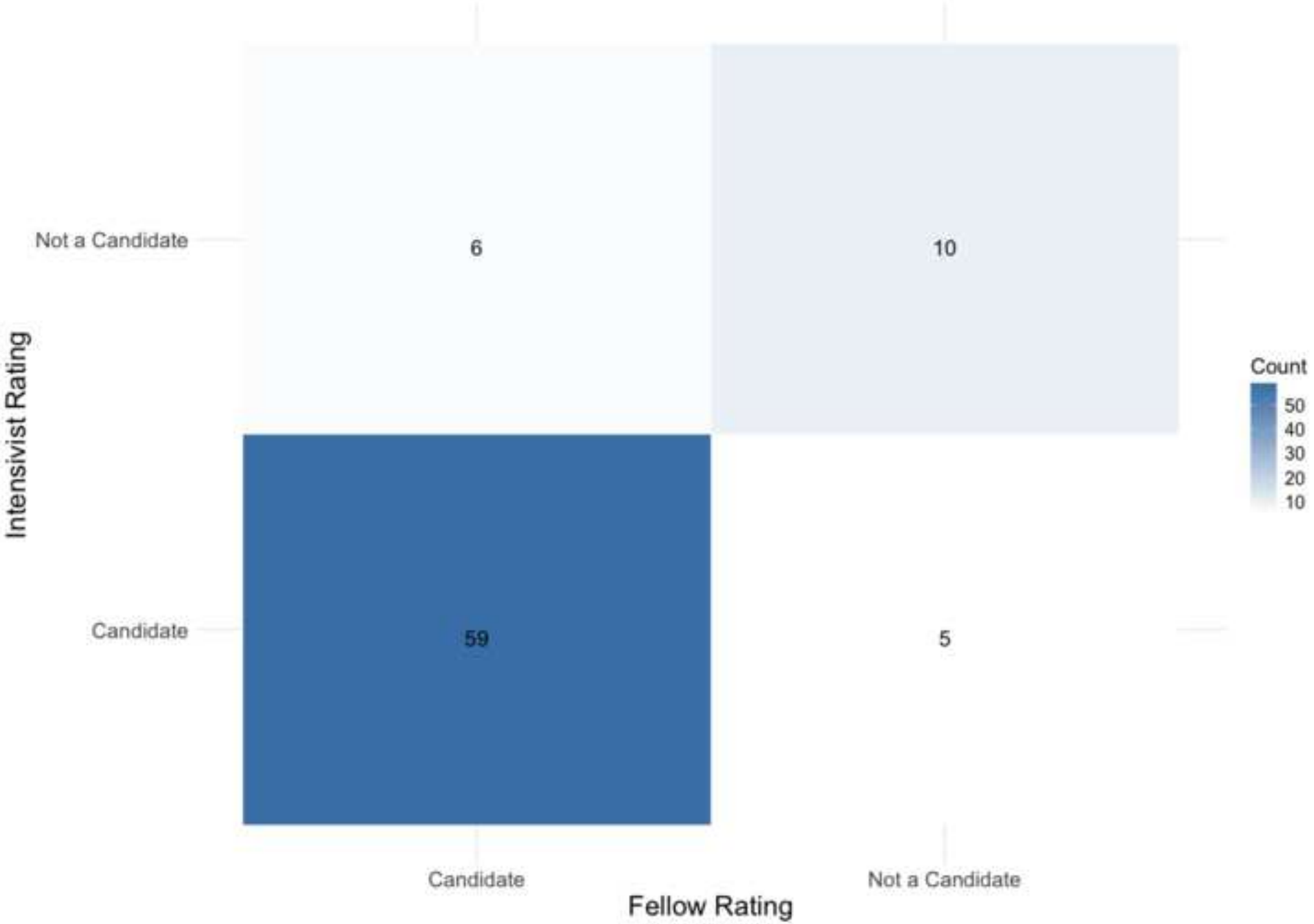

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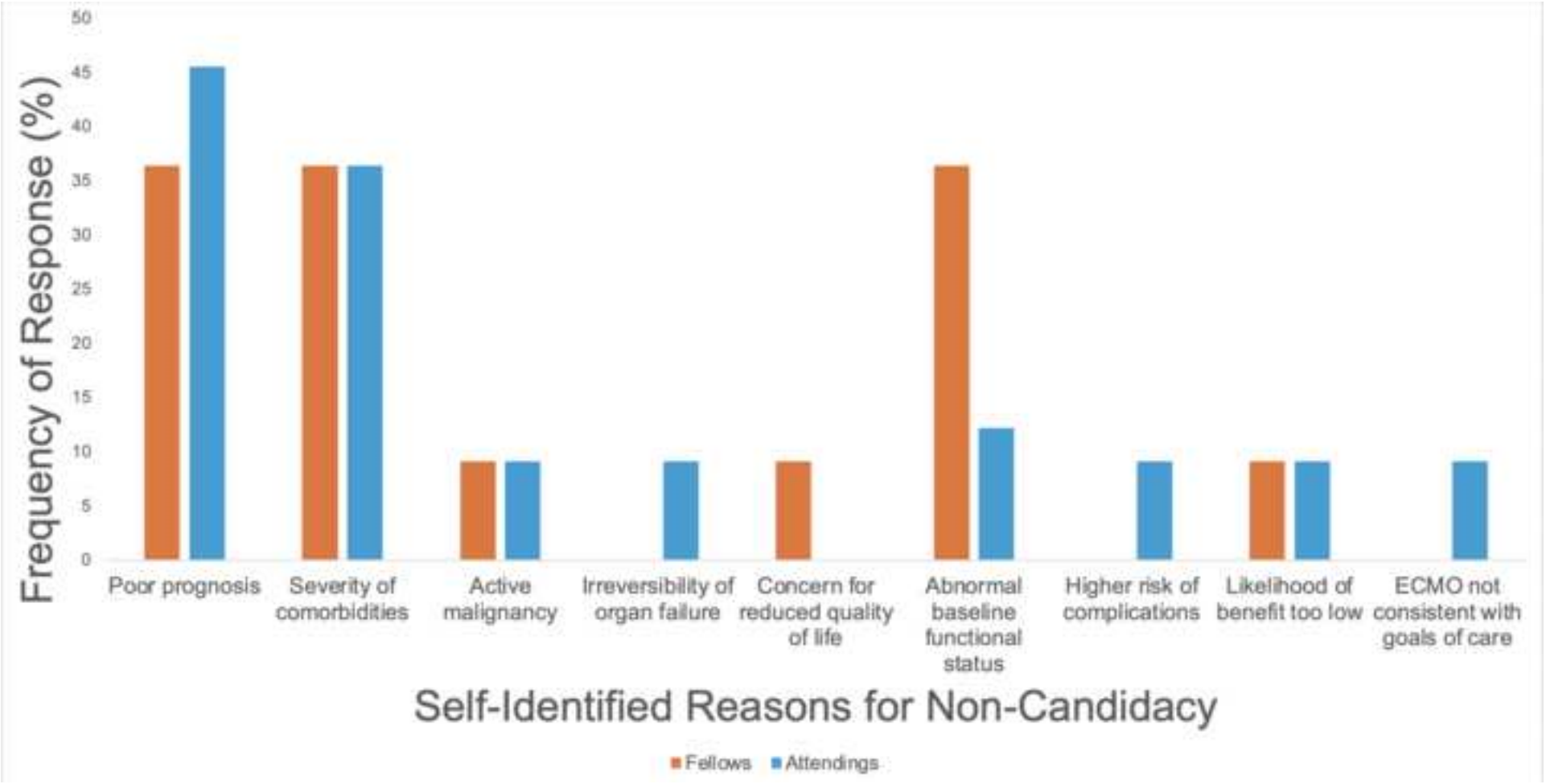

Table 1: Patient characteristics of all pediatric critical care fellow physician responses (N = 80)

Variable	Value
Age (years), median (IQR)	3.5 (1.1 – 9.0)
Gender, n (%)	
Male [a]	48 (60%)
Race, n (%)	
American Indian or Alaska Native	1 (1.3%)
Asian	3 (3.8%)
Black or African American	16 (20.0%)
Other/Mixed	14 (18%)
Unspecified	4 (5.0%)
White	42 (53%)
ECMO Candidacy, n (%)	
Candidates	65 (81%)
Non-Candidates	15 (19%)
Functional Status Score	
All patients, median (IQR)	7 (6-12.3)
Normal or mild dysfunction (FSS 6-12), n (%)	60 (75%)
Moderate or Severe dysfunction (FSS 13-30), n (%)	20 (25%)
Co-morbidities, n (%)	
Previously Healthy	12 (15%)
Chronic Respiratory Failure	25 (31%)
Developmental delay or disorder	25 (31%)

Epilepsy or history of seizure	18 (23%)
Cardiac disease or dysfunction	17 (21%)
Endocrinopathy	16 (20%)
Genetic syndrome	16 (20%)
Prematurity	16 (20%)
Chronic Lung Disease or BPD	14 (18%)
Pulmonary Hypertension	14 (18%)
Severity of Illness Measures, median (IQR)	
PIM 3 score	-3.870 (-4.293 to -3.250)
PIM 3 Risk of Mortality (%)	2.0 (1.4 – 3.7)
PRISM 3 score	6.5 (2.0 – 12.0)
Previous PICU Admissions, n (%)	18 (23%)

Supplemental Table 1: Characteristics of pediatric critical care fellow and attending physician study participants.

Variable	Value
Physician Participants, n	
Fellow	21
Attending	31
Pediatric Critical Care Experience Level (years), median	
Fellow	2
Attending	5 – 10
Pediatric Critical Care Experience Levels for Fellows, n (%)	
0 to < 1 year	9 (43%)
1 to < 2 years	6 (29%)
2 to < 3 years	6 (29%)
Pediatric Critical Care Experience Levels for Attendings, n (%)	
Less than 3 years	11 (36%)
3 to < 5 years	2 (6.5%)
5 to < 10 years	10 (33%)
10 to < 15 years	6 (18%)
More than 15 years	2 (6.5%)
Average number of Responses per Clinician, n	
Fellow	3.8
Attending	2.6

Supplemental Table 2: Patient demographics and characteristics comparison of non-ECMO and ECMO candidates as assessed by pediatric critical care fellow physicians.

Variable	Total (N=80)	Non-ECMO Candidates (N=15)	ECMO-candidates (N=65)	p-value
Age (years), median (IQR)	3.5 (1.1-9.0)	7 (4.5-14.0)	2.9 (0.9-8.0)	0.008
Sex, n (%)				0.14
Male	48 (60%)	12 (80%)	36 (55%)	
Female	32 (40%)	3 (20%)	29 (45%)	
Race, n (%)				0.62
American Indian or Alaska Native	1 (1.3%)	0 (0%)	1 (2%)	
Asian	3 (3.8%)	1 (7%)	2 (3%)	
Black or African American	16 (20%)	5 (33%)	11 (17%)	
Other/Mixed	14 (17.5%)	2 (13%)	12 (18%)	
Unspecified	4 (5%)	0 (0%)	4 (7%)	
White	42 (52.5%)	7 (47%)	35 (54%)	
Admission FSS Score, median (IQR)	7 (6-12.3)	16 (11-21)	6 (6-23)	0.002
Admission FSS Category, n (%)				0.003
Normal to Mild Dysfunction	55 (68.7%)	5 (33.3%)	50 (76.9%)	
Moderate Dysfunction	25 (31.3%)	10 (66.7%)	15 (23.1%)	
Comorbidities, n (%)				
Previously Healthy	12 (15%)	1 (7%)	11 (17%)	
Prematurity	16 (20%)	3 (20%)	13 (20%)	
Pulmonary Hypertension	14 (17.5%)	2 (13%)	12 (18%)	
Chronic Lung Disease	14 (17.5%)	3 (20%)	11 (17%)	
Hematologic Disease, non-oncologic	4 (5%)	3 (20%)	1 (2%)	
Oncologic diagnosis, solid	9 (11.3%)	3 (20%)	6 (9%)	
Oncologic diagnosis, liquid	4 (5%)	0 (0%)	4 (6%)	
SCT or BMT transplant recipient	1 (1.3%)	0 (0%)	1 (2%)	
Solid organ transplant recipient	0 (0%)	0 (0%)	0 (0%)	
Kidney disease (acute or chronic)	12 (15%)	5 (33%)	7 (10.8%)	
Epilepsy or history of seizure	18 (22.5%)	6 (40%)	12 (18%)	
Cerebral palsy	6 (7.5%)	1 (7%)	5 (8%)	
Developmental delay or disorder	25 (31.3%)	7 (47%)	18 (27.8%)	
HIE	4 (5%)	2 (13%)	2 (3%)	
Neuromuscular disorder	6 (7.5%)	1 (7%)	5 (8%)	
Thoracic insufficiency syndrome or neuromuscular scoliosis	4 (5%)	0 (0%)	4 (6%)	
Genetic syndrome	16 (20%)	2 (13%)	14 (22%)	
Chronic static encephalopathy	2 (2.5%)	0 (0%)	2 (3%)	
Hydrocephalus	8 (10%)	3 (20%)	5 (8%)	
Endocrinopathy	16 (20%)	9 (60%)	7 (11%)	
Chronic Respiratory Failure	25 (31.3%)	8 (53%)	17 (26%)	
Asthma or reactive airway disease	10 (12.5%)	3 (20%)	7 (11%)	
Cystic Fibrosis	1 (1.3%)	0 (0%)	1 (2%)	
History of ECMO	1 (1.3%)	0 (0%)	1 (2%)	
History of cardiac arrest	3 (3.8%)	2 (13%)	1 (2%)	
Cardiac disease or dysfunction	17 (21.3%)	4 (27%)	13 (20%)	
Chronic feeding intolerance or intestinal failure	6 (7.5%)	2 (13%)	4 (6%)	

Supplemental Table 3: Univariable logistic regressions for the outcome of ECMO candidacy.

Variable	OR (95% CI)	p-value
Age	0.89 (0.82- 0.96)	0.003
Gender		
Male	Ref	
Female	3.22 (0.82- 12.73)	0.090
Race		
White	Ref	
Black or African American	0.44 (0.11- 1.77)	0.200
All Other	1.26 (0.32- 5.00)	0.700
PIM3 Score	0.61 (0.41- 0.91)	0.020
Functional Status Category		
Normal or mild dysfunction (FSS 6-12)	Ref	
Moderate or severe dysfunction (FSS >13)	0.11 (0.03 - 0.51)	0.001
Comorbidity		
Healthy	2.85 (0.31 - 26.39)	0.356
Chronic Respiratory Failure	0.31 (0.15 - 0.66)	0.003
Developmental delay or disorder	0.44 (0.17 - 1.12)	0.085
Epilepsy or history of seizure	0.34 (0.08 - 1.43)	0.140
Cardiac disease or dysfunction	0.69 (0.20 - 2.36)	0.551
Endocrinopathy	0.08 (0.02 - 0.27)	< 0.001
Genetic syndrome	1.78 (0.58 - 5.50)	0.313
Prematurity	1.00 (0.20- 4.97)	1.000
Chronic Lung Disease or BPD	0.81 (0.35 - 2.16)	0.680
Pulmonary Hypertension	1.47 (0.35 - 6.18)	0.598
Kidney disease (acute or chronic)	0.24 (0.07 - 0.86)	0.029
Cerebral Palsy	1.17 (0.13 - 11.36)	0.894
Neuromuscular disorder	1.17 (0.13 - 10.53)	0.891
IVH	0.43 (0.07 - 2.53)	0.348
History of cardiac arrest	0.10 (0.01 - 1.26)	0.075

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