

Effect of Transfer on Nosocomial Infection Rates in Patients Receiving Extracorporeal Membrane Oxygenation

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Disclosures

None

The views expressed are those of the author and do not reflect the official views or policy of the Department of Defense or its Components.

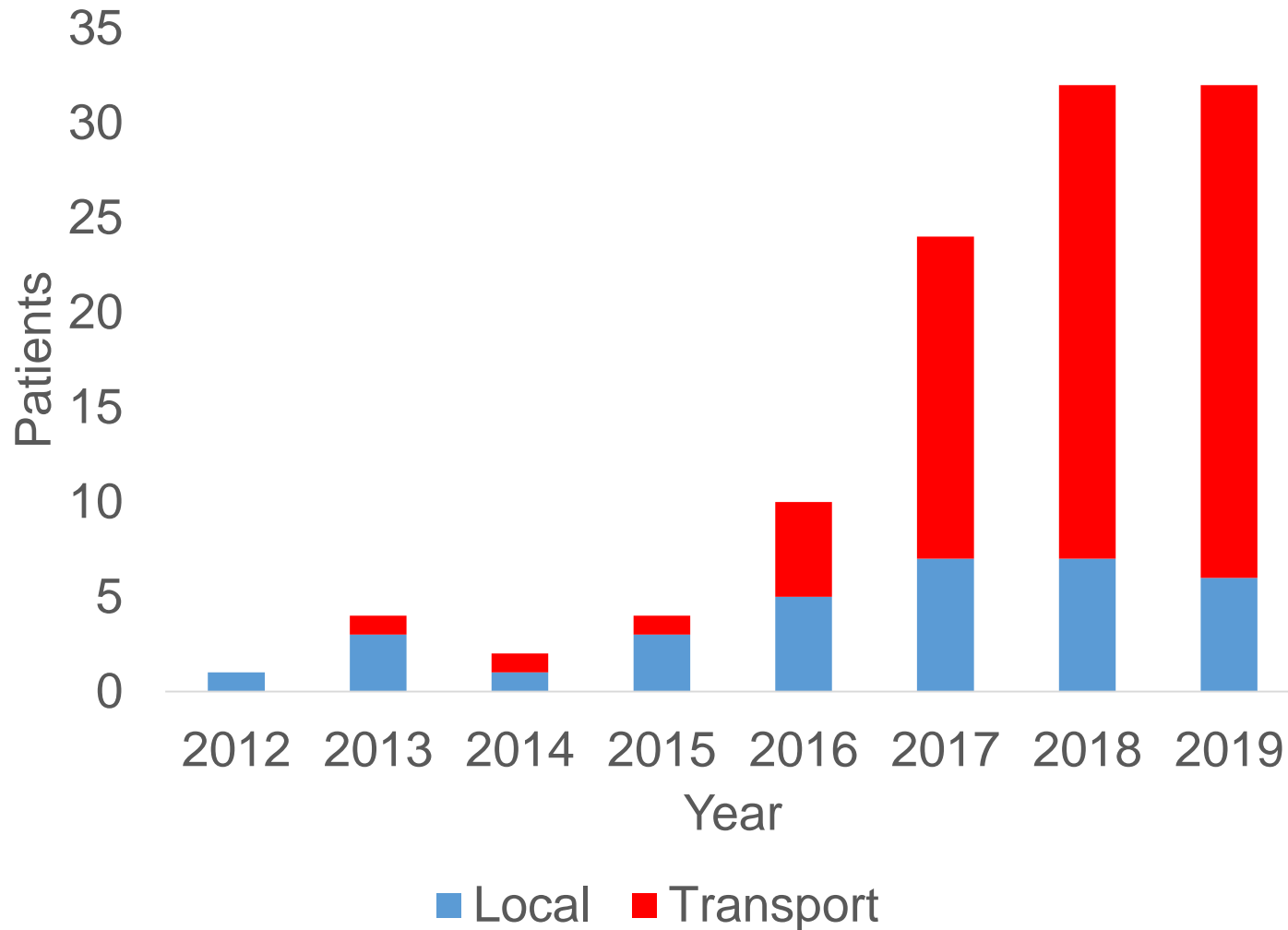
Background-ECMO

- ECMO provides life support for reversible pulmonary or cardiac failure
- Provides oxygenation, ventilation and/or blood pressure support
- Originally used in pediatrics, growth in adults starting with Avian flu epidemic in 2009

Background-ECMO Infections

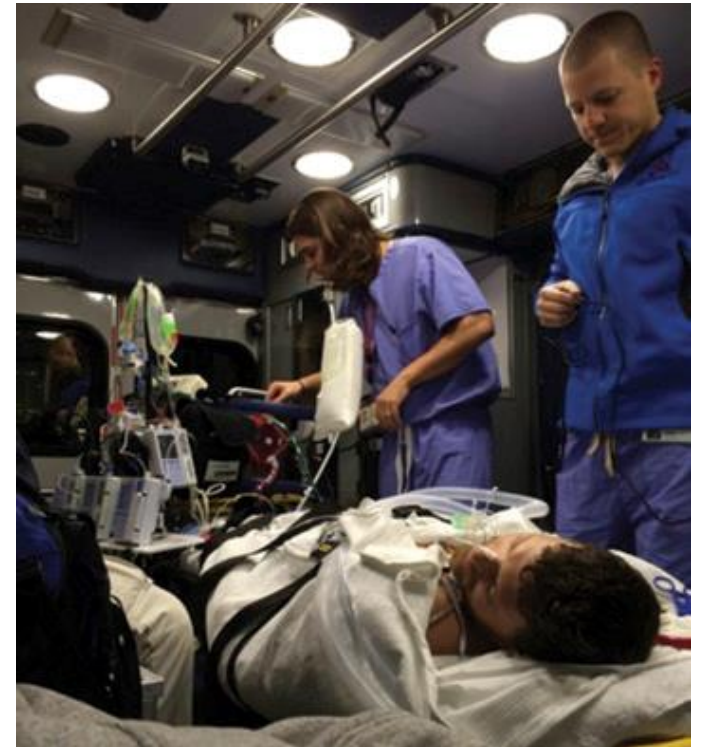
- Infections on ECMO are common (national average: 30 infections/1000 patient days)
- Infections on ECMO have antibiotic challenges
- Transport associated with multidrug resistant organisms (MDRO) in military literature
- No study determining if ECMO transport is associated with increased infections or increased MDRO rates

BAMC ECMO patients by year (through Oct 2019)



Question

Is interhospital transfer associated with an increase in subsequent nosocomial infections and drug resistance for patients on ECMO?



Hypothesis

- Transport = more nosocomial infections
- Transport = more MDROs
- Farther transfer = more nosocomial infections than local transport

Study Design

- Single Center Retrospective Cohort Study
- Inclusion (n=158):
 - Adults (age >18) who received ECMO between start of ECMO program at BAMC and October 2019
- Exclusion (n=49, 31%)
 - Burn patients (n=26)
 - <48 hours of ECMO (n=12)
 - transported by BAMC personnel between hospitals, but did not receive care at BAMC (n=11)

Methods

- Collected: Admission diagnosis, transport status, demographic, time on ECMO, and infectious complications
- Comparisons:
 - local cannulation vs. transfer,
 - ground transport vs. fixed wing transport
- Stats:
 - Nominal variables: Chi Squared or Fisher's Exact as appropriate
 - Continuous variables: Mann Whitney U test
 - Significant variables underwent multivariate analysis

Local cannulation and transport demographics

	Local Cannulation (n=33)	Interhospital Transfer (n=76)	P-value
Male	25 (75%)	54 (71%)	0.61
Median age	43 (33-59)	39 (30-51.5)	0.11
Pre-ECMO Hospital Days	4 (0-12)	4 (2-9.25)	0.53
Median time on ECMO (hr)	161 (93-326)	262.5 (119.25-569.25)	0.04
Survived to discharge	20 (61%)	60 (79%)	0.05
Admission Diagnosis			0.01
Cardiac Diagnosis	5 (15%)	8 (11%)	
Medical Diagnosis	16 (48%)	58 (76%)	
Surgical Diagnosis	12 (36%)	10 (13%)	
ECMO Setting			0.01
VV	24 (73%)	70 (92%)	
VA	8 (24%)	4 (5%)	
VAV	1 (3%)	2 (3%)	

No difference seen in infection or MDRO rates

	Local Cannulation (n=33)	Interhospital Transfer (n=76)	P-value
Any Infection	9 (27%)	33 (44%)	0.1
Multiple infections	2 (6%)	8 (11%)	0.72
Total Infections/1000 ECMO days	33.1	30.5	0.74
Days to Pos Blood Culture	6 (3-9)	20 (7-22)	0.23
Days to Respiratory Infection	2 (1-4.5)	4 (1-17.5)	0.25
Any MDRO	4/8 (50%)	17/31 (55%)	1

No difference seen in infection or MDRO rates

	Local Cannulation (n=33)	Interhospital Transfer (n=76)	P-value
Any Infection	9 (27%)	33 (44%)	0.1
Multiple infections	2 (6%)	8 (11%)	0.72
Total Infections/1000 ECMO days	33.1	30.5	0.74
Days to Pos Blood Culture	6 (3-9)	20 (7-22)	0.23
Days to Respiratory Infection	2 (1-4.5)	4 (1-17.5)	0.25
Any MDRO	4/8 (50%)	17/31 (55%)	1

Confounders do not explain lack of difference

- Differences seen in baseline demographics of transport group vs. no transport group
- Subsequent univariate analysis showed no difference in infectious rate between transferred and non-transferred patients amongst:
 - Medical, cardiac, or surgical diagnosis
 - VV, VA, and VA-V setting

Risk of nosocomial infections also not significant for transport by multivariate analysis

		OR (95% CI)	P Value
Hours on ECMO			
	50 to 100	1	
	100 to 350	5.3 (1.56-25.38)	0.005
	350 to 2200	12.2 (2.5-60.45)	0.001
Admission Diagnosis			
	Medical	1	
	Cardiac	0.61 (0.12-2.61)	0.5
	Surgical	2.95 (1.38-5.98)	0.006
ECMO Setting			
	VV	1	
	VA or VAV	5.87 (1.38-24.32)	0.02
Transport			
	No transfer	1	
	Interhospital Transfer	2.17 (0.98-5.35)	0.06

No dose effect with longer travel time and infectious or MDRO risk

	Ambulance Transfer Only (n=65)	Fixed wing Aircraft Transfer (n=11)	P-value
Any Infection	29 (45%)	4 (37%)	0.75
Multiple infection	5 (8%)	3 (27%)	0.09
Total Infection/1000 ECMO days	31.8	22.4	0.39
Days to Pos Blood Culture	20 (9-22)	22 (11.5-34.5)	0.86
Days to Respiratory Infection	5 (1-15.25)	5 (2.5-29.5)	1
Any MDRO	14/27 (52%)	3/4 (75%)	0.61

Discussion

- Overall nosocomial infection rate, similar to national average and reported values
- Interhospital transfer is not a driver of infections in this population
- Despite high rate of MDRO, not increased in transferred patients
- Limitations: Small study size, differences between in demographics between two groups

Conclusion

At our center, there does not appear to be a significant increased infectious risk associated with interhospital transfer. This study further supports the feasibility and safety of transport programs to move patients to ECMO centers for treatment

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Questions