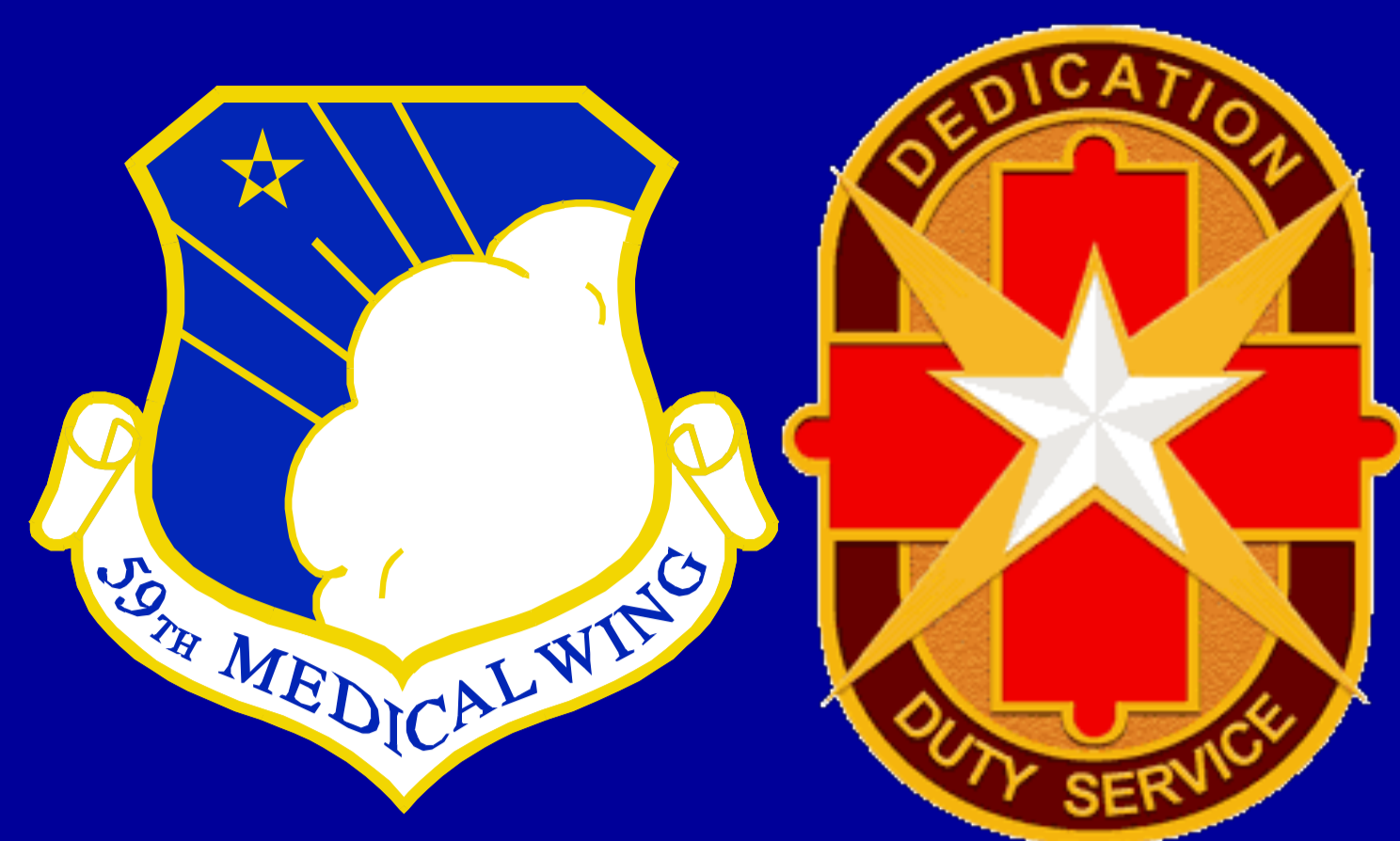


Infections Complicating Trauma Patients Receiving Extracorporeal Membrane Oxygenation

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Introduction

- Indications for ECMO have expanded with recent increased use in trauma
- Trauma patients with infections are associated with a longer length of stay, greater hospitalization cost, and higher hospital mortality compared to patients without infections
- Infection is also common complication of ECMO with risk factors including longer cannulation duration and immunocompromised state.
- There is limited research describing the types of infectious complications of trauma patients requiring ECMO therapy.

Methods

- Retrospective chart review of all patients admitted for traumatic injuries who received ECMO at Brooke Army Medical Center between February 2013 and July 2021
- Infections defined by primary team

Results

Table 1: Characteristics of 21 trauma patients who developed infection post-cannulation for ECMO therapy at BAMC 2013-2021

Age (years), median [IQR]	30 [27-38]
Sex (male)	18 (86%)
Body Mass Index*, median [IQR]	26.9 [24.5-34.5]
Time from Admission to ECMO Cannulation (days), median [IQR]	0 [0-4.75]
Time from Admission to Infection (days), median [IQR]	5 [1-7.75]
Time on ECMO (days), median [IQR]	9.8 [3.9-14.1]
Hospital LOS (days), median [IQR]	35.5 [17-69]
Survival to discharge	16 (76%)

Table 1 (continued): Characteristics of 21 trauma patients who developed infection post-cannulation for ECMO therapy at BAMC 2013-2021

Mechanism of Injury:	
MVC	17 (81%)
Gunshot wound	2 (10%)
Blast	1 (5%)
Fall	1 (5%)
Injury Severity Score, median [IQR]**	31 [18.3-40.3]
< 15	2 (11%)
15- 40	11 (61%)
> 40	5 (28%)
Total Sites of Injury per Patient**	5 [3-7]

Table 2: Characteristics of 24 Infections in Patients with Traumatic Injuries

Site	Infection Rate per 1000 ECMO Days	Gram-positive	Gram-negative	Fungal	Multi-drug Resistant Organism
Blood Stream	17.9	1 (25%)	3 (75%)	0	1 (25%)
Respiratory	58.1	4 (29%)	9 (43%)	1 (7%)	3 (21%)
Skin and Soft Tissue	26.8	2 (22%)	6 (66%)	1 (11%)	4 (44%)
Urinary Tract	4.5	0	1 (100%)	0	1 (100%)
Total	107.3	7 (25%)	19 (68%)	2 (7%)	9 (35%)

Table 3: Infectious Organisms Organized by Time after Cannulation and Site of Infection

Site of Infection	<2 Days after Cannulation	2-7 Days After Cannulation	>7 Days after Cannulation
Blood Stream	<i>Stenotrophomonas maltophilia*</i>	<i>Enterobacter cloacae</i>	<i>Enterococcus faecalis</i> <i>Pseudomonas aeruginosa</i>
Respiratory	<i>Klebsiella pneumoniae</i> <i>Pseudomonas aeruginosa</i> <i>Staphylococcus aureus*</i> <i>Staphylococcus aureus</i>	<i>Acinetobacter pittii</i> <i>Enterobacter cloacae*</i> <i>Enterobacter cloacae</i> <i>Haemophilus influenzae</i> <i>Klebsiella pneumoniae*</i> <i>Pseudomonas aeruginosa</i> <i>Serratia marcescens</i> <i>Staphylococcus aureus</i>	<i>Candida parapsilosis</i> <i>Staphylococcus aureus</i>
Skin and Soft Tissue	<i>Acinetobacter baumannii</i>	<i>Acinetobacter baumannii*</i>	<i>Enterococcus spp.*</i> <i>Mucorales</i> <i>Pseudomonas aeruginosa*</i> <i>Serratia marcescens*</i>
Urinary Tract		<i>Enterococcus faecalis*</i> <i>Klebsiella pneumoniae*</i> <i>Pseudomonas aeruginosa</i>	<i>Pseudomonas aeruginosa*</i>

Conclusions

- High rates of infections (107/1000 ECMO days) compared to non-traumatic cohorts (range: 15-70 infections/1000 ECMO days)
- High prevalence of Gram-negative organisms
- Reasons unknown, but may be related to gastrointestinal translocation, abdominal injuries, or environmental influences.
- Prior ECMO literature has shown the most significant risk factor for infection is time on the circuit. Interestingly, in our trauma patient population, the median time on ECMO was short (less than 10 days), but still showed a high rate of infection.

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