4CPS-323

EVALUATION OF FACTORS AFECTING MEROPENEM EXPOSURE AND TARGET ATTAINMENT IN CRITICALLY ILL PATIENTS ON ECMO

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BACKGROUND AND IMPORTANCE

Extracorporeal membrane oxygenation (ECMO) may impact the pharmacokinetics of β-lactams and dose adjustments might be necessary to achieve therapeutic target attainment (TA).

AIM AND OBJECTIVES

To assess variables influencing meropenem pharmacokinetics and TA in critically ill patients undergoing ECMO.

MATERIALS AND METHODS

Single-center prospective study (May 2022 – August 2025)

Adult ICU patients (> 18 years) receiving **meropenem 2g q8h** (3h-infusion) under **ECMO** support.

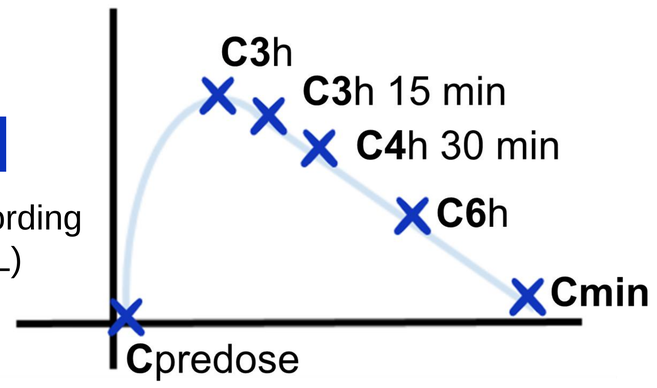
Categorical variables reported as n (%) and continuous variables reported as median (IQR). Statistical analyses were conducted with Jamovi software.

Trough serum concentrations (steady state) → HPLC-UV

TA was defined as:

Cmin>16 mg/L

4 x MIC for *Acinetobacter spp*, according to EUCAST breakpoints (4 mg/L)

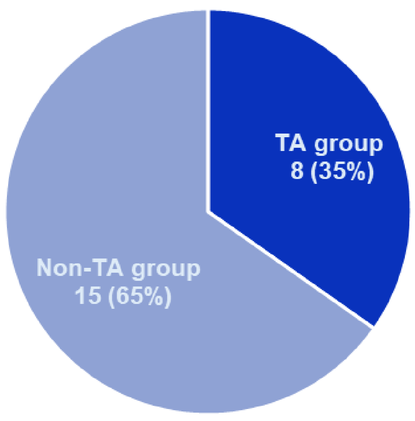


Cmin: Trough serum concentration
MIC: minimal inhibitory concentration

RESULTS

23 patients were included (56.5%) male

Classification according to target attainment



TA group: **Cmin 32.3** (26.1–51.8) mg/L

Non-TA group: **Cmin 6.7** (3.9–8.3) mg/L

Descriptive variables

	TA-group	Non-TA group
Sex: Male/Female	3 (37.5%)/5 (62.5%)	10 (66.7%)/5 (33.3%)
Age (years)	55.7 (53.1-62.7)	55.7 (53.1-62.7)
Body Mass Index (BMI)	29.0 (25.6-29.0)	26.9 (23.6-30.5)
ECMO type: V-V/V-A	6 (75%)/2 (25%)	14 (93.3%)/1 (6.7%)
Treatment: Empiric/Targeted	6 (75%)/2 (25%)	12 (80%)/3 (20%)
Mechanical Ventilation (VM)	7 (87.5%)	11 (73.3%)
Vasoactive Drugs (VAD)	6 (75%)	6 (40%)
ECMO 30-day mortality	2 (25%)	4 (26.7%)

No significant differences were found for these variables.

Renal function parameters

	TA-group	Non-TA group	p value
Creatinine (mg/dL)	1.2 (0.9-1.6) mg/dL	0.6 (0.4-0.6)	**0.003**
GFR CKD-EPI (ml/min)	92.8 (80.8-96.7)	125.8 (106.7-147.8)	0.066
GFR CG (ml/min)	103.8 (99.8-104.0)	175.1 (121.6-220.6)	0.176
GFR MDRD-6 (ml/min)	68.4 (61.4-75.6)	141.6 (102.7-190.2)	0.056
Diuresis (ml)	1657 (725.5-2927.5)	3186 (2460.0-3742.5)	**0.013**

- Glomerular filtration rate (GFR) was estimated using CKD-EPI, Cockcroft-Gault, and MDRD-6 equations.
- Diuresis was approximately twice as high in the non-TA group.
- All patients undergoing continuous renal replacement therapy achieved TA**.**
- **No patients with GFR > 130 mL/min achieved TA**, likely due to an augmented renal clearance.

GFR equations correlation with Cmin

CKD-EPI showed the strongest inverse **correlation with Cmin.**

	Pearson's R
GFR CKD-EPI	0.390
GFR CG	0.265
GFR MDRD-6	0.346

CONCLUSIONS AND RELEVANCE

TA achievement is mainly influenced by renal function parameters, with lower creatinine and increased diuresis associated with non-TA.

Many patients may be underdosed, highlighting the need for **further research on optimal dosing strategies in ECMO patients**.

30th EAHP CONGRESS BARCELONA 18-19-20 MARCH 2026