

MONITORING OF PLASMA CONCENTRATIONS OF NEBULIZED ANTIBIOTICS IN CRITICALLY ILL PATIENTS TREATED VANCOMYCIN AND TOBRAMYCIN

C. Martínez; A. Pau; L. Doménech; S. Garcia; M. Torres; E. Papiol; M. Diez; F.X. Nuvials; Y. Villena; L. Castellote; M.Q. Gorgas

BACKGROUND AND IMPORTANCE

- Nebulized antibiotics in respiratory infections enhance pulmonary exposure and reduce adverse effects.
- In critically ill patients, pharmacokinetics may be altered by organ dysfunction and advanced respiratory support.

AIM AND OBJECTIVES

To **evaluate systemic exposure** during treatment with **nebulized** vancomycin and tobramycin in **critically ill** patients.



MATERIALS AND METHODS

Observational study (March 2022 and March 2025)



1. Data collection:

- Biodemographic, clinical & laboratory variables
- Antibiotic through plasma concentrations

Vancomycin (Cp_Vanco) **Tobramycin (Cp_Tobra)**

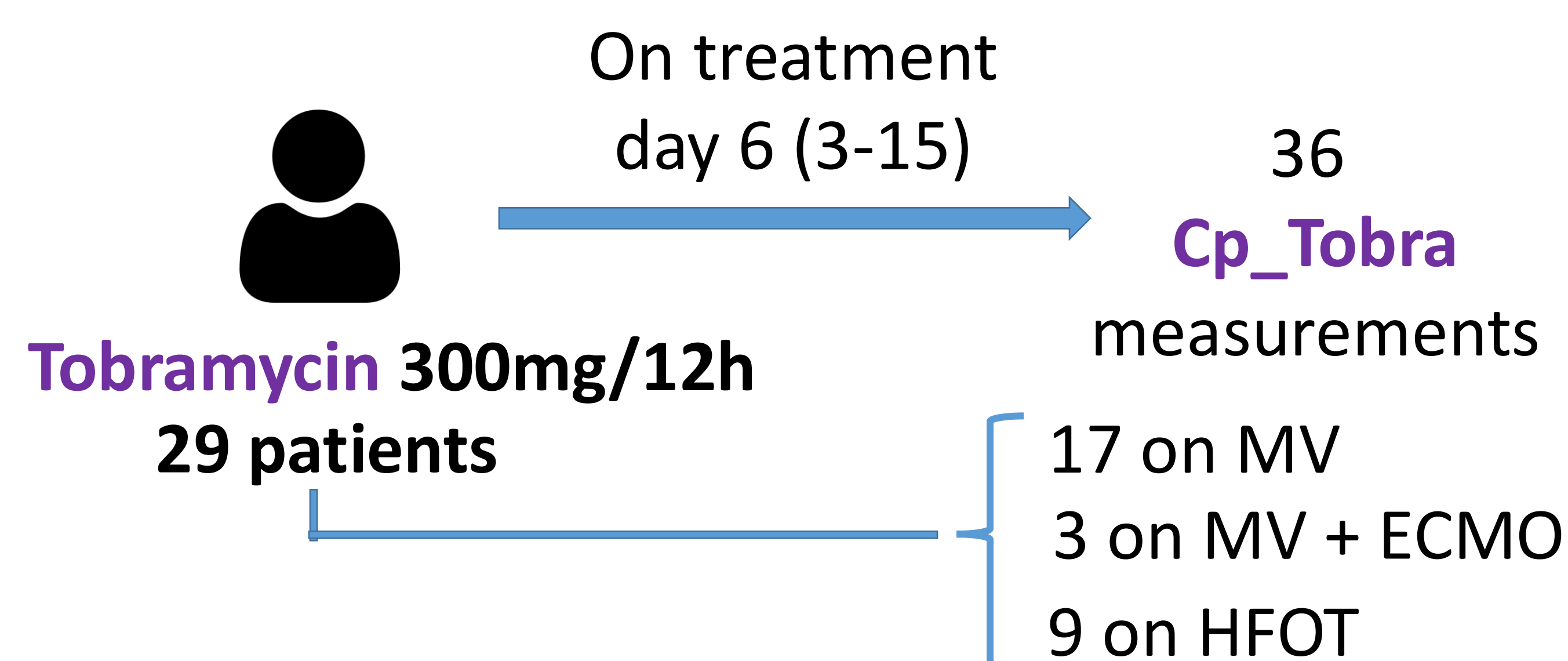
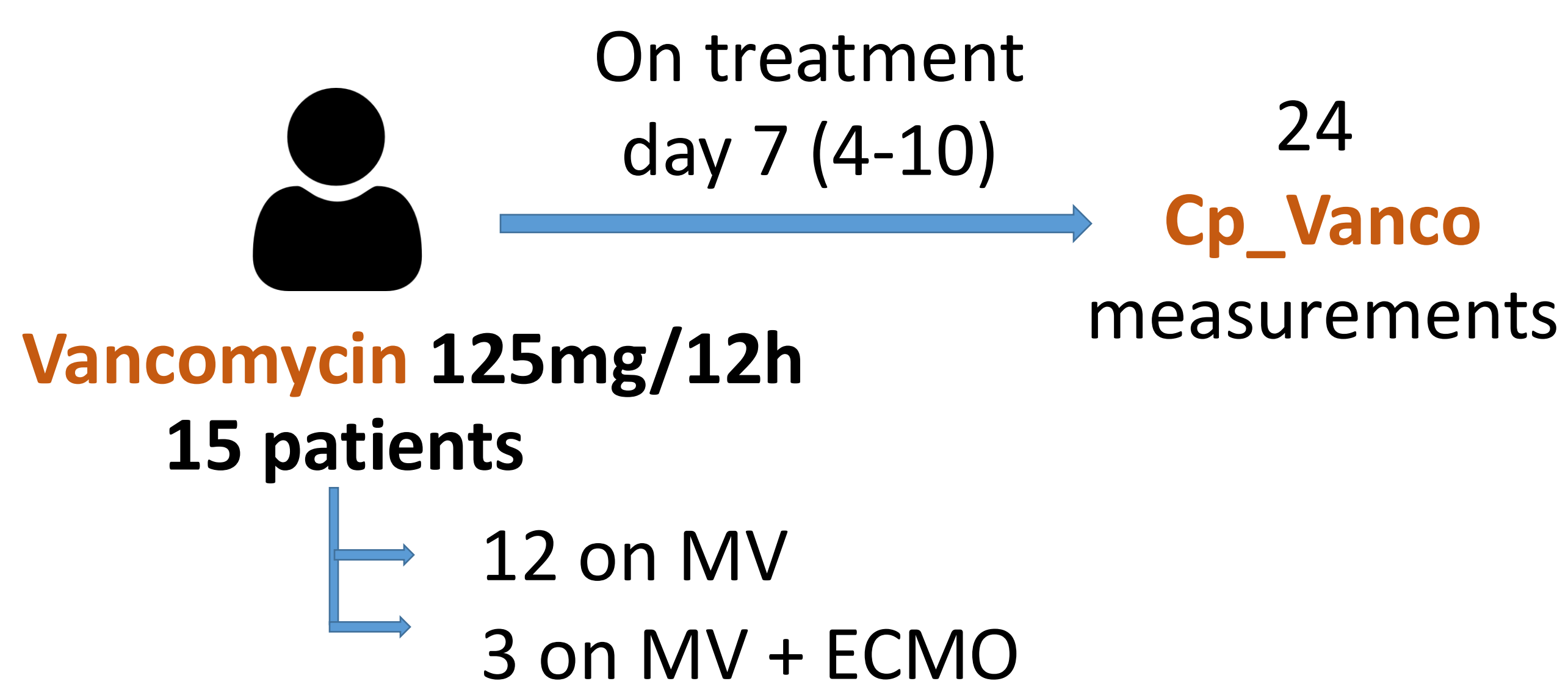
2. Analysis

Systemic exposure comparison by:

- ↳ Renal function
- ↳ Respiratory support type:

Mechanical ventilation (MV)
Extracorporeal Membrane Oxygenation (ECMO)
High-Flow Oxygen Therapy (HFOAT)

RESULTS



Systemic absorption (Cp_vanco > 0.1µg/mL)	20/24 samples (mean 0.9±0.7 µg/mL)
Differences between MV and MV + ECMO	No statistically significant (mean 1.1 vs 0.9µg/mL; p=0.57)
Exposure in GFR < 60 mL/min	Higher exposure (1.7 vs 0.9µg/mL; p=0.008)

Systemic absorption (Cp_tobra > 0.1µg/mL):	31/36 samples (mean 0.5 [0,2-1,5] µg/mL)
Therapeutic concentrations (Cp_tobra > 0.5µg/mL)	17/36 samples (47%)
Concentration differences between MV and HFOT	MV > HFOT (0.7 vs 0.2 µg/mL; p=0.03) Proportion of Cp_tobra > 0.5µg/mL: MV (67%) > HFOT (14%); p=0.03
Exposure in GFR < 60 mL/min	No differences (0.4 vs 0.6µg/mL; p=0.23)

CONCLUSIONS AND RELEVANCE

- Nebulized vancomycin shows minimal systemic exposure, though renal impairment increases levels.
- Nebulized tobramycin achieves plasma concentrations comparable to intravenous regimens, particularly in MV patients.
- Further studies should assess its impact on resistance.
- Monitoring of nebulized antibiotics is important to assess potential toxicity, therapeutic exposure and the need for safety surveillance.

