

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

High rate of respiratory MDR gram-negative bacteria in H1N1-ARDS treated with ECMO.

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/140325> since

Published version:

DOI:10.1007/s00134-013-3012-y

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

This is the author's final version of the contribution published as:

De Rosa FG;Corcione S;Pagani N;Stella ML;Urbino R;Di Perri G;Ranieri VM. High rate of respiratory MDR gram-negative bacteria in H1N1-ARDS treated with ECMO.. INTENSIVE CARE MEDICINE. 39 (10) pp: 1880-1881.

DOI: 10.1007/s00134-013-3012-y

The publisher's version is available at:

<http://link.springer.com/content/pdf/10.1007/s00134-013-3012-y>

When citing, please refer to the published version.

Link to this full text:

<http://hdl.handle.net/2318/140325>

High Rate of Respiratory MDR Gram-negative Bacteria in H1N1-ARDS treated with ECMO

Francesco G. De Rosa^{*}, Silvia Corcione, Nicole Pagani,
Maria Laura Stella, Rosario Urbino, Giovanni Di Perri, V. Marco Ranieri

* Francesco G. De Rosa, MD
Associate Professor,
Infectious Diseases Department,
University of Turin, Italy
Ospedale Amedeo di Savoia
Corso Svizzera 164
10149 Torino
tel. +39 011 4393979
fax. +39 011 4393996
email: francescogiuseppe.derosa@unito.it

Key words: H1N1, ECMO, infections, antibiotic,

Funding : No specific funding was received as a support by the authors.

Transparency Declarations: No conflict of interest

Dear Editor,

During the H1N1 viral respiratory epidemic some patients required admission to the Intensive care unit (ICU) and ECMO was sometimes used after failure of mechanical ventilation (1,2). Infectious complications of ECMO are ranked second after haemorrhagic complications, and are mainly represented by bloodstream infections (BSI) with Gram-positive cocci (3,4). We report the main clinical and microbiological findings of 16 patients (Table 1) with H1N1-ARDS treated with or without ECMO, according to the Italian guidelines (2,5).

All patients were treated with empiric antibiotic treatment and oseltamivir. ECMO was used for 15.14 ± 14.01 days (range, 7-46) after a mean of 1.9 days of mechanical ventilation. Respiratory samples were positive during the ICU stay in seven patients: five (71.4%) in ECMO group (multi-drug resistant (MDR) *P. aeruginosa*, MDR *S. maltophilia*, *S. marcescens*, MDR *A. baumannii*, *K. pneumoniae* producing carbapenemases (KPC) and *Aspergillus fumigatus*) compared to two (22.2%) in the no-ECMO group (two *A. baumannii* isolates) ($p=0.04$). There was only one positive blood culture for *S. marcescens* in the ECMO group. The mortality was 28.6% and 44.4% in patients treated with or without ECMO, respectively. An infection was the probable cause of death in all patients who died. A possible fungal infection by *A. fumigatus* was responsible for one death.

Selective antibiotic pressure We investigated the possible role of selective antibiotic pressure as a predisposing factor for the isolation of respiratory MDR Gram-negative bacteria. The mean daily defined doses (DDD_s) at 14 days were 347 Vs. 1020 ($p=0.04$) for meropenem and 316 Vs. 632 ($p=0.012$) for levofloxacin in the ECMO Vs. no-ECMO group, respectively. By converse, vancomycin and linezolid DDD_s were higher in the ECMO group compared to the no-ECMO group: 138 Vs. 102 and 561 Vs. 122, respectively (not significant).

The rate of infections during ECMO varies from 7.5% to 45.5% and are more often caused by MDR bacteria isolated from the bloodstream (4,5). In our ECMO patients the isolation of respiratory MDR Gram-negative bacteria may be due to the specific setting of H1N1 syndrome probably favoured by the mechanical ventilation, the comorbidities but not by a significantly higher antibiotic consumption against Gram-negatives. In conclusion, notwithstanding the low number of H1N1 patients, we found that in ECMO patients there is a significantly higher rate of respiratory MDR Gram-negative bacteria which is not explained by an excessive selective antibiotic pressure, suggesting that H1N1 infection and ICU stay are more important as risk factors compared to the ECMO support itself.

Table 1. Demographics and clinical characteristics of patients treated without or with ECMO.

Variable	NO ECMO (n=9)	ECMO (n=7)
Age, mean (SD)	58 \pm 15.6	35.5 \pm 11.1
Male sex, n (%)	3 (33.3)	5 (71.4)
BMI, n (%)		
\geq 40	0	2 (28.6)
30-39	3 (33.3)	5 (71.4)
Comorbidities, n (%)	7 (77.8)	2 (28.6)
- Asthma	2 (22.2)	1 (14.3)
- COPD	1 (11)	0
- Cardiovascular diseases	3 (33.3)	0
- Chronic Renal Failure (CRF)	0	1 (14.3)
- Diabetes	2 (22.2)	0
- Haematologic disease	4 (44.4)	1 (14.3)
- Solid organ cancer	1 (11)	1 (14.3)
APACHE II Score, mean (SD)	21.3 \pm 4.5	14.8 \pm 7
P/F on ICU admission, mean (\pm SD)	89 \pm 42.8	73 \pm 24.1
Mortality, n (%)	4 (44.4)	2 (28.6)
Duration of hospital stay (days)		
ICU	14.5 (1-44)	28.2 (9-63)
Total	19.6 (6-49)	31.57 (18-66)
ECMO support	-	15.1 (7-46)

References

- [1]. De Rosa FG, Montrucchio C, Di Perri G. Management of H1N1 influenza virus respiratory syndrome. *Minerva Anesthesiol.* 2009;75(11):654-60.
- [2]. Zangrillo A, Biondi-Zoccai G, Landoni G, Frati G, Patroniti N, Pesenti A et al. Extracorporeal membrane oxygenation (ECMO) in patients with H1N1 influenza infection: a systematic review and meta-analysis including 8 studies and 266 patients receiving ECMO. *Crit Care* 2013;17: R30.
- [3]. Vogel AM, Lew DF, Kao LS, Lally KP. Defining risk for infectious complications on extracorporeal life support. *Journ of Ped Surgery* 2011; 47: 2260-2264.
- [4]. Aubron C, Cheng AC, Pilcher D, Leong T, Magrin G et al. Infections acquired by adults who receive extracorporeal membrane oxygenation: risk factors and outcome. *Infect Control Hosp Epidemiol.* 2013;34:24-30.
- [5]. Patroniti N, Zangrillo A, Pappalardo F, Peris A, Cianchi G, Braschi A et al. The Italian ECMO network experience during the 2009 influenza A(H1N1) pandemic: preparation for severe respiratory emergency outbreaks. *Intensive Care Med.* 2011;37:1447-57.