

## Infection in ECMO Patients



The use of extracorporeal membrane oxygenation (ECMO) has risen significantly as a rescue therapy for respiratory issues, including those caused by viral infections. Patients on ECMO frequently experience complications like thrombotic events and major bleeding, which are considered ECMO-related issues. However, infections are typically attributed to the patient's underlying condition rather than ECMO itself.

A literature search was conducted online in databases including MEDLINE/PubMed, EMBASE, Web of Science, and Scopus, covering studies published from January 2011 to April 2023. The search used appropriate keywords to identify relevant research articles.

Research on healthcare-associated infections (HAI) during ECMO is primarily retrospective and characterised by varying study designs and definitions, as well as diverse patient populations. Notably, there is a consistent finding that longer ECMO duration is associated with a higher incidence of HAI.

Diagnosing infections in ECMO patients can be challenging due to the potential inflammatory effects of the ECMO device, especially with older silicon oxygenators. Clinical signs may be hard to interpret, and a change in temperature alone should not be relied upon as an indicator of infection, as patient temperature is influenced by ECMO circuit heat loss and heat exchanger settings.

In the past, cases of primary bloodstream infections (BSI), which may involve catheter and ECMO-device infections, were primarily caused by Gram-positive and *Candida* species. Secondary BSI cases, often from ventilator-associated pneumonia (VAP), were mostly associated with Gram-negative species, particularly *Acinetobacter baumannii*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*. However, recent years have seen an increase in Gram-negative BSI cases and a growing presence of multidrug-resistant (MDR) bacteria and fungi, mainly *Candida* species, in ECMO-related hospital-acquired infections.

While there are no specific guidelines for optimising antimicrobial dosing during ECMO, it's important to consider potential pharmacokinetic (PK) changes associated with this therapy. ECMO can lead to increased volume of distribution, which may compromise treatment effectiveness, especially when combined with continuous renal replacement therapy. This situation represents an unaddressed clinical challenge. Consequently, some ECMO patients may benefit from therapeutic drug monitoring to prevent toxicity and adverse effects.

Preventing nosocomial infections (NI) in ECMO-supported patients is crucial due to the complexity of diagnosis and associated morbidity and mortality. Practices related to hygiene and ICU infection prevention bundles vary across different medical centres, and in many studies, these practices are not well-documented. Some centres have not included oral and selective digestive decontamination (SOD and SDD) in their ventilator bundles. The authors recommend strengthening these strategies, especially in light of the high incidence of VAP.

Infections have a significant clinical impact on ECMO patients, particularly in septic adults with extended ECMO support, who face a higher risk of death. VAP and BDI are the primary reported infection sites. Infections related to the ECMO device and cannulas may be underdiagnosed. There is a pressing need for standardised definitions of healthcare-associated infections in ECMO patients.

Identifying risk factors and implementing effective prevention and treatment measures are crucial. Infection control practices, minimising device duration, reducing antibiotic use, and maintaining sterility are vital. Innovations in oxygenator membranes should be considered, and clearer definitions, improved infection control strategies, and updated clinical guidelines are needed for optimal ECMO management.

Source: [Anaesthesia Critical Care and Pain Medicine](#)

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