

# INNOVATIVE CONCEPTS IN MECHANICAL VENTILATION

**R**ecent pandemics, such as SARS, bird flu and swine flu, all had in common that the main impact was on the lungs of those affected, and Buchsein predicted that the next pandemic is likely to share this characteristic. This, and the trend for increasing numbers of older patients, means that air ambulance providers are likely to see increasing numbers of patients with severe lung failure. Of around 500 cases per year that FAI sees, around 23 per cent require mechanical



**Thomas Buchsein**  
Medical Director, FAI  
rent-a-jet

ventillation. For dealing with such cases, Buchsein stressed the importance of having well-trained staff and carrying a blood gas analyser in flight. Implementing an in-flight bronchoscopy capability is also worth considering. When even advanced mechanical ventilation techniques are no longer sufficient for the gas exchange required by a patient, devices for extra-corporeal

oxygenation may be an appropriate solution, he said, referred to variously as extra-corporeal membrane oxygenation (ECMO), extra-corporeal lung assistance (ECLA) or pumpless extra-corporeal lung assistance (PECLA). ECMO is largely a hospital-based procedure, as the equipment needed to take arterial blood outside the body, add oxygen and remove carbon-dioxide, then return it to body via a vein, is typically of a considerable size.

## FAI's approach

The large version of the set-up can be housed in a road ambulance or large aircraft such as a Dornier 328, but FAI rent-a-jet recently completed its first transport onboard a Learjet with the Novalung ECMO device produced by Intervention Lung Assist. This consists of a small box that houses the gas-transfer membrane, small enough to be secured between the patient's legs during flight. No pump is required, as the system is driven by the patient's own blood pressure; but this

does cause a fall in blood pressure, countered with medication or by increasing blood volume. Before use, a Doppler ultrasound scan is needed on the femoral artery and vein to check they are large enough to accept cannulas. The use of ECMO is not a complete replacement for mechanical ventilation, but rather allows a reduction in the pressure, volume and  $\text{FiO}_2$  levels on the ventilator to reduce lung injury.

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Buchsein advised that staff training is essential, which in FAI's case included practising the techniques on a pig. He added that although the mission was a success and the team now feels confident in the technique, for the next mission, a perfusion will probably be taken onboard.

Overall, ECMO is a viable technique for air ambulance companies, even on smaller aircraft, and Buchsein expects demand to rise in the future.

