National Institute for Health and Care Excellence

IP408/4 Extracorporeal carbon dioxide removal for acute respiratory failure

IPAC date: 14th September 2023

Com. no.	Consultee name and organisation	Sec. no.	Comments	Response Please respond to all comments
1	Fresenius Medical Care (UK) Ltd	**The procedure, 2.3**	The 2 main types of extracorporeal carbon dioxide removal (ECCO2R) are venovenous (vvECCO2R) and arteriovenous (avECCO2R). In both types, cannulae are connected to a low-resistance synthetic membrane device where exchange of carbon dioxide takes place. In vvECCO2R, either a single-access double-lumen catheter or a dual-access system using 2 venous catheters is inserted into a large vein or veins (usually the femoral or internal jugular veins) and connected to a venovenous circuit. Flow across the membrane is maintained using a pump. In avECCO2R, cannulae are inserted into an artery and a vein (usually the femoral artery and femoral vein). Arterial blood pressure drives blood continuously through the device and it is returned through the vein. Due to complications associated with the arterial access, and the installation of an arterio-venous shunt that is fed by approx. 25% of the cardiac output, the usage of avECCO2R is limited in case of cardiocirculatory compromise. In consequence, the use of avECCO2R has been largely reduced in favor of increased use of vvECCO2R systems. Nowadays, vvECCO2R is used predominantly. Due to the technical developments of the last years, a differentiation of the vvECCO2R into a	Thank you for your comment. The committee was informed that the use of arteriovenous extracorporeal carbon dioxide removal is largely being replaced by venovenous extracorporeal carbon dioxide removal in the UK. Evidence presented to committee included data on outcomes associated with different flow rates. This was considered by the committee when making their recommendations.

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			low-flow and a mid-flow range seems appropriate as this is associated with differences in performance and also with respect to the risk profile. For the mid-flow range which can be seen in extracorporeal blood flows ranging from about 0.5 to 1.5 l/min, usually ECMO devices are in use. These require special education for the ICU team and due to the targeted blood flow usually cannulation with large cannula corresponding to significant invasiveness – both can increase the threshold for being used in daily routine on ICU. For the low-flow range which can be seen in blood flows of 200 - 600 ml/min, frequently Continuous Kidney Replacement Therapy (CKRT) devices and corresponding Shaldon catheters are used, thus, reducing thresholds for application as these devices are used frequently on a routine base in many ICUs. Besides CKRT devices there are some different, particularly designed low-flow vvECCO2R devices in the market. Of note, there is no consensus for a precise blood flow limit segmenting low-flow and mid-flow devices. For practical purposes this largely corresponds to the blood pump technology used, i.e. originating from CKRT or from ECMO devices.	
2	Fresenius Medical Care (UK) Ltd	**The procedure, 2.4**	People having ECCO2R are given blood thinning drugs such as heparin or citrate to prevent blood clots forming in the circuit	Thank you for your comment.

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				The committee were informed that a number of products could be used to prevent blood clots forming in the circuit.
3	British Thoracic Society		BTS is grateful for the opportunity to comment on this consultation. The evidence referenced is accurate and up to date. There are no omissions as far as we are aware. BTS agrees that this should not be used in Hypoxic Respiratory Failure (predominantly due to the REST trial). This was based on harm (intracerebral bleeds). The procedure should only in the context of research in hypercapnic resp failure. There are newer less invasive machines being developed and in the less severely critically ill patients these may be more appropriate alongside NIV to avoid intubation.	Thank you for your comment.
4	British Thoracic Society		The Draft recommendations however appear a little ambiguous. Points 1,2, 1.3 and 1.4 would benefit from clarification. It may be that they replace 1.2 with a statement of this treatment should not be used in patients with acute hypercapnic respiratory failure as part of acute care due to SAE identified in RCT's, before they then discuss the use in clinical trials. If this technology is to be used in research there needs to be a robust review of the protocols	Thank you for your comment. Section 1 is designed to state the recommendations in an accessible way, so people can quickly see what is and isn't recommended for different groups. There is then an explanatory section in 'why committee made these recommendations' immediately after, which notes the safety concerns relating to use in acute hypercapnic respiratory failure. Discussion of the evidence

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			from initiation of treatment and to agree the MDT members involved.	and adverse events then follows in the remainder of the document. Point 1.3 notes who should be included in the MDT as part of the intervention's use in research.

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