

Reducing the Risk of Vascular Air Embolism

Background

Vascular Air Embolism (VAE) is a life-threatening adverse event for a patient.

A Clinical Excellence Commission clinical focus report highlighted that in some cases VAE has been related to Central Venous Access Device (CVAD) removal technique, in particular, removing devices inserted in the neck and thorax.

Patients who cannot lie flat, or have other risk factors, have a higher risk of VAE when their CVAD is removed.

To help minimise the risk of VAE, it is important for all clinicians caring for patients with CVADs to assess for risk factors affecting removal and plan for the procedure.

Clinicians should

1. Identify patients with increased VAE risk prior to CVAD removal
2. Plan the procedure to minimise any risk



At the patient level

- If the patient is unable to tolerate lying flat for CVAD removal and application of an occlusive dressing, or is assessed as high risk, the following should occur.
 - Do not remove the CVAD and seek advice from the doctor responsible for the patient.
 - There may be a need for the doctor responsible for the patient to contact a senior critical care doctor for advice.
 - Delay removal until the risks can be corrected or minimised. Ensure access to emergency equipment is available. Monitor patient's cardiac rhythm and peripheral oxygen saturation.



At the hospital level

- To help minimise risk:
 - ensure training and assessment processes are available for staff
 - consider vascular access decision support to ensure patients are getting the most appropriate devices for their circumstances.

Identifying high-risk patients

Risk factor	Why is this a risk	Potential mitigation strategies
Respiratory compromise	<ul style="list-style-type: none"> • May create a large negative intra-thoracic pressure • Increased speed of air entry into blood vessel 	<ul style="list-style-type: none"> • Delay removal of line and seek advice • Address reasons for respiratory compromise • Lie the bed flat only for the required procedural components i.e. CVAD removal and dressing application
Decreased blood volume	<ul style="list-style-type: none"> • Reduces intravascular pressure 	<ul style="list-style-type: none"> • Administer intravenous volume if possible • Place in Trendelenburg position i.e. head down
Inability to lie flat	<ul style="list-style-type: none"> • Decreases intravascular pressure • Increased risk of air entry into the blood vessel 	<ul style="list-style-type: none"> • Delay removal of line and seek advice • Where possible address reasons for inability to lie flat • Lie the bed flat only for the required procedural components i.e. CVAD removal and dressing application
Low body mass index	<ul style="list-style-type: none"> • Smaller distance between the atmosphere and the blood vessel 	<ul style="list-style-type: none"> • Place in Trendelenburg • Disrupt tract while applying pressure to exit site
Local insertion site infection	<ul style="list-style-type: none"> • Insertion tract fails to collapse and remains open after removal 	<ul style="list-style-type: none"> • Consider alternate dressings to ensure airtight seal • Disrupt tract

Planning for possible emergencies

When removing the CVAD where higher risk is noted, plan for possible emergencies.

- Escalate removal to experienced nurses or vascular access nurse (where available) with the assistance of another nurse.
- Ensure access to emergency equipment is available and attach a monitor to assess the patient's cardiac rhythm and peripheral oxygen saturation throughout the procedure as a minimum.
- Ensure alternative venous access is available prior to the procedure.
- The patient should remain monitored until clinicians are satisfied the risks of air embolism have abated.

