Open Book
Learning from close calls and adverse events

CVC removal

This report alerts providers to key findings of a recent review, and highlights changes put in place to stop such an event happening again.

Central venous catheters (CVCs) are used for some hospitalised patients. For most patients, a CVC causes no harm; however some patients are susceptible to rare, infectious complications associated with CVCs, particularly at the time of removal. Over recent years hospitals have focused on reducing these complications.

This report is intended for:

- chief medical officers and directors of nursing
- clinical staff working with CVCs
- nurses removing CVCs.

Incident

A patient who was eight days post-surgery suffered cardiovascular collapse and death after CVC removal, most likely due to air embolus.

Increased risk of air embolus

Patient factors:

- Patients with increased work of breathing (due to higher than normal negative intrathoracic pressure).
- Body habitus (patients with minimal subcutaneous tissue).
- Long duration of CVC dwell (associated with development of a well-formed tract in the tissues).

Staff factors:

Lack of knowledge among nursing and medical staff regarding:

- the higher likelihood of air embolus in patients with the risk factors detailed above
- how to manage CVCs at the time of catheter removal
- how to manage air embolism.

Organisational factors:

The CVC management policy at the organisation involved contained limited guidance about air embolus prevention and treatment. The information was not readily accessible and not in the most appropriate part of the policy document.

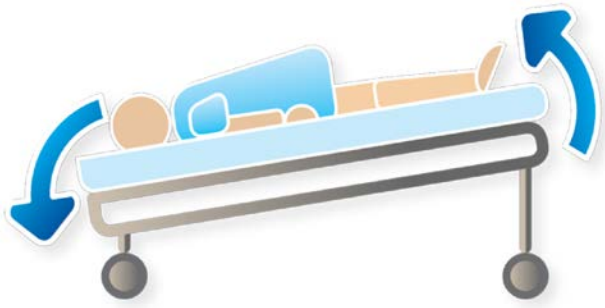
Suggested best practice

Review the necessity for the CVC every day and remove at the earliest opportunity.

Only staff who have been assessed as competent should remove CVCs using one of the methods described below.

Trendelenburg position

CVCs should only be removed when the patient is lying flat or ideally with head tilted slightly down, with breath held at the end of exhalation.

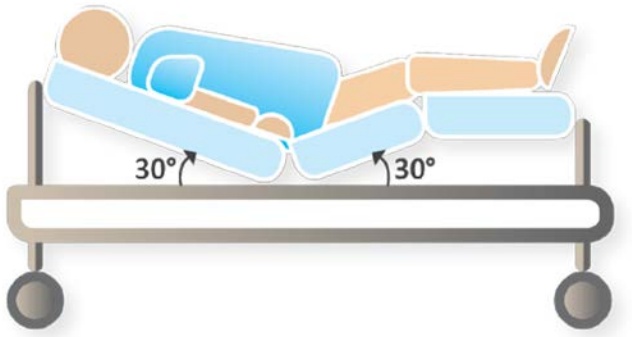


Once the CVC has been removed, gentle pressure to occlude the exit site should be applied for a minimum of five minutes. An airtight dressing should then be applied.

(Cont over.)

Semi-Fowler position 30°–30°

If the patient is unable to lie flat, the low semi-Fowler position may be used (but with no greater than 30° head-up) and the catheter removed with breath held at the end of exhalation.



Once the CVC has been removed, gentle pressure to occlude the exit site should be applied for a minimum of five minutes. An airtight dressing should then be applied.

The following references support the suggested best practice statement:

1. Brockmeyer J, Simon T, Seery J, et al. 2009. Cerebral Air Embolism Following Removal of Central Venous Catheter. *Mil Med* 174(8): 878–81.
2. Peter DA, Saxman C. 2003. Preventing Air Embolism When Removing CVCs: An Evidence-Based Approach to Changing Practice. *Medsurg Nurs* 12(4): 223–8.
3. Laidlaw K. 2011. Air Embolism?: Don't worry it was just a bubble. *Intravenous Nursing NZ Inc. Newsletter*.
4. Luettel D. 2011. Avoiding Air Embolism When Removing CVCs. *Nursing Times* 107(43): 23.
5. Drewett S. 2000. Central Venous Catheter Removal: Procedures and Rationale. *Br J Nursing* 9(22): 2304–15.