

# A COLLABORATIVE APPROACH TO REDUCING INCIDENCE OF VASCULAR AIR EMBOLUS AND CENTRAL VENOUS ACCESS DEVICES IN NEW SOUTH WALES

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## INTRODUCTION

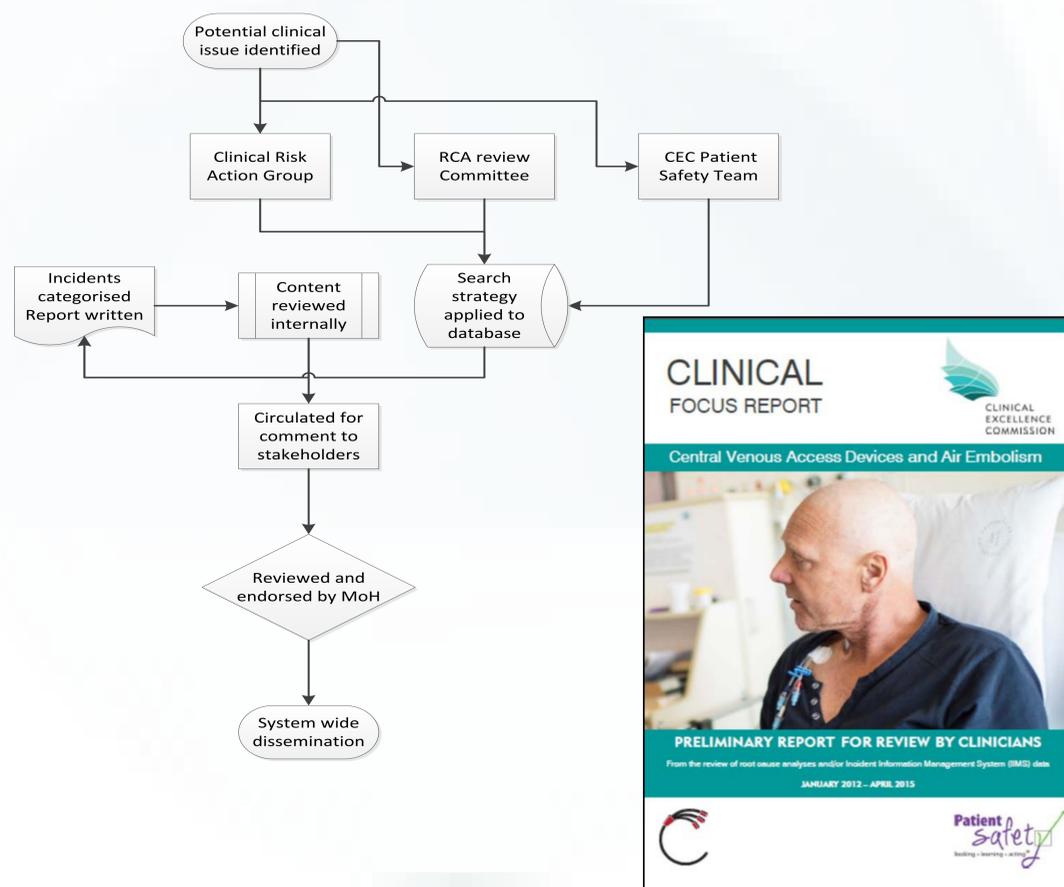
- Vascular Air Embolism (VAE) associated with the management of a central venous access device (CVAD) is a serious but preventable complication.
- Patient outcomes can range from no harm through to neurological impairment and death. Diagnosis can be difficult because the signs and symptoms of an air embolism can be non-specific, subclinical and transient in nature.
- The Clinical Excellence Commission monitors all adverse events in NSW Health. Through this process, an increasing number of VAE incidents was identified, between 2012 and 2015, and a clinical focus report was commissioned.
- Clinical focus reports analyse aggregated de-identified incident information and identify system issues and opportunities for improvement, with the intent of decreasing patient risk.

## OBJECTIVES

1. To identify, through Root Cause Analysis investigations and incident reports, system factors contributing to VAE during CVAD management
2. To identify opportunities for improvement
3. To make system-wide recommendations that mitigate the identified risks and reduce incidence in NSW health

## METHOD

A word search of the NSW Health incident management system, between January 2012 and June 2015, was conducted using search terms related to VAE and CVAD. A clinical expert group was convened to develop the report with recommendations, and a program of work was initiated to support practice change in NSW.



## RESULTS

- Fourteen actual or suspected VAE incidents related to CVADs were identified. There were six deaths.
- Two-thirds of the incidents and four of the deaths related to removal practices.

CVAD precipitating activity	Patient survived with/without confirmed deficit (n=8)	Death (n=6)
CVAD removal (n=9)	5	4
CVAD insertion (n=3)	2	1
CVAD disconnection (n=2)	1	1

- Seven patients were in a sitting or semi-recumbent position during removal. All incidents that specified a site indicated the CVADs were inserted in the jugular vein.

CVAD process	Sitting	Supine 30°	Supine	Trendelenburg	Mobilising	Not stated
CVAD insertion (n=3)				2		1
CVAD removal (n=9)	5	2	1	1		
Disconnection (n=2)					2	

- Respiratory distress, low BMI and low intravascular volume were common patient characteristics.
- Symptoms of an adverse event following VAE management ranged from cardiac arrest and death to respiratory, neurological and cardiac compromise of varying degrees.

Symptom	Patient Outcome		Symptom	Patient Outcome	
Cardiac Arrest	Death	3	Cardiac and respiratory compromise	Death	0
	Survived	3		Survived	1
Respiratory compromise	Death	0	Respiratory and neurological compromise	Death	2
	Survived	4		Survived	0
Neurological compromise	Death	1			
	Survived	0			

- System contributory factors included suboptimal supervision, incorrect patient positioning, knowledge, skill and device issues (absence of secure locking mechanism).
- The awareness campaign managed by the Agency for Clinical Innovation (ACI) Intensive Care Network engaged more than 40 clinicians to standardise education via WebEx. Standard slides, a script, Podcast and video were produced and are available via the ACI website.

## CONCLUSION

CVAD VAE is a serious preventable complication requiring a multifaceted approach to reduce patient risk. Clinicians should be aware that if there is a temporal relationship between a patient's sudden/unexpected deterioration and a CVAD clinical care activity (e.g. insertion, removal), a high index of suspicion between the two events should be considered.



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