

The Adequacy of Training Afforded to New Doctors in Caring for Central Venous Catheters

J. O'Shea¹, M. Corbett², R. Sheridan³, C. Keaveney Jimenez³,
D. Connellan³, M. O'Shea³, M. Boylan³, L. Cash³, J. McDonnell¹

1. Dept. of Anaesthesia and Critical Care, University Hospital Galway.
2. Academic Dept. of Otorhinolaryngology, Head and Neck surgery, University Hospital Galway.
3. HSE Intern Network Executive, HSE.

Abstract

Aim

In Irish hospitals, central venous catheters (CVCs) are typically removed by nurses or Non Consultant Hospital Doctors. More than 18% of patients who receive a CVC experience complications. We sought to assess competency in new doctors' CVC care

Methods

We surveyed 384 doctors at the end of their intern year to assess their level of competence in managing CVCs

Results

Out of 159 responses, one third (34.5%) removed CVCs unsupervised the first time. Seventy eight percent (124) were unconfident in their technique for confirming CVC position on X-ray and 24%(34) thought that their technique for accessing CVCs was incorrect. Ninety six percent (153) felt they would have benefitted from teaching on CVCs at the start of the year, only 29.5% (47) received such a session

Discussion

We suggest that a teaching session involving a simulated procedure for all new interns provided by an experienced clinician would improve knowledge and competence. This may make practices with regards to CVCs safer and reduce the risk of complications

Introduction

Central Venous Catheters (CVCs) are often removed by a nurse or Non Consultant Hospital Doctor (NCHD) on the ward. Removing CVCs incorrectly can cause air embolism, bleeding, infection or endovascular injury. Eighteen percent of patients with CVCs have complications, with this risk rising to 20% when managed by a doctor in the early stages of training.¹ While efforts to make CVC insertion safer have reduced risks of arterial puncture and pneumothorax², efforts to ensure competency of staff caring for and removing CVCs have not been studied in detail. We sought to assess key competencies and knowledge of new doctors in Irish hospitals to determine safety in managing CVCs.

Methods

Following a literature review, focus group interviews between the authors and a small pilot group, we created a questionnaire based around CVC practices³. We surveyed interns working in teaching hospitals across the six hospital groups on their level of training and knowledge of CVCs. The survey was administered using Google Forms over 2 months between May and June 2020. Respondents had successfully completed nine months of rotations in different specialties. Institutional approval was obtained at each site to distribute the survey. Statistical analysis was conducted using Excel.

Results

Response rate was 43% (165/384) One hundred and fifty nine interns across 6 intern groups completed valid surveys. Results are summarized in table 1.

Seventy percent (112) of respondents had not received teaching on CVCs from their hospital. 46.5% (74) of interns were shown how to remove CVCs by a tutor, registrar or SHO, while 31.5% (50) were shown by another intern or nurse, and 22% (35) learned from the internet or textbook. Of 142 interns who had removed a CVC, 34.5% (49) were supervised by a senior colleague the first time they removed a CVC, 29.5% (42) by an intern or nurse, and 36% (51) were unsupervised.

Regarding technique, 93% (149) of interns correctly remove jugular CVCs with the patient head down or flat, while 3.5% (5) remove them head up, and 3.5% (5) remove them in whatever position the patient is already in. When removing femoral CVCs, 83% (132) of interns correctly position the patient head up or flat, while 15% (24) remove them head down, and 2% (3) remove them in the position the patient is already in.

Seventy six percent (120) of interns correctly remove the catheter during expiration, while 20% (32) remove it during inspiration and 4% (7) do not time removal to the respiratory cycle. Ten percent (15) hold pressure for the recommended 3 minutes, while 58% (93) hold pressure for longer, and 32% (15) hold pressure for less time. Fifty two percent (83) of interns were not confident that their CVC removal technique was correct or safe.

Twenty seven percent (43) of interns were taught to confirm CVC position on chest X-ray by a senior colleague or tutor, 4% (6) by an intern or nurse, and 69% (110) learned from the internet or a textbook. Fifty nine percent (93) knew that the CVC tip should lie in the SVC. Seventy eight percent (124) of interns were not confident that their technique for confirming CVC position on chest X-ray was correct.

Twenty four percent (38) of interns are not confident that their technique for accessing a CVC is correct. Ninety six percent (153) of interns feel they would have benefited from teaching sessions on CVC management.

Table 1: Survey Results.

Questions	Answers	Number of valid
Hospital Group	Dublin/Mid-Leinster	42
	Dublin/Northeast	34
	Dublin/Southeast	18
	Mid-West	24
	South	23
	West/Northwest	18
Have you received formal teaching on CVC care	Yes	112
	No	47
Who showed you how to remove a CVC	Tutor/more senior doctor	74
	Nurse/other intern	50
	Not shown	35
Who supervised you when you first removed a CVC	Senior colleague	49
	Other intern/nurse	42
	Not supervised	51
How do you position a patient when removing an internal jugular or subclavian CVC	Head down or flat	149
	Head up	5
	Any position	5
During what portion of the respiratory cycle do you remove CVCs	Inspiration	32
	Expiration	120
	Any time	7
Who taught you how to confirm CVC position on X ray	Senior colleague/tutor	43
	Other intern/nurse	6
	Self-taught	110
Where should the tip of a CVC lie on chest x ray	Superior Vena Cava	93
	Right Atrium	46
	Inferior Vena Cava	5
	Subclavian artery	7
	Hepatic Vein	1
Are you confident that your technique for accessing a CVC is safe?	Yes	52
	No	107
Do you think you would have benefited from teaching on CVC care	Yes	153
	No	6

Discussion

Our survey indicates that interns are not receiving adequate teaching on CVCs. The current national intern curriculum addresses taking blood cultures from CVCs but not removal allowing potential for error.⁴ The respondents report the use of high risk practices, and are not confident they are managing CVCs safely. Many interns are taught how to manage CVCs by juniors, while others are learning from the internet. Sixty six percent removed CVCs without senior supervision for the first time.

The old mantra of “see one do one teach one” has been abandoned in medical education.⁵ Learning methods including simulation and procedure based assessments have replaced these traditional methods in order to improve patient safety and reduce risk.⁶ In CVC management we have not progressed with novel training. Interns may be expected to manage CVCs before “see one” and lack of training may cause avoidable risk to patients.

Based on our findings, we recommend a teaching session for all new interns provided by an experienced clinician. A standardized training session during induction and a supervised procedure based assessment may homogenise practices, reducing risks including air embolism, malpositioned catheters, and associated infections.

Declaration of Conflicts of Interest:

The authors report no conflicts of interest.

Corresponding Author:

John O’Shea

Dept. of Anaesthesia and Critical Care,
University Hospital Galway.

E-Mail: johnoshea@alumnircsi.com

Orchid ID: <http://orcid.org/0000-0003-0050-6792>

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