Towards Best Practice: Nurse Led Central Venous Catheter Placement

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BACKGROUND

TRAINING + PROCEDURAL VOLUME = TECHNICAL EXPERTISE

PROCEDURAL SAFETY AND SUCCESS IS ***NOT*** ASSOCIATED WITH ANY PARTICULAR DISCIPLINE

BACKGROUND

- Patient outcomes from many illnesses have improved significantly over the years
- We are getting better at treating chronic and complex disease
- When patients re-present to hospital they are sicker and more complex
- Vascular access escelated
- More need for centrally placed catheters
- With new clinical / diagnostic techniques treating teams becoming super specialised
- Are they still the best team to insert CVAD?

Barach, P, & Johnson, JK. (2006). Understanding the complexity of redesigning care around the clinical microsystem. *Quality and Safety in Health Care, 15*(suppl 1), i10-i16.

BACKGROUND

Typically in most Australian Hospitals:

- Patient needs PIVC – technician / nurse / JMO
- Patient needs PICC / Midline – nurse / anaesthetics or ICU or IR
- Patient needs CVAD – Anaesthetics / ICU

The problem….

- Not all patients can have PICCs (venous depletion / BMI / tortuous pathway)
- IR not suitable for CVADs (or PICCs), unless being tunnelled (expensive)
- Elective CVAD insertion not a priority for Anaesthetics / ICU (and are put in just like in an emergency or done JMO for ‘training’)

BACKGROUND

This is an ineffective system:

- Patients waiting unacceptably long periods for CVAD placement
- Missed antibiotic doses, delayed chemotherapy or multiple PIVC attempts
- Increased procedural risk by JMO's inserting CVADs
- At the centre is not due process – it is the patient – a better system is required

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

Patient and Consumer Centred Care

Partnering with consumers is about healthcare organisations, healthcare providers and policy-makers actively working with consumers to ensure that health information, systems and services meet their needs.

BACKGROUND

We know that:

- Poor insertion and adherence to aseptic technique principles can lead to infection
- In Australia – 3500 CLABSi cases annually (under reported?)
- Associated with 12% mortality
- Attributable cost approximately $8.2M
- CLABSi reportable to hospital GM in NSW and IMMS generated as SAC 2

Victorian National Nosocomial Infection Surveillance System (VICNISS) Hospital Acquired Infection Project, Year 3 report. June 2005.

BACKGROUND

Poor insertion technique principles can lead to:

- Pneumothorax
- Accidental arterial puncture
- Catheter malposition
- Cardiac arrythmias
- Mortality risk can be as high as 47% in some patient cohorts
- Ultrasound and technologies such as ECG guidance has mitigated some risks but not eliminated it

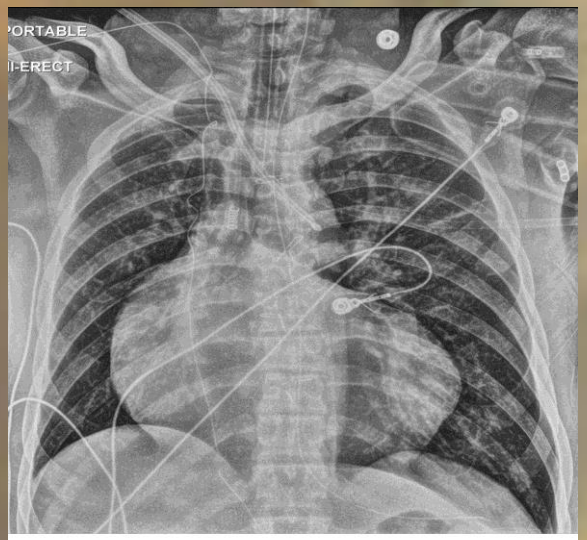
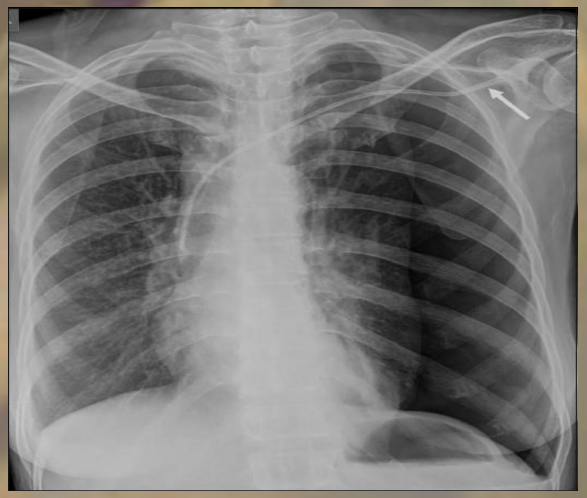


Figure 1B



BACKGROUND

- Studies showed tip position was main independent factor for malfunction, thrombosis and device failure
- Catheter tip especially important with left sided catheters
- Avoid acute insertion angles
- Tip was found best in deep SVC

Central venous access sites for the prevention of venous thrombosis, stenosis and infection (Review)

Ge X, Cavallazzi R, Li C, Pan SM, Wang YW, Wang FL

THE COCHRANE COLLABORATION®

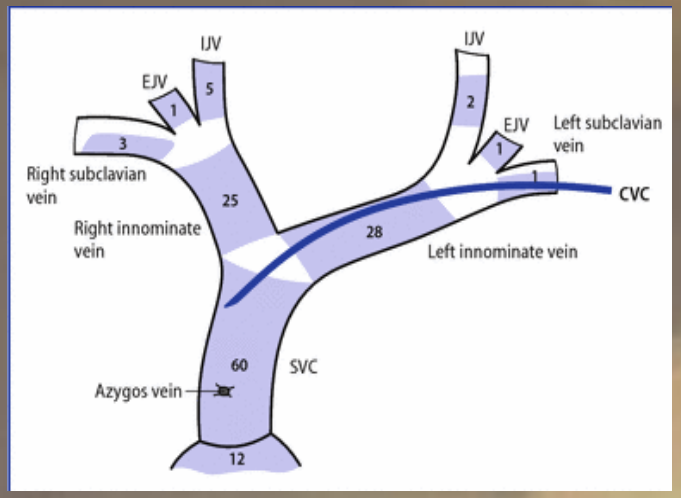


Table 1. Catheter tip position in relation to the development of thrombosis [7].

Catheter tip position	Number of patients with thrombosis	Thrombosis %
Right atrium and superior vena cava junction	3/62	5
Superior vena cava	2/25	8
Junction between superior vena cava and the innominate veins	5/7	71
Innominate (or brachio-cephalic) veins	5/12	42
Aberrant topography, including right atrium and jugular veins	2/7	29

BACKGROUND

- Several studies have shown procedural volume is an important predictor for reducing adverse events
- Many medical training programs work by this model
- Clinical work is mental but also physical and tactile
- Medical specialisation means medical staff are less exposed to general clinical techniques – such as CVAD insertion
- Can put patient at procedural risk or reduce the life of the device (CVADs have a 30% failure rate)
- Experienced operator who has inserted more than 50 CVADs will have half the complication rate of operator who has inserted less than 50

NURSE LED CVC PLACEMENT:

Are nurses safe to insert CVADs?

- Of course!
- Integrative review undertaken in 2010
- 500 papers reviewed – 10 studies found related to topic
- No major difference from broader medically published outcome data

JCN *Journal of* Clinical Nursing

Journal of Clinical Nursing

REVIEW

A review of the nursing role in central venous cannulation: implications for practice policy and research

Evan Alexandrou, Timothy R Spencer, Steve A Frost, Michael JA Parr, Patricia M Davidson and Kenneth M Hillman

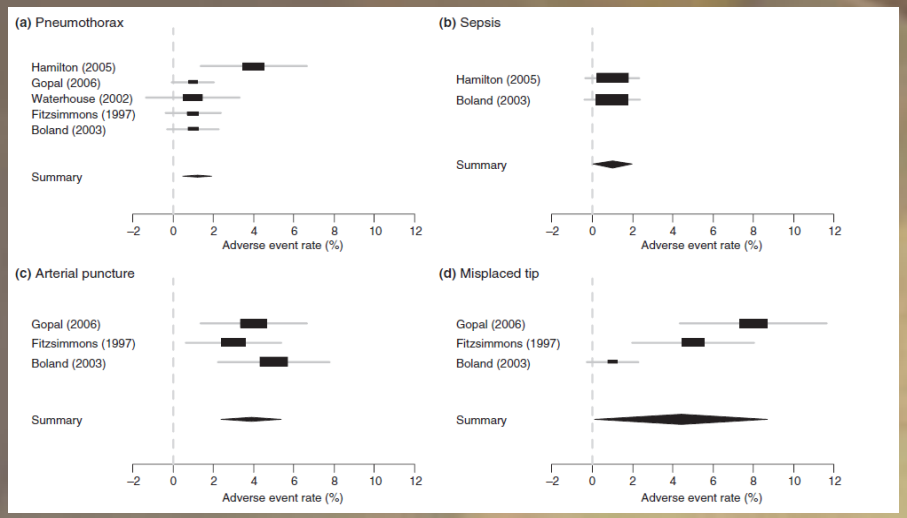


Table 1 Complication rates from cvc insertion

Complication	I. Jugular (%)	S/Clavian (%)	Femoral (%)
Arterial puncture	6·3–9·4	3·1–4·9	9·0–15
Haematoma	0–9·4	1·2–2·1	3·8–4·4
Pneumothorax	0–0·7	1·2–3·1	NA
Venous perforation	0·2	1·2	0
Total	6·3–12·1	6·2–10·7	12·8–19·4

Source: (Comfere & Brown 2007)

NURSE LED CVC PLACEMENT:

Why did nurses start inserting CVADs?

- Procedural risk by JMOs
- Waiting time for CVAD placement
- Missed medication doses
- Inapropriate anatomical placement
- Increased infection rates
- Nurse led CVAD insertion emerged from pressure to increase organisational efficiencies

NURSE LED CVC PLACEMENT:

My experience no different:

- Hospital expanded from 350 beds to 850 beds in 1996
- ICU: 6 beds to 20 beds (now 60!)
- Increased capacity of ICU, doctors unable to sustain elective line placement
- In 1996 a nurse trained to insert percutaneous CVADs by ICU consultants
- Service now inserts around 1000 CVADs annually
- Is the main provider of CVAD placement for ICU / anaesthetics medical trainees in the hospital

RESEARCH / INTERNATIONAL

Establishing a Nurse-Led Central Venous Catheter Insertion Service

Evan Alexandrou, RN, BHealth, MPH, ICU Cert, *Tim Spencer*, RN, BHealth, ICU Cert, *Steven A. Frost*, RN, MPH, ICU Cert, *Dr. Michael Parr*, FRCP, FRCA, FANZCA, FJFICM, *Professor Patricia M. Davidson*, RN BA MEd PhD, *Professor Ken M. Hillman*, MBBS, MD, FRCA, FANZCA, FJFICM

NURSE LED CVC PLACEMENT:

- Specialist operators credentialled to insert CVADs can reduce procedural risk and infection
- Admitting teams or other departments with competing demands cannot sustain increase need for CVADs
- Hospitals are moving towards multi disciplinary team approach to clinical care
- There is emerging evidence that non physician CVAD placement for elective catheters can improve patient safety, satisfaction and organisational efficiency

Table 5. Advantages of a nurse-led CVAS

- Allows timely response to requests for elective CVC insertions that may be delayed due to the acute care focus of anesthetic and critical care services
- Provides an infrastructure for support of CVC best practice across the organization
- Facilitates individualized patient assessment and continuity of care
- Affords capacity for data collection and management to monitor for clinical outcomes
- Presents a framework for interdisciplinary collaboration

Table 6. CVAS pre-insertion check criteria

- Valid signed informed consent
- Consultation form
- APTT 35 – 45 seconds (Activated Partial Thromboplastin Time)
- INR <1.5 (International Normalised Ratio)
- Platelets > 50,000 x 10^9 / L
- Oxygen requirements (Litres / Minute)
- Anticoagulant medication (Type / Dose)
- Allergies (Type / Response)
- Is this a high risk patient (such as abnormal body habitus)?
- Availability of senior ICU medical staff if required

NURSE LED CVC PLACEMENT:

- Specialist operators can also recommend when CVADs are not needed
- Patients requiring hydration, blood products, non irritant meds, dwell less than a month
- Patients with difficult access
- Midline catheters can be used with great success but relatively unknown to medical staff

Recommendations for insertion:
• Use strict aseptic technique and maximal barrier precautions.
• Insert under ultrasound guidance above the ante cubital crease.
• Basilic vein preferable.
• Catheter distal tip should be at or below the axillary vein.
Recommendations with therapy:
• Ideal for IV therapy lasting between 2 – 4 weeks.
• Use with near isotonic solutions (250-350mEq/L).
• Medication pH should be no less than 5 or exceed 9.
• Good for elderly patients with limited venous access.
• Fluids with osmolality <600mOsm/L (However, up to 800mOsm/L has been cited by Pittiruti et al., 2009)
Special considerations for midline use:
• Patients at risk of thrombosis.
• Patients with compromised circulation.
• Patients at risk of lymph oedema.
• Patients with end stage renal disease requiring vein preservation.

The Use of Midline Catheters in the Adult Acute Care Setting – Clinical Implications and Recommendations for Practice

Evan Alexandrou, Lucie M. Ramjan, Tim Spencer, Steven A. Frost, Yenna Salamonson, Patricia M. Davidson, Ken M. Hillman

NURSE LED CVC PLACEMENT:

The Australian Experience:

- Outside of the UK, Australia had a number of nurses inserting CVADs
- The US will become the centre of excellence for nurse led CVAD placement – finances trump culture!
- Local studies have shown effectiveness of nurses inserting CVADs – this data has been used to justify positions

NURSE LED CVC PLACEMENT:

- Comparison of CVAD outcomes between CNC and Anaesthetic medical staff
- 245 CVADs inserted by medical staff and 123 by CNC
- Both inserter groups used same procedural bay, same equipment and patients cared for the same way on wards
- Patient selection based on inserter availability
- Large hospital in Central Sydney

ORIGINAL ARTICLES

Central venous catheter insertion by a clinical nurse consultant or anaesthetic medical staff: a single-centre observational study

Nic Yacopetti, Evan Alexandrou, Tim R Spencer, Steven A Frost, Patricia M Davidson, Greg O'Sullivan and Ken M Hillman

NURSE LED CVC PLACEMENT:

Table 1. Group characteristics

	Clinician type		
	Anaesthetic medical staff	Clinical nurse consultant	*P**
Catheters inserted, *n*	245	123	
Patients, *n*	148	84	
Mean age in years (SD)	50 (15)	49 (18)	0.59
Male sex, *n* (%)	130 (53%)	75 (61%)	0.12
Indications for insertion, *n* (%):			
Oncology and auto-immune disorders	145 (59%)	81 (66%)	0.24
Parenteral nutrition	6 (2%)	3 (2%)	0.99
Antibiotic administration	74 (30%)	27 (22%)	0.09
Drug therapy	9 (4%)	3 (2%)	0.52
Other	11 (4%)	9 (7%)	0.25
Insertion site, *n* (%):			
Internal jugular	125 (51%)	81 (66%)	<0.01
Subclavian	115 (48%)	42 (34%)	<0.01
Femoral	5 (2%)	0	0.11
Catheter type, *n* (%):			
Vascath	29 (12%)	18 (15%)	0.55
Single lumen	42 (17%)	24 (20%)	0.68
Double lumen	23 (9%)	4 (3%)	0.06
Triple lumen	151 (62%)	77 (63%)	0.95

Table 2. Catheter characteristics

	Clinician type		
Catheter type, *n* (%)	Anaesthetic medical staff	Clinical nurse consultant	*P**
Antiseptic-coated catheter (first-generation)†	123 (50%)	78 (63%)	0.01
Antiseptic-coated catheter (second-generation)‡	81 (33%)	3 (2%)	<0.01
Antibiotic-coated CVC	7 (3%)	22 (18%)	<0.01
Non-coated CVC	27 (11%)	20 (16%)	0.16
Tunnelled CVC (non-coated)	7 (3%)	1 (1%)	0.24

ORIGINAL ARTICLES

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NURSE LED CVC PLACEMENT:

Table 3. Outcomes on insertion of central venous catheters (CVCs)

Complications on insertion, *n* (%)	Clinician type: Anaesthetic medical staff	Clinician type: Clinical nurse consultant	*P*
Uneventful	194 (79%)	96 (78%)	0.91
Multiple passes	18 (7%)	5 (4%)	0.32
Arterial puncture	1 (<1%)	0	1.00
Failed venous access	12 (5%)	8 (7%)	0.69
Misplaced CVC tip	1 (<1%)	0	1.00
Difficult feed*	4 (2%)	4 (3%)	0.53
Difficult access	11 (4%)	9 (7%)	0.33
Pneumothorax	2 (1%)	0	0.55
Haematoma	2 (1%)	1 (1%)	0.56

Table 4. Outcomes of central venous catheter (CVC) tip surveillance

	Clinician type: Anaesthetic medical staff*	Clinician type: Clinical nurse consultant*	*P*†
Routine CVC tip surveillance‡ (*N* = 159)	103 (42%)	56 (58%)	
No tip growth	79 (77%)	51 (91%)	0.01
Tip growth	24 (23%)	5 (9%)	<0.01
Clinically indicated CVC tip surveillance,§ (*N* = 56)	46 (19%)	10 (8%)	<0.01
No tip growth	20 (44%)	9 (90%)	0.04
Tip growth only	7 (15%)	0	0.33
BC growth only	3 (6%)	0	1.00
CRBSI	16 (35%)	1 (10%)	0.24
CRBSIs/1000 catheters	2.5	0.4	0.04
Catheter-related thrombosis	1 (< 1%)	0	1.00

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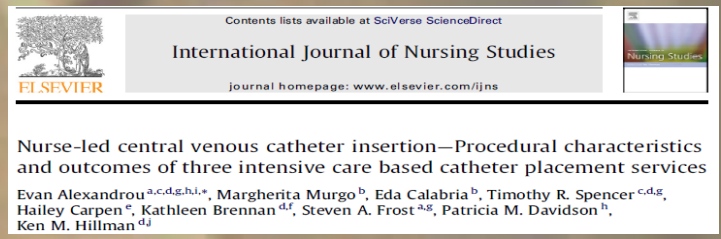
NURSE LED CVC PLACEMENT:

- Reviewed procedural characteristics / outcomes of nurses inserting CVADs in NSW ICUs
- Data part of the CLAB ICU project run by CEC
- 760 CVADs inserted over 18 months across three hospitals
- Low procedural complications
- CLABSI rate lower compared to medical officer rate (1.3 / 1000 CVADs versus 7.2 / 1000 CVADs)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ELSEVIER

Nurse-led central venous catheter insertion—Procedural characteristics and outcomes of three intensive care based catheter placement services

Evan Alexandrou [a,c,d,g,h,i,*], Margherita Murgo [b], Eda Calabria [b], Timothy R. Spencer [c,d,g], Hailey Carpen [e], Kathleen Brennan [d,f], Steven A. Frost [a,g], Patricia M. Davidson [h], Ken M. Hillman [d,j]

NURSE LED CVC PLACEMENT:

Table 5
Catheter Insertion Outcomes.

	Hospital A *N* (%)	Hospital B *N* (%)	Hospital C *N* (%)
Insertion outcome			
Malposition	1 (1)	0	4 (2)
Pneumothorax	1 (1)	0	0
Arterial puncture	0	0	1 (1)
Difficult guidewire feed	0	0	1 (1)
Failed access	0	0	1 (1)
Tip pulled back (in atrium)	0	0	2 (1)
Nil	518 (98)	76 (100)	155 (94)
Total	520 (100)	76 (100)	164 (100)
Infection outcome			
CLAB	0	0	1 (1)
Nil	520 (100)	76 (100)	163(99)
Total	520 (100)	76 (100)	164 (100)

Differences between hospital groups using Fishers exact test: $p < 0.01$.

Table 6
Site of Catheter Placement.

	Hospital A *N* (%) (95% CI)	Hospital B *N* (%) (95% CI)	Hospital C *N* (%) (95% CI)
Internal jugular	8 (1) (0.3–2%)	3 (4) (0.8–11%)	14 (8) (5–14%)
Subclavian	216 (42) (37–46%)	0	55 (34) (26–41%)
Femoral	11 (2) (1–4%)	1 (1) (0.03–7%)	20 (12) (8–18%)
Upper peripheral	285 (55) (50–59%)	72 (95) (87–99%)	75 (46) (38–54%)
Total	520 (100)	76 (100)	164 (100)

Differences between hospital groups using Fishers exact test: $p < 0.001$.

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NURSE LED CVC PLACEMENT:

- Observational study – largest data set published so far
- Published in highest ranked critical care journal (CCM) – will give good exposure to nurses inserting CVADs
- 4560 catheters in 3447 patients across 13 years
  (now close to 9000 on DB)
- Has shown low procedural complications and infection by nurses (0.2/1000 catheter days)

Central Venous Catheter Placement by Advanced Practice Nurses Demonstrates Low Procedural Complication and Infection Rates—A Report From 13 Years of Service*

Evan Alexandrou, RN, MPH[1,2,3,4,5,6]; Timothy R. Spencer, RN BHealth[2,3,4]; Steven A. Frost, RN, MPH[1,2,4,7,8]; Nicholas Mifflin, RN BNursing[3,4]; Patricia M. Davidson, RN, PhD[5]; Ken M. Hillman, MD[4,7,8]

Characteristics	Clinical Division					
	Medical	Surgical	Women and Child Health	Critical Care	Total	*p*
Mean age (SD)	56 (18)	56 (18)	35 (15)	53 (20)	56 (18)	0.262
Female gender (%)	867 (47.6)	601 (38.4)	27 (71.1)	3 (15.9)	1,498 (43.5)	0.05
Number of patients (%)	1,822 (52.9)	1,567 (45.5)	38 (1.1)	19 (0.5)	3,447 (100)	<0.001
Number of catheters (%)	2,528 (55.4)	1,969 (43.2)	43 (0.9)	20 (0.4)	4,560 (100)	<0.001
Primary indication for catheter (%)						
Antibiotics	1,267 (50.1)	1,482 (75.3)	31 (72.1)	8 (40.0)	2,788 (61.1)	<0.001
Chemotherapy/stem cell treatment	770 (30.5)	8 (0.4)	1 (2.3)	0	781 (17.1)	<0.001
Poor vascular access	176 (7.0)	160 (8.1)	4 (9.3)	3 (15.0)	343 (7.5)	<0.001
Parenteral nutrition	34 (1.3)	198 (10.1)	2 (4.7)	1 (5.0)	235 (5.2)	<0.001
Other indications	84 (3.3)	89 (4.5)	5 (11.6)	5 (25.0)	183 (4.0)	<0.001
Other parenteral medication	107 (4.2)	22 (1.1)	0	3 (15.0)	132 (2.9)	<0.001
Hemodialysis/plasmapheresis	92 (3.6)	8 (0.4)	0	0	100 (2.2)	<0.001
Catheter type (%)						
Standard single-lumen CVC	546 (21.6)	675 (34.3)	11 (25.6)	1 (5.0)	1,233 (27.0)	<0.001
Standard double-lumen CVC	198 (7.8)	146 (7.4)	2 (4.7)	0	346 (7.6)	<0.001
Standard triple-lumen CVC	618 (24.4)	161 (8.2)	7 (16.3)	4 (20.0)	790 (17.3)	<0.001
Antiseptic single-lumen CVC	24 (0.9)	30 (1.5)	0	1 (5.0)	55 (1.2)	<0.001
Antiseptic triple-lumen CVC	65 (2.6)	7 (0.4)	0	2 (10.0)	74 (1.6)	<0.001
Single-lumen PICC	785 (31.1)	841 (42.7)	19 (44.2)	8 (40.0)	1,653 (36.3)	<0.001
Double-lumen PICC	89 (3.5)	61 (3.1)	0	4 (20.0)	154 (3.4)	<0.001
Midline	52 (2.1)	41 (2.1)	4 (9.3)	0	97 (2.1)	<0.001
Vascath	150 (5.9)	8 (0.4)	0	0	158 (3.5)	<0.001

Complications	Internal Jugular Vein *n* = 93	Subclavian Vein *n* = 2,383	Femoral Vein *n* = 163	*p*
CVC-related complications				
No complications (%)	86 (92.4)	2,193 (92.0)	153 (93.9)	0.74
Arterial puncture (%)	2 (2.2)	30 (1.3)	7 (4.3)	0.01
Catheter tip malposition (%)	2 (2.2)	58 (2.4)	0	0.09
Difficult feed of catheter (%)	1 (1.0)	17 (0.7)	2 (1.2)	0.34
Failed vascular access (%)	2 (2.2)	49 (2.1)	2 (1.2)	0.81
Hemothorax (%)	0	1 (0.04)	0	1.00
Midclavicle catheter tip termination (%)	0	2 (0.1)	0	1.00
Other complications (%)	0	24 (1.0)	0	1.00
Pneumothorax (%)	0	9 (0.4)	0	1.00
Diagnosed CRBSI (per 1,000 catheter days)	1 (0.1)	10 (0.03)	1 (0.8)	0.33
Median dwell in days (IQR)	10 (5–17)	16 (8–26)	9 (3–11)	< 0.001

Complications	Basilic Vein *n* = 1,402	Antecubital Vein *n* = 142	Cephalic Vein *n* = 377	*p*
PICC-related complications				
No complications (%)	1,057 (75.4)	113 (79.5)	162 (43.0)	< 0.001
Arterial puncture (%)	2 (0.1)	0	2 (0.5)	0.41
Catheter tip malposition (%)	146 (10.4)	3 (2.1)	31 (8.2)	0.001
Difficult feed of catheter (%)	91 (6.5)	14 (9.9)	91 (24.1)	< 0.001
Failed vascular access (%)	49 (3.5)	1 (0.7)	49 (13.0)	< 0.001
Midclavicle catheter tip termination (%)	57 (4.1)	11 (7.7)	42 (11.1)	< 0.001
Diagnosed CRBSI (per 1,000 catheter days)	0	0	1 (0.25)	0.27
Median dwell in days (IQR)	12 (3–23)	10 (4–26)	10 (3–20)	< 0.001

Vessel Approach	Arterial Puncture	Catheter Tip Malposition	Difficult Feed of Catheter	Failed Vascular Access	Midclavicle Catheter Tip Termination
CVC-related complications					
Internal jugular vein ($n = 93$)					
Pre (%)	2 (2.2)	2 (2.2)	1 (1.1)	2 (2.2)	0
Post (%)	0	0	0	0	
p	0.5	0.5	1.0	0.5	
Femoral vein ($n = 163$)					
Pre (%)	5 (3.1)	0	2 (1.2)	2 (1.2)	0
Post (%)	2 (1.2)		0	0	
p	0.4		0.5	0.5	
PICC-related complications					
Basilic vein ($n = 1,402$)					
Pre (%)	1 (0.07)	122 (8.7)	65 (4.6)	31 (2.2)	50 (3.6)
Post (%)	1 (0.07)	24 (1.7)	26 (1.9)	18 (1.3)	7 (0.5)
p	1.0	< 0.001	< 0.001	0.08	< 0.001
Antecubital vein ($n = 142$)					
Pre (%)	0	2 (1.4)	14 (9.9)	1 (0.7)	10 (7.0)
Post (%)		1 (0.7)	0	0	1 (0.7)
p		1.0	1.0	1.0	0.01
Cephalic vein ($n = 377$)					
Pre (%)	2 (0.5)	30 (8.0)	89 (23.6)	43 (11.4)	41 (10.9)
Post (%)	0	1 (0.25)	2 (0.5)	6 (1.6)	1 (0.25)
p	0.49	< 0.001	< 0.001	< 0.001	< 0.001

NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovatie, produce the evidence and influence change:

- Centrally placed PICCs (CICCs)

  - CVC's traditionaly placed centrally
  - Typically requires big needle / dilator
  - Bigger (wide bore) catheter (needed but not always)
  - May be an issue for coagulopathic patients
  - PICC = Micropuncture (draw back no valve)
  - Trim PICC to suite

NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovative, produce the evidence and influence change:

- Axillary cannulation

  - Can insert with ultrasound guidance
  - Visualise lung and vessel anatomy
  - Drawback is you need to follow tip of needle

- Brachio cephalic insertions

  - Low approach IJ better than traditional IJ
  - Despite the literature, no evidence on mid IJ versus low IJ approach
  - Low IJ better for patient comfort

NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovative, produce the evidence and influence change:

- Femoral PICCs

  - Distal common femoral vein
  - 10cm below inguinal groove
  - Infection status unknown - ?? Equal to arm
  - Can scan IVC and view tip or AXR / ECG
  - Insertion site to zyphoid process

- Tunneling PICCs

  - Accessing best vessel can be difficult
  - Maybe deep / high up near axilla or you may want long term IJ
  - Tunneling PICCs will assist in best anatomical position

NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovative, produce the evidence and influence change:

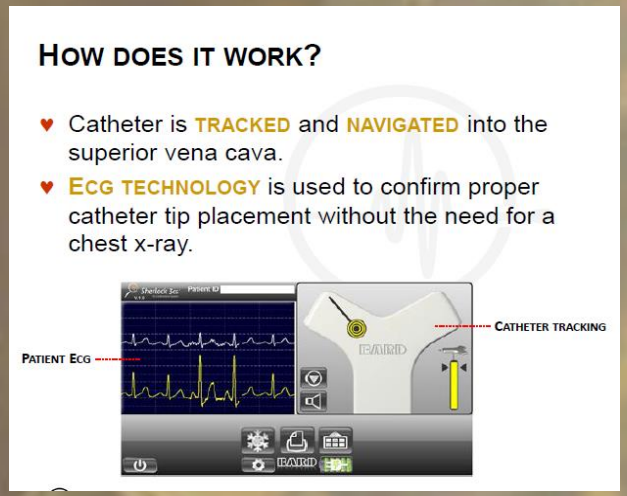
- ECG guided CVAD placement and tip confirmation

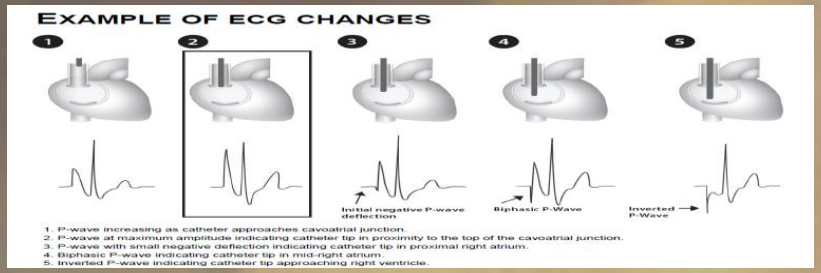
  - ECG allows for real time navigation and optimal placement of catheter

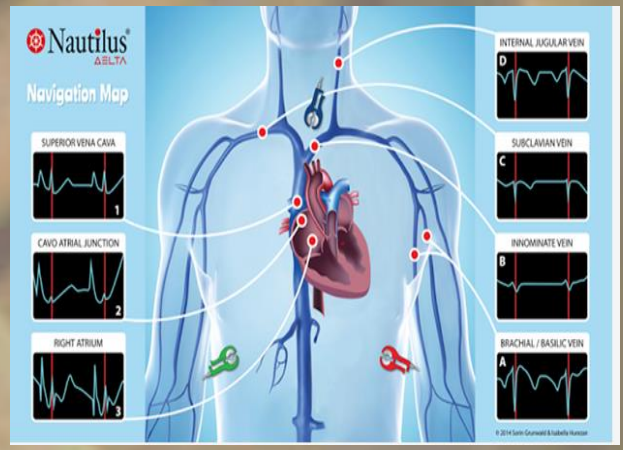
  - Reduces intra-procedural malposition

  - Can reduce dependance on x ray (both CICC / PICC)

  - More high quality studies required (most RCT's under - powered)







NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovative, produce the evidence and influence change:

Effectiveness of electrocardiographic guidance in CVAD tip placement

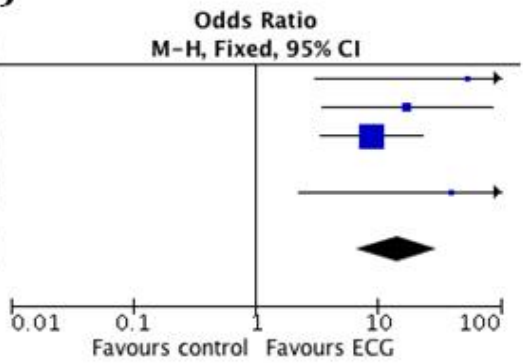
Graham Walker, Raymond J Chan, Evan Alexandrou, Joan Webster and Claire Rickard

Figure 2: Forest plot excluding study by Lee (2009)

Study or Subgroup	ECG-guided insertion Events	Total	Control Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Chu (2004)	30	30	16	30	5.2%	53.61 [3.00, 956.98]
Francis (1992)	49	51	17	29	16.5%	17.29 [3.51, 85.26]
Gebhard (2007)	142	147	109	143	72.9%	8.86 [3.35, 23.40]
Lee (2009)	116	121	123	128	0.0%	0.94 [0.27, 3.34]
McGee (1993)	25	25	14	25	5.4%	40.45 [2.22, 737.97]
Total (95% CI)		**253**		**227**	**100.0%**	**14.27 [6.69, 30.46]**
Total events	246		156			

Heterogeneity: $Chi^2 = 2.29$, df = 3 (P = 0.52); $I^2 = 0\%$

Test for overall effect: Z = 6.87 (P < 0.00001)



British Journal of Nursing, 2015 (IV Therapy Supplement), Vol 24, No 14

NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovative, produce the evidence and influence change:

Comparing traditional *P*lacement *W*ith electroc*A*rdiography for central *V*ascular access d*E*vices trial (P-WAVE Trial)

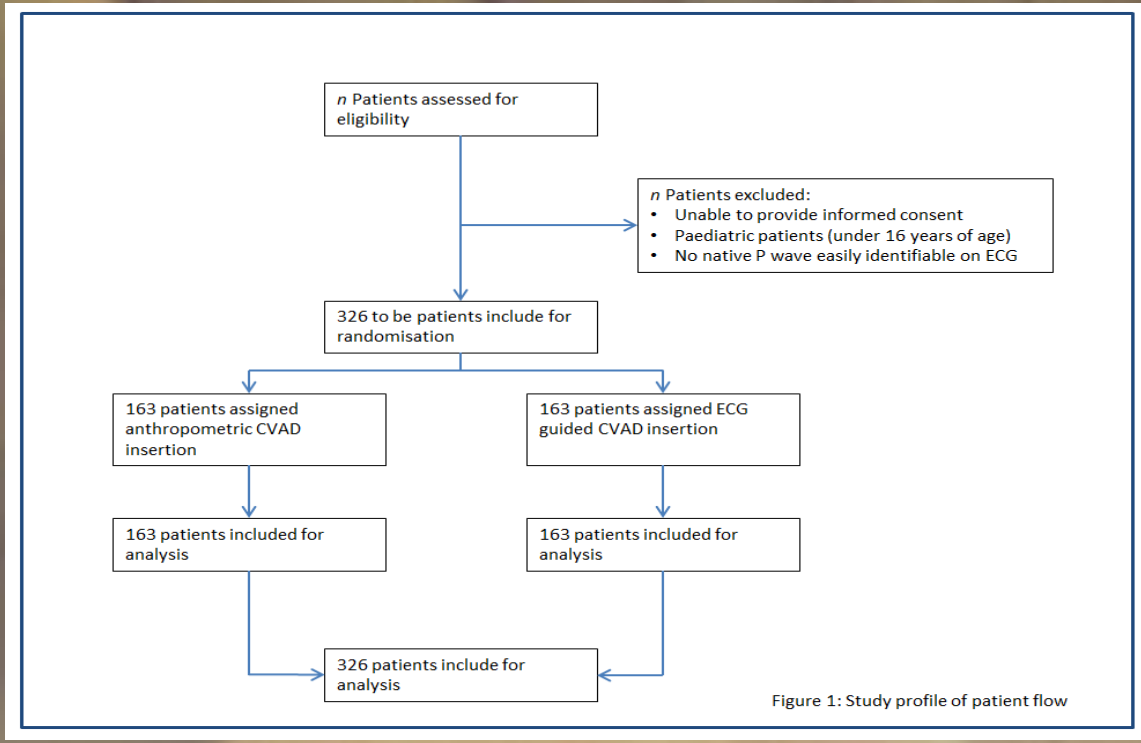


Figure 1: Study profile of patient flow

NURSE LED CVC PLACEMENT:

Specialist Nurses can be innovative, produce the evidence an influence change:

- Midline program for difficult vascular access (DIVAs)

  - Increasing chronicity / complex illness a burden on hospitals

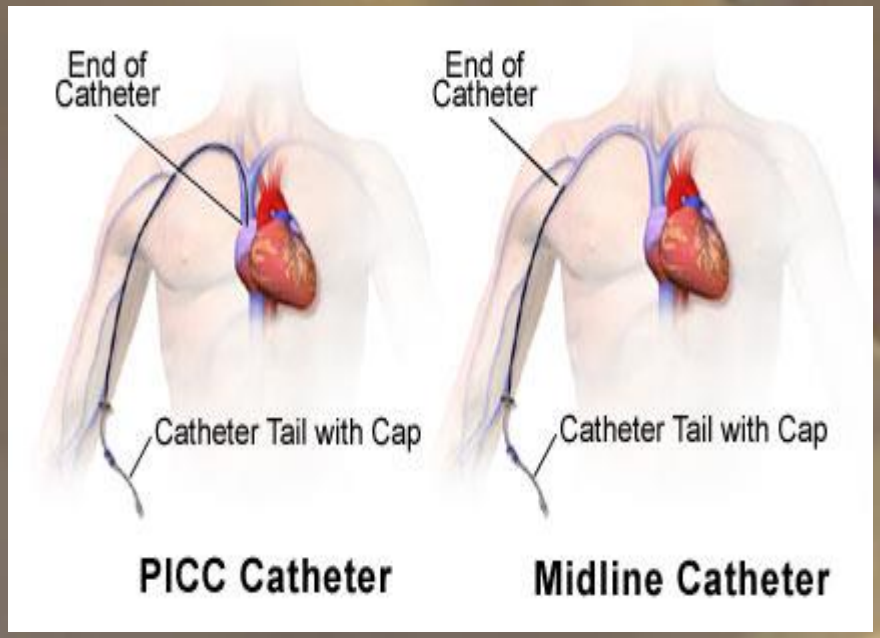
  - Escelation in patients treatment = escelation in vascular access

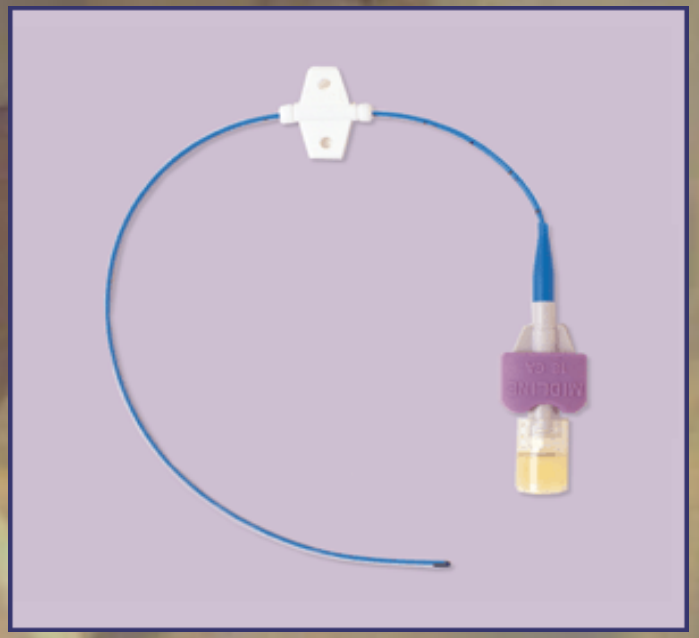
  - High failure rates of PIVs with this cohort

  - Ultrasound guidance assists in PIV placement (but is a PIV the right device?)

  - Midlines can be a solution (inserted under ultrasound / can last for up to 6 weeks)

NURSE LED CVC PLACEMENT:





NURSE LED CVC PLACEMENT:

MIDLINE CATHETERS:

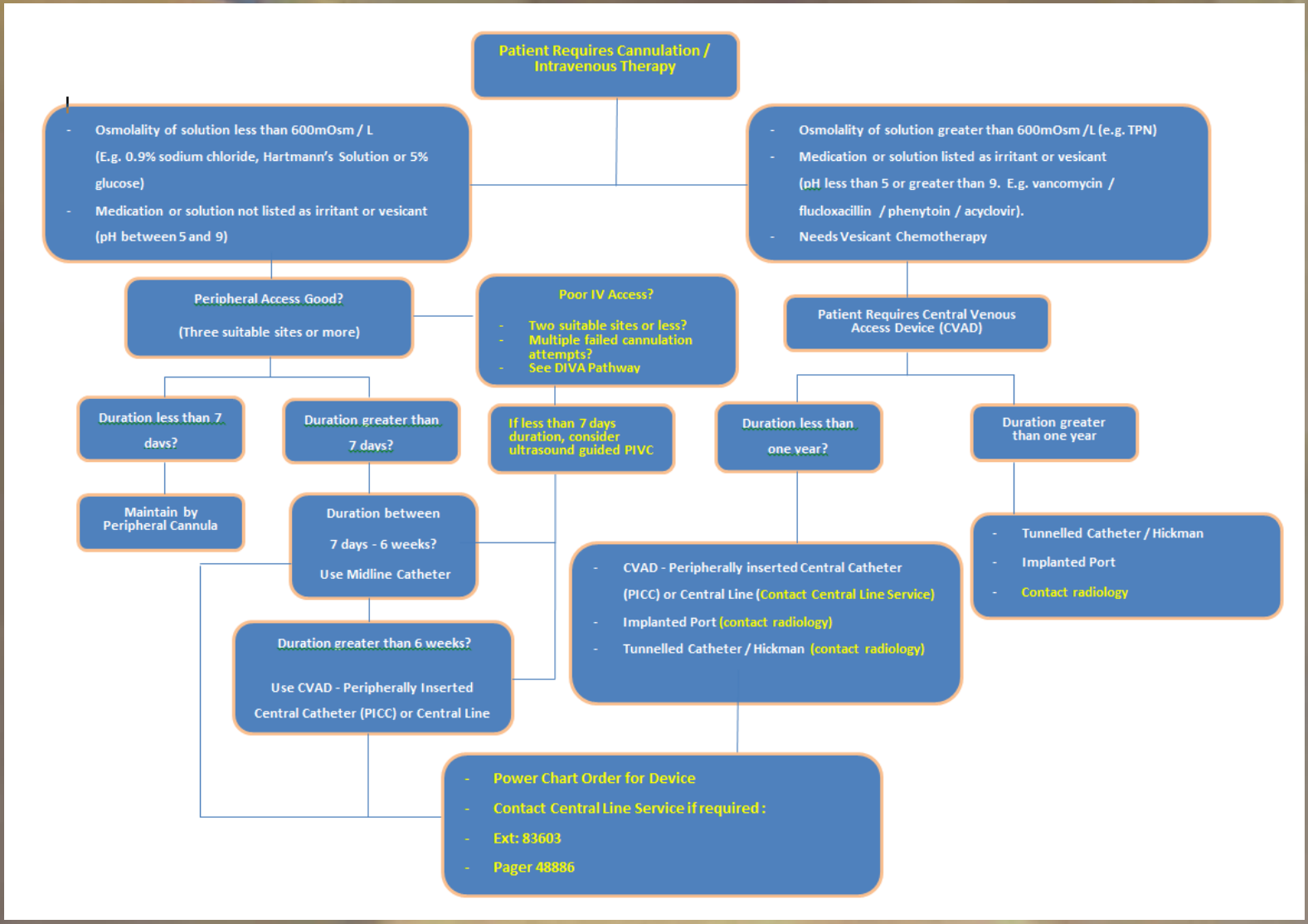
Advantages:

- Avoids repeated PIVC sticks
- Cost effective…(1 Midline = 3 - 4 PIVC's)
- Better dilution of medication at tip of catheter because of greater flow rate
- Don't require an x-ray after insertion (unlike PICC / CVC)

Disadvantages:

- Needs specific training to insert (like a PICC)
- Usually requires ultrasound skills
- Fantastic for patients with difficult vascular access
- Still cant be used for vesicant or irritant medications

NURSE LED CVC PLACEMENT:



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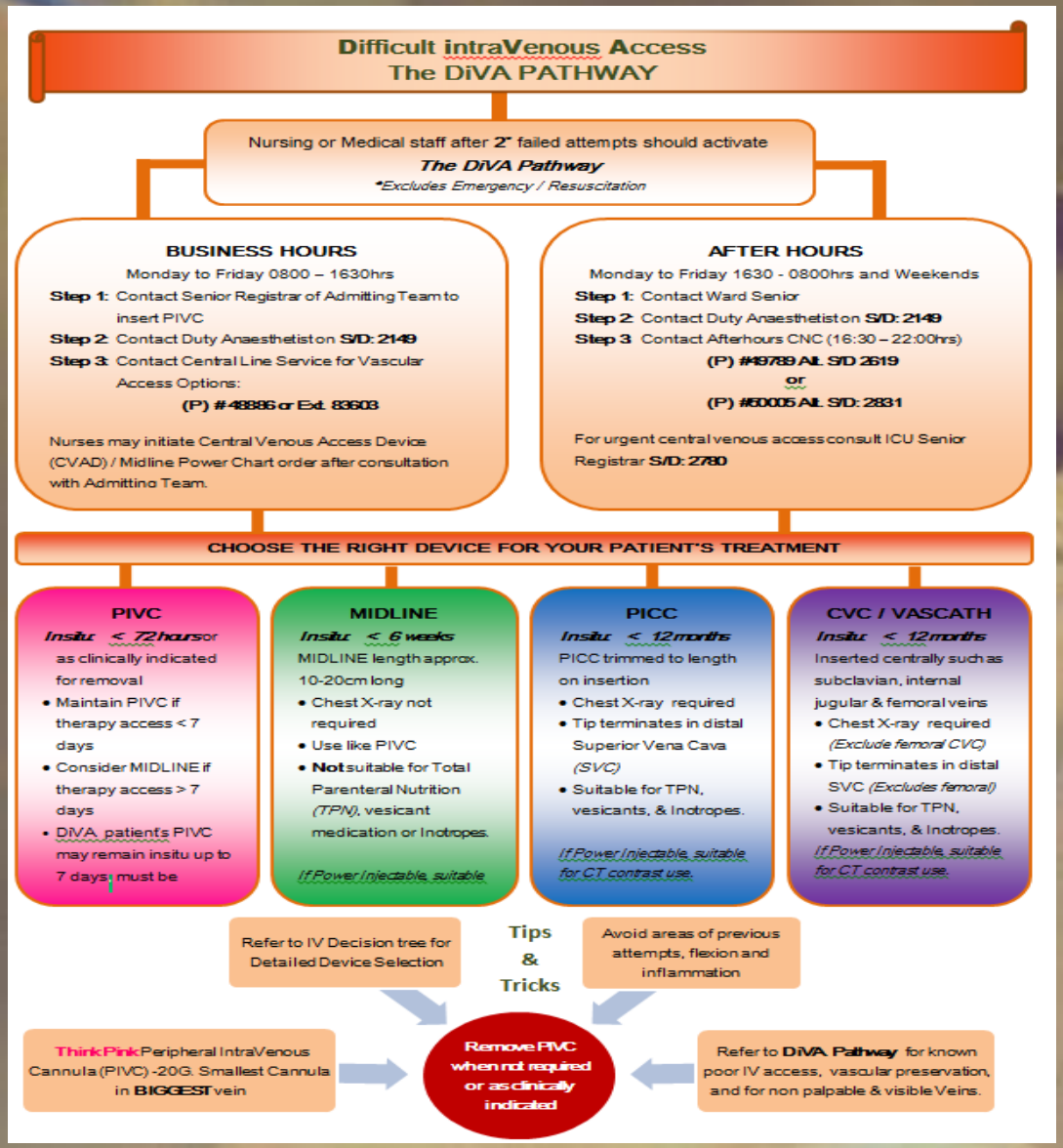

NURSE LED CVC PLACEMENT:

In summary:

- Don’t discount your skills
- Push the boundaries to improve patient care
- You are very important in the system
- 80% of Patients will require a VAD – but they need the correct one!

THANK YOU!

Liverpool Hospital
Central Line Service

TRAINING + PROCEDURAL VOLUME = TECHNICAL EXPERTISE