WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Complicatie Preventie in Vascular Access (VA)

Ton van Boxtel

Disclosure

Nothing to disclose

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Complicaties VA

- Infecties
- Trombose
- Migratie / dislocatie
- Extravasatie
- Verstopping
- ‘Spontane’ verwijdering
- Lekkage

Past, current, & future challenges in infection control: from local to global actions

Prof. Didier Pittet, MD, MS, CBE,

WoCoVA

5th World Congress on Vascular Access

Multimodal intervention strategies to reduce catheter-associated bloodstream infections:

- Hand hygiene
- Maximal sterile barrier precaution at insertion
- Skin antisepsis with alcohol-based chlorhexidine-containing products
- Subclavian access as the preferred insertion site
- Daily review of line necessity
- Standardized catheter care using a non-touch technique
- Respecting the recommendations for dressing change

Eggimann P. *Lancet* 2000; 35: 290
Pronovost P. *N Engl J Med* 2006; 355: 26
Zingg W. *Crit Care Med* 2009; 37: 2167

Multimodal intervention strategies to reduce catheter-associated bloodstream infections:

- Hand hygiene
- Maximal sterile barrier precaution at insertion
- Skin antisepsis with alcohol-based chlorhexidine-containing products
- Subclavian access as the preferred insertion site
- Daily review of line necessity
- Standardized catheter care using a non-touch technique
- Respecting the recommendations for dressing change

Eggimann P. *Lancet* 2000; 35: 290
Pronovost P. *N Engl J Med* 2006; 355: 26
Zingg W. *Crit Care Med* 2009; 37: 2167

Intensive Care Med
DOI 10.1007/s00134-012-2597-x

International evidence-based recommendations on ultrasound-guided vascular access

Massimo Lamperti
Andrew R. Bodenham
Mauro Pittiruti
Michael Blaivas
John G. Augoustides
Mahmoud Elbarbary
Thierry Pirotte
Dimitrios Karakitsos
Jack LeDonne
Stephanie Doniger
Giancarlo Scoppettuolo
David Feller-Kopman
Wolfram Schummer
Roberto Biffi
Eric Desruennes
Lawrence A. Melniker
Susan T. Verghese

Received: 17 February 2012
Accepted: 19 April 2012

M. Blaivas
Department of Emergency Medicine,
Northside Hospital Forsyth,
Atlanta, GA, USA

D. Feller-Kopman
Bronchoscopy and Interventional
Pneumology, Johns Hopkins Hospital,
Baltimore, USA

Domain code	Suggested definition	Level of evidence	Degree of consensus	Strength of recommendation
D1.S1. Ultrasound-guided cannulation	This term is defined as ultrasound scanning being performed to verify the presence and position of a suitable target vessel before skin puncture followed by real-time ultrasound imaging to guide the needle tip throughout the vessel puncture process	NA	Very good	Strong

Efficacy of multimodal intervention strategies:

	Baseline	Intervention
Eggimann	3.1/1000 catheter-days	1.2/1000 catheter-days
Pronovost	*7.7/1000 catheter-days	*1.4/1000 catheter-days
Zingg	3.1/1000 catheter-days	1.1/1000 catheter-days
Timsit	1.4/1000 catheter-days	0.6/1000 catheter-days
	povidone-iodine-alcohol	*chlorhexidine-alcohol*
Mimoz	1.75/1000 catheter-day	0.28/1000 catheter-days

***mean** pooled CRBSI-episodes per 1'000 catheter-days

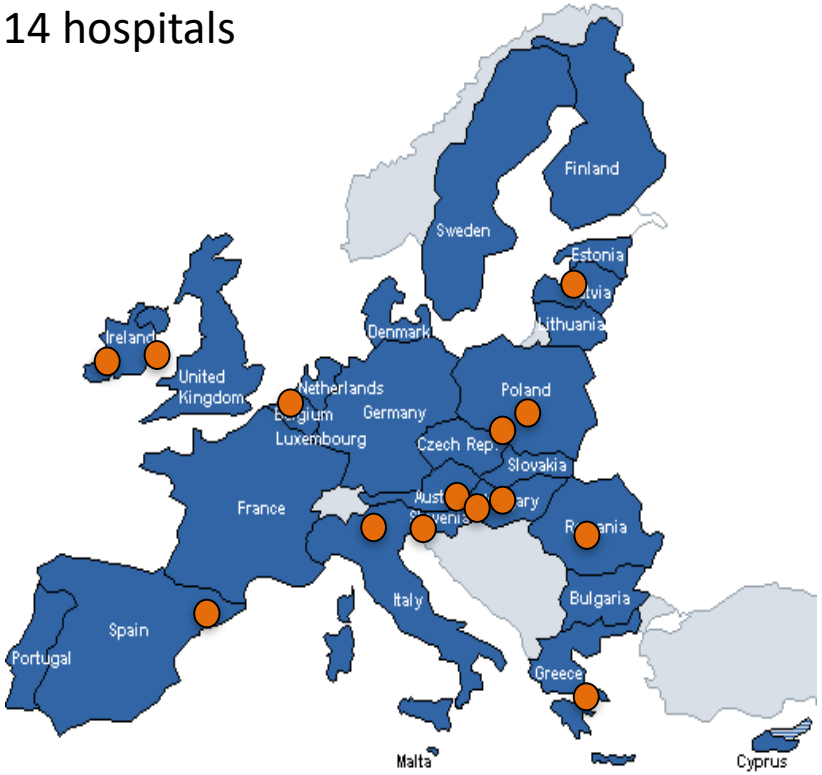
Eggimann P. *Lancet* 2000; 35: 290
Pronovost P. *N Engl J Med* 2006; 355: 26
Zingg W. *Crit Care Med* 2009; 37: 2167
Timsit JF. *JAMA* 2009; 301: 1231
Mimoz O. *Lancet; online 17 sept 2015*

Cross-European Randomized Controlled Trial

Stepped-wedge randomization; 1/2011 – 6/2013

Multimodal strategy to reduce catheter-related bloodstream infections in the intensive care unit; train-the-trainer method based on a successful Geneva model

14 hospitals

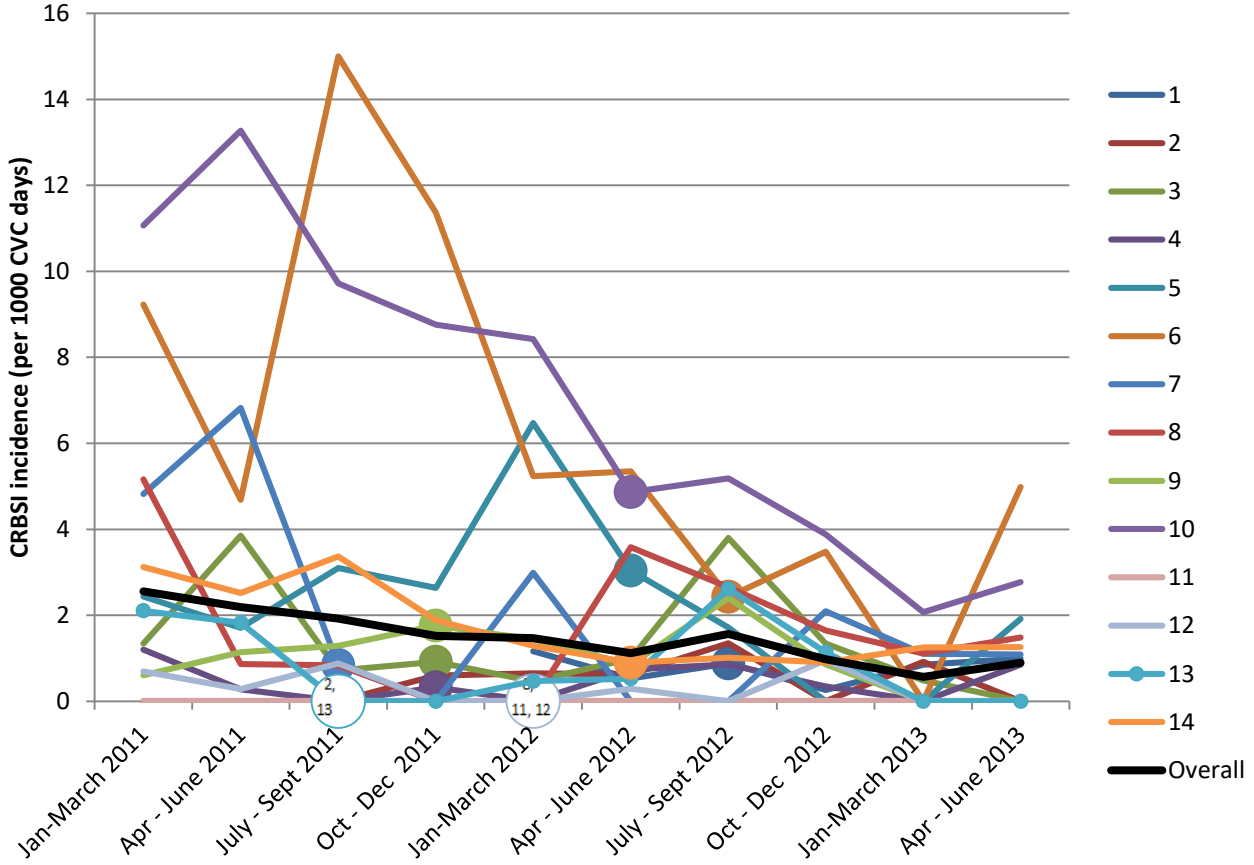


Zingg. *PLOS One* 2014;9:e93898

PROHIBIT
Prevention of Hospital Infections by Intervention & Training

Quarterly CRBSI incidence densities per hospital

PROHIBIT
Prevention of Hospital Infections by Intervention & Training



Intensive Care Med 2018

The dots indicate the start of the intervention.

An already relatively low CRBSI rate of 2.4/1000 catheter-days was further reduced to 0.9/1000 catheter-days

1st GLOBAL PATIENT SAFETY CHALLENGE

To reduce

health care-associated infections

Hand hygiene as the cornerstone

From modern health care settings

To settings with limited resources

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Complicaties VA

- Infecties
- Trombose

Veneuze Trombose in relatie tot tip positie

Proximaal = 41.7%

Midden = 5.3%

Distaal derde deel en dieper = 2.6%

Cadman, et al. 2004

Reducing catheter-related thrombosis using a risk reduction tool centered on catheter to vessel ratio

Timothy R. Spencer, DipAppSc, BHSc, ICCert, RN, APRN, VA-BC™

Virchow's Triad

The Triad of Virchow - formulated in the 19th Century, still forms the basis for the current theory on thrombus formation.[1]

This pathophysiological explanation describes the precursors around three core relationships of vascular thrombosis.

1. vessel wall damage or endothelial injury *(vascular injury)*
2. alterations in blood flow (*hematological stasis*), and
3. hypercoagulability (*changes in the chemical composition of blood)*

deeming it significant effectors in prevention of vessel- and catheter-related complications[2]

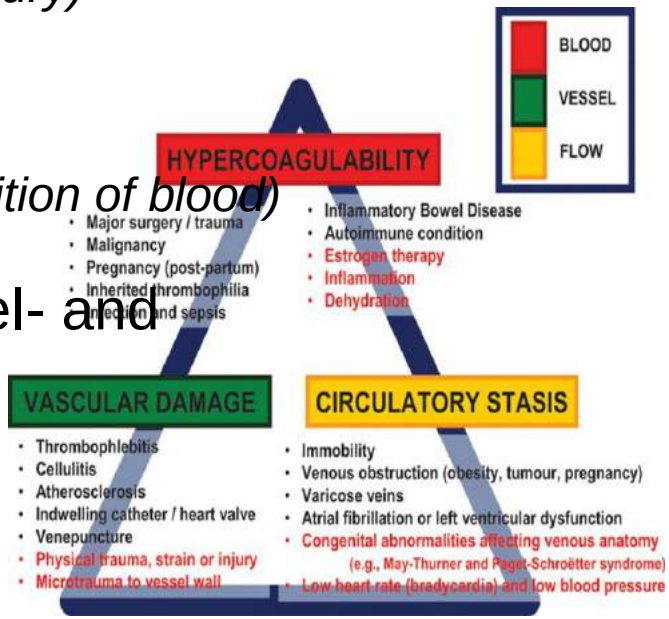
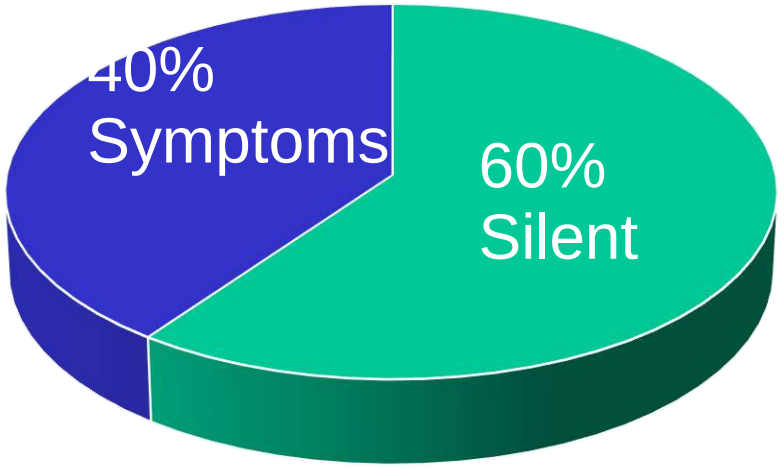


Image: Hull CM, Harris JA. (2013) Venous Thromboembolism and Marathon Athletes, Circulation, 128: e469-e471

Most Catheter-related DVT Are Clinically Silent!

van Rooden CJ, et al. J Thromb Haemost 2005; 3: 2409-2419



The pathogenesis of CRT is complex and multifactorial, with risk factors associated with the catheter, the vessel selected for insertion and the underlying patient co-morbidities and their treatments.

Current Evidence

New standard from INS supporting 45% or *less*

2. Measure the vein diameter using ultrasound before insertion and consider choosing a catheter with a catheter-to-vein ratio of 45% or less (refer to Standard 52, *Central Vascular Access Device [CVAD]-Associated Venous Thrombosis*).

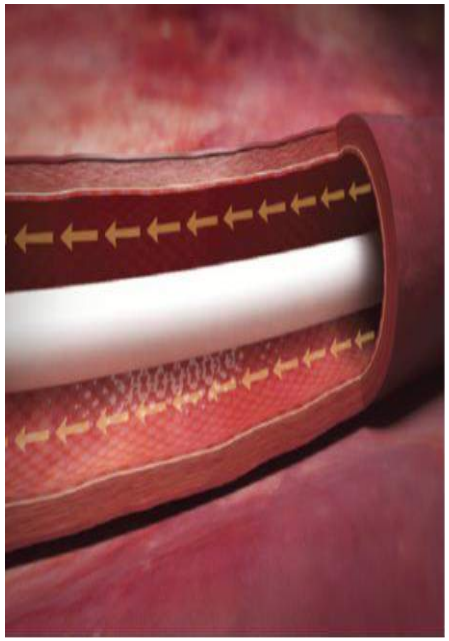
26.2 Selection of the most appropriate VAD occurs as a collaborative process among the interprofessional team, the patient, and the patient's caregiver(s).
26.3 The VAD selected is of the smallest outer diameter with the fewest number of lumens and is the least invasive device needed for the prescribed therapy.
26.4 Peripheral vein preservation is considered when planning for vascular access.

Ongoing Assessment

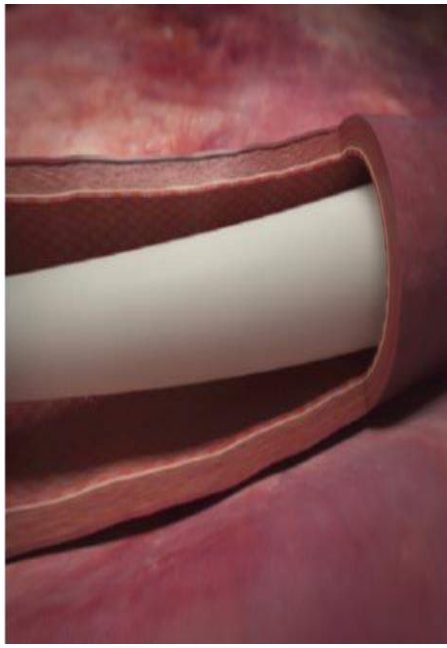
E. Recognize that the majority of CVAD-associated DVT is clinically silent and does not produce overt signs and symptoms. Clinical signs and symptoms are related to obstruction of venous blood flow and include, but are not limited to:
1. Pain in the extremity, shoulder, neck, or chest.
2. Edema in the extremity, shoulder, neck, or chest.
3. Erythema in the extremity.
4. Engorged peripheral veins on the extremity, shoulder, neck or chest wall.

Catheter-Related Factors

1. Left sided insertions
2. >1 insertion attempt
3. Proximal tip location to cavoatrial junction/distal SVC
4. Catheter material (polyethylene, polyvinylchloride > silicone, polyurethane
5. Number of lumens (triple lumen > double lumen > single lumen) = external catheter size
6. Prior catheterization at same puncture site(s) (trauma related)
7. Prolonged catheter dwell time (>2 weeks)
8. Catheter related infections/septicaemia[1]
9. Reverse tapered catheters[2]



Catheter Size



Catheter Taper

Behind the scenes

Based purely upon mathematical calculations.

Very small changes in vessel size have significant impact on CVR when focusing on an AREA calculation

Catheter Size (Fr)	Catheter OD (mm)	Radius of Catheter (mm)	Area of Catheter (mm2)
5	1.65	0.83	2.14
	Vessel OD (mm)	Radius of Vessel (mm)	Area of Vessel (mm2)
	2.46	1.23	4.73
		CVR	45.17%

Red grid represents area between 45% or greater

Catheter Size (Fr)	Catheter OD (mm)	Radius of Catheter (mm)	Area of Catheter (mm2)
5	1.65	0.83	2.14
	Vessel OD (mm)	Radius of Vessel (mm)	Area of Vessel (mm2)
	2.67	1.34	5.60
		CVR	38.19%

Yellow grid represents area between 34 and 44% (38% is the median)

Catheter Size (Fr)	Catheter OD (mm)	Radius of Catheter (mm)	Area of Catheter (mm2)
5	1.65	0.83	2.14
	Vessel OD (mm)	Radius of Vessel (mm)	Area of Vessel (mm2)
	2.88	1.44	6.51
		CVR	32.82%

Green grid represents area between 33% or less

Choosing the exit site of PICCs

JAVA, 2011

PICC Zone Insertion Method™ (ZIM™): A Systematic Approach to Determine the Ideal Insertion Site for PICCs in the Upper Arm

Robert B. Dawson
MSA, BSN, RN, CRNI, CPUI, VA-BC

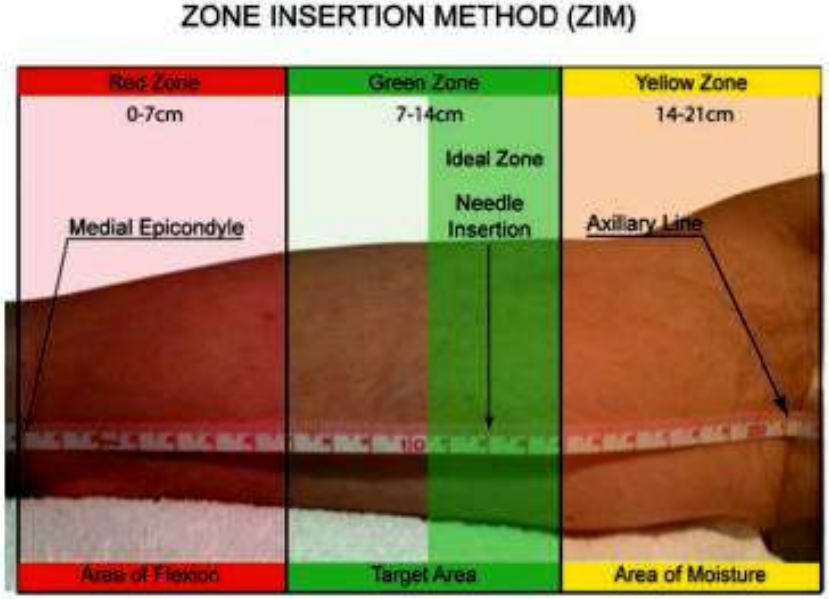


Figure 1. This person has a 21cm Total Zone Measurement (TZM), it divides into three 7cm zones to form the Red, Green and Yellow Zones. The ideal basilic vein image was located at 12cm from the medical epicondyle (MEC), in the Ideal Zone. Image by author.

Flow & Catheter to Vessel Ratio[1]

Flow Model Chart (Nifong, 2011)		2F Catheter Inserted		4F Catheter Inserted		6F Catheter Inserted		8F Catheter Inserted	
Vein and Vein Size	Initial Flow (ml/min)	Flow Reduction		Flow Reduction		Flow Reduction		Flow Reduction	
Cephalic (4mm)	10	5ml	48% remaining	3ml	28% remaining	1.5ml	14% remaining	0.5ml	0.5% remaining
Brachial (5mm)	25	13ml	53% remaining	9ml	36% remaining	6ml	22% remaining	3ml	12% remaining
Basilic (6 mm)	52	29 ml	56% remaining	21ml	41% remaining	15ml	28% remaining	9ml	18% remaining
Axillary (8mm)	164	100ml	61% remaining	79ml	48% remaining	62ml	38% remaining	47ml	28% remaining
Subclavian (10mm)	400	256ml	64% remaining	212ml	53% remaining	175ml	44% remaining	143ml	36% remaining

ECG technique: CVC tip location

1998: NAVAN: *lower one-third of the SVC, close to the junction of the SVC and the right atrium*.

2007: EPIC: *SVC*

2009: ESPEN: *cavo-atrial region or right atrium*

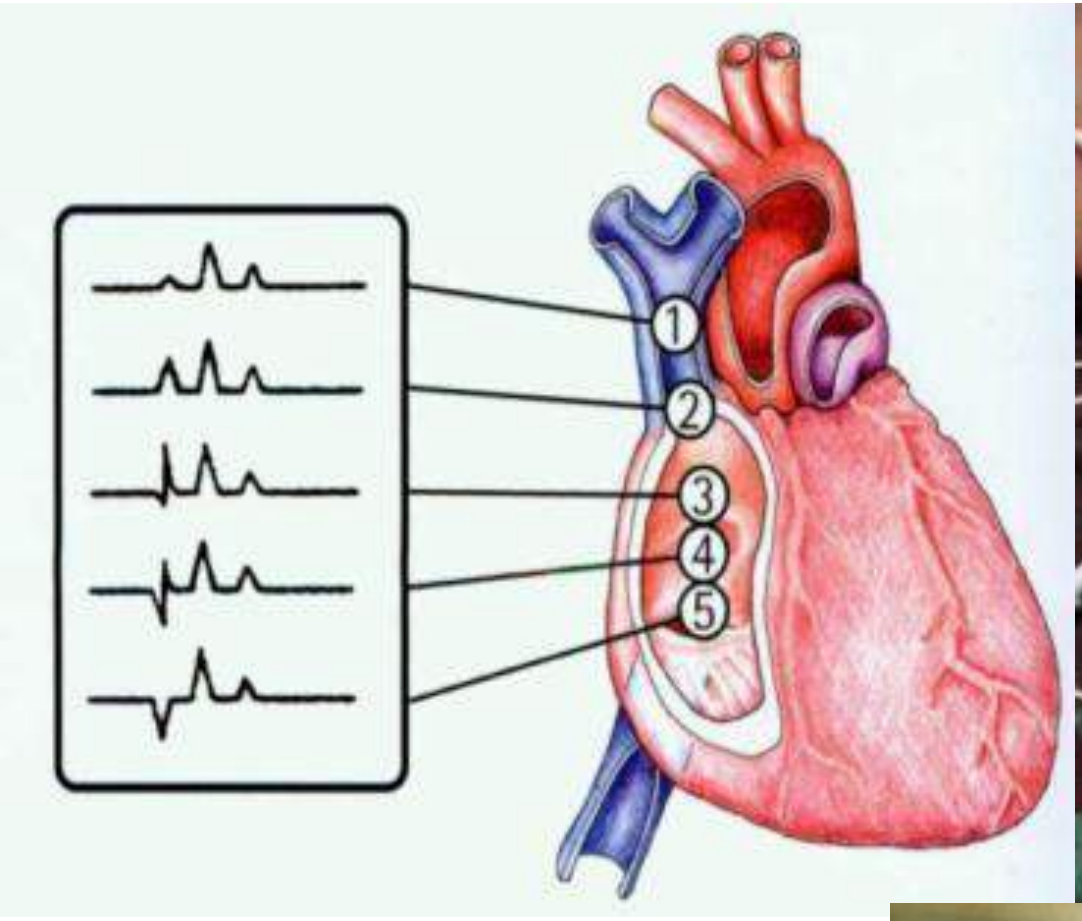
2010: RCN: *lower third SVC or right atrium*

SIR: *cavo-atrial region or right atrium*

ASPEN: *SVC adjacent to the right atrium*

2011: INS: *lower third of the SVC to the CAJ*

ECG bevestiging tip positie



Brazilian Experience 2017: PICC – Related Thrombosis

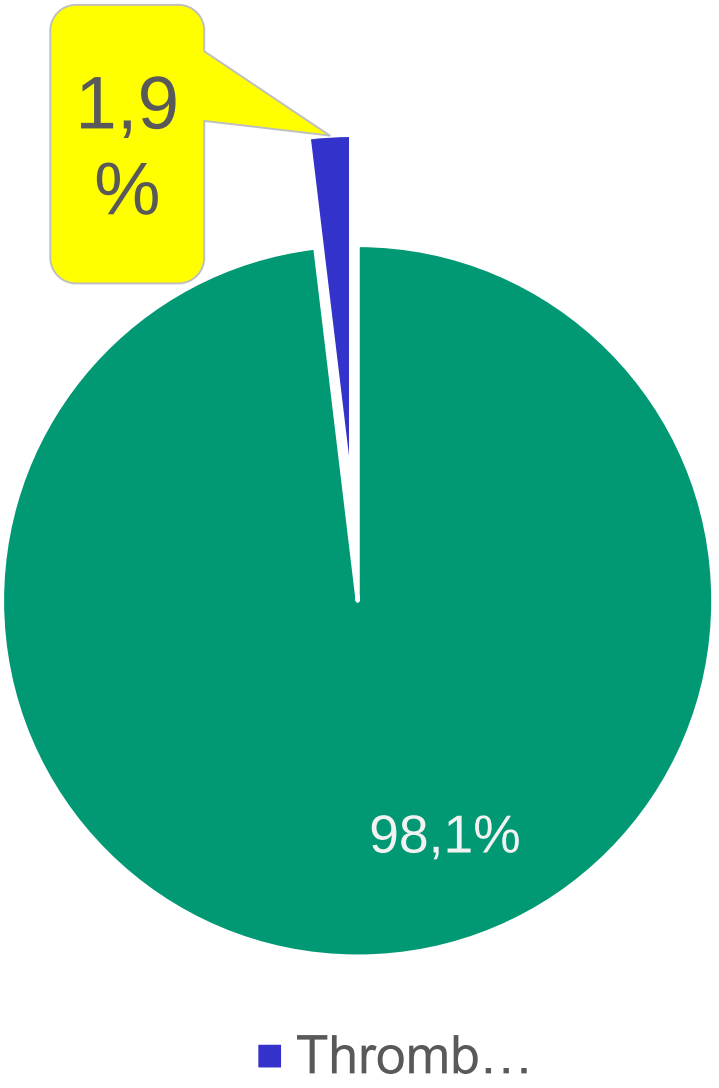
Kelly Onaga Jahana
Sociedade Beneficente de Senhoras Hospital Sírio Libanês
São Paulo - Brazil

Results

N: 2419

PICCs

Thrombosis rate



WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

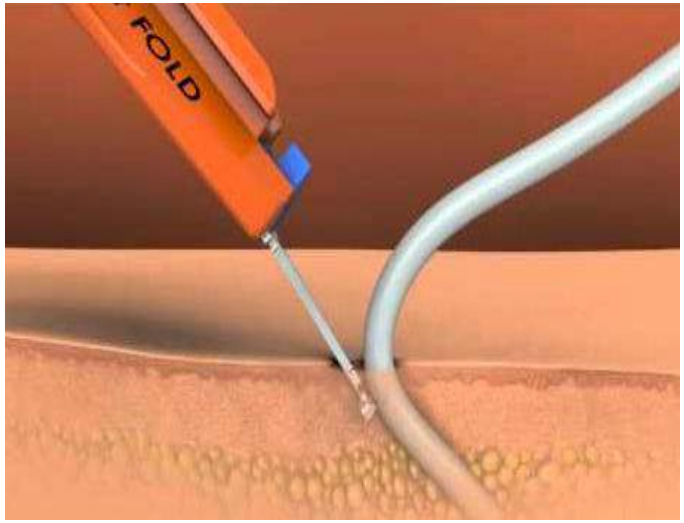
Complicaties VA

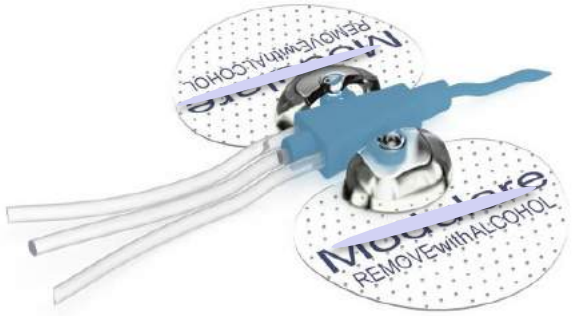
- Infecties
- Trombose
- Migratie / dislocatie

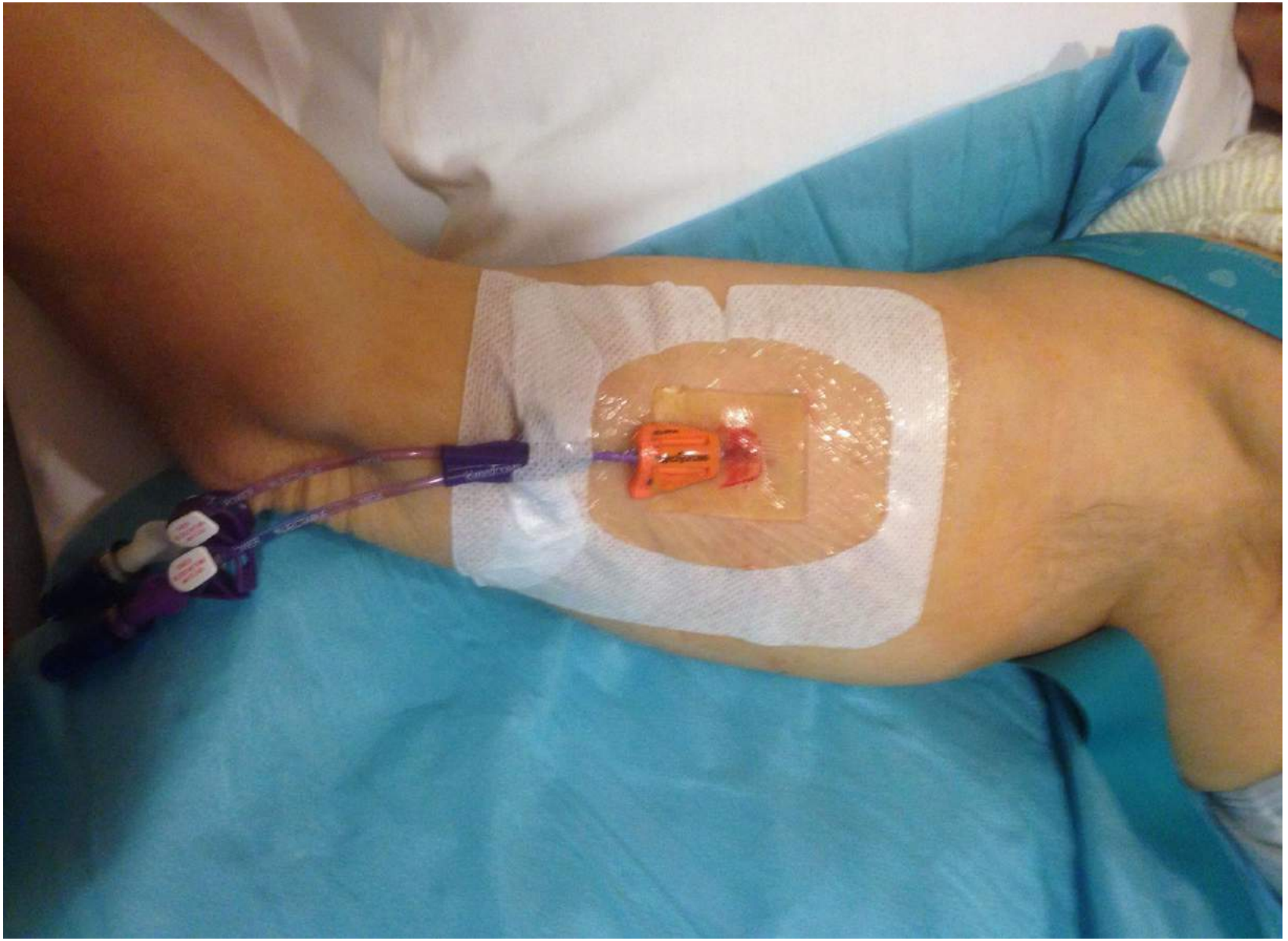
Sutureless stabilization devices

Winged adhesives

Subcuteneous stabilization device







Migratie / dislocatie

- Vooral bij CVC's
  - Bij het inbrengen
    - Te voorkomen door ECG geleid tip positioneren
  - Bij extreem braken en/of hoesten
    - Te voorkomen door tip goed te positioneren
      - Cavo-atrial junction of re atrium
  - Bij de verzorging
    - Tijdens vervangen van de fixatiepleister
  - Door externe factoren
    - Vast haken
    - Door handelen van de patient

PICC Migration – A Problem of the past

Cross Sectional & Health-Economic comparison of Adhesive and Subcutaneous Engineered Stabilisation Devices for Securing PICCs

Dympna McParlan, Infusional Services Coordinator, Belfast City Hospital
Robert Menelly, Infusional Services Staff Nurse, Belfast City Hospital

Method

Defined the problem and identified securement as the concern

Catheter replacement rate when using adhesive securement

6% (66/1111)

Costs for replacements £17.952 in 12 months

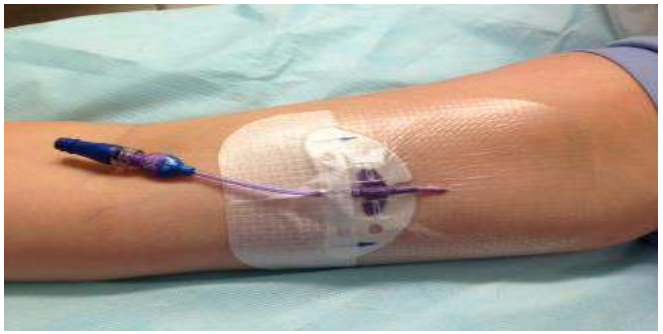
Identified alternative, subcutaneous engineered securement device (SESD) with evidence supporting reduced complications

Delivered competency based training to staff Trust wide

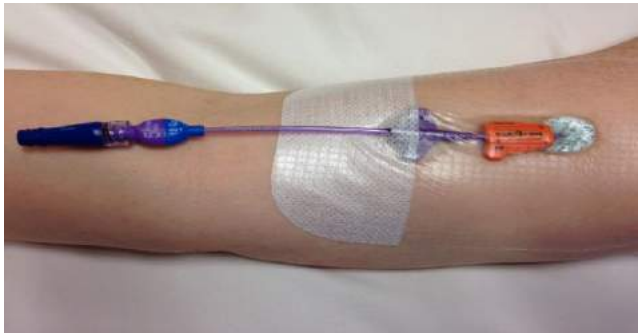
Communication and training to District Nurses

Patients' PICC information booklet incorporated the new device and related care change

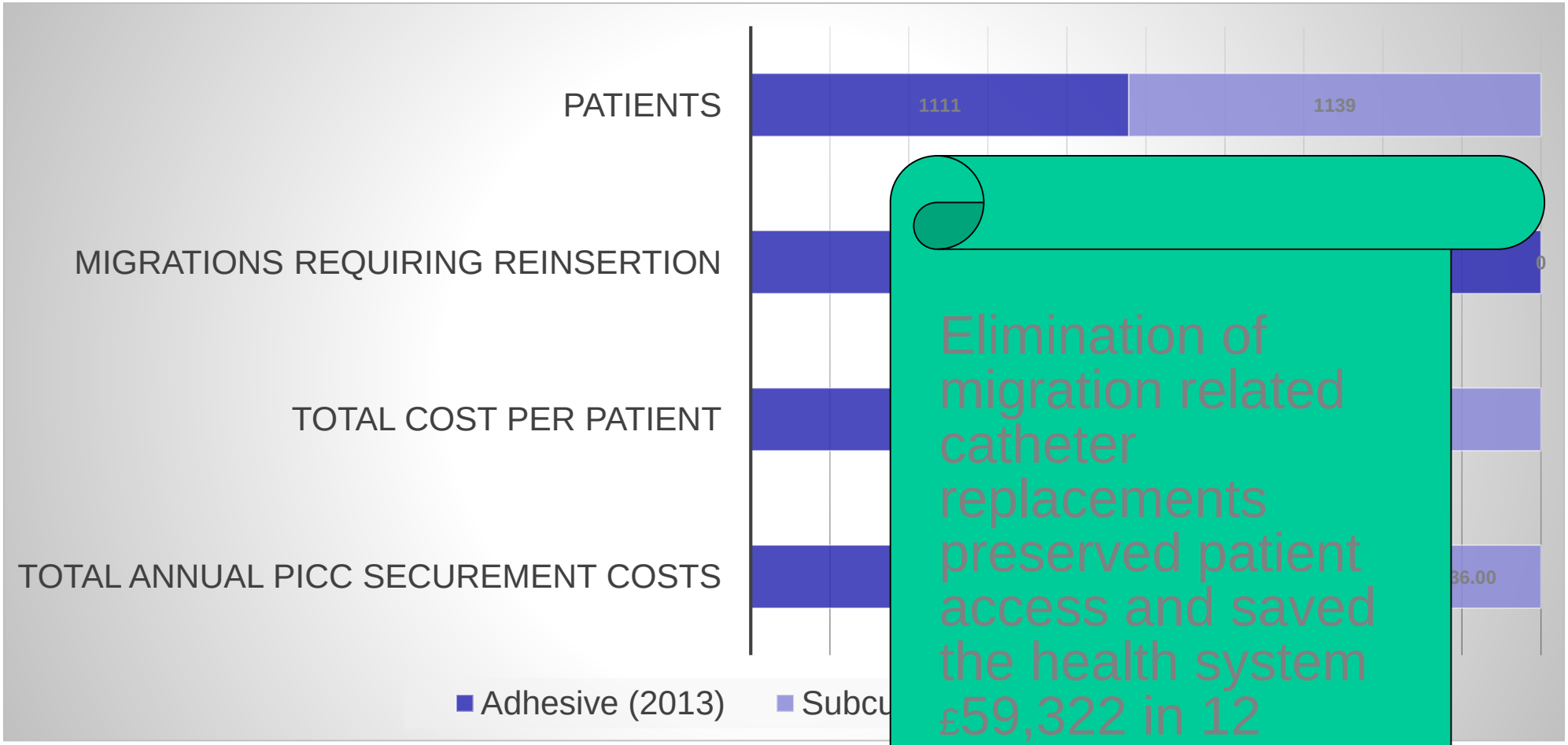
Before



After



Results


PATIENTS
MIGRATIONS REQUIRING REINSERTION
TOTAL COST PER PATIENT
TOTAL ANNUAL PICC SECUREMENT COSTS
1111
1139
0
36.00
Adhesive (2013)
Subcu
Elimination of migration related catheter replacements preserved patient access and saved the health system £59,322 in 12 months

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Complicaties VA

- Infecties
- Trombose
- Migratie / dislocatie
- Extravasatie

Extravasatie

Hoofdzakelijk bij perifere canules

- niet juist ingebracht
  - Indien tip buiten het bloedvat ligt
  - Ondeskundigheid?
  - Te korte canule
  - Langere canules en

    Minimidline zijn beschikbaar

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Complicaties VA

- Infecties
- Trombose
- Migratie / dislocatie
- Extravasatie
- Verstopping

Annals of Oncology Advance Access published April 3, 2013

original article

Annals of Oncology 00: 1–8, 2013
doi:10.1093/annonc/mdt114

Comparing normal saline versus diluted heparin to lock non-valved totally implantable venous access devices in cancer patients: a randomised, non-inferiority, open trial

G. A. Goossens[1,2*], M. Jérôme[1], C. Janssens[1], W. E. Peetermans[3], S. Fieuws[4,5], P. Moons[2], J. Verschakelen[6], K. Peerlinck[7], M. Jacquemin[7] & M. Stas[8]

Conclusion: NS is a safe and effective locking solution in implantable ports if combined with a strict protocol for device insertion and maintenance.

> n 380 per group

What's good about heparin?

EPIC3 guidelines conclude:

- Flushing with heparin is no more beneficial than flushing with saline alone
- Published studies are of low quality
- IVAD34: Use sterile normal saline for injection to flush and lock catheter lumens that are accessed frequently. *Class A*

SINGLE INSTITUTION TRIALS ON TIVADS

	BERTOGLIO et al *Cancer Nursing 2012* **prospective study**		**GOOSSENS et al** *Annals of Oncology 2013* **RCT**	
	HEPARIN SOLUTION	**NORMAL SALINE**	**HEPARIN SOLUTION**	**NORMAL SALINE**
CATHETER OCCLUSION	6.7%	5.7%	n.a.	n.a.
EASY INJECTION + WITHDRAWAL OCCLUSION	n.a.	n.a.	3.7%	3.9%
DVT	2.2%	2.4%	3.3%	2.8%

No statistically significant differences on occlusion between competitors

SISTEMATIC REVIEWS

JOURNAL OF SCHOOL OF NURSING USP
REVISTA DA ESCOLA DE ENFERMAGEM DA USP

EFFECTIVENESS OF HEPARIN VERSUS 0.9% SALINE SOLUTION IN MAINTAINING TH EPERMEABILITY OF CENTRAL VENOUS CATHETERS: A SYSTEMMATIC REVIEW

Ferreira Dos Santos EJ, et al Rev Esc Enferm USP 2015;49(6): 995

Eduardo José Ferreira dos Santos[1], Maria Madalena Jesus Cunha Nunes[2], Daniela Filipa Batista Cardoso[1], João Luís Alves Apóstolo[1], Paulo Joaquim Pina Queirós[1], Manuel Alves Rodrigues[1]

According to available evidence, the consensus among several authors and the results of this systematic review show no significant differences between the effectiveness of heparinized solutions and saline 0.9% in maintaining CVC patency in adults (RR=0.68, CI 95%=0.41-1.10; p=0.12).

IS ANTICOAGULATION NECESSARY FOR FLUSH AND LOCK CVCs ?

J Vasc Access. 2016 Nov 2;17(6):453-464

JVA
ISSN 1129-7298

REVIEW

Evidence-based criteria for the choice and the clinical use of the most appropriate lock solutions for central venous catheters (excluding dialysis catheters): a GAVeCeLT consensus

Mauro Pittiruti[1], Sergio Bertoglio[2], Giancarlo Scoppettuolo[1], Roberto Biffi[3], Massimo Lamperti[4], Alberto Dal Molin[5], Nicola Panocchia[1], Nicola Petrosillo[6], Mario Venditti[7], Carla Rigo[8], Enrico DeLutio

[1] Fondazione Policlinico Universitario 'A. Gemelli', Roma - Italy
[2] Dip. Scienze Chirurgiche, Università degli Studi, Genova - Italy
[3] Istituto Europeo di Oncologia, Milano - Italy
[4] Cleveland Clinic Hospital, Abu Dhabi - United Arab Emirates
[5] Università del Piemonte Orientale, Biella - Italy
[6] Istituto Nazionale Malattie Infettive 'L. Spallanzani', Roma - Italy
[7] Università 'La Sapienza', Roma - Italy
[8] Azienda Ospedaliera Universitaria 'Maggiore della Carità', Novara - Italy

PANEL POSITION Question 1

Q.1 - Is there a role for anticoagulant lock in the management of non-dialysis central venous access (NDCVA), as a method for prevention of lumen occlusion?

PANEL RECOMENDATION

1. The role of anticoagulant lock is only marginally important in terms of prevention of lumen occlusion

1. Future assessmenf the role of citrate lock in NDCVA is desirable and considered of increasing importance.

2. The benefit on citrate might be more focused on its action against biofilm formation and against bacteria rather than on its anticoagulant effect

CONCLUSIONS

ANTICOGULANTS AND IN PARTICULAR HEPARIN ARE NOT NEEDED TO PREVENT CATHETERS OCCLUSION EXCEPT FOR DIALYSIS CATHETERS

OTHER ANTICOAGULANTS LIKE CITRATE AND EDTA RATHER THAN HEPARIN HAVE ATTITIONAL DESIRABLE EFFECTS ON BIOFILM FORMATION AND PREVENTION OF BACTERIAL CONTAMINATION

GOODBYE HEPARIN !!!!!!

CVAD Lock Solutions –

The debate, the triple threat and the solution

Jocelyn Hill – MN, RN, CVAA(c), VA-BC™
Providence Health Care, Vancouver, BC – Canada
Nurse Educator, IV Therapy/Vascular Access, Home Infusion, OPAT
Practice Consultant for BC Home TPN Program – Vascular access

The Debate

Most currently used catheter lock solutions are effective in some but not all processes that lead to complications.

ANTICOAGULANT

Sodium citrate
Heparin
4% t-EDTA

- *ANTIMICROBIAL*

Antibiotics
30% and 46.7% sodium citrate
Ethanol
Taurolidine
4% t-EDTA

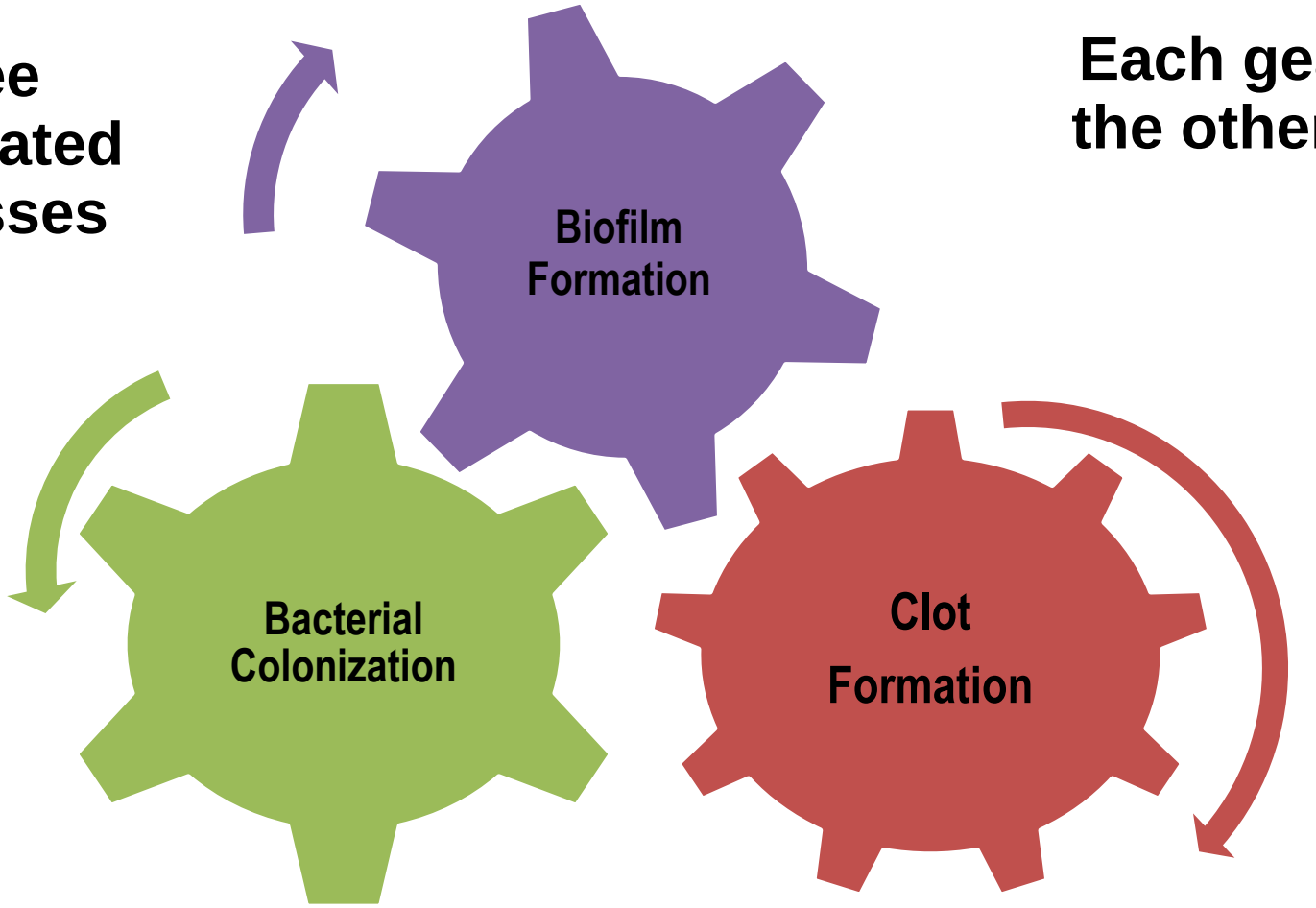
ANTIBIOFILM

- *4% t-EDTA*

The Triple Threat[7]

Three interrelated processes

Each gear drives the other forward



Stop the cycle to reduce complications

CVAD Lock Solutions[1-4,7-11]

Product	Anticoagulant	Antimicrobial	Antibiofilm (prevent)	Antibiofilm (eradicate)	Comment
Saline	X	X	X	X	
Heparin	√	X	X	X	Stimulates biofilm
Citrate 4%	√	√	√	X	
Citrate 4% w/ 30% ethanol	√	√	√	X	Stimulates biofilm
Ethanol 70%	X	√	√	X	
Antibiotic cocktail*	X	√	√	X	Antibiotic Resistance
Taurolidine	X	√	√	X	
CathFlo (tPA)	X	X	X	X	Treatment only
Tetrasodium EDTA 4%	√	√	√	√	

What 4% T-EDTA strikes[4,5,7]

Isolate[a]	MIC	MBC	MBEC	Biofilm Killing[b]	Exposure time
Gram-positive					
Staphylococcus epidermidis (SK)	0.063%	0.125%	4.0%	3.8	24 h
Staphylococcus epidermidis (ON)	0.063%	0.5%	0.5%	4.2	3 h
Staphylococcus aureus (ON)	0.063%	1.0%	4.0%	6.1	24 h
Methicillin-resistant *S. aureus* (ON)	0.063%	0.5%	0.5%	4.6	6 h
Methicillin-resistant *S. aureus* (SK)	0.008%	0.016%	0.06%	3.6	24 h
Enterococcus faecalis (ON)	0.063%	0.5%	4.0%	3.7	6 h
Vancomycin-resistant *E. faecalis* (SK)	0.008%	0.016%	0.063%	1.5	6 h
Gram-negative					
Escherichia coli (SK)	0.125%	0.25%	2.0%	4.4	1 h
Escherichia coli (ON)	0.5%	1.0%	1.0%	6.0	1 h
Pseudomonas aeruginosa (SK)	0.25%	1.0%	4.0%	5.5	6 h
Stenotrophomonas maltophilia (ON)	0.063%	1.0%	4.0%	6.5	1 h
Serratia marcescens (SK)	1.0%	1.0%	4.0%	5.2	6 h
Enterobacter agglomerans (ON)	0.125%	0.25%	4.0%	5.1	1 h
Klebsiella pneumoniae (SK)	1.0%	1.0%	2.0%	3.9	3 h
Proteus mirabilis (ON)	0.063%	2.0%	4.0%	6.2	3 h
Salmonella serovar Typhimurium (control)	0.25%	0.5%	1.0%	4.7	24 h
Fungi					
Candida albicans (SK)	0.016%	0.063%	0.25%	1.7	TBD[c]
Candida albicans (ON)	0.031%	2.0%	4.0%	4.0	TBD[c]

[a] Isolates were obtained from two different hospitals: West - RUH in Saskatchewan (SK) and East -SRHC in Ontario (ON).
[b] The number refers to the highest log reduction in CFU/mL possible (based on how much biofilm had formed) after treatment with KiteLock solution for 24h in the MBEC assays.
[c] Time to Kill assays will be completed for both *C. albicans* in the near future.

Discussion

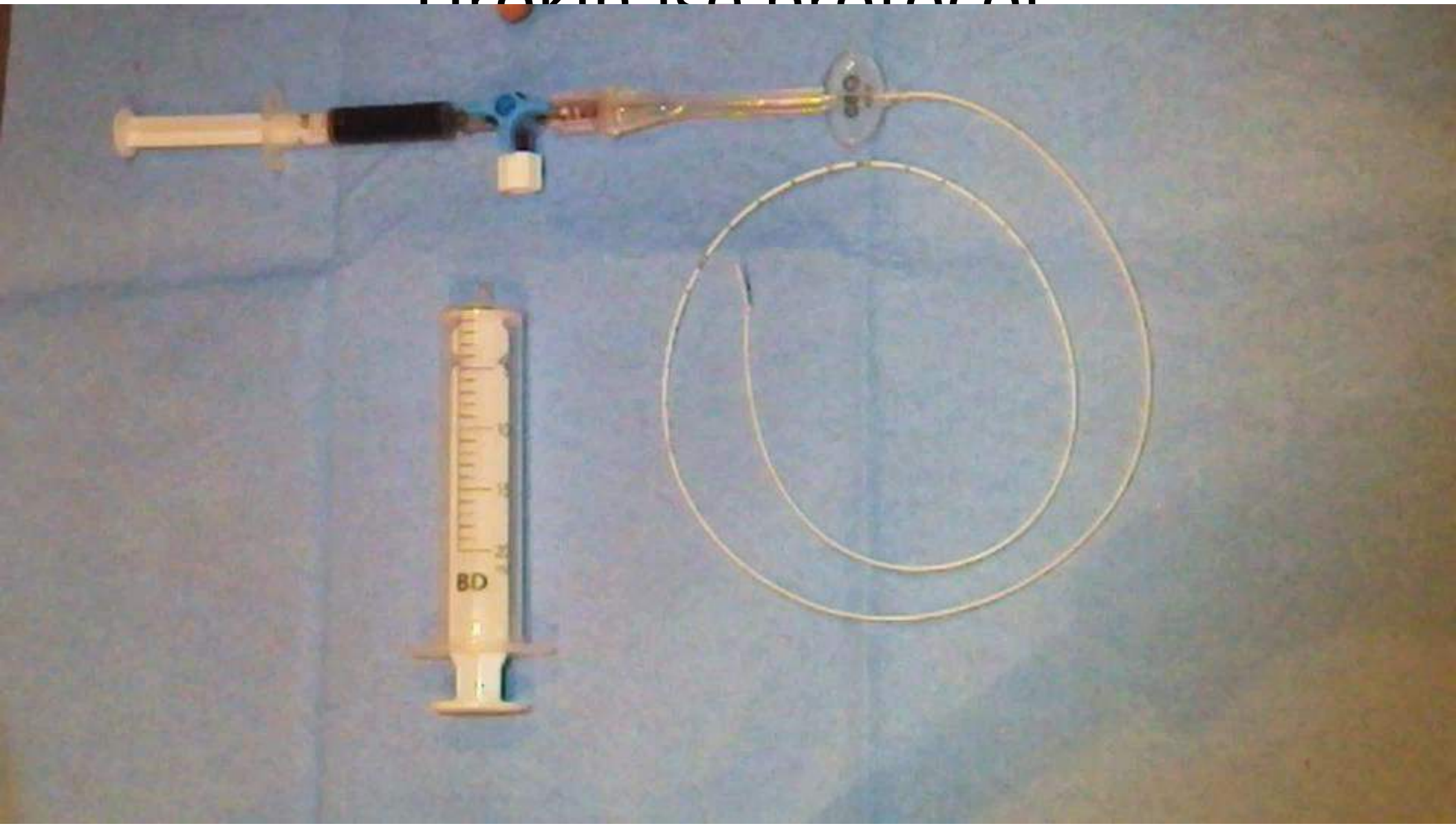
Putting up bacterial roadblocks and reducing the risk of occlusion are extremely important, and making sure an optimal lock solution is instilled every time the catheter is manipulated is a key piece to the puzzle.

The optimal lock solution should effectively prevent all 3 processes but must also **eradicate** bacteria and associated biofilm when needed.

4% Tetrasodium EDTA is a solution to be considered for best patient outcomes:

1. Antimicrobial
2. Anticoagulation
3. Antibiofilm – prevention and eradication

Urokinase protocol



WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

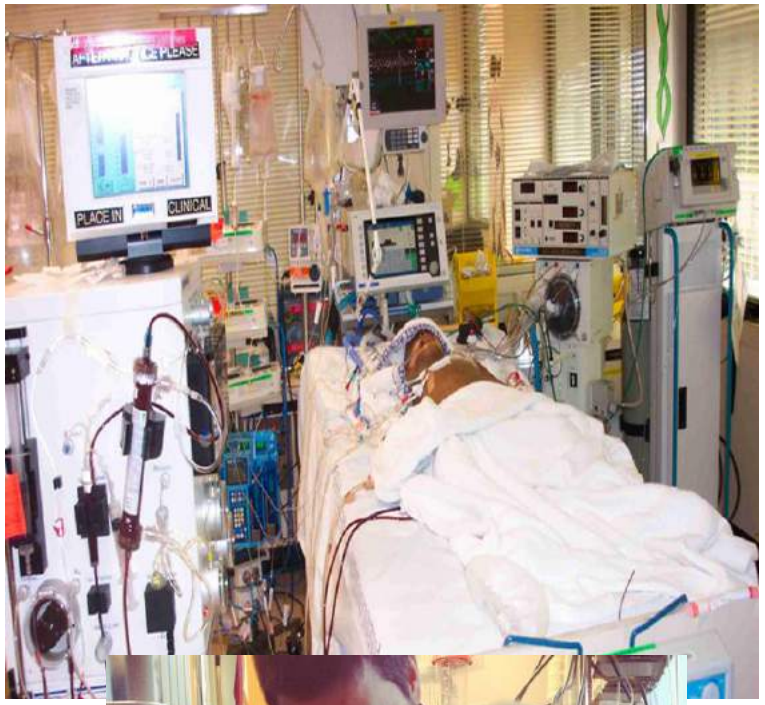
Complicaties VA

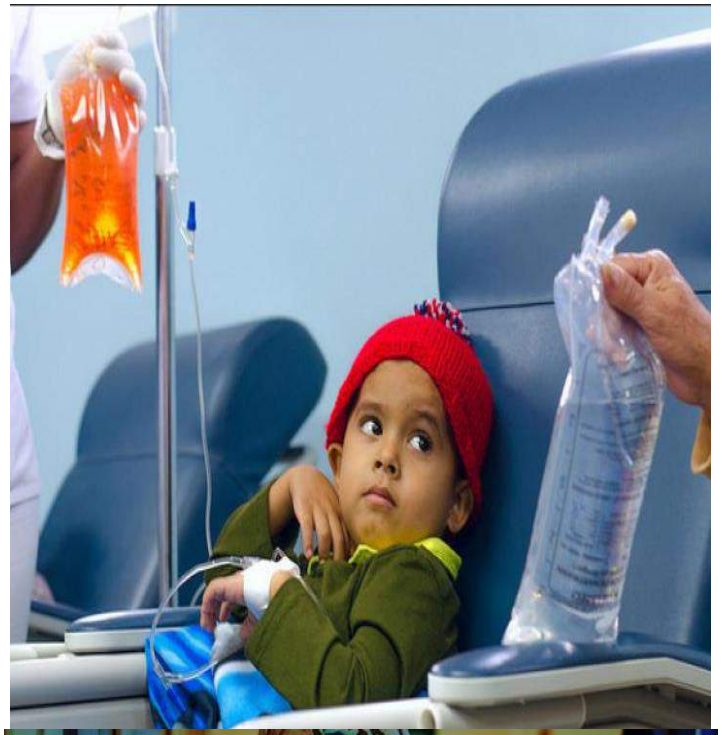
- Infecties
- Trombose
- Migratie / dislocatie
- Extravasatie
- Verstopping
- ‘Spontane’ verwijdering

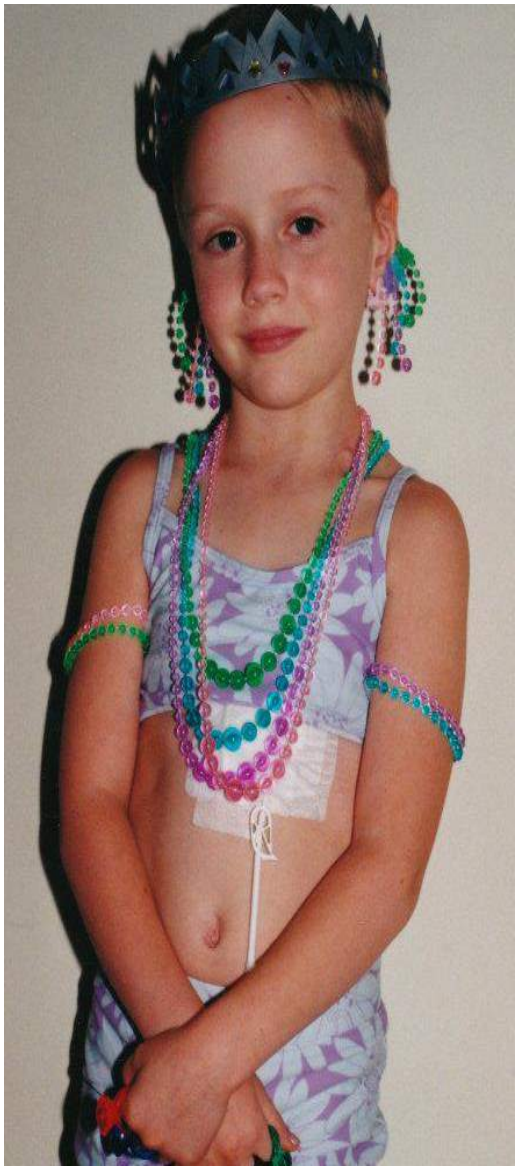
‘Spontane’ verwijdering

- Door ongewilde tractie op de katheter
  - Door onrust
  - Aan- en uitkleden
  - Spelen

Vascular Access Devices – Paediatric Patients







Catheter Dressing and Securement -paediatric patients

Tricia Kleidon
Nurse Practitioner

WoCoVA
5th World Congress on Vascular Access

PIVC securement - Results

	Number of attempts	Number of successes	Success rate
Vascular Access Specialist	136	129	95%
Anaesthetist Doctor	142	104	73%
Resident Medical Officer	204	38	19%
Registrar Doctor	233	37	16%
Other	20	8	40%

	Hazard Ratio (95% CI)	
	Univariable	*Multivariable*
Study group (ref=control):		^
- ISD	0.67 (0.42-1.05)	
- TA	0.78 (0.50-1.22)	
Age (1 year increase)	0.95 (0.91-0.99)*	~
Comorbidity (1 category higher)	0.87 (0.68-1.11)	
Placement (ref=cephalic):		&
- Dorsal venous arch	0.87 (0.52-1.47)	
- Other	1.12 (0.73-1.72)	
Location (ref=posterior lower forearm):		&
- Hand	1.15 (0.70-1.89)	
- Other	1.33 (0.86-2.04)	
Inserted by (ref=VAS):		
- Anaesthetist	1.47 (0.95-2.29)	2.03 (1.23-3.35)*
- Other	1.44 (0.91-2.30)	1.65 (1.02-2.68)*
Males (ref=females)	0.98 (0.67-1.42)	&
Weight appearance (ref=minimal adipose)	0.74 (0.51-1.09)	0.67 (0.45-0.99)*
Infection at baseline (ref=no)	1.58 (1.09-2.30)*	2.21 (1.44-3.39)*
Wound at baseline (ref=no)	1.27 (0.84-1.91)	&
Device size (ref=22g)	1.27 (0.84-1.90)	&
Difficult insertion (ref=no)	1.27 (0.87-1.86)	&
Multiple insertion attempts (ref=no)	1.44 (0.97-2.12)	^

*VAS = vascular access specialist; ref = referent category; g = gauge; CI = confidence interval; * statistically significant at p<0.05; ~ excluded from multivariable analysis due to not satisfying the proportional hazards assumption; ^ removed from multivariable model at multivariable p≥0.05; & excluded from multivariable model at univariable p≥0.20;*

CENTURION
MEDICAL PRODUCTS

Verwijdering

- Na het vervallen van de indicatie

Do Guidelines Consider the Patient? Infusion Therapy Standards of Practice

Mary Alexander, MA, RN, CRNI®, CAE, FAAN
Infusion Nurses Society
Norwood, MA, USA
June 2018

WoCoVA
5th World Congress on Vascular Access

44. VAD Removal

Remove SPC if it's no longer included in the plan of care or has not been used for 24 hours or more (IV)

Remove SPC and midline catheters when ***clinically indicated*** based on site assessment and signs/symptoms of complications (I)

Facilitate timely removal of CVADs (IV)

- Daily rounds by interprofessional team
- Standardized tool
- Assessment by infusion nurse

Gorski L, et al. Infusion therapy standards of practice. *J Infus Nurs*. 2016: 39(suppl 1): S91-S94.

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Voorkomen Complicaties VA

- Infecties
- Trombose
- Migratie / dislocatie
- Extravasatie
- Verstopping
- ‘Spontane’ verwijdering
- Lekkage

Voorkomen Complicaties VA

- Duidelijke criteria kennis- en vaardigheidsniveau

BJA Advance Access published January 29, 2013

British Journal of Anaesthesia Page 1 of 10
doi:10.1093/bja/aes499

BJA

Evidence-based consensus on the insertion of central venous access devices: definition of minimal requirements for training

N. Moureau[1], M. Lamperti[2]*, L. J. Kelly[3], R. Dawson[4], M. Elbarbary[5], A. J. H. van Boxtel[6] and M. Pittiruti[7]

[1] PICC Excellence Inc., Greenville Hospital System University Medical Center, Hartwell, GA, USA
[2] Department of Neuroanaesthesia, Neurological Institute Besta, Via Celoria, 11, 20136 Milan, Italy
[3] Department of Health, University of the West of Scotland, Glasgow, UK
[4] PICC Academy, University of the West of Scotland, Concord Hospital, Nashua, NH, USA
[5] National and Gulf Center for Evidence Based Health Practice, King Saud University for Health Sciences, Riyadh, Saudi Arabia
[6] Infusion Innovations, Vascular Access Team Utrecht, Utrecht, The Netherlands
[7] Department of Surgery, Catholic University, Rome, Italy

* Corresponding author. E-mail: doclampmd@gmail.com

Editor's key points

- This review presents consensus on standard minimal requirements for training on central venous access devices.
- An international task force generated an evidence-based consensus.

Summary. There is a lack of standard minimal requirements for the training of insertion techniques and maintenance of central venous access devices (CVADs). An international evidence-based consensus task force was established through the World Congress of Vascular Access (WoCoVA) to provide definitions and recommendations for training and insertion of CVADs. Medical literature published from February 1971 to April 2012 regarding 'central vascular access', 'training', 'competency', 'simulation', and 'ultrasound' was reviewed on Pubmed, BioMed Central, ScienceDirect, and Scopus databases. The GRADE and the GRADE-RAND methods were utilized to develop recommendations. Out of 156 papers initially identified, 83 papers described training for central vascular access placement. Sixteen recommendations are proposed by this task force, each with an evidence level, degree of consensus, and recommendation grade. These recommendations suggest central venous access education include didactic or web-based teaching with

Moureau et all BJA, 2013

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Voorkomen Complicaties VA

- Eenduidigheid
  - Certificering
  - Nederlandstalige richtlijn VA
    - WIP richtlijn
      - Verlopen in 2013
      - Enkel gericht op infectie preventie
      - Werkgroep opgeheven
- Infuustechnologie opnemen in curiculum artsen en berpleegkundigen
- Team aanpak

Iedere patient is uniek

WoCoVA
5th World Congress on Vascular Access

VIT
vascular infusion technology

Hartelijk dank

E-MAIL: TON@INFU-IN.COM