Complicatie Preventie in Vascular Access (VA)

Ton van Boxtel
Disclosure

Nothing to disclose
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,
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
Zingg W. *Crit Care Med* 2009; 37: 2167
Multimodal intervention strategies to reduce catheter-associated bloodstream infections:

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- 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
International evidence-based recommendations on ultrasound-guided vascular access

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

D. Feller-Kopman
Bronchoscopy and Interventional
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Baltimore, USA

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<table>
<thead>
<tr>
<th>Domain code</th>
<th>Suggested definition</th>
<th>Level of evidence</th>
<th>Degree of consensus</th>
<th>Strength of recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1.S1. Ultrasound-guided cannulation</td>
<td>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</td>
<td>NA</td>
<td>Very good</td>
<td>Strong</td>
</tr>
</tbody>
</table>
# Efficacy of multimodal intervention strategies:

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggimann</td>
<td>3.1/1000 catheter-days</td>
<td>1.2/1000 catheter-days</td>
</tr>
<tr>
<td>Pronovost</td>
<td>*7.7/1000 catheter-days</td>
<td>*1.4/1000 catheter-days</td>
</tr>
<tr>
<td>Zingg</td>
<td>3.1/1000 catheter-days</td>
<td>1.1/1000 catheter-days</td>
</tr>
<tr>
<td>Timsit</td>
<td>1.4/1000 catheter-days</td>
<td>0.6/1000 catheter-days</td>
</tr>
</tbody>
</table>

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

Eggimann P. *Lancet* 2000; 35: 290
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


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
Quarterly CRBSI incidence densities per hospital

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

*Intensive Care Med 2018*
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
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™

WoCVA
5th World Congress on Vascular Access
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*)

deeiming it significant effectors in prevention of vessel- and catheter-related complications²

Most Catheter-related DVT Are Clinically Silent!


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/septicaemia¹
9. Reverse tapered catheters²
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.

### Red grid represents area between 45% or greater

<table>
<thead>
<tr>
<th>Catheter Size (Fr)</th>
<th>Catheter OD (mm)</th>
<th>Radius of Catheter (mm)</th>
<th>Area of Catheter (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.65</td>
<td>0.83</td>
<td>2.14</td>
</tr>
<tr>
<td>Vessel OD (mm)</td>
<td>Radius of Vessel (mm)</td>
<td>Area of Vessel (mm²)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.46</td>
<td>1.23</td>
<td>4.73</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Catheter Size (Fr)</th>
<th>Catheter OD (mm)</th>
<th>Radius of Catheter (mm)</th>
<th>Area of Catheter (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.65</td>
<td>0.83</td>
<td>2.14</td>
</tr>
<tr>
<td>Vessel OD (mm)</td>
<td>Radius of Vessel (mm)</td>
<td>Area of Vessel (mm²)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.67</td>
<td>1.34</td>
<td>5.60</td>
</tr>
</tbody>
</table>

### Green grid represents area between 33% or less

<table>
<thead>
<tr>
<th>Catheter Size (Fr)</th>
<th>Catheter OD (mm)</th>
<th>Radius of Catheter (mm)</th>
<th>Area of Catheter (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.65</td>
<td>0.83</td>
<td>2.14</td>
</tr>
<tr>
<td>Vessel OD (mm)</td>
<td>Radius of Vessel (mm)</td>
<td>Area of Vessel (mm²)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.88</td>
<td>1.44</td>
<td>6.51</td>
</tr>
</tbody>
</table>

CVR
Choosing the exit site of PICCs

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 21 cm Total Zone Measurement (TZM), it divides into three 7 cm zones to form the Red, Green and Yellow Zones. The ideal basilic vein image was located at 12 cm from the medical epicondyle (MEC), in the Ideal Zone. Image by author.
<table>
<thead>
<tr>
<th>Flow Model Chart (Nifong, 2011)</th>
<th>2F Catheter Inserted</th>
<th>4F Catheter Inserted</th>
<th>6F Catheter Inserted</th>
<th>8F Catheter Inserted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vein and Vein Size</td>
<td>Initial Flow (ml/min)</td>
<td>Flow Reduction</td>
<td>Flow Reduction</td>
<td>Flow Reduction</td>
</tr>
<tr>
<td>Cephalic (4mm)</td>
<td>10</td>
<td>5ml</td>
<td>48% remaining</td>
<td>3ml</td>
</tr>
<tr>
<td>Brachial (5mm)</td>
<td>25</td>
<td>13ml</td>
<td>53% remaining</td>
<td>9ml</td>
</tr>
<tr>
<td>Basilic (6 mm)</td>
<td>52</td>
<td>29ml</td>
<td>56% remaining</td>
<td>21ml</td>
</tr>
<tr>
<td>Axillary (8mm)</td>
<td>164</td>
<td>100ml</td>
<td>61% remaining</td>
<td>79ml</td>
</tr>
<tr>
<td>Subclavian (10mm)</td>
<td>400</td>
<td>256ml</td>
<td>64% remaining</td>
<td>212ml</td>
</tr>
</tbody>
</table>
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

98.1%

1.9%
Complicaties VA

- Infecties
- Trombose
- Migratie / dislocatie
Sutureless stabilization devices

Winged adhesives
Subcutaneous 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

Elimination of migration related catheter replacements preserved patient access and saved the health system £59,322 in 12 months.
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 Minimidieline zijn beschikbaar
Complicaties VA

- Infecties
- Trombose
- Migratie / dislocatie
- Extravasatie
- Verstopping
Conclusion: NS is a safe and effective locking solution in implantable ports if combined with a strict protocol for device insertion and maintenance.
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  
<table>
<thead>
<tr>
<th></th>
<th>Cancer Nursing 2012 prospective study</th>
<th>GOOSSENS et al Annals of Oncology 2013 RCT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CATHETER OCCLUSION</strong></td>
<td>HEPARIN SOLUTION 6.7%</td>
<td>NORMAL SALINE 5.7%</td>
</tr>
<tr>
<td><strong>EASY INJECTION + WITHDRAWAL OCCLUSION</strong></td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>DVT</strong></td>
<td>2.2%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

No statistically significant differences on occlusion between competitors.
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?


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 Pittiruti¹, Sergio Bertoglio², Giancarlo Scopettuolo¹, Roberto Bifﬁ³, Massimo Lamperti⁴, Alberto Dal Molin⁵, Nicola Panocchia¹, Nicola Petrosillo⁶, Mario Venditti⁷, Carla Rigo⁸, 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
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 RECOMMENDATION

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

1. Future assessment of 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

ANTICOAGULANTS 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

WoCVA
5th World Congress on 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

Three interrelated processes

Biofilm Formation

Bacterial Colonization

Clot Formation

Each gear drives the other forward

Stop the cycle to reduce complications
## CVAD Lock Solutions

<table>
<thead>
<tr>
<th>Product</th>
<th>Anticoagulant</th>
<th>Antimicrobial</th>
<th>Antibiofilm (prevent)</th>
<th>Antibiofilm (eradicate)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saline</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heparin</td>
<td>√</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Stimulates biofilm</td>
</tr>
<tr>
<td>Citrate 4%</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citrate 4% w/ 30% ethanol</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td>Stimulates biofilm</td>
</tr>
<tr>
<td>Ethanol 70%</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic cocktail*</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td></td>
<td>Antibiotic Resistance</td>
</tr>
<tr>
<td>Taurolidine</td>
<td>X</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CathFlo (tPA)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Treatment only</td>
</tr>
<tr>
<td>Tetrasodium EDTA 4%</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>
## What 4% T-EDTA strikes

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

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* Isolates were obtained from two different hospitals: West - RUH in Saskatchewan (SK) and East -SRHC in Ontario (ON).

* 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.

* 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
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

<table>
<thead>
<tr>
<th></th>
<th>Number of attempts</th>
<th>Number of successes</th>
<th>Success rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vascular Access Specialist</strong></td>
<td>136</td>
<td>129</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Anaesthetist Doctor</strong></td>
<td>142</td>
<td>104</td>
<td>73%</td>
</tr>
<tr>
<td><strong>Resident Medical Officer</strong></td>
<td>204</td>
<td>38</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Registrar Doctor</strong></td>
<td>233</td>
<td>37</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>20</td>
<td>8</td>
<td>40%</td>
</tr>
</tbody>
</table>

### Hazard Ratio (95% CI)

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

*VASC = 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 univariable p≥0.05; & excluded from multivariable model at univariable p≥0.20;
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
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

Voorkomen Complicaties VA

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

- Duidelijke criteria kennis- en vaardighedsniveau

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

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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
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⁷ Department of Surgery, Catholic University, Rome, Italy

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

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...
Voorkomen Complicaties VA

- Eenduidigheid
  - Certificering
  - Nederlandstalige richtlijn VA
    - WIP richtlijn
      - Verlopen in 2013
      - Enkel gericht op infectie preventie
      - Werkgroep opgeheven

- Infuustechnologie opnemen in curriculum artsen en berpleegkundigen

- Team aanpak
Iedere patient is uniek
Hartelijk dank