



UMC Utrecht

# De patiënt en de CICC

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# **Diclosure**

- Geen 'conflict of interest'
- Veel dia's gekopieerd van presentaties WoCoVA 2018
  - The state of the art of CICC insertion – Jack LeDonne, MD (US)
  - A new approach to CICC: the ZIM – Mauro Pittiruti, MD (IT)
  - Securement of PICC, CICC and FICC – Liz Simcock, RGN (GB)
  - Patients assessment by ultrasound: RaCeVA and RaPeVA – Fulvio Pinelli, MD (IT)
  - Which patients will benefit of a FICC? – Sergio Bertoglio, MD (IT)



# What patients want



Word cloud: How do you want to feel in a healthcare provider's office?

[THESCHWARTZCENTER.ORG/WHATPATIENTSWANT](http://THESCHWARTZCENTER.ORG/WHATPATIENTSWANT)

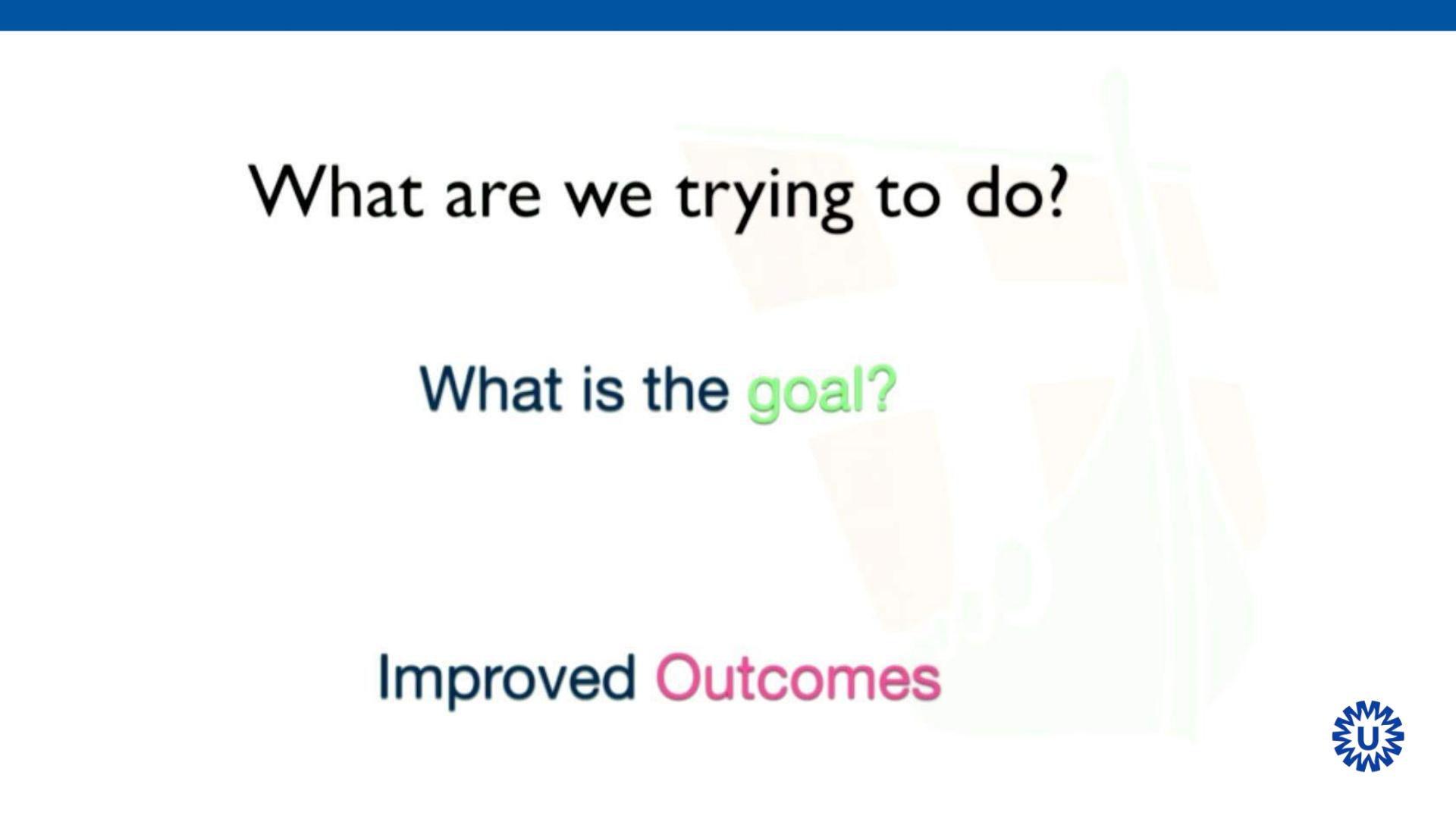
# **Elke patiënt heeft recht op een adequate veneuze toegang!**

- Maximaal therapeutische baten voor de patiënt
- Minimalisatie van ongemak voor de patiënt
  - minimale belemmering van ADL
- Minimalisatie morbiditeit en mortaliteit

## ➤ adequate veneuze toegang

- geschikt voor indicatie
- laagste kans op complicaties (infectieus/non-infectieus)
- gedurende therapie geen/minimale vervanging  
noodzakelijk





# What are we trying to do?

## What is the goal?

### Improved Outcomes



# Exactly One Way to Improve Outcomes

Improve your Process



## How to Improve your Process

Determine what are the “**best**” practices,  
then **standardize** procedures at that level

Agreement

Disagreement



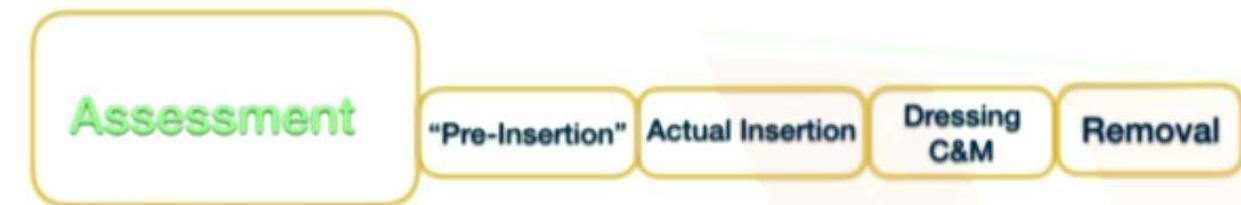
# Life Cycle of a CICC: Standardizing Practice...at

Assessment   "Pre-Insertion"   Actual Insertion   Dressing C&M   Removal

**Chain of CLABSI Prevention**



MAGIC, GaVeCeLT, Proper Device



Infuse Compatibility

DIVA

Frequent Phlebotomy

Projected Duration

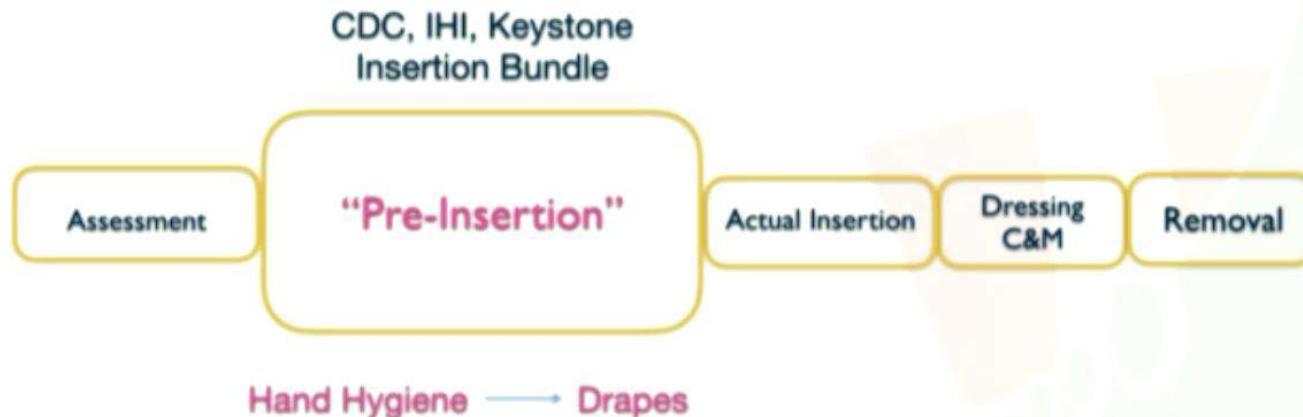
CKD 3b

# of Lumens

What can we do to  
standardize assessment?



# Life Cycle of a CVC: Standardizing Practice...at



# The Insertion Bundle

Hand Hygiene

Chlorhexidine

Maximum Barrier

Daily Review of Necessity

Avoid Femoral Site



Reductie infecties:  
7.7 => 1.4/1000 katheterdagen



# Disagreement

Which vein?

Who should insert?

Blind vs US

Antimicrobial cath?

Which dressing?

Which endcap?



# Temporal Relationship



## Trick-LeDonne Hypothesis

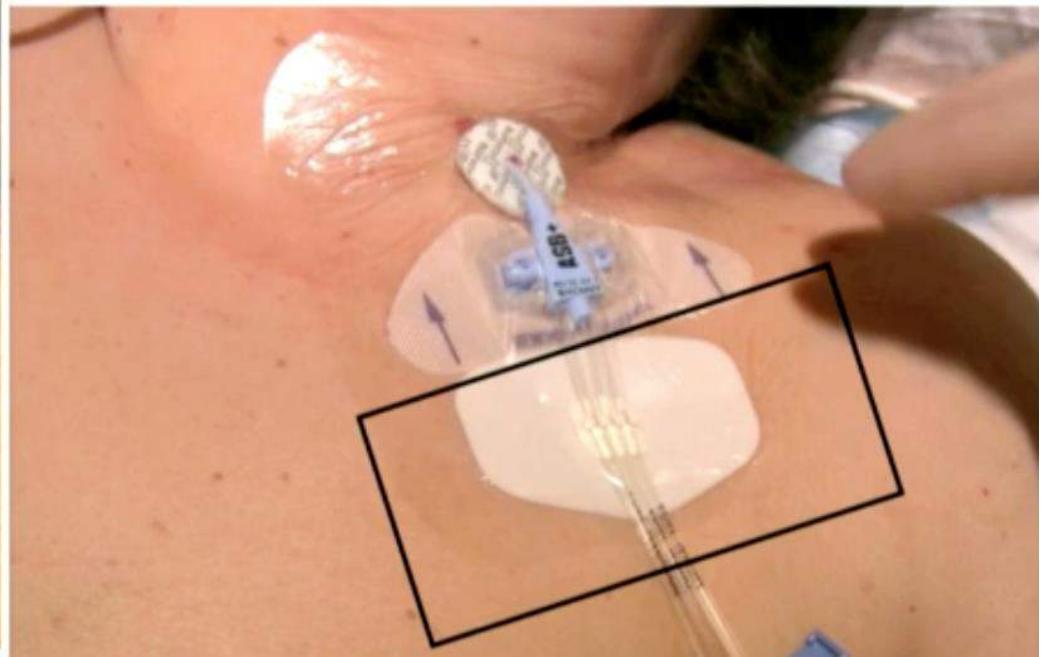
Dressing is Vital

Marks the end of Insertion  
and start of C&M





# Gravity





# Dressing disruption is a major risk factor for catheter-related infections\*

Jean-François Timsit, MD, PhD; Lila Bouadma, MD, PhD; Stéphane Ruckly, MSc; Carole Schwebel, MD, PhD;  
Maïté Garrouste-Orgeas, MD; Régis Bronchard, MD; Silvia Calvino-Gunther, RN; Kevin Laupland, MD;  
Christophe Adrie, MD, PhD; Marie Thuong, MD; Marie-Christine Herault, MD; Sebastian Pease, MD;  
Xavier Arrault, PharmD; Jean-Christophe Lucet, MD, PhD



Crit Care Med 2012 Vol. 40, No. 6



67% Dressing Changes were Unscheduled

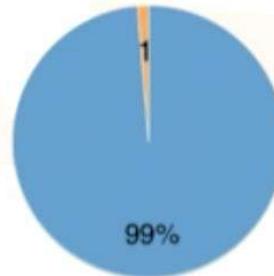
If a dressing was  
disrupted  
the infection risk ↑

“Subclavian” access  
protected from Disruption



# State of the Art: CICC Insertion

1. Recognize the Relation between Insertion & C&M (1% vs 99%)



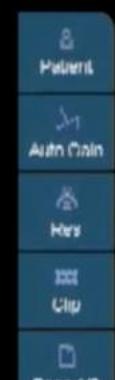
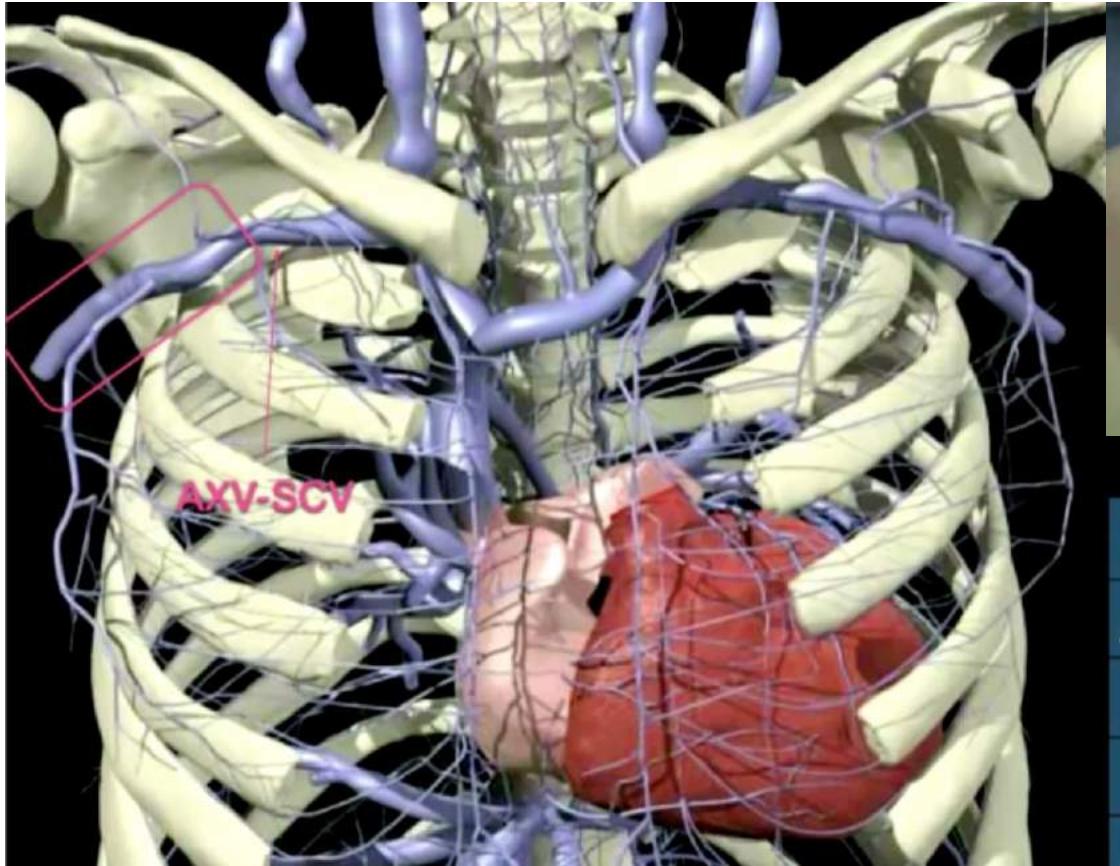
2. "
3. "
4. "

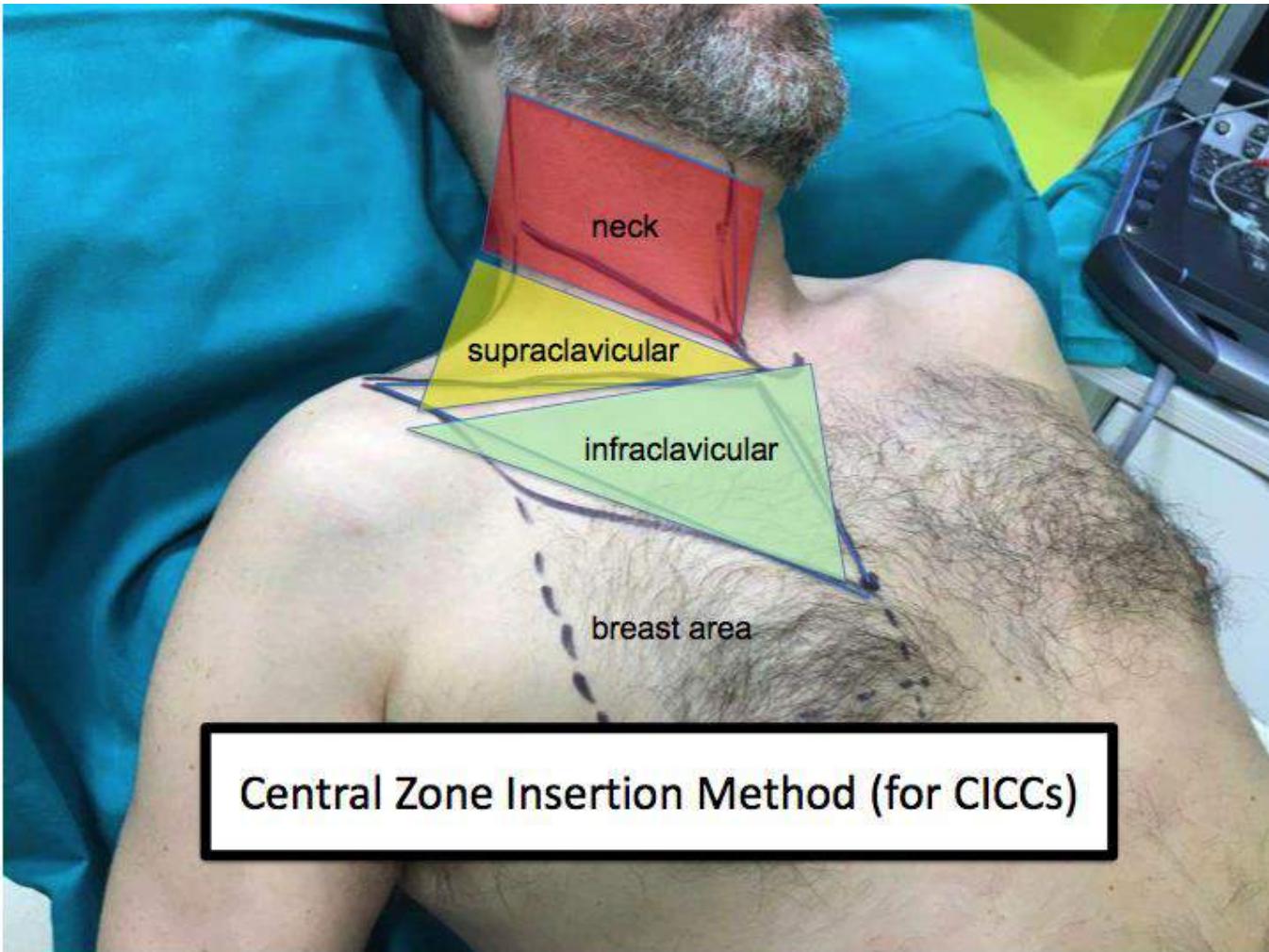
5. Optimal Dressing is on Chest

6. AXV for Acute CICC,  
ex CKD & technicals



# V. axillaris

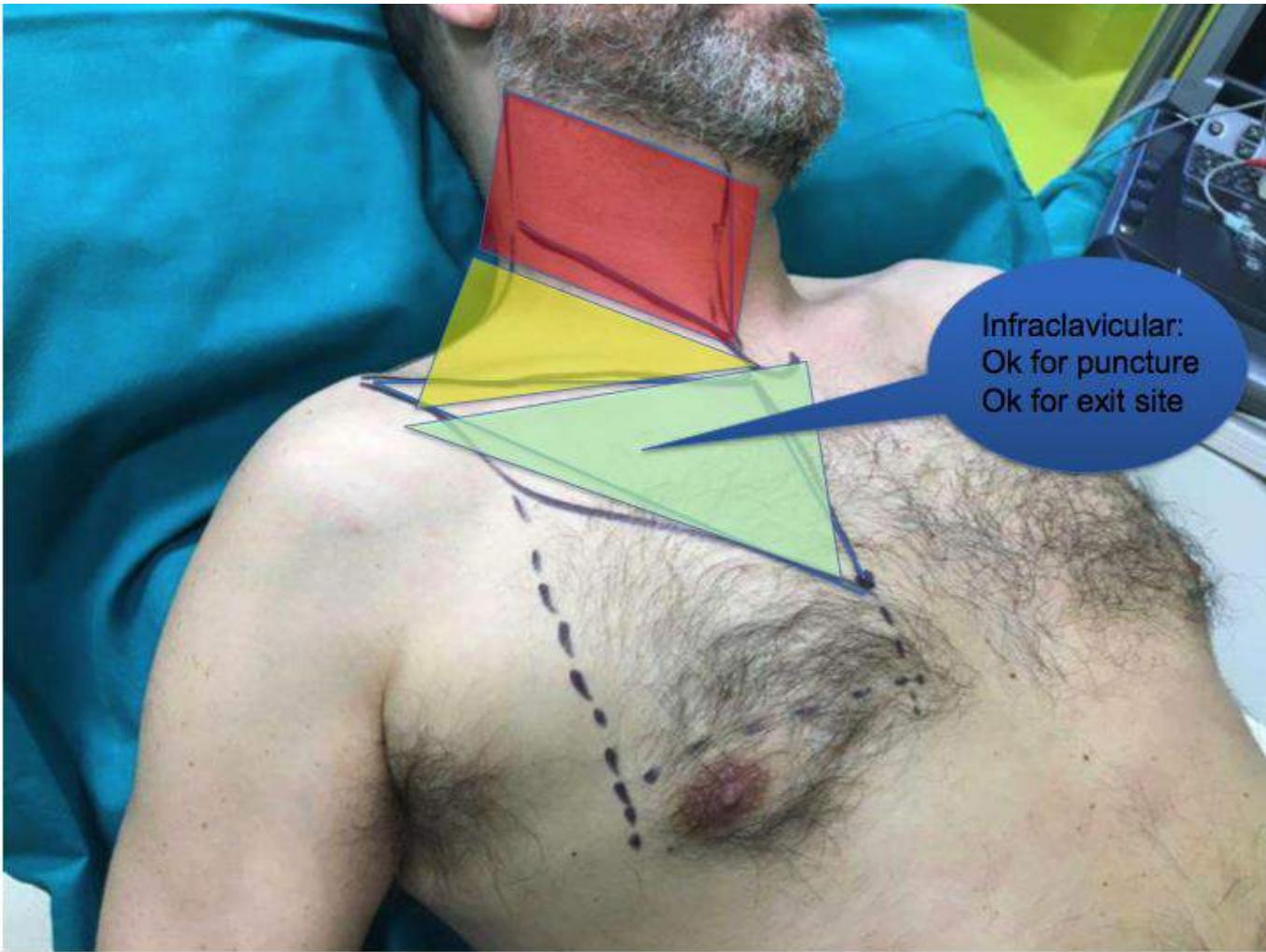


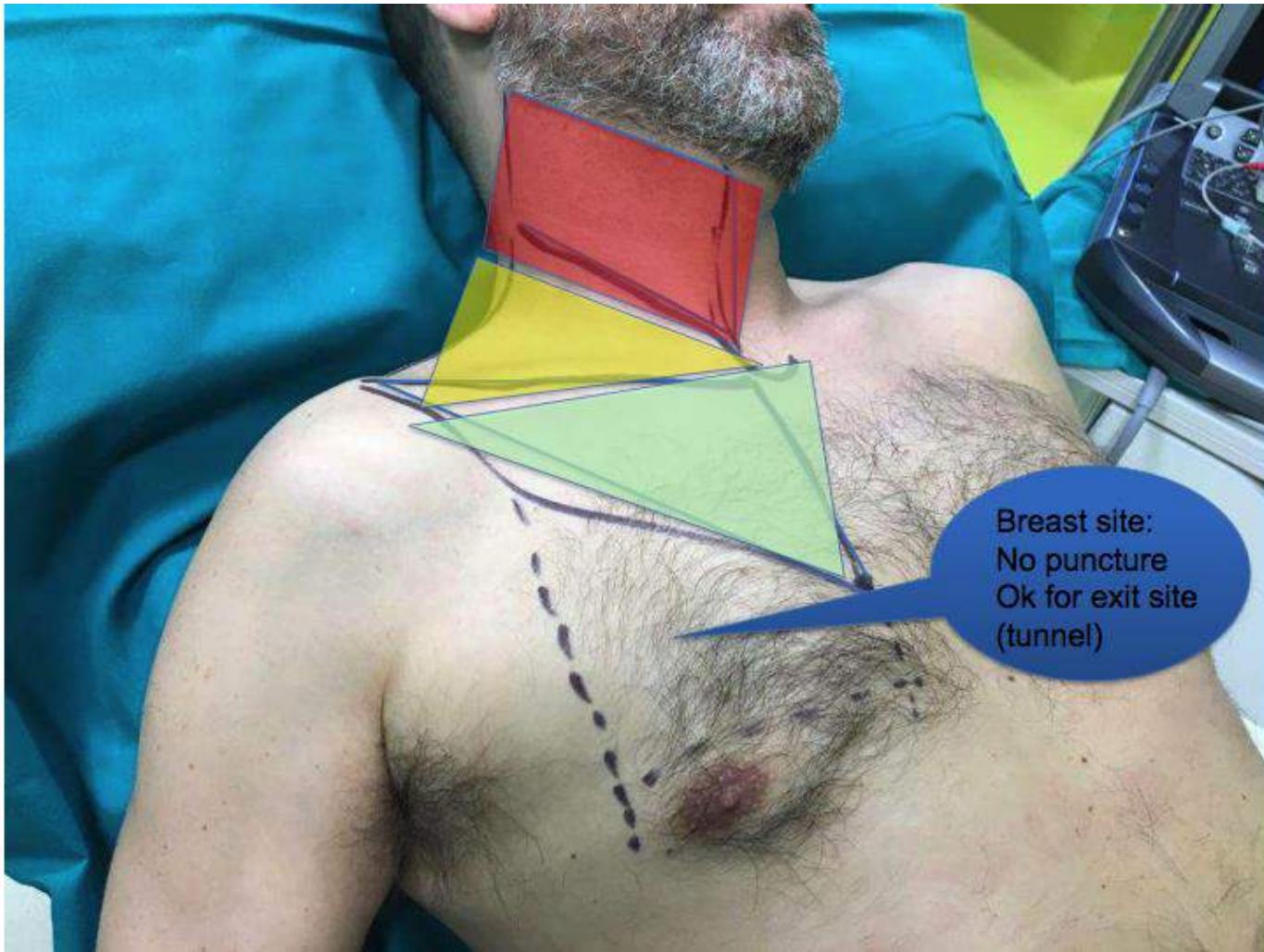






Supraclavicular :  
Ok for puncture  
Not ideal for exit site





Breast site:  
No puncture  
Ok for exit site  
(tunnel)

# State of the Art: CICC Insertion

7. Abandon upward directed IJV



8. Acute IJV: SoB, Low, Rotate



# Internal Jugular Vein

2 Circumstances: CKD  
Technical Challenges w AXV

Side of Bed

Low in the Neck

Rotate Downwards



# State of the Art: CICC Insertion

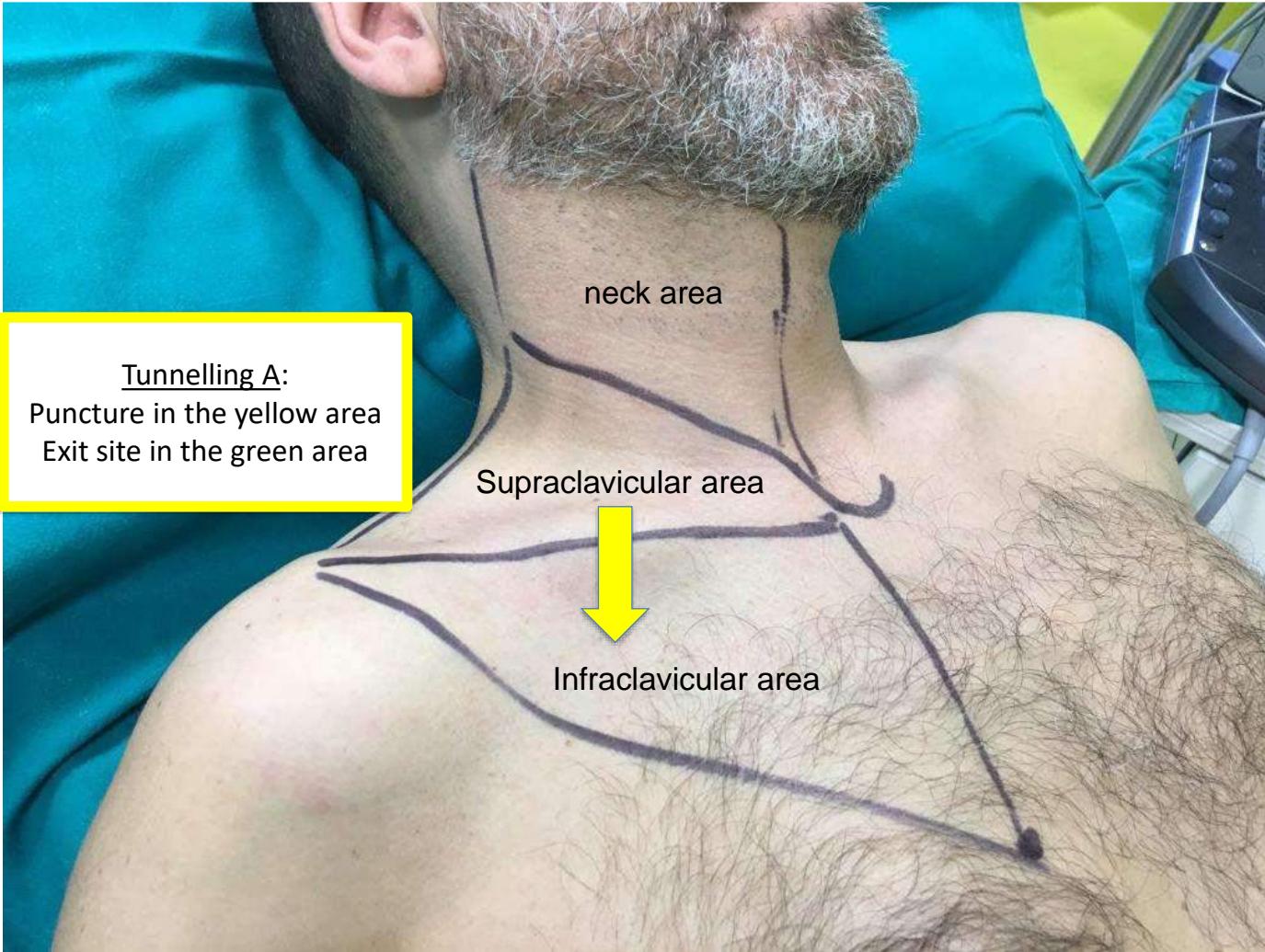


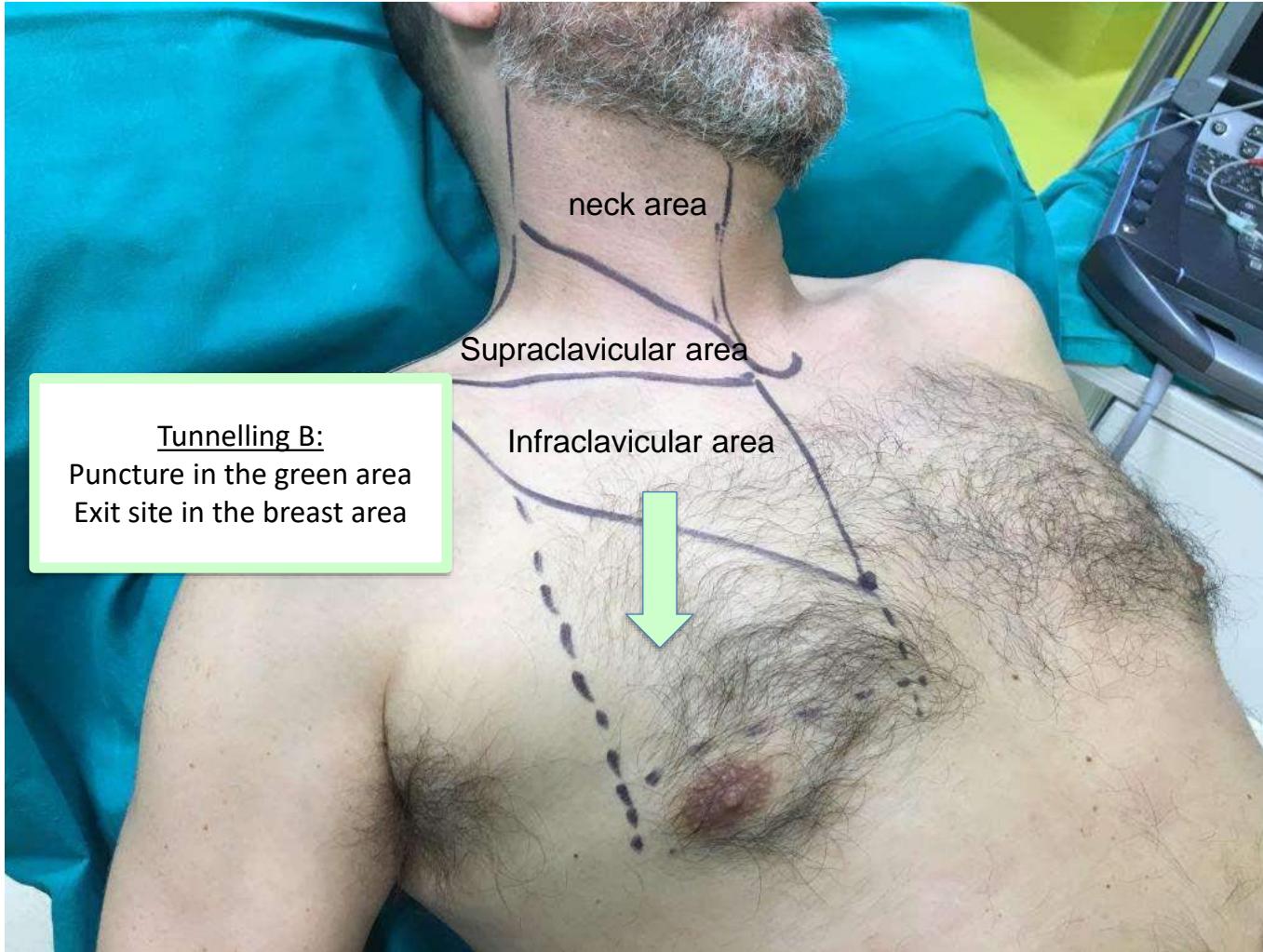
9. Bedside Tunnel for  
IJV & FICC



10. RetroTun for HD (long term)







# Vena femoralis

REGRESSION OF FEMORAL CATH BSI PER YEAR OF PUBLICATION  
LOG ODDS RATIO BELOW ZERO FAVERS THE FEMORAL SITE

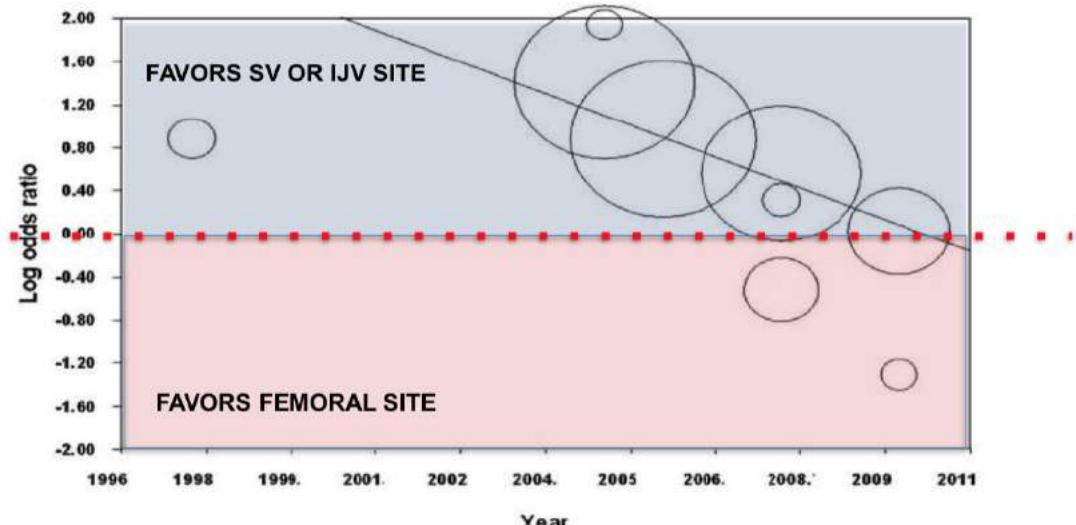
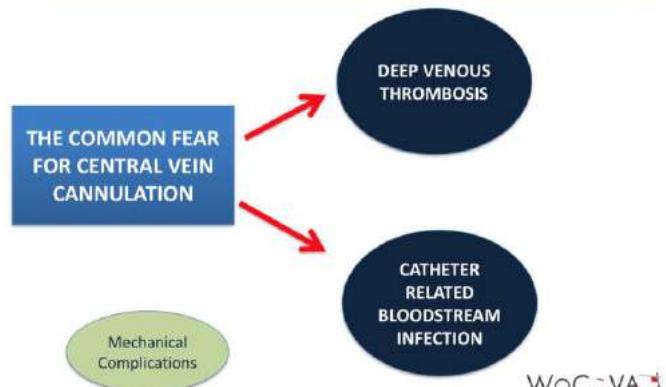
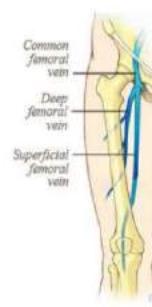


Figure 5. Regression of the year of publication vs. the log odds ratio of catheter-related bloodstream infections. A log odds ratio above zero favors the internal jugular site while a log odds ratio below zero favors the femoral site. The size of the circle indicates the statistical influence of each study.

CONS OF FEMORAL VEIN CANNULATION HAVE BEEN MAINLY EVALUATED IN EMERGENCY AND ICU PATIENTS



WHAT ABOUT TUNNELED PICCS IN FEMORAL VEIN?



INITIALLY REPORTED FOR PATIENTS WITH LUNG CANCER SVC SYNDROME

Linfang Zhao AVA 2015

# State of the Art: CICC Insertion

## III. Avoid Incisions, Hubbing & Sutures



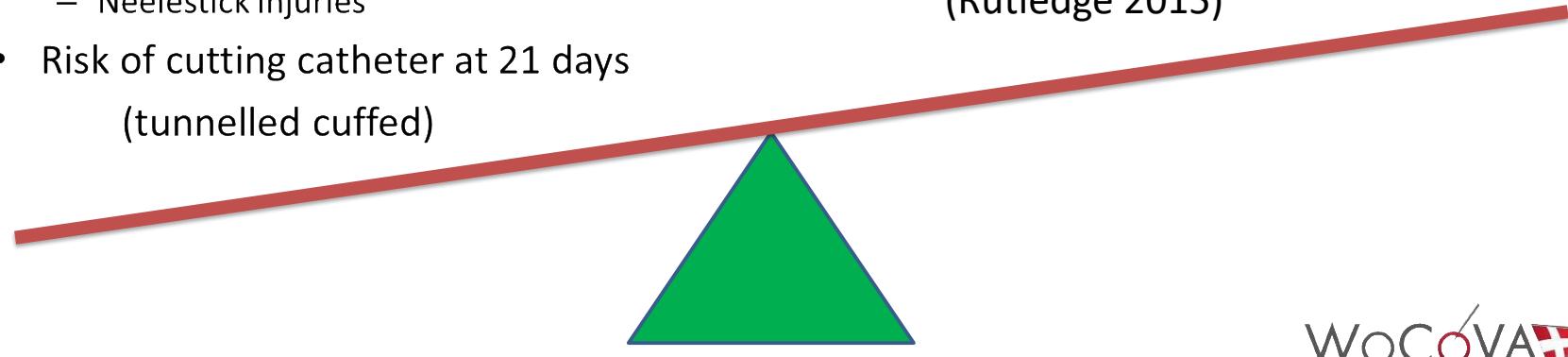
# Suturing: out of date?



- NOT recommended: INS 2011
- Gabriel 2018
  - Pain
  - Infection
  - Work loose / skin erosion
  - Neelestick injuries
- Risk of cutting catheter at 21 days  
(tunneled cuffed)



- Still widely used: (Moon 2017, Ahmadnia 2016)
- Non-specialist medical choice? (Inwood 2014)
- Can withstand higher pull forces than securement dressing? (Rutledge 2015)



# State of the Art: CICC Insertion

11. Avoid Incisions, Hubbing & Sutures

12. AM Catheters & Dressings



# Evidence for Chlorhexidine?

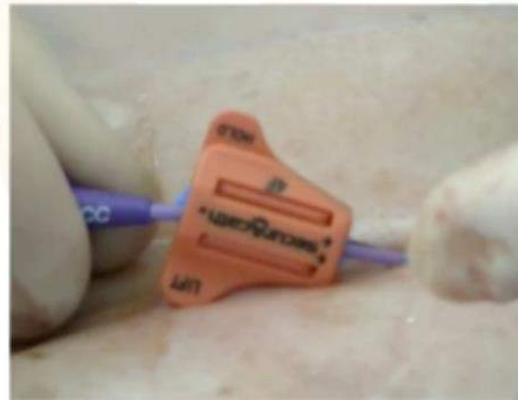


- Medication-impregnated dressing products reduce the incidence of catheter-related BSI relative to all other dressing types. (Cochrane review) Ullman et al 2015)
- Proven in CVCs but not PICCs (Rickard 2017)
- (NB Allergic reactions / intolerance)



# State of the Art: CICC Insertion

11. Avoid Incisions, Hubbing & Sutures



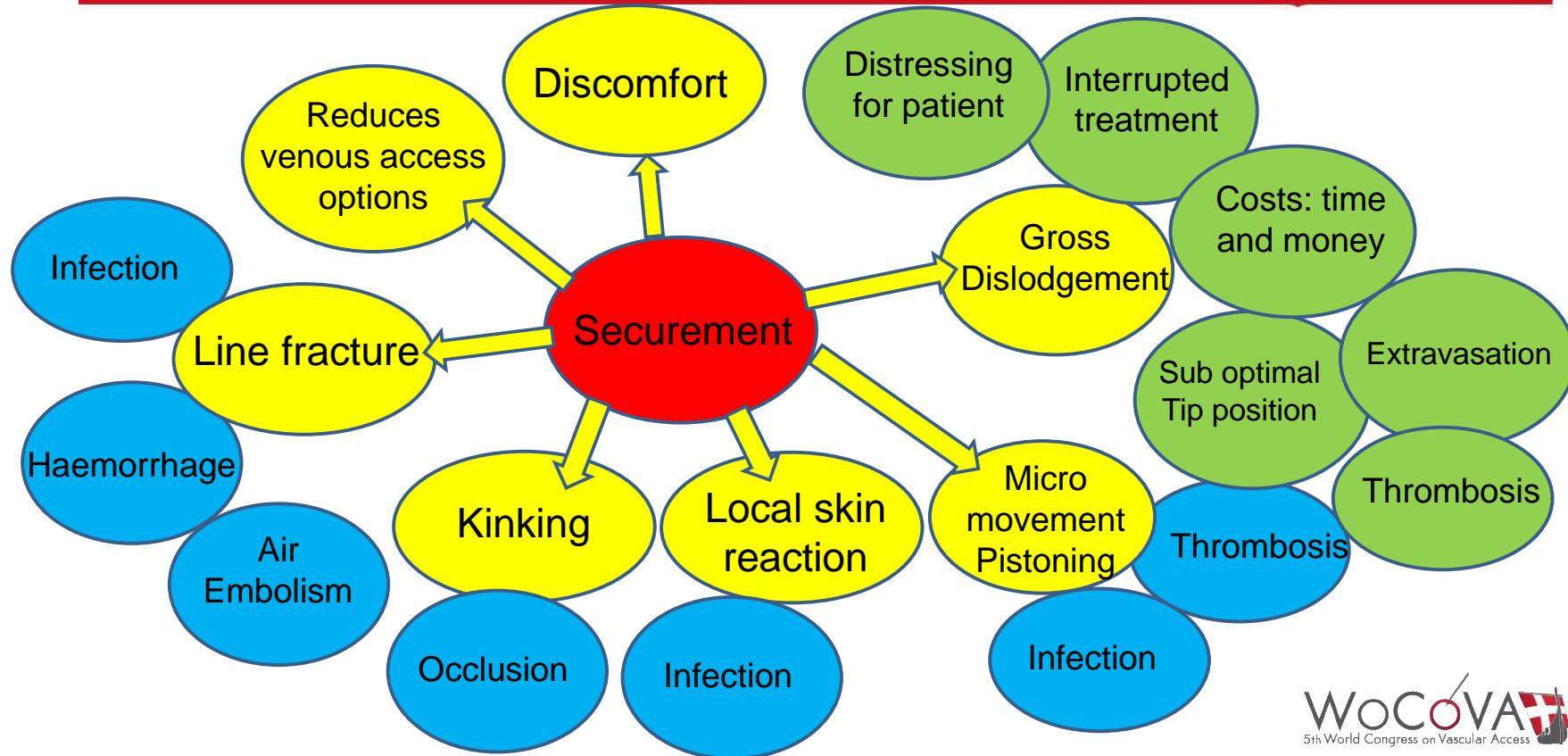
12. AM Catheters & Dressings



13. ESD & Dressing Adhesive



# Complications linked to securement





- Ideal dressing & securement device should...
  - provide a **barrier** that protects from microbial colonisation and infection, preventing catheter related BSI
  - provide adequate **securement** to prevent accidental removal, partial dislodgement and micro-motion
  - be **comfortable** and non-irritating for the patient
  - be **easy** to use
  - be **cost-effective**

# 3 types securement (Macklin & Blackburn 2015)



- **Transdermal:**

- sutures



- **Cutaneous**

- Tape
  - Dressing itself



- **Subcutaneous**

- Subcutaneously Anchored Sutureless Device (SAS)

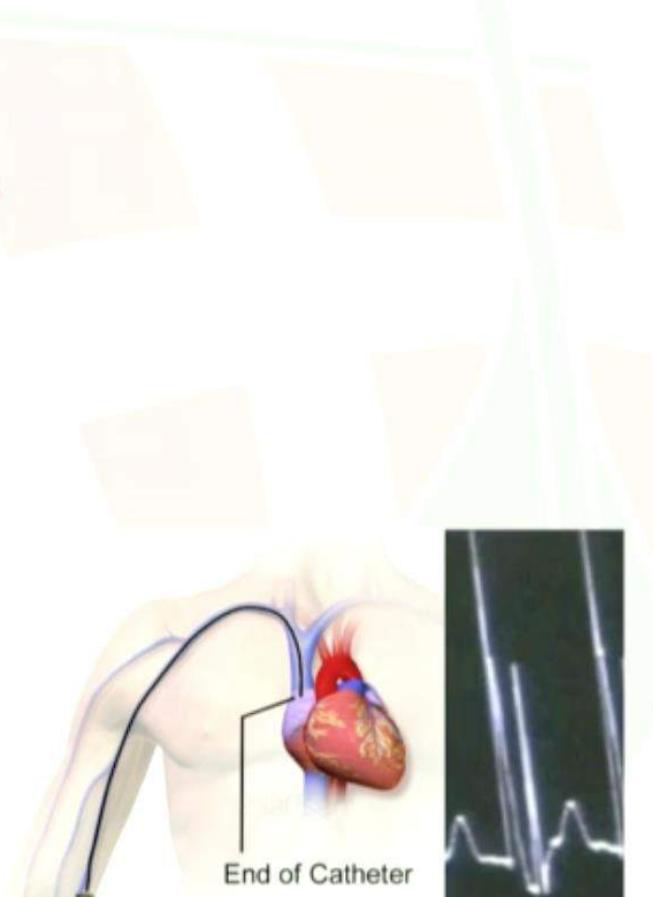
# State of the Art: CICC Insertion

11. Avoid Incisions, Hubbing & Sutures

12. AM Catheters & Dressings

13. ESD & Dressing Adhesive

14. Intraprocedural Tip Location



# Inadequate tippositie geassocieerd met negatieve outcomes

- tromboflebitis/veneuze trombose
- chemische/mechanische vaaterosie
- spontane dislocatie
- katheter disfunctie
- fibrineaanhechting/trombotische occlusies
- non-trombotische occlusies tgv neerslag van medicatie

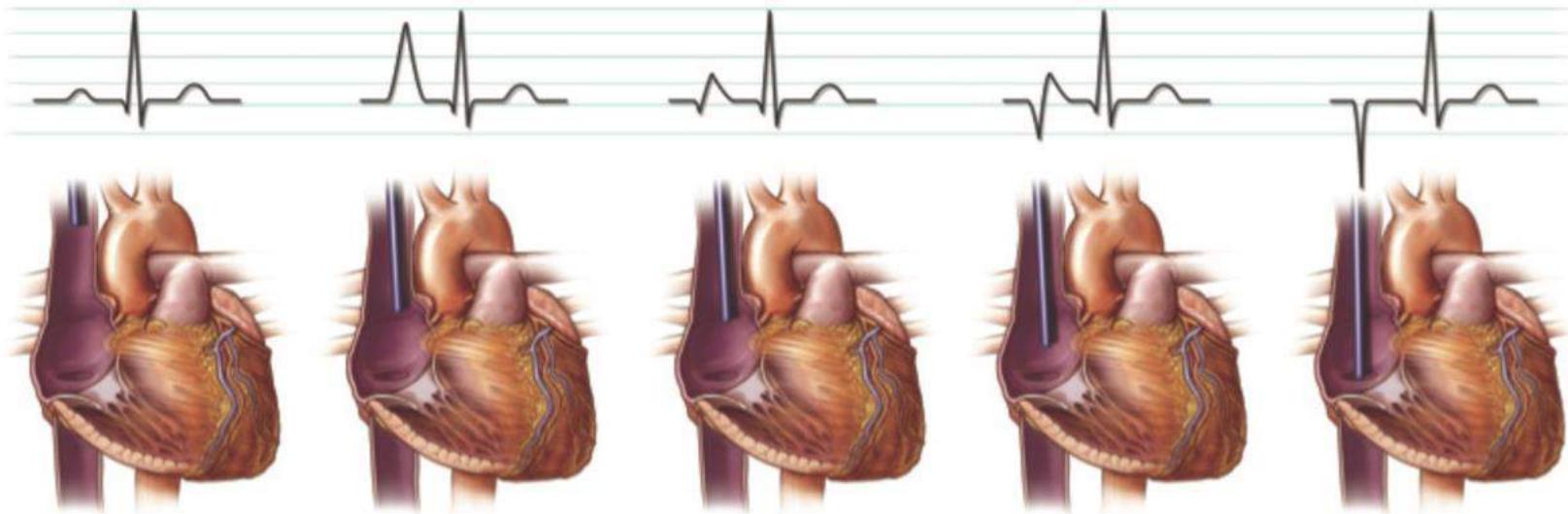


# Optimale locatie van de tip

- Consensus: tip van CVC in het onderste derde van de V. cava. superior/t.h.v. cavo-atriale overgang
  - grote diameter
  - hoge snelheid bloed flow
  - goede verdeling en verdunning van infuusvloeistof
  - minste kans op traumatisering van de veneuze intima



# ECG-geleide CVC plaatsing



**Figure 1**

No evident P-wave changes indicates a catheter is not in acceptable position.

**Figure 2**

A P-wave at its maximum height will indicate the catheter is in the lower 1/3 of superior vena cava/right atrial junction.

**Figure 3**

A downward deflection on the leading edge of the P-wave indicates the catheter entering the right atrium.

**Figure 4**

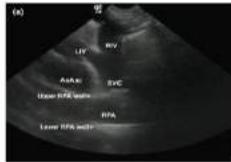
A biphasic P-wave indicates the catheter is within the right atrium.

**Figure 5**

An inverted P-wave indicates a catheter is approaching the right ventricle.



## ORIGINAL ARTICLE

**Ultrasound confirmation of central venous catheter position via a right supraclavicular fossa view using a microconvex probe***An observational pilot study*Se-Chan Kim<sup>1</sup>, Ingo Heinze<sup>1</sup>, Alexandra Schmiedel, Georg Baumgarten, Pascal Knuefermann, Andreas Hoeft and Stefan Weber

**Improving the “global use” of ultrasound for central venous access: a new supraclavicular scan by microconvex probe** Critical Ultrasound Journal  
*a SpringerOpen Journal*

A La Greca<sup>1</sup>, DG Biasucci<sup>2</sup>, A Emoli<sup>3</sup>, M Pittiruti<sup>1</sup>From 7th WINFOCUS Italian Congress on Ultrasound in Emergency, Anaesthesiology and Critical Care  
 Lodi, Italy, 26–29 March 2014**Ultrasound-guided supraclavicular central venous catheter tip positioning via the right subclavian vein using a microconvex probe**Se-Chan Kim<sup>1</sup>, Ingo Gräff<sup>1</sup>, Alexandra Sommer<sup>2</sup>, Andreas Hoeft<sup>1</sup>, Stefan Weber<sup>1</sup>**Electrocardiography-controlled central venous catheter tip positioning in patients with atrial fibrillation**Folkert Steinhagen<sup>1</sup>, Maximilian Kanthak<sup>1</sup>, Guido Kukuk<sup>2</sup>, Christian Bode<sup>1</sup>, Andreas Hoeft<sup>1</sup>, Stefan Weber<sup>3</sup> and Se-Chan Kim<sup>1,4</sup>**Using Ultrasound to Identify the Central Venous Catheter Tip in the Superior Vena Cava**

Keith Killu, MD, Alton Parker, MD, Victor Coba, MD, Mathilda Horst, MD, and Scott Dulchavsky, MD, PhD

**No more BS**



# No more BS



# No more blind sticking !!!

- Voordelen echo
  - Evaluatie van de vene
  - Volgen van het naald traject
  - Evaluatie van guidewire



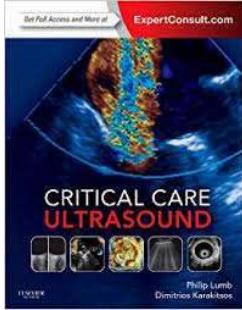
# CICC: Which vein? Which route/approach ?



A wide range of approaches to a wider range of veins

- Internal jugular vein (IJV)
  - Jernigan (in plane)
  - Axial (out of plane)
- Brachiocephalic vein (BCV)
  - in plane
- Subclavian vein (SCV)
  - Supra-clavicular (in plane)
  - Infra-clavicular ?
- Axillary vein (AV) – thoracic tract
  - in plane and out of plane
- Cephalic vein (CV) – thoracic tract
  - in plane
  - out of plane
- External jugular vein (EJV) - deep neck

# RaCeVA



12

## How to Choose the Most Appropriate Ultrasound-Guided Approach for Central Line Insertion: Introducing the Rapid Central Venous Assessment Protocol

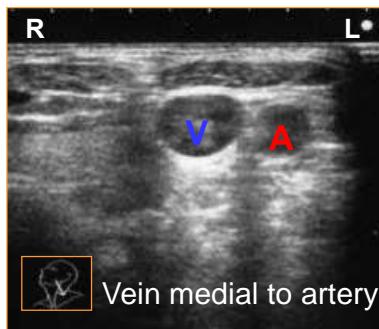
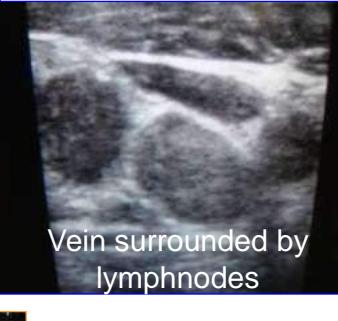
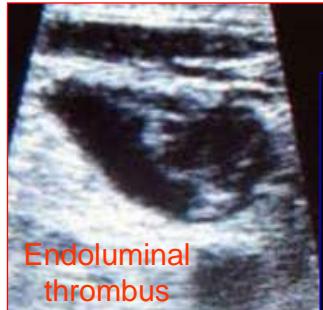
MAURO PITTIRUTI | ANTONIO LAGRECA

Lumb P. Critical Care Ultrasound. Elsivier ED. 2014

WoCVA  
5th World Congress on Vascular Access

# RaCeVA

## AVOID UNSUITABLE VEINS



# The Vein's Choice: Six Criteria

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- 1 – Vein's Diameter
- 2 – Vein's Depth
- 3 – Collapsability during inspiration
- 4 – Compression by the artery or pathological structures
- 5 – Contiguity with the pleura
- 6 – Convenience of the emergency site

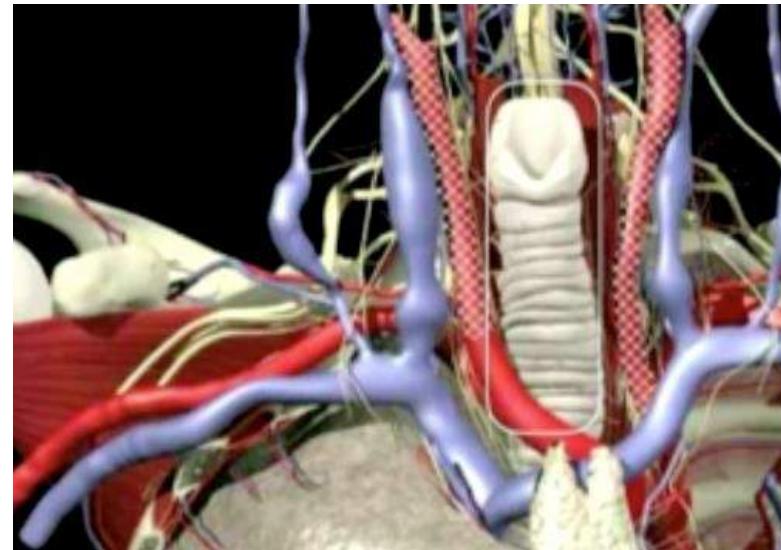
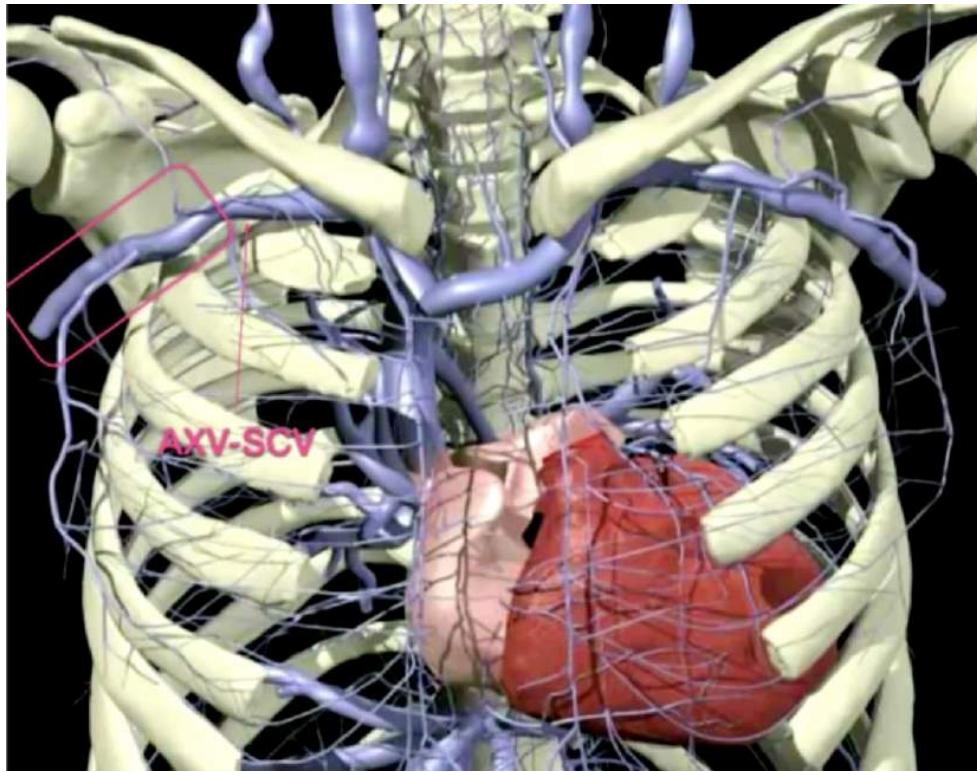
# RaCeVA = 30 seconds

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## **QUICK REVIEW OF NECK AND INFRACLAVICULAR VEINS**

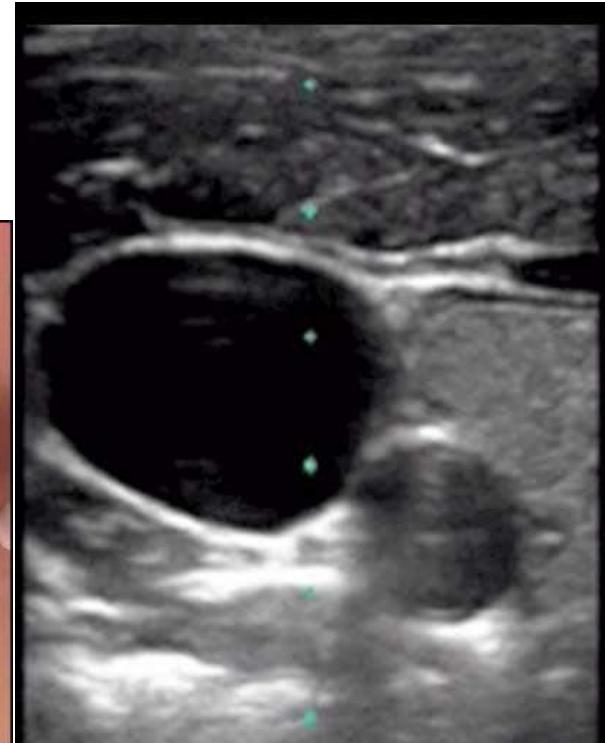
1. Place the probe (transverse) half of the neck (IJV, CA)
2. Lower the probe along the neck caudally to the sternum-clavicular joint (IJV, SA).
3. Tilt the probe in order to obtain a plan almost frontal (ANV)
4. Move the probe to the side, behind the clavicle (SV, EJV, SA)
5. Place the probe in the infraclavicular space (parallel to the clavicle, near the lateral 1/3) (AXV, AXA, CF)
6. Rotate the probe counterclockwise (AXV LONG AXIS)



# 1. Mid Neck



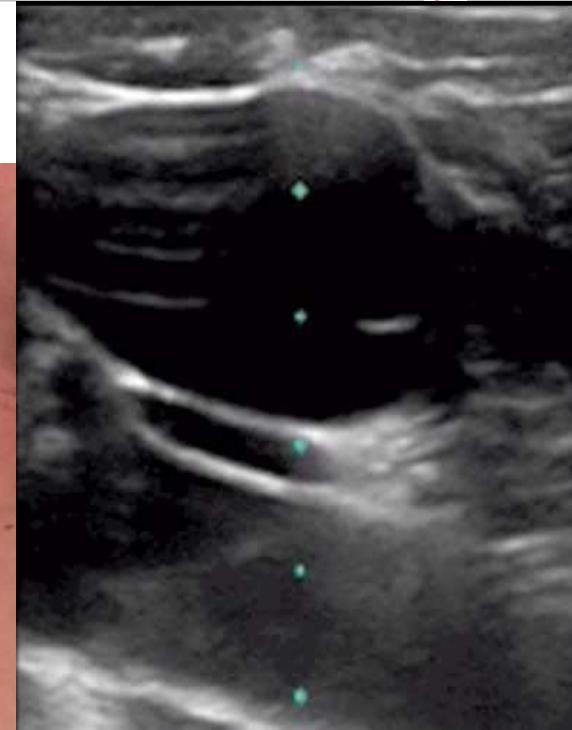
- IJV + CA + TYROID





## 2. Bottom NECK

- IJV (+ valves) + SA



### 3. Tilting towards mediastinum

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- Brachiocephalic vein





## 4. Lateral Sliding

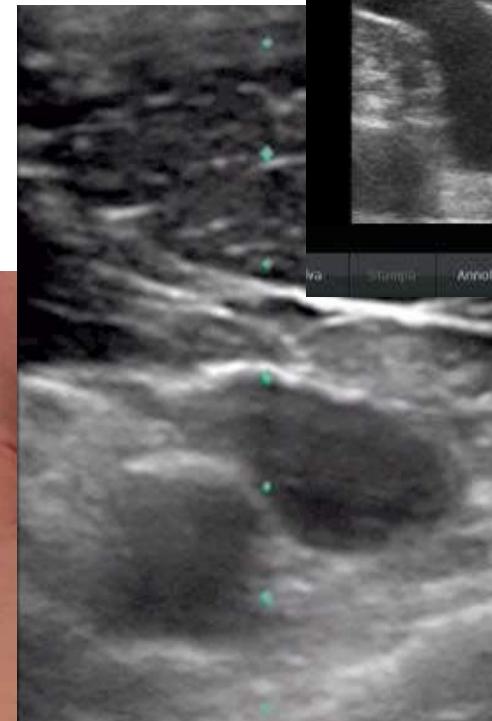
- Subclavian vein (supraclavicular)
- Subclavian artery



## 5. Infraclavicular (short axis)



- Axillary vein and artery
- Cephalic vein





## 6. Infraclavicular (long axis)

- Axillary vein and artery
- Cephalic vein



# Take home messages

- Houd rekening met de tijdelijke verhouding tussen inbrengfase en onderhoudsfase
  - Optimale locatie voor fixatie/verband en verzorging: de thorax
- Pas bundelmaatregelen toe
- Gebruik real-time echo voor vaatscreening en plaatsing
- Gebruik methode voor intraprocedurele tiplocatie
- Houd de huid barrière intact
  - Antimicrobieel verband
- Overweeg tunnelen (mn bij FICC, VJI, HD-katheter, langdurig gebruik)
- Op indicatie: antimicrobiële katheter

