L'ACCESSO A LUNGO TERMINE IN ETÀ PEDIATRICA OGGI: UNA RIVOLUZIONE NEI DISPOSITIVI E NEI MATERIALI

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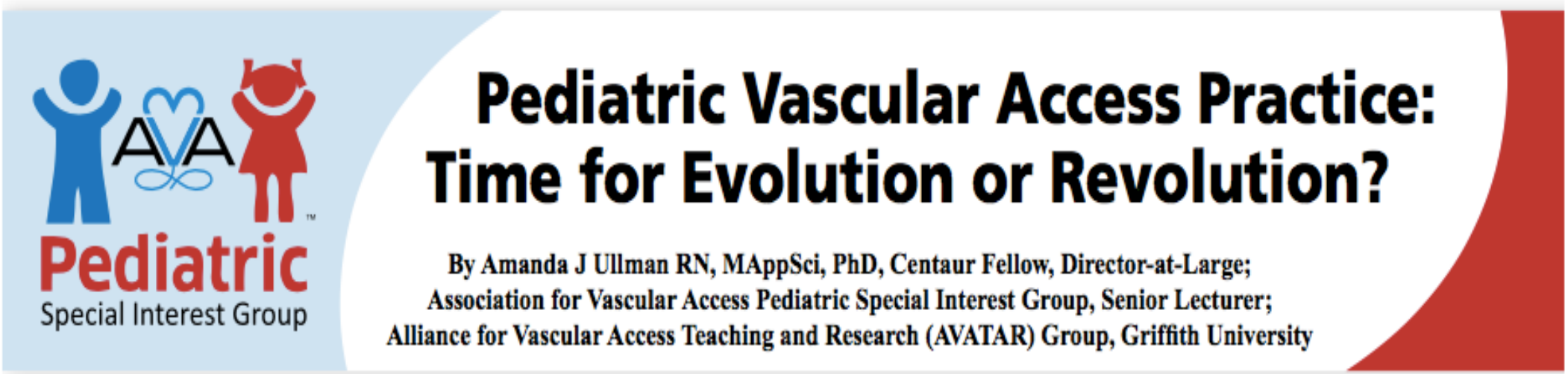
GAVePed
Gruppo Accessi Venosi Pediatrici

150
1869
2019
Bambino Gesù
OSPEDALE PEDIATRICO

Quali sono le piu' grandi novità e le tecnologie utilizzate negli ultimi anni per diminuire le complicanze negli accessi venosi pediatrici?



Pediatric Vascular Access Practice: Time for Evolution or Revolution?

By Amanda J Ullman RN, MAppSci, PhD, Centaur Fellow, Director-at-Large;
Association for Vascular Access Pediatric Special Interest Group, Senior Lecturer;
Alliance for Vascular Access Teaching and Research (AVATAR) Group, Griffith University

1. **We need to improve central venous access in the neonates, the main issues being:**
   - Define the role of ultrasound (US) -guided central venous catheters (3Fr, PUR, power injectable, high performance) in premature newborns if compared to the use of epicutaneo-caval catheters (ECC) (1-2.7Fr, silicone or PUR, non-power, low performance)
   - Verify the cost-effectiveness and the indication of Near Infra Red Technology in visualizing and cannulating the superficial veins for insertion of ECC
   - Improve the training of health care specialists so to implement the use of new technology for insertion (US, NIR) and for tip location (echocardio, intracavitary EKG) of central access in neonates

«The world of pediatric central venous access **needs an update**, **by implementing materials and methods** which have become or are becoming the **standard of care** in adults:

- Consistent adoption of US-guidance for all central venous access devices (PICC, CICC, FICC, ports)
- Adoption of tip location by intracavitary EKG and/or echocardio
- Shift to power injectable polyurethane for all external catheters (the reason for still using fragile silicon catheters like Broviac and Hickman is mysterious)
- Increased use of PICCs as first option central line in all children
- Increased adoption of tunneling for all external catheters (even if non-cuffed)

Pediatric Vascular Access Practice: Time for Evolution or Revolution?

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3. Eliminate the problem of dislodgment (the main cause of loss of the central line in pediatrics) by an extensive use of subcutaneously anchored securement devices.

Classificazione Classica

La complicanza “avviene”

- Complicanze meccaniche
- Complicanze infettive
- Complicanze trombotiche

Classificazione piu attuale

La complicanza “è (quasi) sempre provocata”

- Complicanze legate all’errata scelta dei materiali
- Complicanze immediate legate alla inserzione
- Complicanze tardive legate alla inserzione
- Complicanze tardive legate alla gestione

Impianti e complicanze

Come ridurre le complicanze?

1) Scelta del VAD

- neonato
- bambino

2) Impianto

- Importanza della tecnica di accesso venoso
- Importanza del materiale per la venipuntura
- Importanza del diametro vena vs. catetere
- Importanza del sito di emergenza

3) Gestione

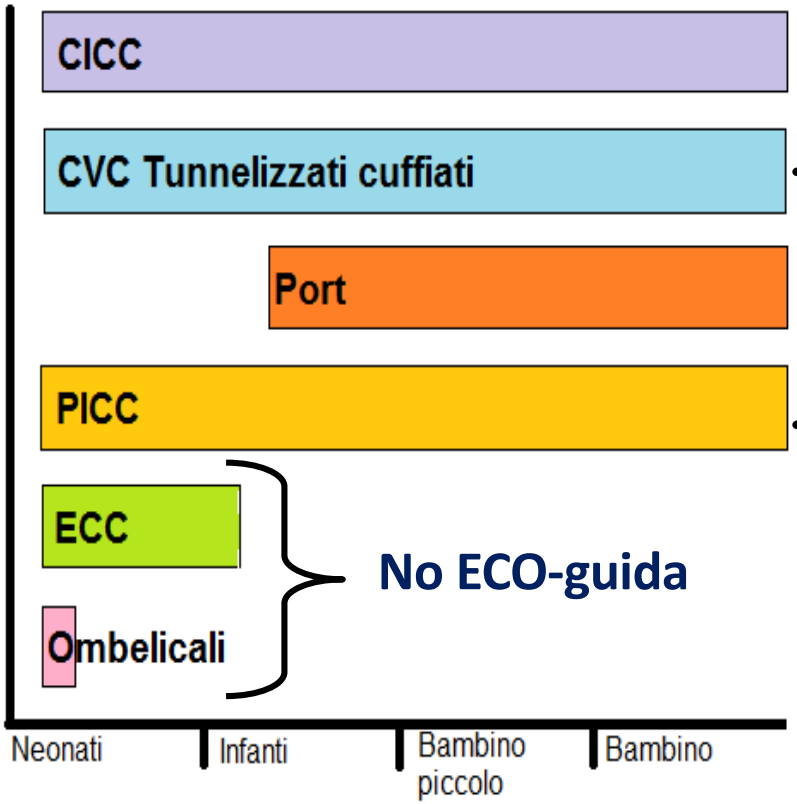
- Importanza della stabilizzazione
- Importanza della antisepsi cutanea
- Importanza della disinfezione degli hub
- Importanza dei protocolli di lavaggio

Come ridurre le complicanze?

1) Scelta del VAD

- neonato
- bambino

Quali cateteri



Long term (tunneled, cuffed external VADs)				
	Material	**Tip**	**Lumen**	**French**
Broviac	Silicon	No valve	1	2.7, 4.2, 6.6, 7, 9.6
Hickman	Silicon	No valve	2	7, 12
Leonard	Silicon	No valve	2	10
Groshong	Silicon	Distal valve	1 or 2	5.5, 7 8, 9
ProLine	P.I. PUR	No valve	1 or 2	5, 6

Medium term (PICCs)				
Silicon PICC	Silicon	No valve	1 or 2	3, 4, 5
Groshong PICC	Silicon	Distal valve	1 or 2	4, 5
Solo, PASV PICC	P.I. PUR	Proximal valve	1 or 2 or 3	3, 4, 5, 6
PASV PICC	PUR	Proximal valve	1 or 2	4, 5
PUR PICC	PUR	No valve	1 or 2	4, 5
P.I. PUR PICC	P.I. PUR	No valve	1 or 2 or 3	3, 4, 5, 6

Scelta dei materiali

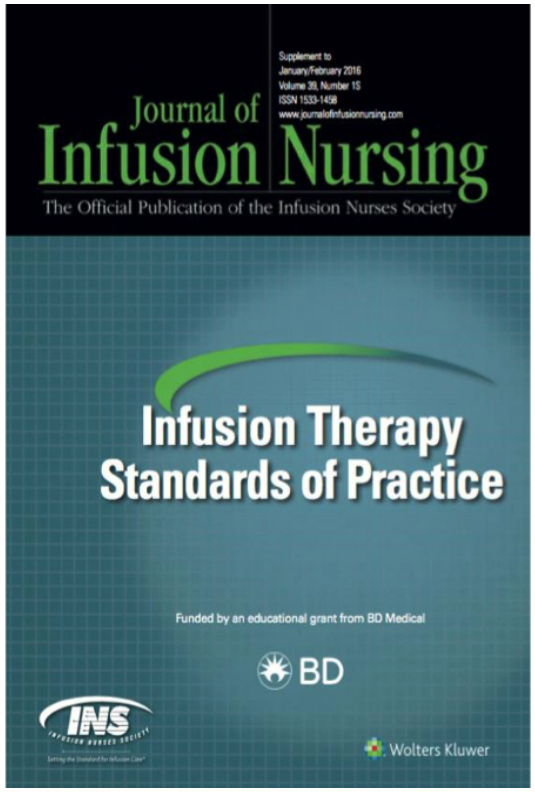
Le evidenze dimostrano che il SIL è più soggetto a complicanze meccaniche (rotture, dislocazioni) rispetto al P-PUR

I cateteri in P- PUR sono dotati di kit di inserzione di materiale migliore (micro-introduttore, aghi 12G, guida retta in nitinol)

Scelta del dispositivo per accesso venoso

Si deve utilizzare *<u>un algoritmo di scelta</u>* <u>basato su una valutazione preventiva delle necessità vascolari del paziente</u>

- Occorre una via centrale o periferica?
- Solo in ambito intra-ospedaliero o anche extra ?
- Per quanto tempo?
- Quali vene sono disponibili ?
- Quale VAD assicura la performance richiesta ?



DIVA SCORE

Format: Abstract

Full text links

Wolters Kluwer

Pediatr Emerg Care. 2008 Mar;24(3):143-7. doi: 10.1097/PEC.0b013e3181666f32.

Derivation of the DIVA score: a clinical prediction rule for the identification of children with difficult intravenous access.

Yen K[1], Riegert A, Gorelick MH.

Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

ORIGINAL RESEARCH CONTRIBUTION

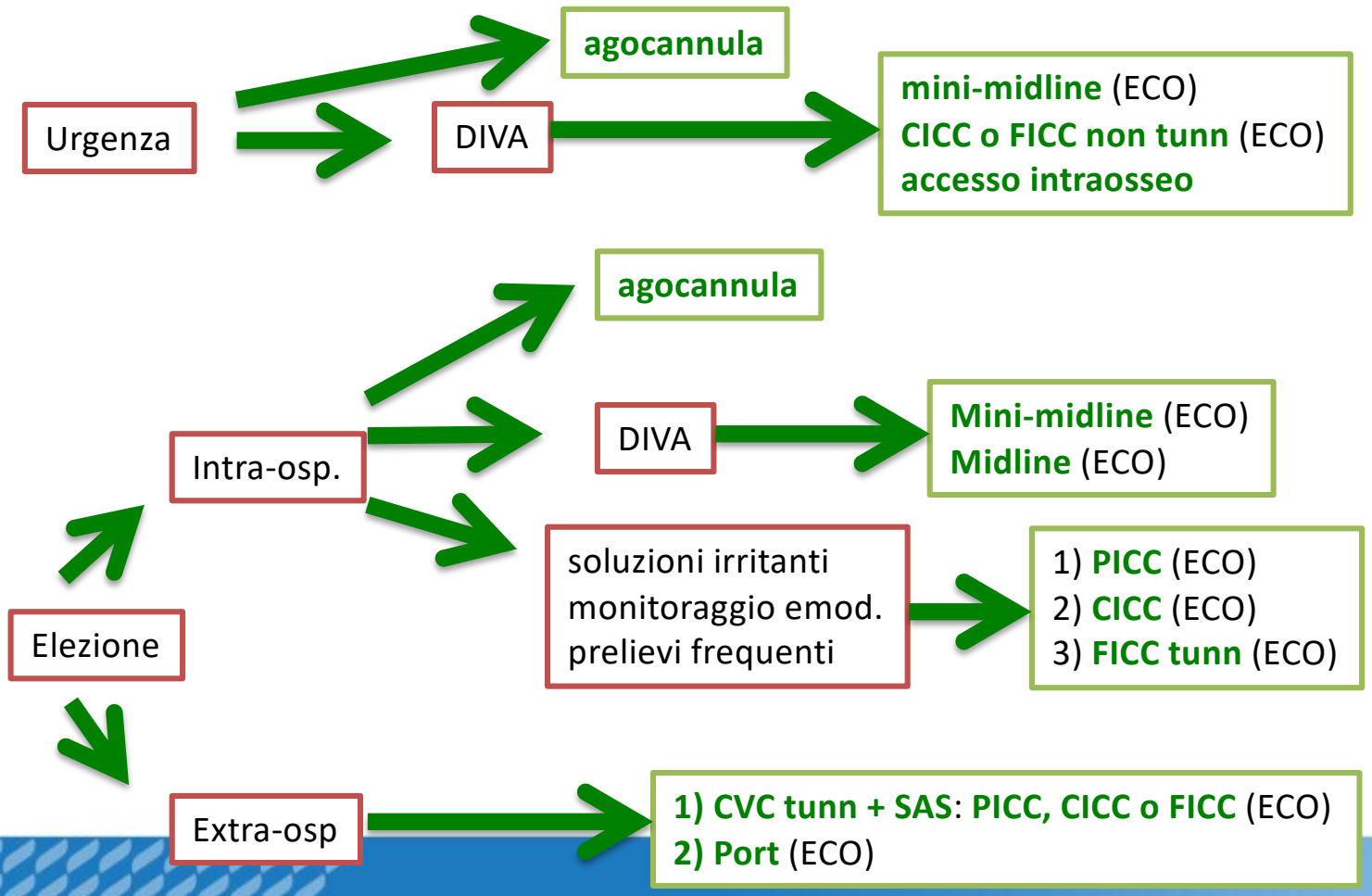
Validation and Refinement of the Difficult Intravenous Access Score: A Clinical Prediction Rule for Identifying Children With Difficult Intravenous Access

Michael W. Riker, MD, Chris Kennedy, MD, Brad S. Winfrey, RN, Kenneth Yen, MD, MS, and M. Denise Dowd, MD, MPH

Table 1
DIVA Score[4]

Predictor Variable	Scores		
Visibility	Visible = 0		Not visible = 2
Palpability	Palpable = 0		Not palpable = 2
Age	≥36 months = 0	12–35 months = 1	< 12 months = 3
Prematurity	Not premature = 0		Premature = 3
Skin shade	Light = 0	Dark = 1	

Algoritmo per la scelta dell'accesso venoso nel bambino



Algoritmo per la scelta dell'accesso venoso centrale nel neonato

Neonato pretermine stabile ancora intubato a 48 ore:
- previsione NP/terapie e.v.

CVO
(primi giorni)

ECC

ECC non fattibile o difficile
- mancanza vene supf.
- malposizioni ripetute
- ripetuti tentativi ineffficaci

Accesso previsto > 14gg

Neonato grave alla nascita:
- Monitoraggio emodinamico
- Necessità di due lumi
- Patologia malformativa (GI, CV etc.)
- Insufficienza respiratoria grave

CVO bilume
(primi giorni)

Neonato grave dopo 24 ore di vita:
- Monitoraggio emodinamico
- Necessità di due lumi
- Patologia chirurgica (NEC, PI etc.)
- BPD grave di tipo 2
- Esaurimento del patrimonio venoso

Anticipare il posizionamento del CICC in caso di:
-CVO malposizionato
-Necessità di chirurgia addominale

CICC ecoguidato

Come ridurre le complicanze?

Utilizzare le tecnologie

2) Impianto

Importanza del diametro vena vs. catetere
Importanza della tecnica di accesso venoso
Importanza del materiale per la venipuntura
Importanza del sito di emergenza

Ultrasuoni

Eco-cardio

ECG intracavitario

NIR

ULTRASOUND

Ideal (mandatory !) for detection – puncture – cannulation of **deep veins (> 7mm of depth)**

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

CONFERENCE REPORTS AND EXPERT PANEL

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International evidence-based recommendations on ultrasound-guided vascular access

2) Impianto

Importanza del diametro vena vs. catetere
Importanza della tecnica di accesso venoso
Importanza del materiale per la venipuntura
Importanza del sito di emergenza

Una nuova impostazione

Ogni VAD è definito da quattro caratteristiche:

a) **Vena incannulata**
b) **Tecnica di inserzione**
c) **Posizione della punta**
d) **Sito di emergenza**

2) Impianto

Importanza del diametro vena vs. catetere
Importanza della tecnica di accesso venoso
Importanza del materiale per la venipuntura
Importanza del sito di emergenza

Una nuova impostazione

Sulla base di queste caratteristiche, è possibile prevedere:

- la futura ‘performance’ del VAD
- il rischio di complicanze

a) Come scelgo la vena?

Intensive Care Med
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International evidence-based recommendations on ultrasound-guided vascular access

1. Dimensioni
2. Profondità
3. Pervietà
4. Rapporti con strutture circostanti
5. Collassabilità respiratoria
6. Praticità dell'exit-site

Tassativo misurarla

Accessi disponibili

Ma quali accessi nel neonato e lattante sono veramente disponibili?

Topographical Anatomy of Central Venous System in Extremely Low-Birth Weight Neonates Less Than 1000 Grams and the Effect of Central Venous Catheter Placement

Clinical Anatomy, 2011

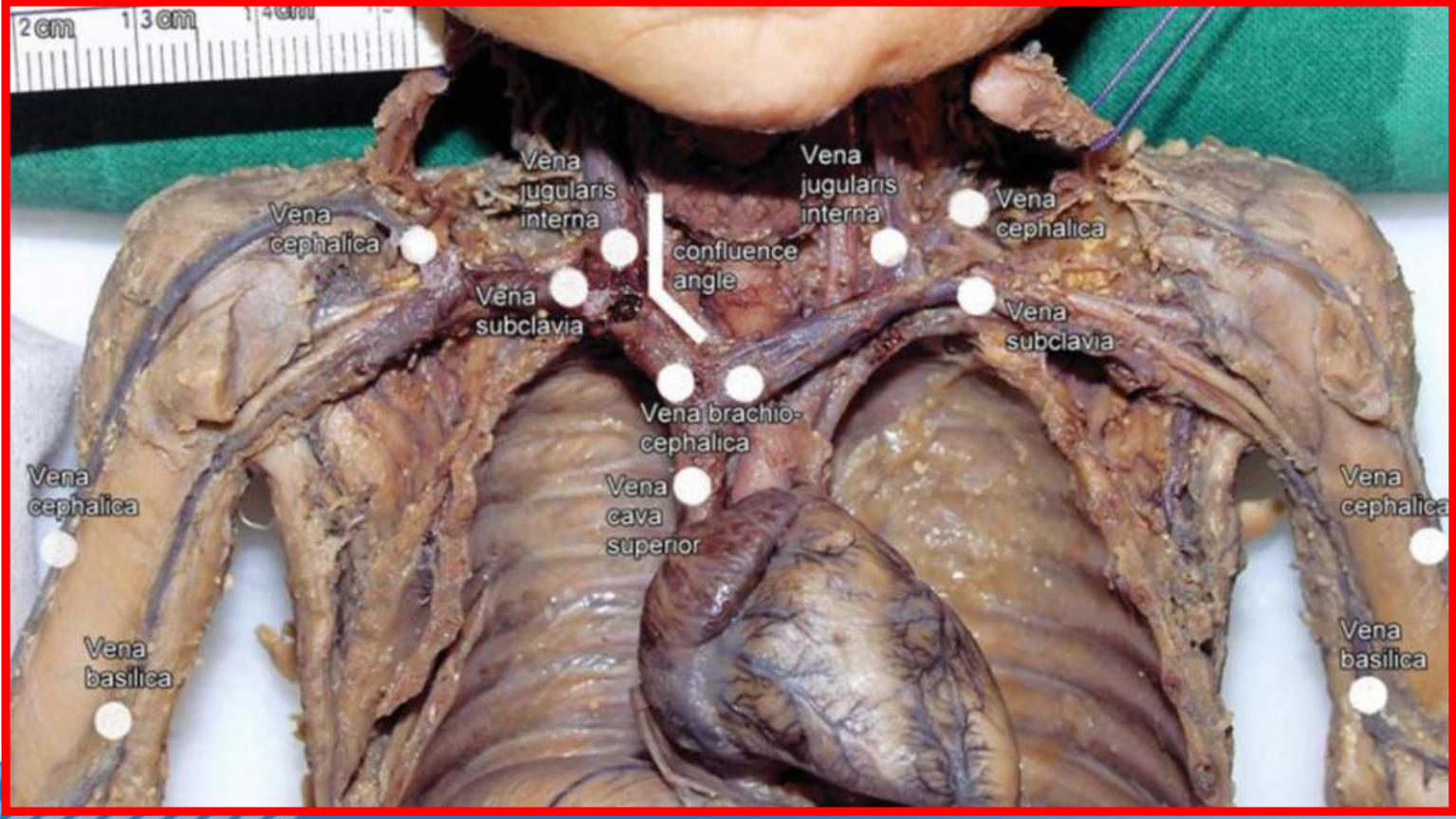


TABLE 3. Outer Diameter [mm] of the Internal Jugular Vein, Brachiocephalic Vein, Subclavian Vein, and Superior Caval Vein[a]

Preparation no.	Internal jugular vein [mm]		Brachiocephalic vein [mm]		Subclavian vein [mm]		Superior vena cava [mm]
	Right	Left	Right	Left	Right	Left	
1	5.3 ± 0.1	3.7 ± 0.2	3.9 ± 0.1	4.4 ± 0.2	2.7 ± 0.2	2.8 ± 0.2	4.6 ± 0.1
2	4.5 ± 0.1	4.2 ± 0.1	3.9 ± 0.2	4.6 ± 0.1	2.6 ± 0.2	3.1 ± 0.1	5.0 ± 0.1
3	3.7 ± 0.2	n.m.	3.2 ± 0.1	4.2 ± 0.2	2.9 ± 0.2	n.m.	3.9 ± 0.2
4	5.0 ± 0.2	4.7 ± 0.1	2.4 ± 0.1	3.5 ± 0.1	2.9 ± 0.1	2.4 ± 0.1	4.5 ± 0.1
5	3.7 ± 0.2	3.3 ± 0.2	3.4 ± 0.2	4.0 ± 0.1	2.9 ± 0.1	2.9 ± 0.2	4.3 ± 0.1
6	4.4 ± 0.1	3.9 ± 0.1	4.4 ± 0.2	4.5 ± 0.1	2.2 ± 0.2	2.1 ± 0.1	4.3 ± 0.1
7	3.2 ± 0.1	3.0 ± 0.1	2.9 ± 0.2	3.6 ± 0.2	2.7 ± 0.1	2.0 ± 0.2	3.1 ± 0.1
8	4.4 ± 0.2	4.0 ± 0.2	3.7 ± 0.2	4.2 ± 0.1	2.4 ± 0.1	2.6 ± 0.1	4.2 ± 0.2
9	2.8 ± 0.1	3.9 ± 0.1	2.2 ± 0.2	3.3 ± 0.2	1.7 ± 0.2	2.1 ± 0.1	3.0 ± 0.1
Mean ± SD	4.1 ± 0.8	3.8 ± 0.5	3.3 ± 0.7	4.0 ± 0.5	2.6 ± 0.4	2.5 ± 0.4	4.1 ± 0.7
	Not significant		$P < 0.005$		Not significant		

[a]The head is not rotated. Note, that the outer diameter increases closer to the heart. All data are given as means ± SD.

TABLE 4. Outer Diameter [mm] of the Basilic and Cephalic Veins[a]

Preparation no.	Basilic vein [mm]		Cephalic vein [mm]			
			Axillar		Cubital	
	Right	Left	Right	Left	Right	Left
1	0.9 ± 0.1	1.2 ± 0.2	1.4 ± 0.1	1.6 ± 0.1	1.3 ± 0.1	1.3 ± 0.1
2	n.m.	1.4 ± 0.1	1.3 ± 0.1	1.0± 0.1	1.3± 0.1	1.0± 0.2
3	1.5 ± 0.1	1.4 ± 0.1	1.3 ± 0.1	n.m.	1.5 ± 0.2	n.m.
4	1.3 ± 0.1	1.4 ± 0.1	n.m.	n.m.	n.m.	n.m.
5	n.m.	1.3 ± 0.1	n.m.	1.3 ± 0.1	1.1 ± 0.1	0.9 ± 0.1
6	1.4 ± 0.1	1.2 ± 0.1	1.8 ± 0.1	1.1 ± 0.1	1.4 ± 0.1	1.3 ± 0.1
7	0.9 ± 0.1	1.2 ± 0.1	n.m.	1.3 ± 0.1	1.0 ± 0.2	1.0 ± 0.1
8	1.1 ± 0.1	1.3 ± 0.2	1.3 ± 0.1	n.m.	1.2 ± 0.1	1.3 ± 0.1
9	0.8 ± 0.1	1.1 ± 0.1	n.m.	0.8 ± 0.1	1.0 ± 0.1	1.1 ± 0.2
Mean ± SD	1.1 ± 0.3	1.3 ± 0.1	1.4 ± 0.2	1.2 ± 0.2	1.2 ± 0.2	1.1 ± 0.2
	Not significant		Not significant		Not significant	

[a]The head is not rotated. All data are given as means ± SD.

JVA
ISSN 1129-7298

J Vasc Access 2017; 00 (00): 000-000
DOI: 10.5301/jva.5000773

ORIGINAL RESEARCH ARTICLE

Atypical use of PICC in infants and small children: an unicentric experience

Filippo Bernasconi[1], Clelia Zanaboni[2], Andrea Dato[2], Andrea Dolcino[3], Michela Bevilacqua[4], Luigi Montagnini[2], Nicola Disma[5]

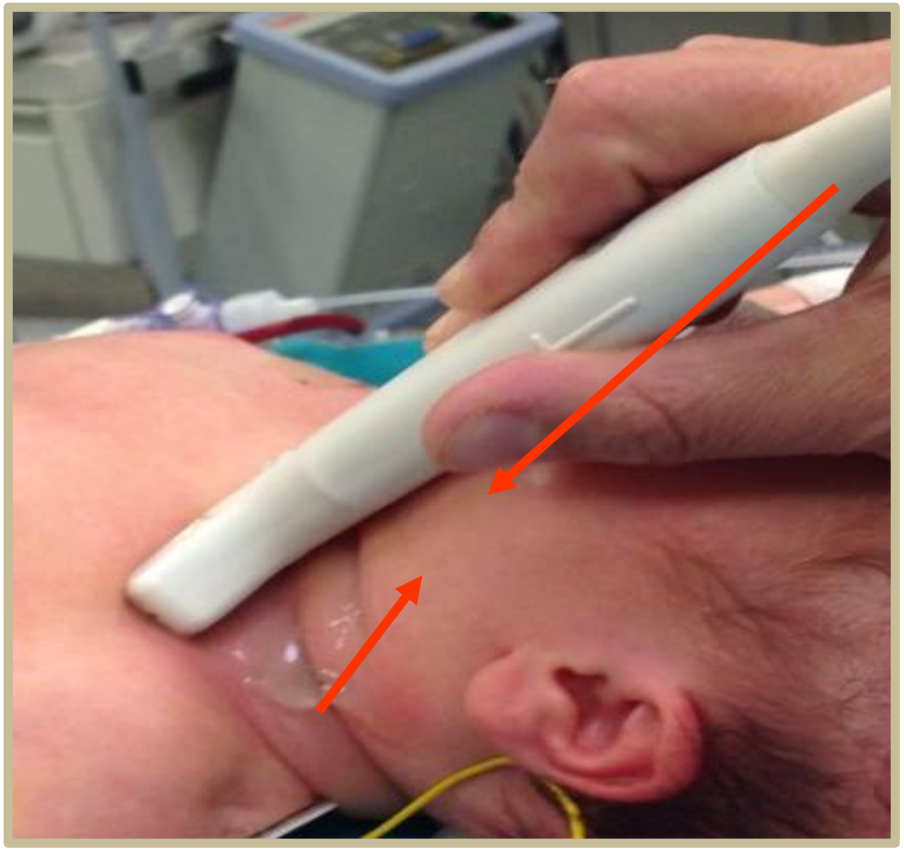
Age at PICC insertion, median (IQR), months	14 (3-27)
Weight at PICC insertion, median (IQR), kilograms	7.5 (4-12)
Clinical indication for PICC placement, no. (%)	
Perioperative ± nutritional support	10 (55)
Chemotherapy	4 (22,5)
Antibiotic therapy	4 (22,5)
Patients exposed to PICU >24 h, no. (%)	9 (50)
Reason for atypical insertion, no. (%)	
Not possible	14 (74)
Arm failure	5 (26)
Catheter French (Fr), no. (%)	
3 Fr	9 (48)
4 Fr	7 (36)
5 Fr	3 (16)
Site of PICC insertion, no. (%)	
Brachiocephalic	16 (85)
Jugular	2 (10)
Subclavian	1 (5)

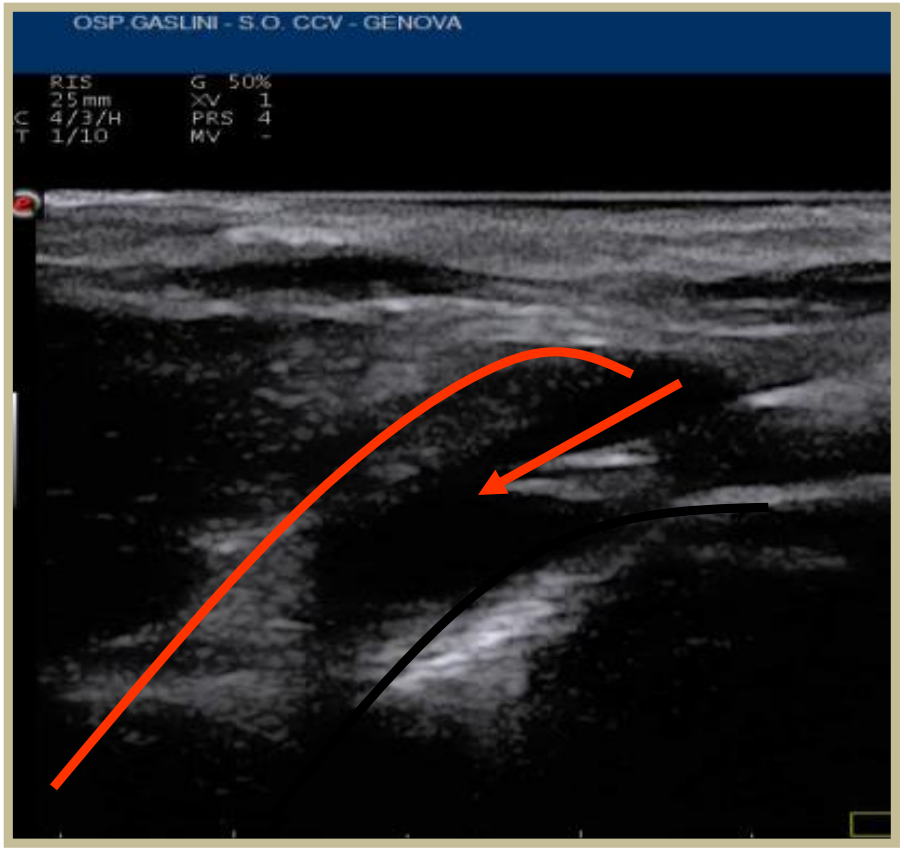
PICC-CICC “atipico” o “off-label”

- Possibile utilizzo già dal neonato
- CVC ad alta performance
- Kit micro-introduzione
- Regolabile
- Tunnellizzabile
- Controllo ECG
- Homecare
- Sutureless e SAS
- Rimozione al letto

- J Vasc Access. 2017 Jul 29:0. [Epub ahead of print]

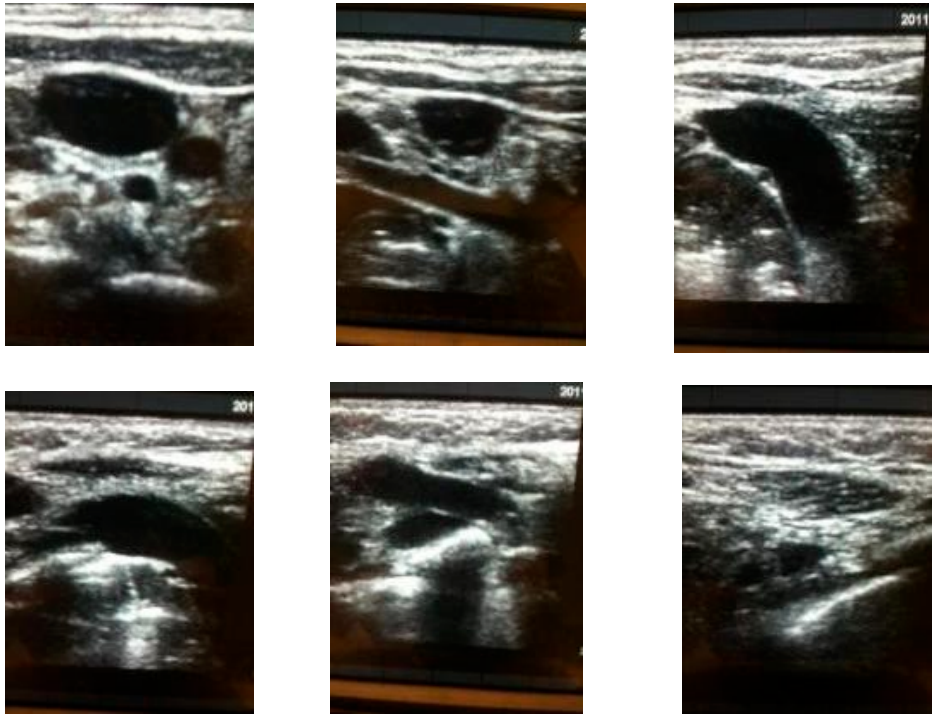
Venipuntura Vena Anonima





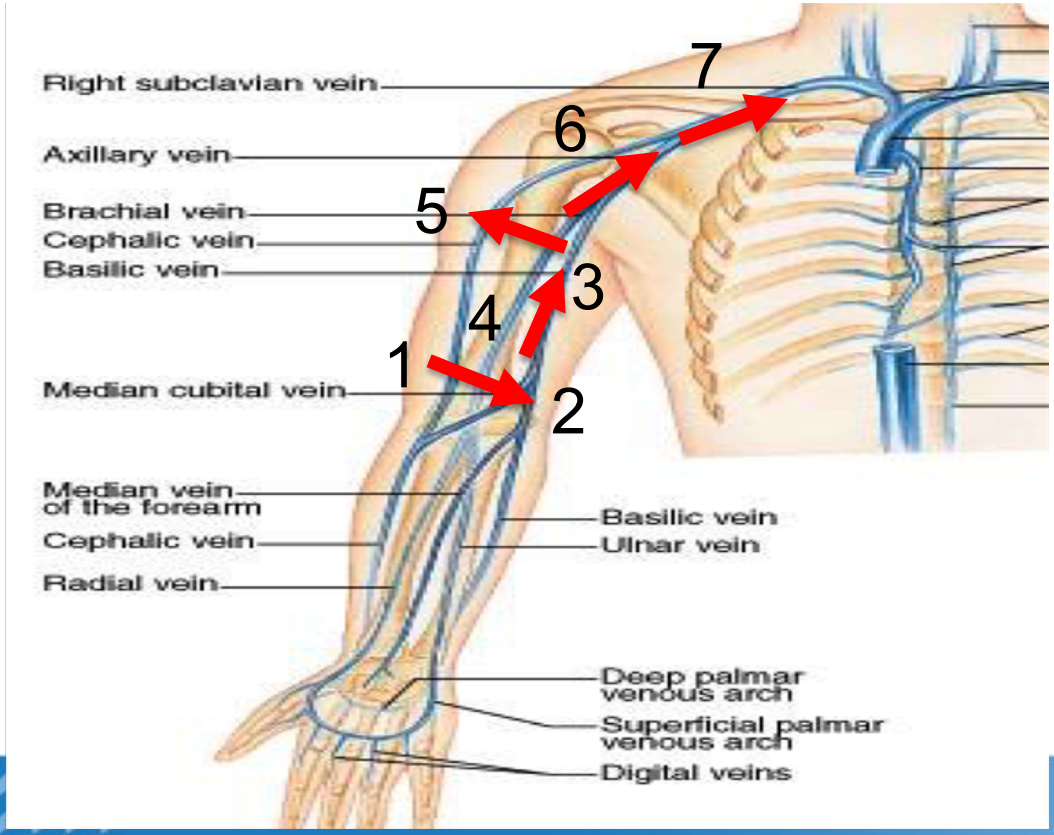
D4.SD1.S9	There is no ideal site for cannulation in children; the best site should be determined after ultrasound examination	A

RaCeVA - Rapid Central Vein Assessment



D4.SD1.S9	There is no ideal site for cannulation in children; the best site should be determined after ultrasound examination	A

RaPeVA - Rapid Peripheral Vein Assessment



Puntura Ecoguidata

Minimizza la contaminazione, riducendo il numero dei tentativi e quindi la possibile perdita della tecnica asettica

Guidelines for the prevention of intravascular catheter-related infections

American Journal of Infection Control
May 2011

Naomi P. O'Grady,[a] Mary Alexander,[b] Lillian A. Burns,[c] E. Patchen Dellinger,[d] Jeffrey Garland,[e] Stephen O. Heard,[f] Pamela A. Lipsett,[g] Henry Masur,[a] Leonard A. Mermel,[h] Michele L. Pearson,[i] Issam I. Raad,[j] Adrienne G. Randolph,[k] Mark E. Rupp,[l] Sanjay Saint,[m] and the Healthcare Infection Control Practices Advisory Committee (HICPAC) (Appendix 1)
Bethesda, Maryland; Norwood, Worcester, Boston, Massachusetts; Staten Island, New York, Seattle, Washington; Milwaukee, Wisconsin; Baltimore, Maryland; Rhode Island; Atlanta, Georgia; Houston, Texas, Omaha, Nebraska; and Ann Arbor, Michigan

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Use ultrasound guidance to place CVCs (if this technology is available and the operator has been trained) to reduce the number of cannulation attempts and mechanical complications	1B

By reducing the number of attempts and the risk of hematoma formation, ultrasound guidance may indirectly reduce the incidence of CRBSI (Category IB, *CDC Guidelines 2011*)

Journal of Hospital Infection

epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

H.P. Loveday[a]*, J.A. Wilson[a], R.J. Pratt[a], M. Golsorkhi[a], A. Tingle[a], A. Bak[a], J. Browne[a], J. Prieto[b], M. Wilcox[c]

Facilitating Central Venous Catheter placement, ultrasound guidance may indirectly reduce the incidence of CRBSI (*EPIC Guidelines 2014*)

SHEA/IDSA PRACTICE RECOMMENDATION

Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

Jonas Marschall, MD;[1,2]* Leonard A. Mermel, DO, ScM;[3]* Mohamad Fakih, MD, MPH;[4] Lynn Hadaway, MEd, RN, BC, CRNI;[5] Alexander Kallen, MD, MPH;[6] Naomi P. O'Grady, MD;[7] Ann Marie Pettis, RN, BSN, CIC;[8] Mark E. Rupp, MD;[9] Thomas Sandora, MD, MPH;[10] Lisa L. Maragakis, MD, MPH;[11] Deborah S. Yokoe, MD, MPH[12]

5. Use ultrasound guidance for internal jugular catheter insertion (quality of evidence: II).[99]
   a. Ultrasound-guided internal jugular vein catheterization reduces the risk of CLABSI and of non-infectious complications of CVC placement.[100]

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

CONFERENCE REPORTS AND EXPERT PANEL

International evidence-based recommendations on ultrasound-guided vascular access

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Prevention of infectious and mechanical complications with ultrasound-guided cannulation

D8.S2	Ultrasound guidance should be used in order to decrease the rate of CRBSI in adults and children	C	Very good	Strong
D8.S3–4	A multi-faceted strategy, including the use of ultrasound guidance with specific preventive and educational measures and the promotion of good practices applied by both medical and nursing staff, is suggested in order to reduce the incidence of CRBSI	B	Good	Strong
D8.S6	Ultrasound guidance, by reducing puncture attempts, technical failure rates and mechanical complications, has to be preferred because of a reduced incidence of catheter-related thrombosis	A	Very good	Strong

b) Tecnica di inserzione

I materiali fanno la differenza

Kit di micro-introduzione

Ago 21 G ecogenico

Giuda “soft straight tip” 0.018”

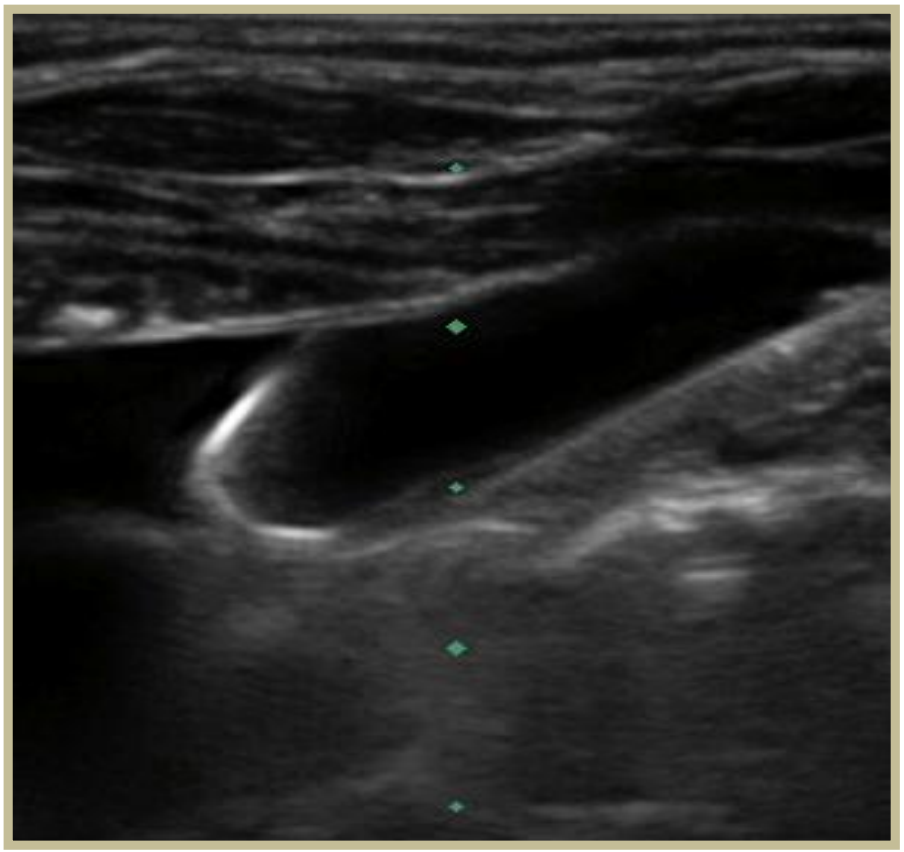
Micro-introduttore-dilatatore 3,5 o 4,5 Fr

MASSIMA SICUREZZA

E

COSTO EFFICACIA

Utilizzare sempre guide rette



Pediatric Anesthesia 2008 18: 745–751 doi:10.1111/j.1460-9592.2008.02631.x

Internal jugular vein diameter in pediatric patients: are the J-shaped guidewire diameters bigger than internal jugular vein? An evaluation with ultrasound

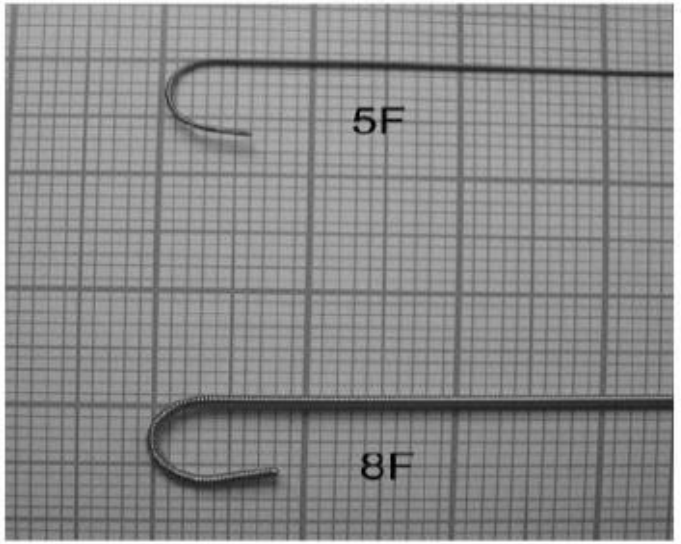
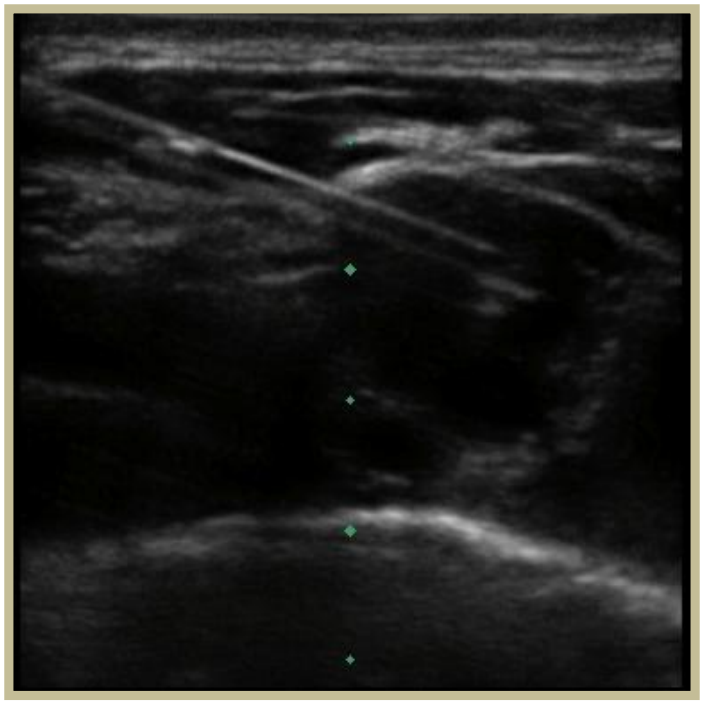
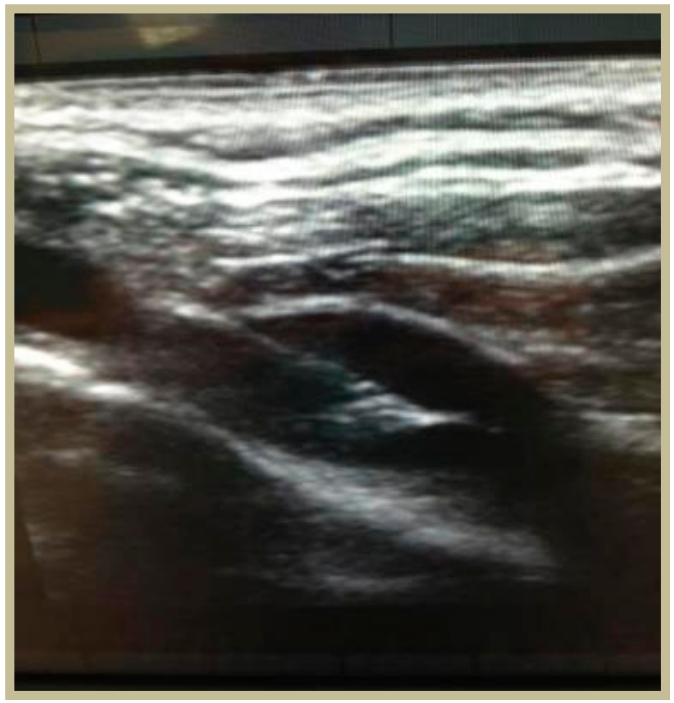


Figure 1
J-tip of Seldinger wires of two commercially available catheterization kits. Braun Certofix Paed S® 5F vs Standart 8F Central venous catheter.

Preferire sempre la venipuntura in plane per l’accesso venoso centrale pediatrico





Controllo della guida..
SEMPRE!

La visualizzazione della guida all'interno della v.giugulare predice il successivo posizionamento del catetere in vena con sens e spec 100%

Am J Em Medicine 2010 (28), 82-84

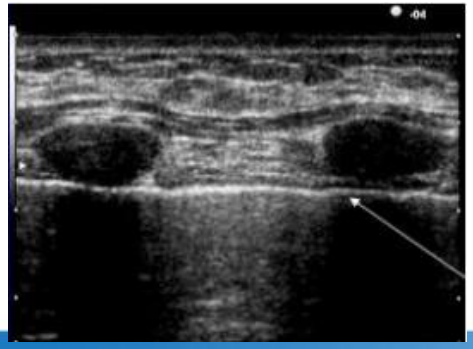
L'ecografia è utile nel confermare la presenza sia della guida che del catetere all'interno del vaso (raccomandazione forte)

International evidence-based recommendations on ultrasound-guided vascular access, ICM 2012

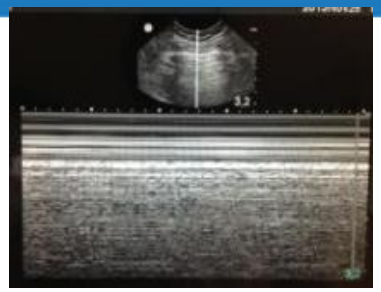
Ecografia: USO GLOBALE

Valutazione Ecografica Preliminare
(scelta approccio)

Puntura ecoguidata



Controllo della punta
Diagnosi/Esclusione
PNX/Emotorace



CHEST

Official publication of the American College of Chest Physicians

Test Characteristics of Ultrasonography for the Detection of Pneumothorax: A Systematic Review and Meta-analysis

Khaled Alrajhi, Michael Y. Woo and Christian Vaillancourt

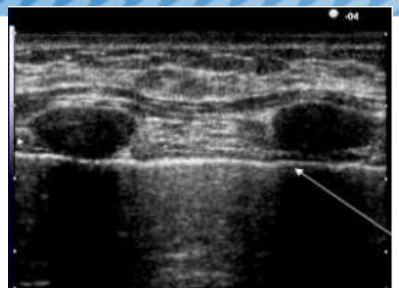
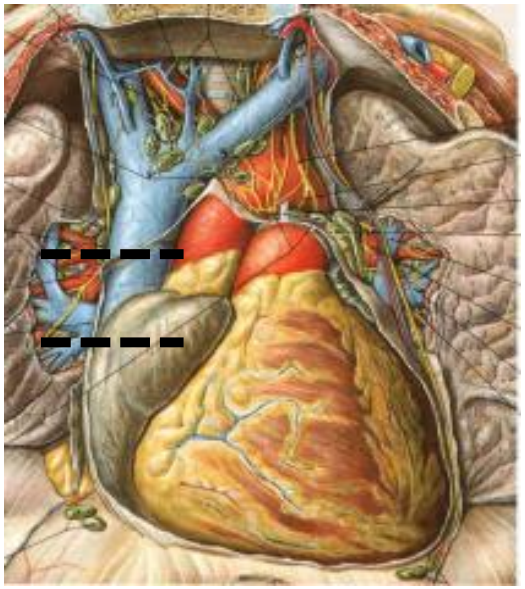


Table 2: Summary of sensitivity and specificity for included studies

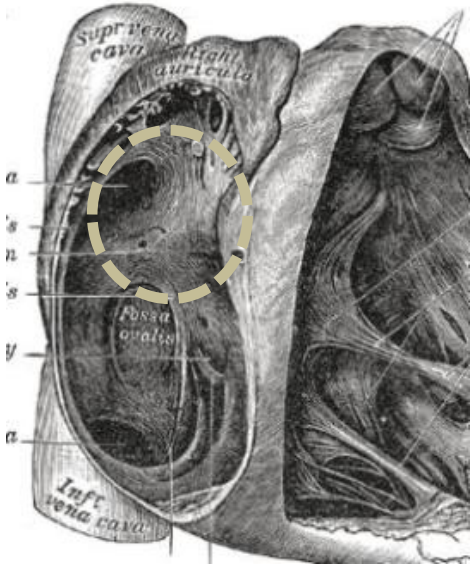
Author	N	Ultrasonography		Chest X-ray	
		Sensitivity	Specificity	Sensitivity	Specificity
Blaivas[14]	176	98.1%	99.2%	75.5%	100.0%
Chung[15]	97	88.2%	89.3%	47.1%	94.0%
Garofalo[13]	184	95.7%	100%	-	-
Kirkpatrick[11]	133	48.8%	98.7%	20.9%	99.6%
Rowan[16]	27	100%	93.8%	36.4%	100.0%
Soldati[17]	186	98.2%	100%	53.6%	100.0%
Soldati[18]	109	92.0%	99.5%	52.0%	100.0%
Zhang[19]	135	86.2%	97.2%	27.6%	100.0%

Posizione della punta: Dov'è "centrale"?

1/3 Inferiore Vena cava superiore –
1/3 superiore atrio dx



Giunzione cavo-atriale
=
posizionamento perfetto



ECG intracavitario

JVA
ISSN 1129-7298

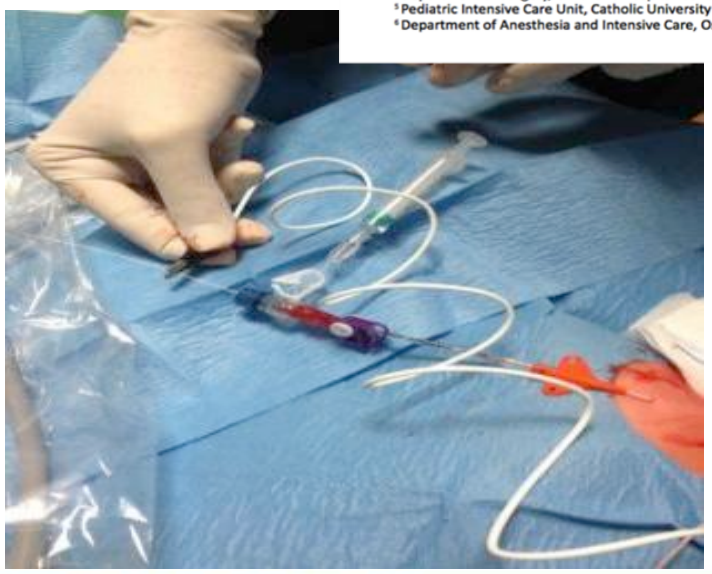
J Vasc Access 2014; 00 (00): 000-000
DOI: 10.5301/jva.5000281

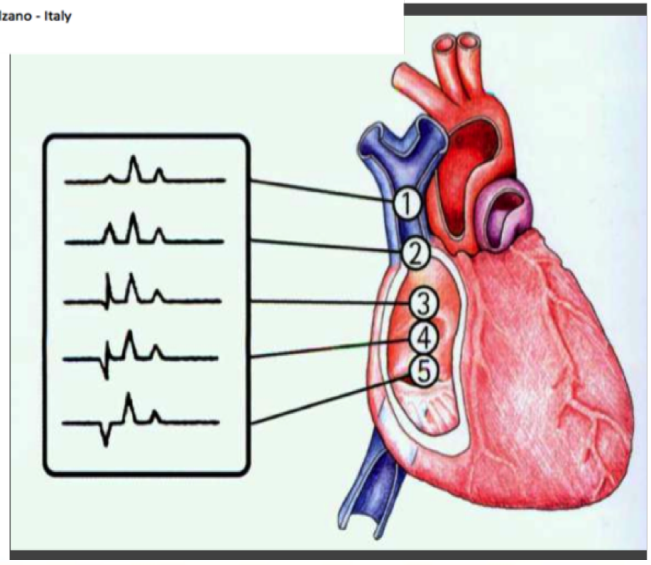
ORIGINAL ARTICLE

The intracavitary ECG method for positioning the tip of central venous access devices in pediatric patients: results of an Italian multicenter study

Francesca Rossetti[1], Mauro Pittiruti[2], Massimo Lamperti[3], Ugo Graziano[4], Davide Celentano[5], Giuseppe Capozzoli[6]

[1] Department of Anesthesia, Children's Hospital 'Meyer', Firenze - Italy
[2] Department of Surgery, Catholic University Hospital, Roma - Italy
[3] Department of Neuroanesthesia, Neurological Institute 'Besta', Milano - Italy
[4] Department of Surgery, Children's Hospital 'Santobono', Napoli - Italy
[5] Pediatric Intensive Care Unit, Catholic University Hospital, Roma - Italy
[6] Department of Anesthesia and Intensive Care, Ospedale Civile di Bolzano, Bolzano - Italy





Costo-efficacia

Specialty Section: Pediatric Surgery

Cost Comparison of Electrocardiography Versus Fluoroscopy for Central Venous Line Positioning in Children

Shannon N Tierney, BA, Joshua Katke, BA, Jacob C Langer, MD, FACS

Background: Although most central venous lines in children are positioned using fluoroscopy, electrocardiography (ECG) has been shown to be accurate, and avoids unnecessary radiation exposure. We studied whether ECG may also have cost advantages.

Study Design: All ports and Hickman/Broviac catheters placed during a 2.5-year period were reviewed. Two surgeons routinely used fluoroscopy, and two used ECG. Costs included surgeon and anesthesia fees, operating room use, and fluoroscopy equipment and personnel.

Results: There were 287 cases with sufficient data to be included in the study (167 fluoroscopy and 120 ECG). In the ECG group, 12 (10%) were converted to fluoroscopy because an adequate tracing could not be obtained, but they were kept in the ECG group for data analysis. The groups were similar with regard to age, gender, indication, previous catheters, and intraoperative or postoperative complications. Time for surgical placement of the line was not significantly affected by the positioning technique. Ports placed using ECG were less costly than those placed fluoroscopically ($2,880 ± 408 versus $3,595 ± 357, $p < 0.001$), and the same was true for tunneled external catheters ($2,249 ± 435 versus $2,923 ± 350, $p < 0.001$).

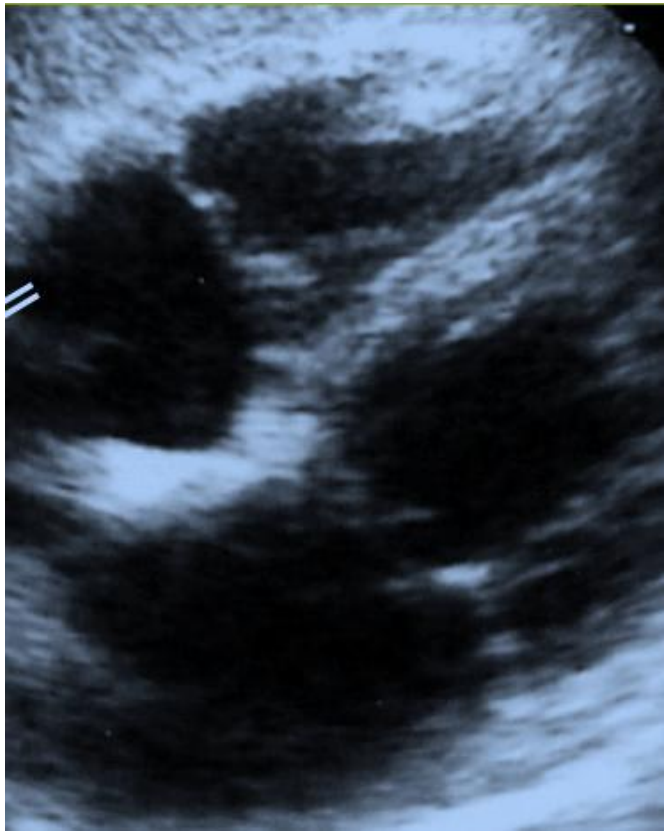
Conclusions: The ECG technique was less costly than fluoroscopy, despite a 10% conversion rate. At our center, the savings were approximately $700 per procedure. Because operating room time used is similar, the additional cost of fluoroscopy can be attributed to the need for x-ray equipment and personnel. (J Am Coll Surg 2000;191:209–211. © 2000 by the American College of Surgeons)

Received October 28, 1999; Revised February 1, 2000; Accepted February 7, 2000.

From the Department of Surgery, Washington University School of Medicine, St. Louis, MO.
Correspondence address: Jacob C Langer, MD, Division of General Surgery, Hospital for Sick Children, 555 University Ave, Toronto, Ontario M5G 1X8, Canada.

ECOCARDIO PER LA VISIONE DELLA PUNTA

Proiezione Sottocostale
4 camere



Ultrasonic Examination

An Alternative to Chest Radiography after Central Venous Catheter Insertion?

ERIC MAURY, JEAN GUGLIELMINOTTI, MARC ALZIEU, BERTRAND GUIDET, and GEORGES OFFENSTADT

Service de Réanimation Médicale, Hôpital Saint-Antoine, Assistance Publique-Hôpitaux de Paris, Paris, France

Jerome Bedel
Fabrice Vallée
Arnaud Mari
Beatrice Riu
Benjamin Planquette
Thomas Geeraerts
Michèle Génestal
Vincent Minville
Olivier Fourcade

Guidewire localization by transthoracic echocardiography during central venous catheter insertion: a periprocedural method to evaluate catheter placement

Ultrasound localization of central vein catheter and detection of postprocedural pneumothorax: An alternative to chest radiography*

Antonella Vezzani, MD; Claudia Brusasco, MD; Salvatore Palermo, MD; Claudio Launo, MD; Mario Mergoni, MD; Francesco Corradi, MD, PhD

Brief Report

American Journal of Emergency Medicine 32 (2014) 78–81

Contrast enhanced ultrasound vs chest X-ray to determine correct central venous catheter position

Francesca Cortellaro, MD [a,*], Luca Mellace, MD [a], Stefano Paglia, MD [a], Giorgio Costantino, MD [c], Sara Sher, MD [b], Daniele Coen, MD [a]

d) Scelta razionale dell'Exit Site

Il sito di emergenza del catetere (exit site) è un fattore assai rilevante nel determinare la fattibilità di una buona medicazione

- Exit site ideale (per i cateteri ad inserzione centrale)
  - Sottoclaveare > sopraclaveare > collo > inguine
- Exit site ideale (per i cateteri ad inserzione periferica)
  - Terzo medio del braccio

Una nuova consapevolezza

Molte complicanze a distanza sono in realtà legate a '***scelte sbagliate***' al momento dell'impianto:

- **Scelta di cateteri fragili** (ovvero in silicone), a rischio di dislocazione e rottura, e con minore performance clinica
- **Tecniche di venolisi o di puntura alla cieca**, che si associano a maggior rischio di complicanze
- **Utilizzo routinario di metodi radiologici** per la tip location, con conseguente aumento di malposizioni e posizioni sub-ottimali, che si associano a malfunzione e trombosi
- **Scelta di siti di emergenza non ideali** (collo e inguine), che si associano a maggior rischio di infezione e dislocazione
- **Fissaggio inappropriato** (ovvero con punti di sutura) che si associa a maggior rischio di infezione e dislocazione

STRATEGIE PER RIDURRE LE COMPLICANZE LEGATE ALL'IMPIANTO

- Usare gli US per tutti gli accessi venosi centrali
- Utilizzare la miglior tecnica
- Utilizzare la migliore vena disponibile (usualmente il tronco brachiocefalico)
- Abbandonare i cateteri in silicone (troppo fragili) e passare al poliuretano power injectable
- Scegliere i kit da microintroduzione
- Adottare l'ECG intracavitario e Ecocardio per la tip location
- Adottare la tecnica di tunnellizzazione per tutti i cateteri anche non cuffiati

NIR TECHNOLOGY

Ideal for detection – puncture – cannulation of **superficial veins (< 7mm of depth)**

British Journal of Anaesthesia **110** (6): 888–91 (2013)
doi:10.1093/bja/aet078

EDITORIAL II

Difficult peripheral veins: turn on the lights

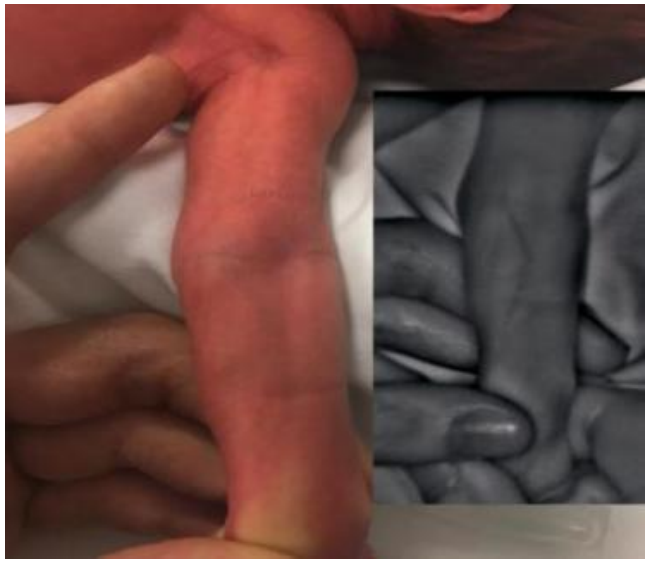
M. Lamperti[1]* and M. Pittiruti[2]

[1] Department of Neuroanaesthesia, National Neurological Institute Besta, Via Celoria, 11, 20136 Milan, Italy
[2] Department of Surgery, Catholic University, Rome, Italy

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

UTILIZZO DELLA NIR

- CVP
- Cateteri epicutaneo-cavali



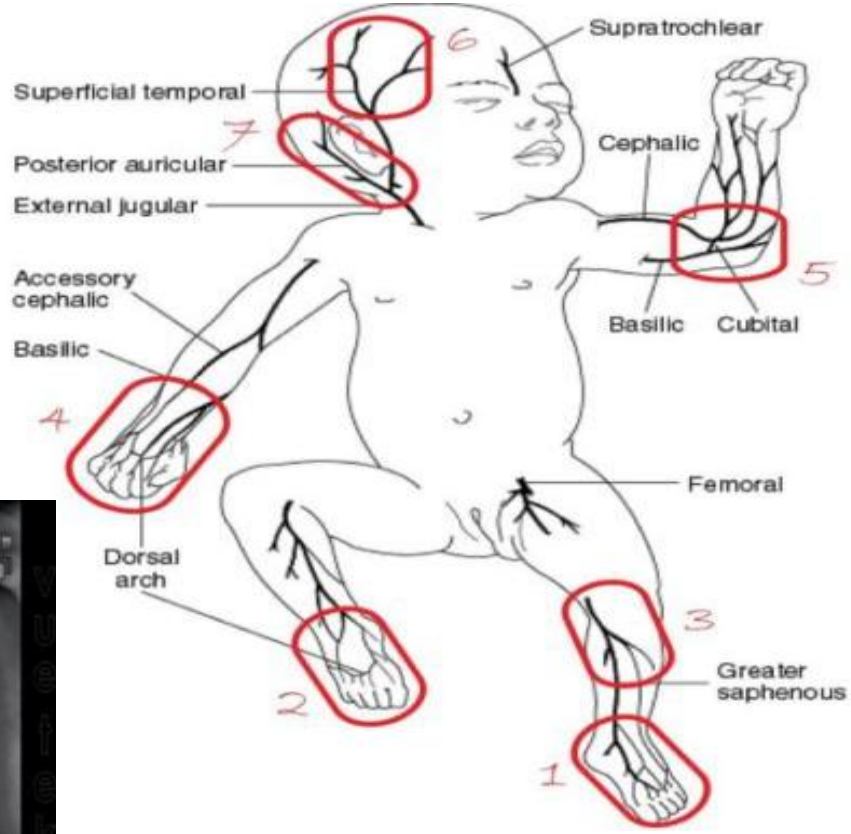
NIR nei neonati

PROTOCOLLO RaSuVA

Un protocollo per scegliere la vena superficiale in cui inserire una AGOCANNULA o un EPICUTANEO-CAVALE:

Il protocollo RaSuVA

- **diretto**
- **utilizzando la tecnologia NIR**



3) Gestione

- Importanza della stabilizzazione
- Importanza della antisepsi cutanea
- Importanza della disinfezione degli hub
- Importanza dei protocolli di lavaggio

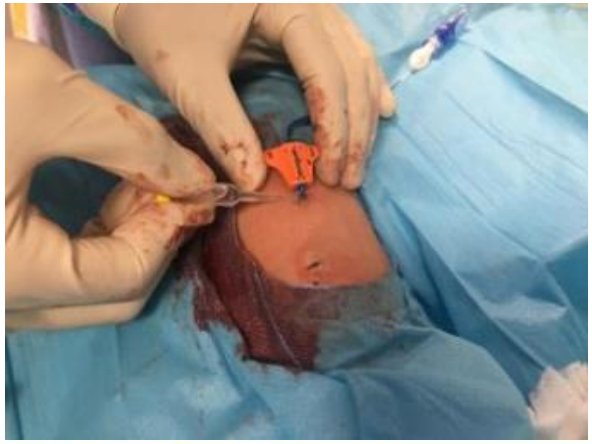
Stabilizzazione

E’ ormai dimostrato che ogni strategia che stabilizzi il catetere alla sua insorgenza riduce il rischio di infezione e trombosi. Ciò vale per tutti i cateteri sia periferici che centrali

Strategie:

- Scelta appropriata dell’exit
- Tunnellizzazione
- SAS
- Colla istoacrilica
- Medicazioni trasparenti semipermeabili

Stabilizzazione ideale



TUNNELLIZZAZIONE

«….tecnica chirurgica di superficie che consiste nel trascinare nel tessuto sottocutaneo un tratto più o meno lungo di un catetere…»

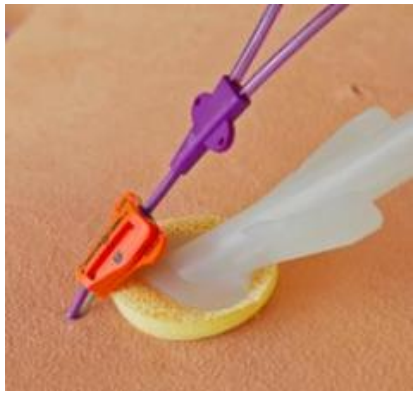
Tunnellizzazione

- In zone ad alta contaminazione riduce le infezioni
- Miglior stabilizzazione (aree asciutte, superfici piatte)
- Miglior medicazione
- Diminuzione dell'incidenza di trombosi
- Maggior comfort del paziente
- Facilità di gestione
- Catetere a breve-medio termine può permanere come a lungo termine

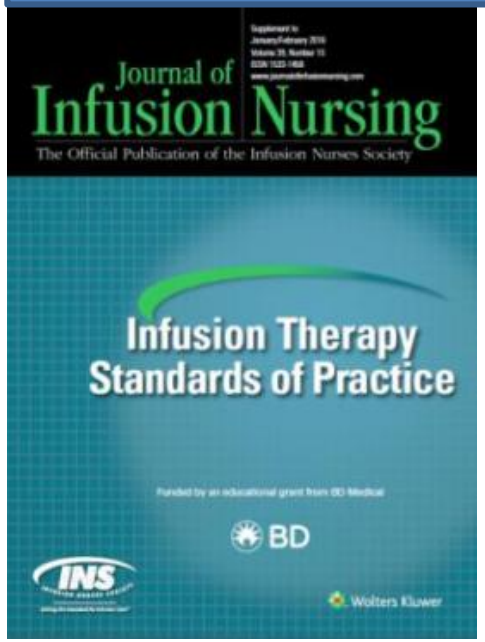
SAS sistemi di ancoraggio sottocutaneo

Vita contestuale al catetere

securAcath



… forse è tempo di gettare l'ancora!



A. Specific patient populations including pediatric, elderly, or those with cognitive dysfunction are at risk of accidental VAD dislodgment or patient removal of the VAD. Consider VAD site or line protection methods

Canadian Journal of Anesthesia/Journal canadien d'anesthésie
May 2013, Volume 60, Issue 5, pp 504–505

A prospective trial on a new sutureless securemer device for central venous catheters

A. Consider use of an engineered stabilization device (ESD) to stabilize and secure VADs as inadequate stabilization and securement can cause unintentional dislodgment and complications requiring premature VAD removal. ESDs promote consistent practice among all clinicians, reduce VAD motion that can lead to complications, reduce interruption of needed infusion therapy, and may decrease cost of care.

F. Subcutaneous ESDs have been successful in stabilizing PICCs and CVADs inserted through the internal jugular vein of adults. Patient outcomes and patient and inserter satisfaction have been favorable; how-

Colla Istoacrilica

CIANOACRILATO: adesivo tissutale liquido:
BARRIERA ANTIBATTERICA ad ampio spettro, con un tempo di polimerizzazione molto ridotto (10-20 sec), garantisce protezione all'exit-site per 7-10 gg

- protezione da contaminazioni
- emostasi
- stabilizzazione
- riduzione dell'incidenza di trombosi

Antisepsi cutanea

- Una decade di lavori scientifici ha dimostrato che la clorexidina al 2% è superiore allo iodopovidone

  - La clorexidina è utile

  a) nel momento dell'impianto

  b) al momento della medicazione

  c) come strategia per una antisepsi continua dell'exit site (Biopatch)

CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

12. Use a chlorhexidine-impregnated sponge dressing for temporary short-term catheters in patients older than 2 months of age if the CLABSI rate is not decreasing despite adherence to basic prevention measures, including education and training, appropriate use of chlorhexidine for skin antisepsis, and MSB [93, 96–98]. Category 1B

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JULY 2014, VOL. 35, NO. 7

SHEA/IDSA PRACTICE RECOMMENDATION

Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

Jonas Marschall, MD;[1,2,a] Leonard A. Mermel, DO, ScM;[3,a] Mohamad Fakih, MD, MPH;[4] Lynn Hadaway, MEd, RN, BC, CRNI;[5] Alexander Kallen, MD, MPH;[6] Naomi P. O'Grady, MD;[7] Ann Marie Pettis, RN, BSN, CIC;[8] Mark E. Rupp, MD;[9] Thomas Sandora, MD, MPH;[10] Lisa L. Maragakis, MD, MPH;[11] Deborah S. Yokoe, MD, MPH[12]

2. Use chlorhexidine-containing dressings for CVCs in patients over 2 months of age (quality of evidence: I).[80,155-160]

Infusion Therapy Standards of Practice

J. Use chlorhexidine-impregnated dressings over CVADs to reduce infection risk when the extraluminal route is the primary source of infection. Even when organizations show a low baseline central line-associated bloodstream infection (CLABSI) rate, further reduction in CLABSI rate has been demonstrated with use of chlorhexidine-impregnated dressings. The efficacy of chlorhexidine dressings in long-term CVAD use, beyond 14 days when intraluminal sources of infection are the primary source, has not been shown.[18] (I)

Journal of Hospital Infection 86S1 (2014) S1-S70

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

ELSEVIER

epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

H.P. Loveday[a,*], J.A. Wilson[a], R.J. Pratt[a], M. Golsorkhi[a], A. Tingle[a], A. Bak[a], J. Browne[a], J. Prieto[b], M. Wilcox[c]

[a] Richard Wells Research Centre, College of Nursing, Midwifery and Healthcare, University of West London (London).
[b] Faculty of Health Sciences, University of Southampton (Southampton).
[c] Microbiology and Infection Control, Leeds Teaching Hospitals and University of Leeds (Leeds).

IVAD20 Consider the use of a chlorhexidine-impregnated sponge dressing in adult patients with a central venous catheter as a strategy to reduce catheter-related bloodstream infection.

New recommendation *Class B*

Un nuovo concetto

la protezione del sito d'emergenza

- Dal rischio di contaminazione extraluminale
  - Clorexidina 2% in alcool 70%
  - Medicazioni trasparenti semipermeabili
  - Feltrini a rilascio di clorexidina (biopatch)
  - Colla in cianoacrilato

- Dal rischio di sanguinamento
  - Colla in cianoacrilato

- Dal rischio di dislocazione del catetere
  - Sistemi sutureless (ad adesività cutanea – SAS – integrati con la medicazione)
  - Colla in cianoacrilato

DISINFEZIONE DEGLI HUB

Se è vero che i needlefree connectors devono essere utilizzati, è anche vero che è tassativa la disinfezione della superficie di accesso prima dell'utilizzo

- Frizionare per 10-15 sec con antisettico o disinfettante
- Oppure (meglio) utilizzare i 'port protectors'

RICORDARE

- i NFC da preferire sono quelli 'a pressione neutra' con minimo spazio morto;
- i NFC a pressione negativa aumentano il rischio di occlusione del lume;
- i NFC a pressione positiva aumentano il rischio di infezione

DISINFEZIONE DEI PUNTI DI ACCESSO (HUB O NEEDLEFREE CONNECTORS) DI UN CVC MEDIANTE SCRUBBING CON SOLUZIONI ALCOLICHE (PREFERIBILMENTE CLOREXIDINA 2% IN SOLUZIONE ALCOLICA) OPPURE DISINFEZIONE PASSIVA DEI NFC MEDIANTE PORT PROTECTORS.

F. Perform a vigorous mechanical scrub for manual disinfection of the needleless connector prior to each VAD access and allow it to dry.
   1. Acceptable disinfecting agents include 70% isopropyl alcohol, iodophors (ie, povidone-iodine), or >0.5% chlorhexidine in alcohol solution.[7,16] (II)

G. Use of passive disinfection caps containing disinfecting agents (eg, isopropyl alcohol) has been shown to reduce intraluminal microbial contamination and reduce the rates of central line-associated bloodstream infection (CLABSI). Use of disinfection caps on peripheral catheters has limited evidence but should be considered.

Medicazione

Journal of Hospital Infection 86S1 (2014) S1-S70

Journal of Hospital Infection

epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

H.P. Loveday[a,*], J.A. Wilson[a], R.J. Pratt[a], M. Golsorkhi[a], A. Tingle[a], A. Bak[a], J. Browne[a], J. Prieto[b], M. Wilcox[c]

[a] Richard Wells Research Centre, College of Nursing, Midwifery and Healthcare, University of West London (London).
[b] Faculty of Health Sciences, University of Southampton (Southampton).
[c] Microbiology and Infection Control, Leeds Teaching Hospitals and University of Leeds (Leeds).

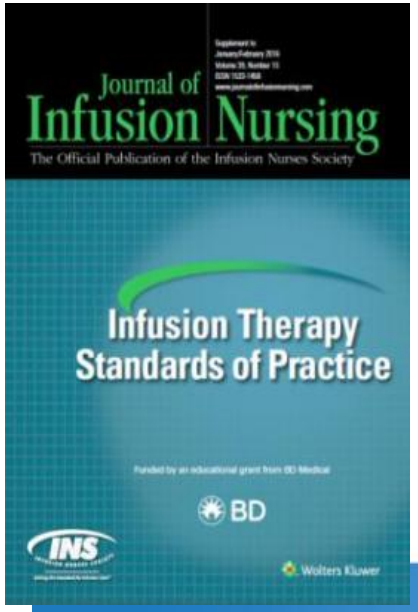
Catheter and Catheter Site Care

CVAD 19 Preferably, a sterile, transparent, semi-permeable polyurethane dressing should be used to cover the catheter insertion site. *Class D*

CVAD 20 Transparent dressings should be changed every 7 days, or sooner if they are no longer intact or moisture collects under the dressing. *Class D*

CVAD 21 If a patient has profuse perspiration or if the insertion site is bleeding or oozing, a sterile gauze dressing is preferable to a transparent, semi-permeable dressing. *Class D/GPP*

CVAD 22 The need for a gauze dressing should be assessed daily and changed when inspection of the insertion site is necessary or when the dressing becomes damp, loosened or soiled. A gauze dressing should be replaced by a transparent dressing as soon as possible. *Class D/GPP*



Medicazione coprente

Medicazione trasparente semipermeabile bordata (MST)

Protocolli di lavaggio (INS 2016)

Il fattore fondamentale nel mantenere pervio il lume del catetere è il costante lavaggio con soluzione fisiologica durante l'uso (FLUSH) e l'appropriato riempimento con fisiologica a fine uso (LOCK) evitando 'backflow'

- Prima di iniziare la infusione
- Tra una infusione e la successiva
- Tra un farmaco e un altro
- Dopo il prelievo
- Alla fine della infusione

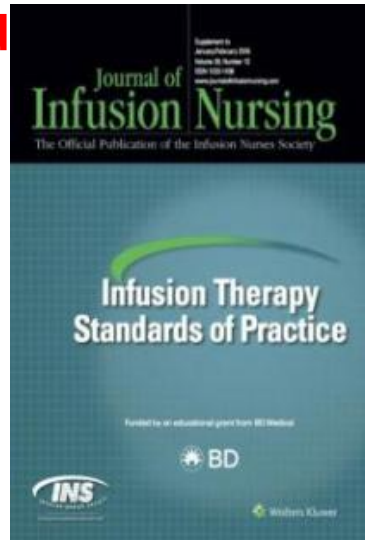
- Il volume del flush deve essere almeno 2 volte lo spazio morto del sistema
- Usare preferibilmente dispositivi monouso, monodose (es.: siringhe pre-riempite)

,

Abbandonare l'eparinizzazione

INS 2016: Anticoagulant lock

- **In all peripheral and central VADs not used for dialysis or apheresis, in all patients:**
  - **No evidence of difference between saline lock and heparin lock**
- In VADs used for apheresis:
  - Lock with heparin 100 units/ml or 4% citrate
- In VADs used for dialysis:
  - Lock with heparin 1000 units/ml or 4% citrate



INS 2016: lock

- **Indicazioni al lock profilattico**
  - VAD centrali a lungo termine con CRBSI ricorrenti
  - Pazienti ad alto rischio per CRBSI
  - Unità operativa con alta incidenza di CRBSI nonostante la adozione di appropriato bundle di prevenzione
- Volume del lock
  - **Spazio morto del sistema + 20%**
- Nuovo concetto: possibile utilizzo del lock NON ai fini della prevenzione delle occlusioni ma ai fini della prevenzione delle complicanze infettive

  - Soluzioni con attività antibatterica
    - **Taurolidina**
    - **Citrato > 10%**
    - **Etanolo**
    - **EDTA tetrasodico**
    - Antibiotici (Rischio resistenze batteriche, Allergie)

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]

BJA
2013

It is necessary to have minimal cannulation of 70 central vein punctures per year in order to maintain the skills and the competence in these patients.[91] Ultrasound guidance enhances first-time success and time to cannulation in small infants, but requires supervised training to gain proficiency. It has been demonstrated to take 15 supervised, ultrasound-guided cannulations to reach proficiency with small infants.[91]

Favorire la collaborazione tra i centri pediatrici:

- Condivisione di protocolli operativi evidence-based , bundle e check list procedurali
- Condivisione di algoritmi di scelta dei VAD
- Valutazione di nuovi VAD pediatrici e neonatali
- Condivisione di schede di impianto e gestione
- Condivisione di database e studi multicentrici
- Formazione e training

GAVePed

Gruppo Accessi Venosi Pediatrici

GRAZIE PER L'ATTENZIONE