

Accessi centrali per via periferica versus accessi centrali per via centrale

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Pediatric Vascular Access Practice: Time for Evolution or Revolution?

By Amanda J Ullman RN, MAppSci, PhD, Centaur Fellow, Director-at-Large;
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- Today, around the world, all you have to do is walk into any pediatric Emergency Room (ER) or by a treatment room and you will hear a child screaming as they are being poked. Open the door/curtain and the child is being held down while an IV attempt is made (without any pain intervention or use of vessel visualization).
- We have HUGE opportunities to improve a child's experience with needlesticks/pokes/jabs/needle related pain.









Indicazioni

- Prelievi multipli
- Necessita di nutrizione parenterale/infusione prolungata di farmaci
- Monitoraggio emodinamico
- Assenza di vene periferiche
- Needlefobic



In un passato non troppo lontano

PRE ULTRASOUND

ACCESSO CHIRURGICO

COMPLICANZE

L'ago cerca la struttura, la via chirurgica la vede



ACCESSO CHIRURGICO

- ❑ E' PIU' SICURO
- ❑ E' ANATOMICO
- ❑ E' SOGGETTO A MINORI COMPLICAZIONI

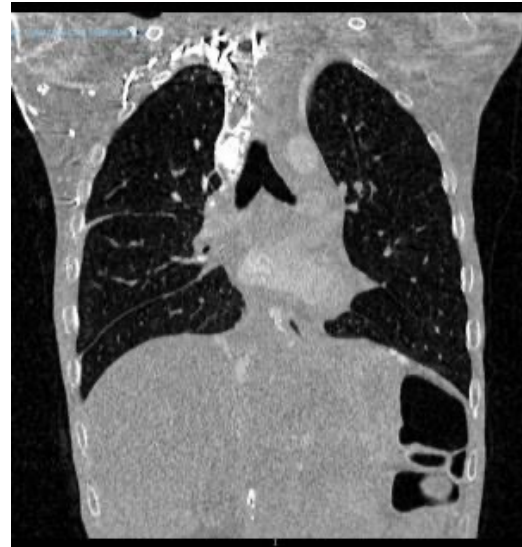
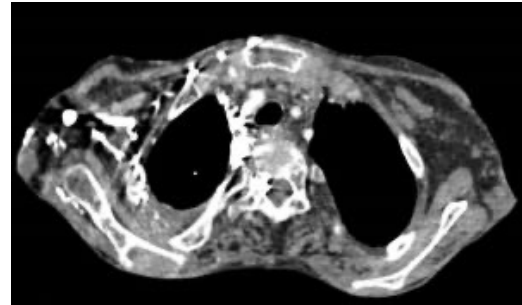


Venolisi

- Tecnica che il chirurgo pediatra **deve** conoscere
- Richiede skills di chirurgia vascolare/microchirurgia
- Danno vascolare permanente
→ trombosi
- INTERVENTO CHIRURGICO



In un passato non troppo lontano



Accessi venosi centrali

In età pediatrica

- Catetere a breve termine (es.: terapia intensiva, o nel perioperatorio)
- Catetere a medio/lungo termine → PICC
- Catetere a lungo termine
 - Hickman/Broviac/Groshong
 - PICC “off-label”/CICC/FICC
 - Port



Accessi venosi centrali

In età pediatrica

- **PICC**: catetere con punta in VCS-GCA ad inserzione periferica (brachiale)
- **CICC**: catetere con punta in VCS-GCA inserito in area sopra o sottoclaveare
- **FICC**: catetere con punta in VCI inserito per via femorale



Ultrasound Guided Central Vascular Access in Neonates, Infants and Children

Mauro Pittiruti*

Department of Surgery, Catholic University, Largo Francesco Vito 1, 00168 Roma, Italy

962 *Current Drug Targets*, 2012, Vol. 13, No. 7

Mauro Pittiruti

Table 1. Central Lines

• <u>Umbelical catheters</u> (Umbelical vein)*
• <u>Epicutaneo-caval catheters</u> (Superficial veins of limbs or scalp)*
• <u>Central venous catheters</u> : tunneled, non-tunnelled, ports (central veins of the neck and of the supra/infra-clavicular region)
• <u>PICC, Peripherally Inserted Central Catheters</u> (Deep veins of the arm)
• <u>Inferior Vena Cava catheters</u> (femoral and saphenous vein)

* = *only in neonates.*



Cornerstones

- Visualizzazione e scelta della vena
- Venipuntura ecoguidata
- Tip navigation – Tip location
- Exit site



Accessi venosi centrali per via centrale

- CICC/FICC in PUR, mono o doppio lume, di calibro ridotto
 - Inserzione ecoguidata
 - Vene centrali:
 - VGI e V.anonima
 - V.ascellare e V.succlavia nei bambini > 2 aa
 - V.femorale: da utilizzare con prudenza



Accessi venosi centrali per via centrale

- Pazienti: TIP o ONCOPED
- Catetere: mono/bilume – cuffiato/non cuffiato
- Inserzione: in vena giugulare, anonima o femorale
- Tecnica ecoguidata + microintrodotto
- Tunnellizzazione: al fine di far fuoriuscire il catetere in posizione più comoda e più stabile



Accessi venosi centrali per via periferica

PICC

- VALIDA ALTERNATIVA AL CICC
- In caso di controindicazione all'anestesia generale (posizionamento bedside)
- SCELTA OTTIMALE IN ALCUNI PAZIENTI



Come e quando?

- Vene piccole, da 3 mm in su
- Cateteri piccoli, da 3 Fr in su
- Mono lume o doppio lume
- In poliuretano power injectable



Attenzione!!!!

Epicutaneo-caval caths

Neonates

Direct or NIR insertion

Superficial veins of the arm

Tip not always central

Caliber < 3Fr

Low flow

No blood sampling

US-guided PICCs

Infants and children

Ultrasound guidance

Deep vein of the arm

Tip at CAJ

Caliber 3 Fr or >

High flow (power inject.)

Ok for blood sampling



Scelta del vaso - DIMENSIONI

- Calibro del catetere DEVE essere MINORE o UGUALE ad $\frac{1}{3}$ del calibro della vena scelta per il posizionamento
- RIDOTTO RISCHIO TROMBOSI



Quindi???

Il PICC è un catetere venoso centrale a tutti gli effetti

Punta in prossimità della giunzione cavo atriale

Possibilità di prelievi

Possibilità di monitoraggio emodinamico

Possibilità di infusione di ogni tipo di liquidi e ogni tipo di farmaco

UNICA DIFFERENZA:

Accesso ottenuto da una vena periferica dell'arto superiore, e non tramite una vena 'centrale'

- cambia il sito di emergenza
- cambia la lunghezza del catetere
- cambia la tecnica di inserzione



Quindi???

Come performance di durata, i PICC non tunnellizzati sono superiori ai CVC non tunnellizzati.



ANNO 2012



Tunnellizzazione al braccio

- Possibilità di pungere la vena basilica/ascellare in area più vicina al cavo ascellare (vena di maggior calibro), pur lasciando il sito di emergenza in sede appropriata (1/3 medio del braccio)
- Aumento delle indicazioni dei PICC, anche nei bambini e negli adulti con piccole vene
- Riduzione del rischio trombotico (posizionamento in vene di maggior calibro)



Da dove nasce il problema?



Da dove nasce il problema?



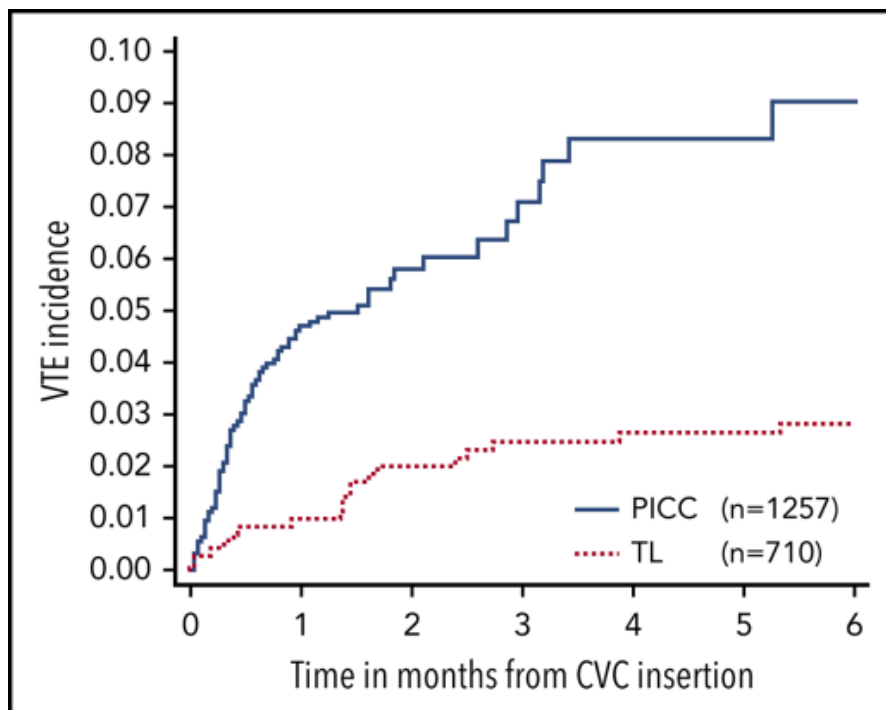
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Peripherally Inserted Central Catheters Lead to a High Risk of Venous Thromboembolism in Children

Tracking no: BLD-2019-002260R1

Julie Jaffray (Children's Hospital Los Angeles, United States) Char Witmer (The Children's Hospital of Philadelphia, United States) Sarah O'Brien (Nationwide Children's Hospital, United States) Rosa Diaz (Texas Children's Hospital, United States) Lingyun Ji (University of Southern California, Keck School of Medicine, United States) Emily Krava (Children's Hospital Los Angeles, United States) Guy Young (Children's Hospital Los Angeles, United States)





Julie Jaffray,Char Witmer,Sarah H. O'Brien,Rosa Diaz,Lingyun Ji,Emily Krava,Guy Young, Peripherally inserted central catheters lead to a high risk of venous thromboembolism in children, Blood, 2020,

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Table 1. Comparison of demographic information on subjects with either a PICC or TL at the time of catheter placement

Variables	PICC group, n = 1257	TL group, n = 710
	Median (range) or n (%)	Median (range) or n (%)
Age at CVC insertion, y	7 (0.5-17.9)	5.3 (0.5-17.9)
Age group, y		
0.5-1	101 (8)	36 (5)
>1-5	398 (32)	312 (44)
>5-10	300 (24)	148 (21)
>10-18	458 (36)	214 (30)
Sex		
Female	603 (48)	317 (45)
Male	654 (52)	393 (55)
Ethnicity		
Hispanic/Latino	429 (34)	231 (33)
Non-Hispanic	508 (40)	302 (42)
Not listed	320 (26)	177 (25)
Race		
White	585 (47)	375 (53)
Asian	71 (6)	54 (8)
Black or African American	157 (12)	70 (10)
Native Hawaiian/Pacific Islander, American Indian, or Native Alaskan	6 (<1)	16 (2)
Unknown	438 (35)	195 (27)
Medical history*		
Current infection	423 (34)	95 (13)
Previous CVC	375 (30)	291 (41)
Recent surgery	287 (23)	145 (20)
Cancer	268 (21)	534 (75)
Parental nutrition dependence	207 (16)	101 (14)
Congenital heart disease	118 (9)	11 (2)
History of thrombosis	93 (7)	49 (7)
Cystic fibrosis	84 (7)	8 (<1)
Metabolic/mitochondrial disorder	69 (5)	24 (3)
Inflammatory bowel disease	34 (3)	5 (<1)
Nephrotic syndrome	11 (<1)	4 (<1)
Lupus/juvenile rheumatoid arthritis	8 (<1)	2 (<1)
None/other	230 (18)	41 (6)

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Table 2. Variables found to have increased risk of developing a CVC-related VTE

Variables	n	VTEs	Multivariable	
			HR (95% CI)	P
CVC type				
TLs	710	19	1.0	<.001
PICCs	1257	75	8.5 (3.1, 23)	
History of VTE				
No	1825	75	1.0	<.001
Yes	142	19	23 (4.0, 127)	
No. of lumens				
1	1228	41	1.0	.003
2 or 3	625	50	3.9 (1.8, 8.9)	
Unknown	114	3		
Cancer				
No cancer	1165	49	1.0	.031
Leukemia/lymphoma	456	33	3.5 (1.3, 9.0)	
Other cancer	346	12	1.3 (0.39, 4.5)	
CLABSI				
No	1794	82	1.0	.002
Yes	173	12	5.6 (1.9, 16)	
CVC malfunction				
No	1523	64	1.0	<.001
Yes	444	30	5.8 (2.5, 13)	

CLABSI and CVC malfunction were diagnosed prior to the VTE event.

CI, confidence interval; HR, hazard ratio.

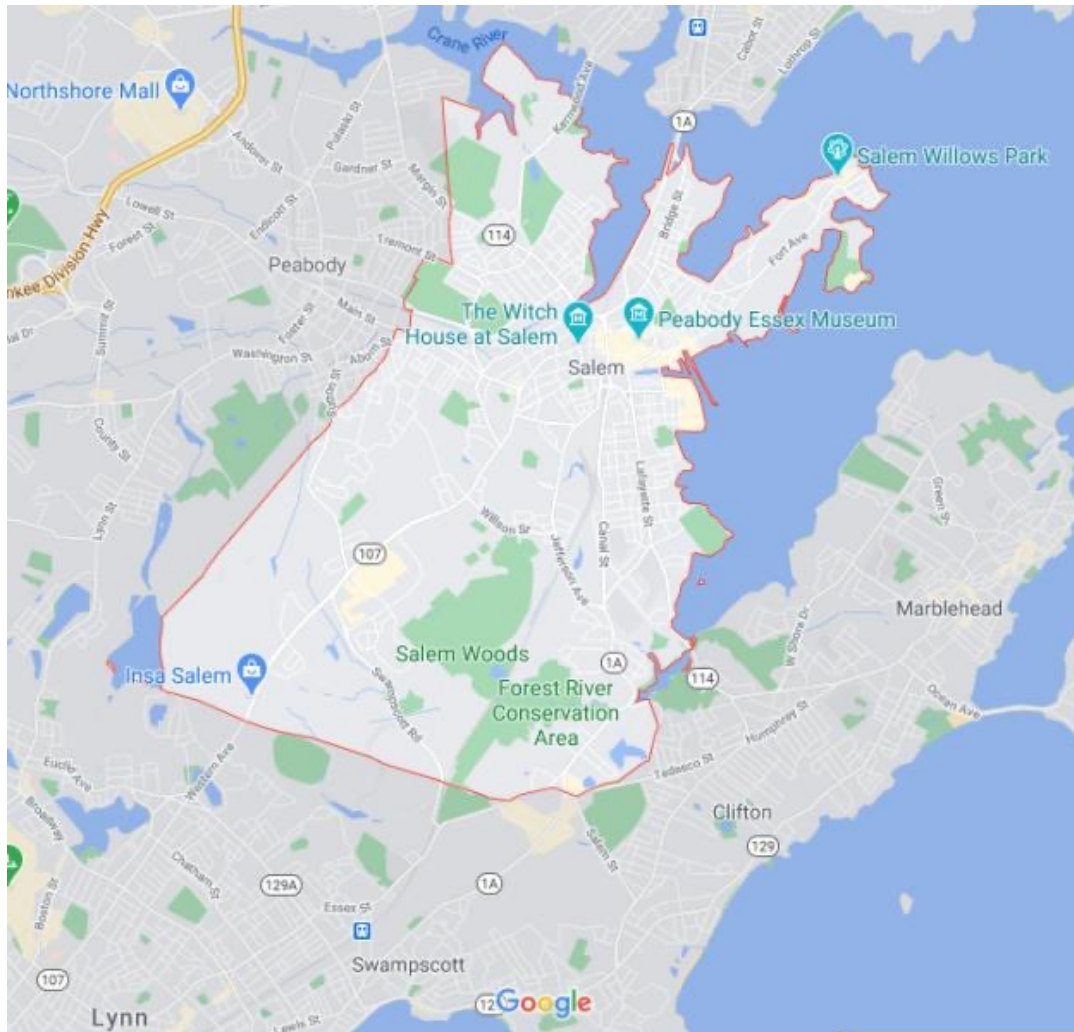


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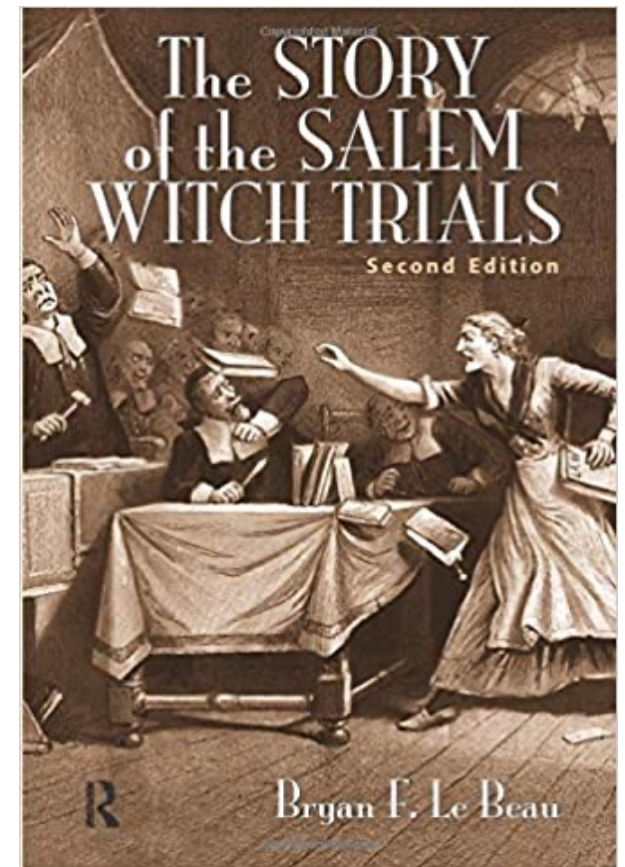
In conclusion, CVCs are an essential part of medical care for many children, but the increasing rates of CVC-related VTE must be addressed. To lower the CVC-related VTE rate, we must focus on modifiable risk factors, such as limiting multilumen CVCs, preventing CLABSI, or placing a TL over a PICC if possible. Most importantly, pediatricians and pediatric subspecialists need to reconsider how quickly and easily decisions to place CVCs, especially PICCs, are being placed. Inserting a PICC is tempting to avoid repeat venipuncture or surgical intervention with TL placement, but results from the CIRCLE study showing increased risks of VTE, CLABSI, and malfunction with PICCs should give practitioners pause.





«Salem Witch Trials»

In 1692 in the city of Salem, Massachusetts, some children began to suffer strange symptoms. “These children were bitten and pinched by invisible agents; their arms, necks, and backs turned this way and that way, and returned back again, so it was impossible for them to do of themselves” 4 . That was the beginning of the (in)famous ‘Salem Witch Trial’: 144 people were prosecuted for witchcraft, and 19 of them were sentenced to death and executed. Only after decades they were pardoned from their charges.



«PICC Witch Trials»

With all due proportions, the Salem Witch Trial event parallels with some current surprising statements about PICCs in children with cancer...not far to trigger a “PICC hunt”, rather than a “witch hunt”.



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Dove sta il problema?

- Dalla lettura si evince che :
 - i PICC sono stati posizionati senza ecografo (basti pensare che parlano di PICC in bambini con meno di un anno di età)



Dove sta il problema?

- Dalla lettura si evince che :
 - I PICC sono stati posizionati senza nessuna precauzione per il diametro del catetere. il che spiega la alta incidenza di trombosi (9% nei bambini con PICC/ECC).



Dove sta il problema?

- Dalla lettura si evince che :
 - La più alta incidenza di CLABSI è invece ovvia considerando che la maggior parte dei cateteri che loro chiamano 'Tunneled Lined' sono in realtà port



Letteratura????

Editorial

JVA | The Journal of
Vascular Access

Guidelines of the Italian Association of Pediatric Hematology and Oncology for the management of the central venous access devices in pediatric patients with onco-hematological disease

The Journal of Vascular Access
1-15

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Alessia Pancaldi⁷, Francesca Rossetti⁸, Federica Pitta⁹ and
Simone Cesaro¹⁰ **



Letteratura????

Appendix I. BUNDLE for the management of the CVAD.

- a. Hand washing, aseptic technique and maximum barrier protections during the implantation procedure. Hand washing before the procedure must be done with alcoholic gel or with disinfectant soap if visibly dirty or contaminated. The maximum precautions are also meant for the sterile and adequately length coverage of the ultrasound probe
 - b. Appropriate selection of the insertion site: an ultrasound scan of all veins of the arm and neck is performed bilaterally before the procedure.
 - c. Choice of the most appropriate vein in terms of size, collapsibility, depth and proximity to structures at risk.
 - d. Use of 2% chlorhexidine in 70% isopropyl alcohol for skin disinfection before insertion. Sterile single-dose applicators are recommended.
 - e. US-guided system
 - f. Use the intracavitary ECG method to check the position of the catheter
 - g. Use non-cuffed external catheter stabilization systems (or cuffed until cuff stabilization), of the sutureless or subcutaneous implant type.
 - h. Use of cyanoacrylate glue for the protection of the exit site.
 - i. Daily re-evaluate the need for catheter permanence.
 - j. Carry out hand hygiene before any contact with the catheter, the insertion site and the infusion lines.
 - k. Disinfect the needle-free connector access port (hub) before each access with 2% chlorhexidine solution in 70% alcohol solutions.
 - l. Flush and lock with normal saline. Washing should be done every 7 days.
 - m. The dressing (sterile, transparent, semipermeable) must remain intact (dry, not detached, clean) and must be replaced every 7 days.
 - n. Use 2% chlorhexidine gluconate in 70% alcohol for disinfection of the insertion site when changing the dressing.
- Always keep in mind the times for replacing the infusion lines according to the solutions administered.



Letteratura????

Pediatric Blood & Cancer

Research Article |  Full Access

[Pediatric Blood & Cancer homepage](#)

Central Line Associated Blood Stream Infections in Pediatric Hematology/Oncology Patients With Different Types of Central Lines

Jeffrey D. Hord MD , John Lawlor MHS, Eric Werner MD, MMM, Amy L. Billett MD, David G. Bundy MD, MPH, Cindi Winkle RN, CPON, Aditya H. Gaur MD, MSc ... [See all authors](#) 

First published: 16 May 2016 | <https://doi.org/10.1002/pbc.26053> | Citations: 20

Conflict of interest: Nothing to declare.

..in prospectively tracking CLABSI across 15 US PHO centers, using standardized approaches to prevent and track CLABSI, we note a clear difference in CLABSI rates across the various categories of CL types and in the inpatient versus the ambulatory setting with implanted ports having the overall lowest CLABSI rates.



Letteratura????

Pediatric Blood & Cancer

Research Article |  Full Access

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We recognize that the drivers of these differences in infection risk are multifactorial and while these observed differences and the overall difference in infection-related morbidity noted in a previous study can inform decisions about choice of CL type, accounting for the underlying disease and other host determinants of infection risk is important.



Take Home Message

L'eccellenza di un dono consiste nella **sua appropriatezza** piuttosto che nel suo valore.

Charles Dudley Warner



GRAZIE PER L'ATTENZIONE

