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I protocolli di impianto

Il protocollo ISiCEC per il catetere epicutaneo-cavale

Vito D'Andrea

Infection Control & Hospital Epidemiology (2022), 1–17
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SHEA

SHEA/IDSA/APIC Practice Recommendation

Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update

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Impianto Sicuro del Catetere Epicutaneo Cavale

1. Valutazione pre-procedurale (utilizzo del protocollo RaSuVA, preferibilmente impiegando la NIR)
2. Utilizzo di un pack procedurale pre-assemblato
3. Tecnica asettica appropriata: igiene delle mani, massime protezioni di barriera e antisepsi cutanea con clorexidina 2% in IPA 70%.
4. Utilizzo dell'ecografo per la tip navigation e la tip location intra-procedurale (secondo il protocollo NeoECHOTip).
5. Stabilizzazione del catetere e protezione del sito di emergenza (colla in cianoacrilato, membrana semipermeabile trasparente e "sutureless device")
6. Controlli seriati della posizione della punta usando l'ecografia (48 ore; ogni 7 giorni e al cambio di medicazione)
7. Valutazione rimozione dell'ECC entro due settimane

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Techniques in vascular access

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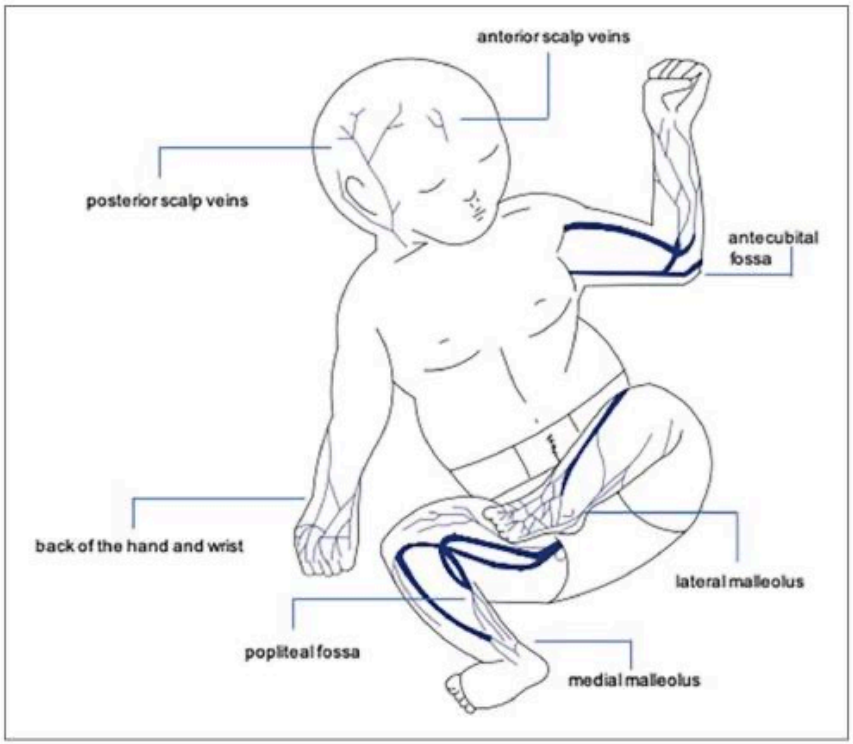
SAGE

Rapid Superficial Vein Assessment (RaSuVA): A pre-procedural systematic evaluation of superficial veins to optimize venous catheterization in neonates

Vito D'Andrea[1], Giorgia Prontera[1], Lucilla Pezza[1], Giovanni Barone[2], Giovanni Vento[1] and Mauro Pittiruti[3]

1. Medial malleolus
2. Lateral malleolus
3. Retro-popliteal fossa
4. Back of the hand and wrist
5. Antecubital fossa
6. Anterior scalp surface
7. Posterior scalp surface



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ARTICLE

Risk factors for peripherally inserted central catheter complications in neonates

Gillian C. Pet[1] · Jens C. Eickhoff[2] · Kate E. McNevin[3] · Julie Do[3] · Ryan M. McAdams[4]

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	Upper extremity *n*/total (%)	Lower extremity *n* (%)	OR of complication with UE compared with LE PICC (95% CI) *p* value
Any complications	210/524 (40.1%)	215/710 (30.3%)	1.54 (1.22–1.94) <0.001
Nonelective line removal	183/524 (34.9%)	168/710 (23.7%)	1.73 (1.35–2.21) <0.001
Associated with PICC clot	18/524 (3.4%)	40/710 (5.6%)	0.6 (0.33–1.06) NS
Malposition in 1st 72 h	33/524 (6.3%)	17/710 (2.4%)	2.74 (1.51–4.97) <0.001
Malposition over time	35/524 (6.7%)	14/710 (2.0%)	3.56 (1.89–6.71) <0.001
Dislodgement	20/524 (3.8%)	17/710 (2.4%)	1.62 (0.83–3.16) NS
Crack/Broken/Fracture	23/524 (4.4%)	39/710 (5.4%)	0.79 (0.47–1.34) NS
Extravasation/Infiltration	13/524 (2.5%)	4/710 (0.6%)	4.49 (1.44–13.96) 0.001
Phlebitis/Edema/ Erythema/Perfusion changes	18/524 (3.4%)	44/710 (6.2%)	0.54 (0.31–0.93) 0.03
Malfunction/Occlusion	37/524 (7.1%)	40/710 (5.6%)	1.27 (0.8–2.01) NS
Failed insertion	35/524 (6.7%)	25/710 (2.3%)	1.96 (1.19–3.24) 0.009
Infection	11/524 (2.0%)	7/710 (1.0%)	2.15 (0.8–5.79) NS

Research Article

Risk Factors Related to Peripherally Inserted Central Venous Catheter Nonselective Removal in Neonates

Xiaohe Yu, Shaojie Yue, Mingjie Wang, Chuanding Cao, Zhengchang Liao, Ying Ding, Jia Huang, and Wen Li

We aimed to investigate the incidence and risk factors associated with nonselective removal of peripherally inserted central venous catheter (PICC) in neonates. In this prospective cohort study, neonates who underwent PICC placement at neonatal intensive care units (NICUs) in China from October 2012 to November 2015 were included. The patient demographics, catheter characteristics, catheter duration, PICC insertion site, indication for PICC insertion, infuscate composition, PICC tip location, and catheter complications were recorded in a computerized database. Risk factors for nonselective removal were analyzed. A total of 497 PICCs were placed in 496 neonates. Nonselective removal occurred in 9.3% of PICCs during 10,540 catheter-days (4.6 nonselective removals per 1,000 catheter-days). These included occlusion (3%), infection (1.4%), leakage (2.0%), phlebitis (0.6%), displacement (1%), pleural effusion(0.6%), and breaks (0.6%). Noncentral tip position was independently associated with an increased risk of nonselective removal (odds ratio 2.621; 95% confidence interval, 1.258-5.461) after adjusting for gestational age, sex, birth weight, and PICC dwell time. No significant differences in the rate of complications occurred between silastic and polyurethane PICC or different insertion sites. Noncentral PICC tip position was the only independent risk factor for nonselective removal of PICC.

Peripherally Inserted Central Catheter Complications in Neonates With Upper Versus Lower Extremity Insertion Sites

- **662 ECC**
- **GA: 30 ± 4 wks**

TABLE 2. Type and Frequency of Complications Requiring Peripherally Inserted Central Catheter Removal: Upper Versus Lower Extremity Insertion Site

Complication	Upper Extremity (n = 374)	Lower Extremity (n = 252)	*P*
Presumed sepsis, n (%)	31 (8.3)	18 (7.1)	.6006
Clotted, n (%)	20 (5.4)	16 (6.4)	.5976
Leaking, n (%)	16 (4.3)	4 (1.6)	.0605
Edema/infiltrated, n (%)	15 (4)	5 (2)	.1574
Slipped out, n (%)	6 (1.6)	2 (0.8)	.4849
Phlebitis, n (%)	4 (1.1)	5 (2)	.4958
Pleural effusion, n (%)	3 (0.8)	0	.2773
Malpositioned, n (%)	2 (0.5)	1 (0.4)	1.0000
Central tip needed, n (%)	2 (0.5)	0	.5182
Broken catheter, n (%)	1 (0.3)	2 (0.8)	.5680
Surgical line placed, n (%)	1 (0.3)	0	1.0000
Other, n (%)	1 (0.3)	0	1.0000

Abbreviation: PICC, peripherally inserted central catheter.

Use of peripherally inserted central catheters (PICC) via scalp veins in neonates

Allison Callejas, MD, Horacio Osiovich, MD, FRCPC, Joseph Y Ting, MBBS, MPH, FRCPC

Doi: 10.3109/14767058.2016.1139567

Abstract

Objective To describe the use and complications of peripherally inserted central catheters (PICC) via scalp veins in neonates.

Methods A retrospective review of neonates who had PICCs inserted, between January 2010 and June 2013, in the NICU at Childreńs and Womeńs Health Centre of British Columbia.

Results During the study period, 689 PICCs were inserted over a total of 46728 NICU patient days. The PICC insertion sites were: scalp veins (69), upper limb veins (471) and lower limb veins (149). The mean catheter durations were 17 days, 19 days and 18 days for PICCs inserted through scalp, upper limb and lower limb veins, respectively. The complication rates were 23%, 23% and 15% for insertion via scalp, upper and lower limb veins, respectively. Centrally placed PICCs at the time of insertion were more likely to remain in situ for longer than one week ($p < 0.001$). The incidence of central line-associated blood stream infection was 4.4, 6.4 and 3.4 per 1000 catheter days, respectively, for scalp, upper and lower limb PICCs.

Insertion Site	Scalp	Upper limb	Lower limb
No. of PICCs (% of total PICCs)	69 (10%)	471 (68%)	149 (22%)
End of therapy	40 (58%)	296 (63%)	94 (63%)
*Death or transferred to other NICUs	9 (13%)	45 (10%)	18 (12%)
Infectious complications	5 (8%)	56 (13%)	8 (6%)
	- CoNS. [1] - Unidentified Staph. [1] - Enterococcus [1] - Group B Strep. [1] - E Coli [1]	- CoNS. [42] - Enterococcus [3] - E Coli [3] - Kleb. pneumoniae [2] - Unidentified Staph. [2] - Candida lustiniae [1] - Klebsiella oxytoca [1]	- CoNS. [3] - Enterococcus [3] - E Coli [1] - Staph. Aureus [1]

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ORIGINAL ARTICLE

Near-infrared system's efficiency for peripheral intravenous cannulation in a level III neonatal intensive care unit: a cross-sectional study

Silvia Ferrario[1] · Gabriele Sorrentino[1] · Giacomo Cavallaro[1] · Ivan Cortinovis[2] · Silvia Traina[1] · Salvatore Muscolo[1] · Alessandro Agosteo[1] · Germana Santini[1] · Elisa Lagostina[1] · Fabio Mosca[1,3] · Laura Plevani[1]

	NIR group ($n = 124$)	Control group ($n = 101$)	p
Gestational age (weeks), median (Q1–Q3)	34.6 (33.8–35.2)	34.4 (34.6–36.2)	0.136
Birth weight (g), median (Q1–Q3)	2471 (2300–2641)	2624 (2440–2808)	0.229
Weight at the study (g), median (Q1–Q3)	3943 (3724–4162)	3668 (3504–3833)	0.058
Ethnic group (Caucasian), *n* (%)	102 (82.3)	87 (86.1)	0.8359
Drugs taken, *n* (%)	60 (48.4)	48 (47.5)	0.8975
Years of nurses' experience, *n* (%)			0.4124
<1 year	22 (17.7)	13 (12.9)	
1–5 years	35 (28.2)	25 (24.7)	
>5 years	67 (54.1)	63 (62.4)	
Proportion of one attempt (CI 95%)	64.5 (56.1; 72.9)	55.5 (45.8; 65.1)	0.2136
Proportion of one attempt based on the nurses' years of experience (CI 95%)			
<1 year	72.7 (54.1; 91.3)	23.1 (0.2; 46.0)	*0.0125*
1–5 years	60.0 (43.8; 76.2)	52.0 (32.4; 71.6)	0.7246
>5 years	64.2 (52.7; 75.7)	63.5 (51.6; 75.4)	0.9206
Average pain score (CI 95%)	5.5 (4.9–6.1)	4.9 (4.3–5.4)	0.147
Average pain score based on the nurses' years of experience (CI 95%)			
<1 year	5.8 (4.0; 7.8)	4.1 (2.4; 5.7)	0.191
1–5 years	5.6 (4.7; 6.4)	5.3 (3.8; 6.9)	0.756
>5 years	5.3 (4.8; 6.2)	4.8 (4.2; 5.2)	0.366

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www.nature.com/jp

ORIGINAL ARTICLE

A randomized trial of the Vein Viewer versus standard technique for placement of peripherally inserted central catheters (PICCs) in neonates

K Phipps, A Modic, MA O'Riordan and M Walsh

Division of Neonatology, Department of Pediatrics, Rainbow Babies and Children's Hospital, University Hospitals of Cleveland Case Medical Center, Cleveland, OH, USA

	Standard (N = 56)	*Vein Viewer* (N = 59)	P
Gestational age (weeks)	28.0 (23–40)	30.0 (23–40)	0.08
Birthweight (g)	1030 (320–4160)	1160 (300–4700)	0.06
Gender, male, *N* (%)	35 (62.5)	32 (54.2)	0.37
African American, *N* (%)	29 (51.8)	27 (45.8)	0.52

	Unadjusted odds ratio (95% CI)	*Adjusted odds ratio (95% CI)*
Success on first attempt	1.26 (0.59, 2.68)	1.57 (0.71, 3.50)
Any success	2.33 (0.90, 6.04)	3.05 (1.10, 8.42)

showed a trend to more successful placement 86 versus 75%; unadjusted odds ratio 2.33 (0.90, 6.04; $P = 0.08$). Infants randomized to the Vein Viewer were more mature (30 ± 2 weeks gestational age (GA) versus 28 ± 2 weeks GA; $P = 0.08$). After adjusting for GA, use of the Vein Viewer was significantly more likely to lead to successful line placement (adjusted odds ratio 3.05 (1.10, 1.82)).

ORIGINAL ARTICLE

Increased frequency of peripheral venipunctures raises the risk of central-line associated bloodstream infection in neonates with peripherally inserted central venous catheters

Hao-Yuan Cheng [a], Chun-Yi Lu [a], Li-Min Huang [a], Ping-Ing Lee [a], Jong-Min Chen [b], Luan-Yin Chang [a,*]

Background/Purpose: Central-line associated bloodstream infection (CLA-BSI), which is mostly caused by coagulase-negative staphylococcus, is an important morbidity in neonatal intensive care units. Our study is aimed to identify the risk factors of CLA-BSI in neonates with peripherally inserted central venous catheters (PICCs).

Methods: A retrospective cohort study of neonatal intensive care unit patients with a PICC insertion between January 1, 2011 and December 31, 2012 was conducted. We performed univariate and multivariate analyses with a logistic regression model to investigate the risk factors and the association between increased frequency of peripheral venipunctures during PICC use and the risk of CLA-BSI while adjusting for other variables.

Results: There were 123 neonates included in our study. Thirteen CLA-BSIs were recorded within the follow-up period. The incidence of PICC-associated CLA-BSI was 4.99 per 1000 catheter-days. There was no statistically significant association between the risk of CLA-BSI and gestational age, birth weight, chronological age, or other comorbidities. However, the odds of CLS-BSI increased to 12 times if the patient received six or more venipunctures within the period without concurrent antibiotic use [odds ratio (OR), 11.94; $p < 0.001$]. The OR of CLA-BSIs increased by 16% per venipuncture during PICC use (OR, 1.14; $p = 0.003$).

NIR ed ECC

- La NIR permette la corretta visualizzazione e la valutazione di vene superficiale ma non visibili e/o palpabili
- La NIR è di aiuto nella scelta della vena
- La NIR può essere di aiuto nei DIVA come tecnica elettiva

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3. Tecnica asettica appropriata: igiene delle mani, massime protezioni di barriera e antisepsi cutanea con clorexidina 2% in IPA 70%.
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6. Controlli seriati della posizione della punta usando l'ecografia (48 ore; ogni 7 giorni e al cambio di medicazione)
7. Valutazione rimozione dell'ECC entro due settimane

33. VASCULAR ACCESS SITE PREPARATION AND DEVICE PLACEMENT

III. Central Vascular Access Device (CVAD)

A. Implement the central line bundle when placing CVADs, which includes the following interventions:

hand hygiene; skin antisepsis using >0.5% chlorhexidine in alcohol solution; maximal sterile barrier precautions; and avoidance of the femoral vein in obese adult patients during placement under planned and controlled conditions.[3,15,16,33] (I)

Ensure adherence to proper technique through use of and completion of a standardized checklist completed by an educated health care clinician and empower the clinician to stop the procedure for any breaches in aseptic technique. Completion of a checklist should be done by someone other than the CVAD inserter.[15,34]

Use a standardized supply cart or kit that contains all necessary components for the insertion of a CVAD.[15] (IV)

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SHEA

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Niccolò Buetti MD, MSc, PhD[1,2,a], Jonas Marschall MD, MSc[3,4,a], Marci Drees MD, MS[5,6], Mohamad G. Fakih MD, MPH[7], Lynn Hadaway MEd, RN, NPD-BC, CRNI[8], Lisa L. Maragakis MD, MPH[9], Elizabeth Monsees PhD, MBA, RN, CIC[10,11], Shannon Novosad MD MPH[12], Naomi P. O'Grady MD[13], Mark E. Rupp MD[14], Joshua Wolf MBBS, PhD, FRACP[15,16], Deborah Yokoe MD, MPH[17] and Leonard A. Mermel DO, ScM[18,19]

Essential Practices

Before insertion

1. Provide easy access to an evidence-based list of indications for CVC use to minimize unnecessary CVC placement (Quality of Evidence: LOW)
2. Require education and competency assessment of HCP involved in insertion, care, and maintenance of CVCs about CLABSI prevention (Quality of Evidence: MODERATE)[74–78]
3. Bathe ICU patients aged >2 months with a chlorhexidine preparation on a daily basis (Quality of Evidence: HIGH)[86–90]

At insertion

1. In ICU and non-ICU settings, a facility should have a process in place, such as a checklist, to ensure adherence to infection prevention practices at the time of CVC insertion (Quality of Evidence: MODERATE)[101]
2. Perform hand hygiene prior to catheter insertion or manipulation (Quality of Evidence: MODERATE)[102–107]
3. The subclavian site is preferred to reduce infectious complications when the catheter is placed in the ICU setting (Quality of Evidence: HIGH)[33,37,108–110]
4. Use an all-inclusive catheter cart or kit (Quality of Evidence: MODERATE)[118]
5. Use ultrasound guidance for catheter insertion (Quality of Evidence: HIGH)[119,120]
6. Use maximum sterile barrier precautions during CVC insertion (Quality of Evidence: MODERATE)[123–128]
7. Use an alcoholic chlorhexidine antiseptic for skin preparation (Quality of Evidence: HIGH)[42,129–134]

After insertion

1. Ensure appropriate nurse-to-patient ratio and limit use of float nurses in ICUs (Quality of Evidence: HIGH)[34,35]
2. Use chlorhexidine-containing dressings for CVCs in patients over 2 months of age (Quality of Evidence: HIGH)[45,135–142]
3. For non-tunneled CVCs in adults and children, change transparent dressings and perform site care with a chlorhexidine-based antiseptic at least every 7 days or immediately if the dressing is soiled, loose, or damp. Change gauze dressings every 2 days or earlier if the dressing is soiled, loose, or damp (Quality of Evidence: MODERATE)[145–148]
4. Disinfect catheter hubs, needleless connectors, and injection ports before accessing the catheter (Quality of Evidence: MODERATE)[150–154]
5. Remove nonessential catheters (Quality of Evidence: MODERATE)
6. Routine replacement of administration sets not used for blood, blood products, or lipid formulations can be performed at intervals up to 7 days (Quality of Evidence: HIGH)[164]
7. Perform surveillance for CLABSI in ICU and non-ICU settings (Quality of Evidence: HIGH)[13,165,166]

4. **Use an all-inclusive catheter cart or kit** (Quality of Evidence: MODERATE)[118]
   a. A catheter cart or kit that contains all necessary components for aseptic catheter insertion should be available and easily accessible in all units where CVCs are inserted.


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“Instruction for use..”

“Instruction for use..”

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7. Valutazione rimozione dell'ECC entro due settimane

6. **Use maximum sterile barrier precautions during CVC insertion** (Quality of Evidence: MODERATE)[123–128]
   a. Use maximum sterile barrier precautions:
      i. A mask, cap, sterile gown, and sterile gloves are to be worn by all HCP involved in the catheter insertion procedure.
      ii. The patient is to be covered with a large ("full-body") sterile drape during catheter insertion.
   b. These measures should also be followed when exchanging a catheter over a guidewire.

7. **Use an alcoholic chlorhexidine antiseptic for skin preparation** (Quality of Evidence: HIGH)[42,129–134]
   a. Before catheter insertion, apply an alcoholic chlorhexidine solution containing at least 2% chlorhexidine gluconate to the insertion site.
      i. The antiseptic solution must be allowed to dry before making the skin puncture.
      ii. Alcoholic chlorhexidine for skin antisepsis to prevent CLABSI in NICU patients should be used when the benefits are judged to outweigh potential risk.

La disinfezione cutanea

Aree di disinfezione per applicatore monodose:

- 0.67 ml: 5 cm x 8 cm
- 1 ml: 8 cm x 10 cm
- 1.5 ml: 10 cm x 13 cm
- 3 ml: 15 cm x 15 cm

Instructions for using ChloraPrep® applicators.

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Uso della Clorexidina in TIN…riassumendo

Allo scopo di minimizzare il rischio delle reazioni senza perdere i vantaggi legati all'uso della clorexidina

- Usare le quantità idonee
- Usare applicatori monodose
- Rimuovere la clorexidina in eccesso (no pooling)
- Usare la soluzione fisiologica e l'asciugatura dopo l'applicazione della clorexidina
- Evitare lo scrubbing della cute

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ARTICLE

Does ultrasound guidance for peripherally inserted central catheter (PICC) insertion reduce the incidence of tip malposition? – a randomized trial

Tejopratap Oleti[1] · M. Jeeva Sankar[1] · Anu Thukral[1] · V. Sreenivas[2] · Arun Kumar Gupta[3] · Ramesh Agarwal[1] · Ashok K. Deorari[1] · Vinod K. Paul[1]

	Ultrasound group ($N = 40$)	Conventional group ($N = 40$)	p value	Relative risk RR (95% CI)
PICC tip malposition	13 (32.5)	27 (67.5)	0.002	0.48 (0.29–0.79)
Longevity of PICC (hrs)	154 ± 14.9	133 ± 9.4	0.23	—

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Ultrasound Guided Catheter Tip Location in Neonates: A Prospective Cohort Study

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Objective To assess point-of-care-ultrasound (POCUS) guided catheter tip location in a neonatal cohort after insertion of percutaneously inserted central catheters (PICCs) from the upper part of the body.

Study design This was a prospective, observational study on PICC tip location. Tip site was assessed by radiological landmarks or direct ultrasound (US) visualization of the cardiovascular structures.

Results One hundred eighteen PICCs (28Gauge/1French) were studied in 102 neonates (mean postmenstrual age 31 weeks, range 25-43 weeks; mean weight at positioning 1365 g, range 420-4180 g). Feasibility of POCUS guided tip location was 92.3% in our population. Failures were significantly associated with mechanical ventilation (aOR 5.33; 95% CI 1.13-29.5; $P = .038$). Agreement between US and radiographic methods was found in 88 of 109 cases (80.7%). Fifteen of 21 discordant cases led to a change in clinical management.

Conclusions POCUS guided localization of small bore PICC is a non-invasive and effective alternative to the conventional radiogram. The latter should be recommended when US examination fails to locate the catheter

Real-Time Ultrasound Tip Location Reduces Malposition and Radiation Exposure during Epicutaneo-Caval Catheter Placement in Neonates

	X-ray	RT-US	*p*-Value
Primary malposition	107 (65.4%)	11 (13.25%)	<0.001
Single repositioning	79 (47.88%)	10 (12.5%)	<0.001
Multiple repositioning	28 (16.97%)	1 (1.2%)	<0.001
Removal reason			
Dislocation	4 (2.4%)	–	0.304
Phlebitis	10 (6.1%)	5 (6%)	1
Infection	20 (12.1%)	15 (18.1%)	0.246
Malposition	7 (4.2%)	–	0.099
Occlusion	6 (3.6%)	4 (4.8%)	0.736
Rupture	15 (9.1%)	3 (3.6%)	0.193
Extravasation	7 (4.2%)	1 (1.2%)	0.274
Cardiac tamponade	1 (0.6%)	1 (1.2%)	1

"Ultrasound"

Table 1 Ultrasonography during catheter insertion

	Population	*n* RTUS-guided insertions	US operator	Probe	Technique	Tips visualized by US	Average time savings with US	Average manipulations per patient prevented with US	Average XRs per patient saved with US
Brissaud et al (2010)[16]	BW: 1,305 (620–3,550) g GA: 30 (26–40) wk	36 PICCs	Pediatric intensivist	Not specified	Not specified	89%	15 min	Not reported	Not reported
Katheria et al (2013)[15]	Weight at procedure: 1,185 ± 538 g. CGA 31 ± 4 wk	20 PICCs	Neonatologists	13 MHz linear	UE: right parasternal sagittal view. LE: subcostal sagittal view. Saline or nonionic, isotonic contrast used	90%	30 min	1	1

Abbreviations: BW, birth weight; CGA, corrected gestational age; GA, gestational age; LE, lower extremity; PICC, peripherally inserted central catheter; RTUS, real-time ultrasound; SAX, short axis; UAC, umbilical artery catheter; UE, upper extremity; US, ultrasound; UVC, umbilical venous catheter; XR, radiograph.
Note: Population expressed as ranges, means ± standard deviation, and median (range).

Ultrasonography for Central Catheter Placement in the Neonatal Intensive Care Unit—A Review of Utility and Practicality. Am J Per 2015

Table 2 Ultrasonography after catheter insertion

	Population	*n*	US operator	Probe	Technique	Tips visualized by US	Clinical utility
Madar and Deshpande (1996)[17]	BW: 1,210 (640–3,530) g GA: 28 (23–40) wk	18 UACs, 3 UVCs, 19 PICCs	Not specified	7.5 MHz	Suprasternal, subcostal, and parasternal SAX views	95%	US detected two venous catheters passed through the foramen ovale which was not evident on XR
Ohki et al (2000)[7]	"Neonates"	57 PICCs	Not specified	10 and 12 MHz	Not specified	95%	US could detect 78% of cases of catheter tip dislodgement by changes in extremity position
Jain et al (2012)[6]	BW: 833 (710–1,930) g GA: 26.5 (25.4–28.8) weeks.	22 PICCs	Neonatologists	10 MHz	UE: Subcostal, parasternal LAX, high parasternal, and apical views. LE: subcostal sagittal view. Saline contrast used	100%	XR incorrectly deemed 4 of 11 malpositioned tips in good position, and 5 of 11 well-positioned tips in bad position. In nine infants, a second XR was avoided with US-guided manipulation
Tauzin et al (2013)[8]	BW: < 1,800 g Weight: ~1,130 (828–1,452) g CGA: 27–33 weeks.	109 PICCs	"US specialist"	12 MHz	Subcostal, apical, parasternal LAX, high parasternal, and abdominal parasternal views	100%	US evaluation determined 25% of PICCs extended into the heart even though deemed to be in good position by XR. 21% PICCs repositioned after US evaluation without complications

Abbreviations: BW, birth weight; CGA, corrected gestational age; GA, gestational age; LAX, long axis; LE, lower extremity; PICC, peripherally inserted central catheter; SAX, short axis; UAC, umbilical artery catheter; UE, upper extremity; US, ultrasound; UVC, umbilical venous catheter; XR, radiograph.
Note: Population expressed as ranges, means ± standard deviation, and median (range).

Impianto Sicuro del Catetere Epicutaneo Cavale

1. Valutazione pre-procedurale (utilizzo del protocollo RaSuVA, preferibilmente impiegando la NIR)
2. Utilizzo di un pack procedurale pre-assemblato
3. Tecnica asettica appropriata: igiene delle mani, massime protezioni di barriera e antisepsi cutanea con clorexidina 2% in IPA 70%.
4. Utilizzo dell'ecografo per la tip navigation e la tip location intra-procedurale (secondo il protocollo NeoECHOTip).
5. Stabilizzazione del catetere e protezione del sito di emergenza (colla in cianoacrilato, membrana semipermeabile trasparente e "sutureless device")
6. Controlli seriati della posizione della punta usando l'ecografia (48 ore; ogni 7 giorni e al cambio di medicazione)
7. Valutazione rimozione dell'ECC entro due settimane

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Infusion Therapy Standards of Practice

Change transparent semipermeable membrane (TSM) dressings at least every 7 days (except neonatal patients) or immediately if dressing integrity is disrupted (eg, lifted/detached on any border edge or within transparent portion of dressing; visibly soiled; presence of moisture, drainage, or blood) or compromised skin integrity is present under the dressing.[2,4,5,8-10] (III)

1. In neonatal patients, perform dressing change as needed per patient or clinical indications due to risk of catheter dislodgement, patient discomfort, or skin injury.[10-14] (V)

Table 1 Ultrasound findings of catheter tip position

	First ultrasound, n=65	Second ultrasound, n=52	Third ultrasound, n=42	Fourth ultrasound, n=24
Good position, n (%)	25 (38.5)	40 (77)	24 (57)	13 (54.2)
Malposition, n (%)	40 (61.5)	12 (23)	18 (43)	11 (45.8)
Right atrium, n (%)	17 (26.2)	6 (11.5)	9 (21)	1 (4.2)
Foramen ovale, n (%)	6 (9.2)	1 (2)	2 (5)	2 (8.3)
Left atrium, n (%)	15 (23.1)	3 (5.7)	–	1 (4.2)
Hepatic vessels, n (%)	2 (3)	2 (3.8)	7 (17)	7 (29.1)
Migration rate, n (%)	–	9 (17)	13 (31)	7 (29.1)

Franta J, *et al*. *Arch Dis Child Fetal Neonatal Ed* 2017;**102**:F251–F255. doi:10.1136/archdischild-2016-311202

Line type	*N*	Migration 1 h	Migration 24 h
		% (*n*) (95% CI)	% (*n*) (95% CI)
UVC	41	36% (15) (21–51%)	23% (9) (9–36%)
PICC (total)	63	23% (15) (12–33%)	11% (7) (3–18%)
UE PICC	25	28% (7) (10–46%)	28% (7) (10–46%)
LE PICC	38	21% (8) (7–38%)	0

	N°	Rimoz Non elettiva
Central catheters	413	7.5%
Non central cathet.	83	18.1%

Xiaohe Yu,Bio Med Research Intern, 2018

	N°	Complicanze	Durata catet
Central catheters	97	19%	17.7 gg
Non central cathet.	79	49%	11.4 gg

Goldwasser, Pediatr Radiol 2017

	N°	Complicanze	Rimozione Non elettiva
Central catheters	203	29%	27%
Non central cathet.	116	47%	45%

Jain, J of Perinatology, 2013

	N°	Complicanze
Central catheters	889	15.9 per 1000 line days
Non central cathet.	91	51.7 per 1000 line days

Colacchio, J of Perinatology, 2012

Impianto Sicuro del Catetere Epicutaneo Cavale

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DWELL Time: tempo tra inserzione e rimozione o CLABSI
CLABSI: Emocoltura positive senza evidenza di infezione in altro sito
ECC duration mediana 14 giorni (IQR: 7 –23)

TABLE 4 Unadjusted and Adjusted Risk Factors for CLABSIs in Neonates With PICCs

Variable	CLABSI, *n* = 149, *n* (%)	No CLABSI, *n* = 4648, *n* (%)	Unadjusted IRR (95% CI)	*P* Value	aIRR[a] (95% CI)
Age at line insertion, d			1.00 (0.99–1.00)	.19	1.00 (0.99–1.00)
Birth weight, 100 g			0.98 (0.96–0.99)	.006	0.97 (0.95–0.99)
Concurrent PICCs					
No	134 (89.9)		(reference)		1.0 (reference)
Yes	15 (10.1)		(0.97–2.84)	.06	2.04 (1.12–3.71)
CLABSI from previous PICC					
No	143 (96.0)		(reference)		1.0 (reference)
Yes	6 (4.0)		(1.00–4.90)	.05	1.66 (0.69–3.98)
Catheter dwell time					
≤7 d	25 (16.6)	1071 (23.0)	1.0 (reference)		—
8–13 d	32 (21.2)	1257 (27.1)	2.02 (1.21–3.38)	.007	—
14–22 d	39 (25.8)	1090 (23.5)	3.27 (2.04–5.24)	<.001	—

DISCUSSION

These data confirm that the daily risk of infection is higher in PICCs that have been in place for >2 weeks as compared with those that have been in place for <2 weeks. However, we found no

Catheter Dwell Time and CLABSIs in Neonates With PICCs: A Multicenter Cohort Study Pediatrics 2013

thank you
danke
謝謝
ngiyabonga
teşekkür ederim
рахмат
Баярлалаа
спасибо
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