Primo PICC DAY Italiano

RIUNIONE MONOTEMATICA GAVeCeLT 2007

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PICC E MIDLINE: UNA NUOVA ERA NELL'ACCESSO VENOSO

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OUTLINE

Perché una nuova era?

- Il ruolo infermieristico e l'organizzazione per team: nurse-driven management
- L'impiego sistematico dell' eco-guida
- Il rapporto con gli accessi venosi centrali: contrapposizione vs. integrazione

NURSE-DRIVEN MANAGEMENT

Clinical Nutrition (2006) 25, 541–542

ELSEVIER

CORRESPONDENCE

A completely nurse-driven PICC-line service in a surgical ward: A prospective audit of the implementation-phase in unselected patients

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Our institution had no experience with PICC-lines. We wanted to establish a completely nurse-run PICC-line service in our ward, serving all departments in our hospital. We wanted to manage the service only with unspecialized ward nurses, avoid any patient selection and to audit all patients prospectively. We present our experiences with the first 150 attempted insertions.

Four nurses from the ward without any formalized previous training volunteered. They received a 2-day, hands-on course from an invited instructor. The patients were brought to our ward for the procedure. The procedure in brief: Local anaesthetic cream was applied and the antecubital fossae scrubbed with antiseptic. The nurses wore sterile gowns and gloves. The best vein was cannulated, and the catheter (*Groshong PICC, 4 or 5 French, C.R. BARD Inc., New Jersey, USA*) advanced slowly to a pre-measured length. A single, frontal chest X-ray was performed to confirm catheter-tip position.

NURSE-DRIVEN MANAGEMENT

Table 1 Baseline characteristics and outcome of 150 attempted PICC-line insertions (crude numbers).

Male proportion	79/150
Age (median)	56
Main diagnosis cancer	95/150
Main indication	
Chemotherapy	93/150
Malnutrition	23/150
Inaccessable veins, and others	34/150
Catheters successfully inserted	124/150
Catheters functioning, removed when redundant (longevity (days): mean 14, median 31, range 2–180*)	87/124
Catheters removed prematurely	33/124
Catheter malfunction (longevity (days): mean 14, median 7)	19/33
Catheter damage/leakage	3
Catheter clogged	5
Accidental removal, slipped out	10
Suspected wrong position	1
Patient complication (longevity (days): mean 19, median 14)	14/33
Deep venous thrombosis	1
Thrombophlebitis	3
Infection, or suspected infection	6
Unspecified discomfort	4
Lost to follow-up	4/124

Catheter insertion unsuccessful or removed before use	26/150
Unable to enter vein	13
Unable to advance catheter	1
Cubital vein perforations	5
Catheter in jugular vein	2
Catheter curled up in subclavian vein	1
Bleeding from puncture site	1
Leaking catheter	1
Unknown	2

We have shown that a completely nurse-driven PICC-line service may be established in a surgical ward. Outcome from our implementation phase is comparable to previously reported series from specialized centres,[1,3–5] indicating that safety and efficacy are achieved without a learning curve. Our material is unselected, which is important as patient selection seems to be the main factor affecting outcome. Our model is entirely devoid of physician participation except for the counter-signing of chest X-rays for medico-legal reasons.

Indagini Conoscitive GAVeCeLT sulle modalità di impianto di accessi vascolari a lungo termine in Italia

1° Review	1999	3900 impianti /anno (13 Centri - 27% risposte)
2° Review	2003	5200 impianti /anno (21 Centri - 48% Risposte)

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CENTRI (n. 21- 5200 impianti/anno):

Bologna
Conegliano V.
Genova (3)
Milano (3)
Pisa
Reggio E.
Sestri Levante
Catania (2)
Frosinone
Messina
Napoli
Prato
Roma (2)
Torino (2)

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Sono stati posti quesiti su:

N° annuo di impianti	Regime di Ricovero
Logistica dell'impianto	Tipo di anestesia
Monitoraggio ECG	Fluoroscopia
Tecnica dell'impianto	Via di accesso
Controllo Rx postop.	Profilassi antibiotica

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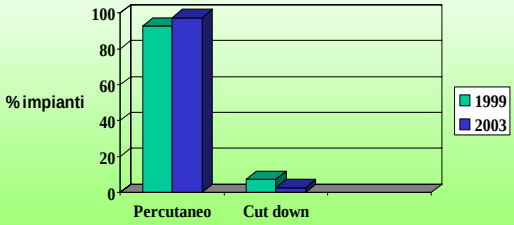
Tecnica di impianto



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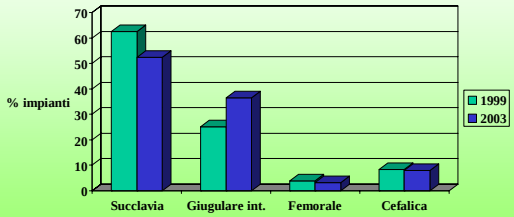
SCELTA DELLA VENA DA INCANNULARE



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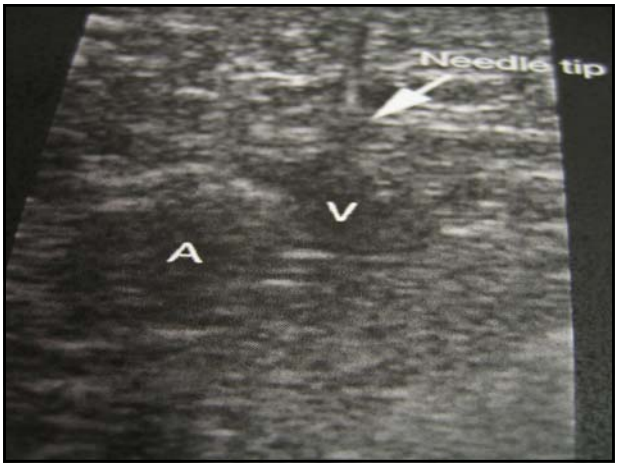
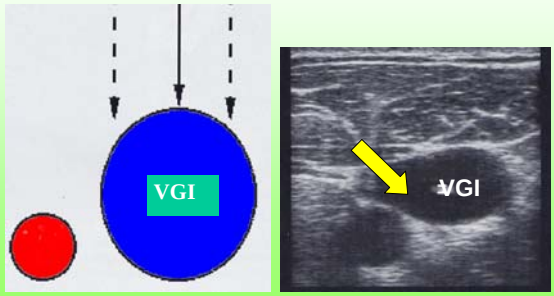
NICE STATEMENTS AND RECOMMENDATIONS
Technology appraisal guidance – no. 49 [Sept 2002]

• 2-D imaging ultrasound guidance should be the preferred method when inserting of CVC (Central Venous Catheter) into the internal jugular vein in adults and children in 'elective situations'.

• 2-D imaging ultrasound guidance should be considered in most clinical situations where CVC insertion is necessary, whether the situation is elective or an emergency.

• Everyone who uses 2-D imaging ultrasound guidance to insert central venous catheters should have appropriate training to ensure they are competent to use the technique.





PICC vs. CVC

Peripherally Inserted Central Venous Catheters Are Not Superior to Central Venous Catheters in the Acute Care of Surgical Patients on the Ward

Simon Turcotte, MD, Serge Dubé, MD, MSc, Gilles Beauchamp, MD

World J Surg (2006) 30: 1605–1619

Abstract

Methods: We have proceeded with a review of the literature [...]. Our hypothesis was that the routine adoption of PICC instead of CVC for the acute care of surgical patients has occurred in the absence of strong scientific evidence. Our aim was to compare the associated infectious, thrombotic, phlebitic, and other common complications, as well as PICC and CVC durability. [...]. Data were extracted from 48 papers published between 1979 and 2004.

Results: Our results show that infectious complications do not significantly differ between PICC and CVC. Thrombotic complications appear to be more significant with PICC and to occur early after catheterization. Phlebitic complications accounted for premature catheter removal in approximately 6% of PICC. Finally, prospective data suggest that approximately 40% of PICC will have to be removed before completion of therapy, possibly more often and earlier than CVC.

Conclusions: We believe that **there is no clear evidence that PICC is superior to CVC in acute care settings.** Each approach offers its own advantages and a different profile of complications. Therefore, the choice of central venous access should be individualized for surgical patients on the ward. More comparative prospective studies are needed to document the advantages of PICC over CVC.

PICC vs. CVC

Table 1.
Comparative studies of PICC versus Subclavian CVC in acute care

Studies	Design	End point	Population (% of total)	Uses (% of total)	Insertion (% of total)	Catheters	Type of catheter (% of total)
Cowl *et al.*[17]	RCT	PICC vs CVC complication rates, survival and cost	n = 102 inpatients ICU (4%) Pancreatitis (27%) Post-op ileus (17%) IBD (11%) Malignancy (16%)	TPN (100%)	NT (33%) MD (41%) R (26%)	51 PICCs 482 Cd 51 CVCs 533 Cd	PICC Per-Q-Cath 3 F sl 5.5 F dl (71%) CVC Arrow-Howes 5 F 7 F (83% l)
Duerksen *et al.*[18]	Retrospective	PICC vs CVC complications	n = ~ 500 inpatients Pancreatitis (10%) GI obstruction or ileus (38%) IBD (6%) Malignancy (9%)	TPN (70%)	NT (PICC) MD (CVC)	209 PICCs 2209 Cd 285 Non-PICCs 3597 Cd	PICC Groshong 4 F sl (87%) 5 F dl CVC Tunneled dl Non- tunneled tl (~90%)
Alhimyary *et al.*[19]	Retrospective	PICC vs CVC complications	n = 231 inpatients Pancreatitis (15%) GI obstruction or ileus (24%) IBD (15%) Malignancy (30%)	TPN (100%)	NT (PICC)	126 PICCs 1381 Cd 105 CVCs 1056 Cd	PICC Per-Q-Cath 4 F sl CVC NR

Cd: catheter days; CVC: central venous catheter; dl: double lumen; F: French; GI: gastrointestinal; IBD: inflammatory bowel disease; ml: multiple lumen; MD: physician insertion at the bedside; NR: not reported; NT: nurse team insertion of catheter at the bedside; PICC: peripherally inserted central venous catheter; R: resident insertion at the bedside; RCT: randomized controlled trial; sl: single lumen; tl: triple lumen; TPN: total parenteral nutrition; Arrow-Howes, Reading, PA, USA; Baxter, Deerfield IL, USA; Cook Critical Care, Bloomington, IN, USA; Davol, Cranston, RI, USA; Groshong-Bard Access System (silicone), Salt Lake City, UT, USA; Baxter, Deerfield, IL, USA; Cook (silicone), Bloomington, IN, USA; Per-Q-Cath (Silastic), Gesco International, San Antonio, TX, USA.

PICC vs. CVC

Table 2.
PICC prospective cohorts

Studies	End point	Population	Uses (% of total)	Insertion (% of total)	Number of PICC	Type of catheter (% of total)
Walshe *et al.*[4]	PICC-related complications	n = 351	AB (48%) CTx (6%) TPN (10%)	NT (45%) IR (55%)	351 10,562 Cd	Groshong 4 F sl (87%) 5 F dl
Loewenthal *et al.*[40]	PICC-related complications	n = 148	—	NT	209	Groshong 3 F sl 4 F sl
Fong *et al.*[41]	PICC complications as function of who inserts the catheter	n = 256	AB (56%) CTx (9%) TPN (25%)	NT (60%) IR (40%)	308 5799 Cd	Groshong 3 F 4 F 5 F
Ng *et al.*[2]	PICC-related complications and cost	n = 778	AB (30%) CTx TPN (30%)	NT MD	835 33,592 Cd	Cook 3 F sl 4 F sl
Kearns *et al.*[42]	PICC-related complications and impact of tip location on occlusion and thrombosis	n = 72	—	R, MD	92 37 (RCT)	Cook, Per-Q-Cath, US Viggo 4 F 4.8 F 5.0 F
Linder *et al.*[43]	Comparison of thrombophlebitic complications between SE and PU PICC	n = 75	TPN	MD	75	XRO-2181.20 Vygon 6 F Secalon Cathy1751-7 Viggo 5.5 F
Curelaru *et al.*[44]	Comparison of thrombophlebitic complications between PE and SE PICC	n = 61	Mainly TPN	MD	61	XRO-2181.20 Vygon 6 F Cavafix-75 5 F
Bennegard *et al.*[45]	Comparison of thrombophlebitic complications between heparinized and standard PE PICC	n = 49	Mainly TPN	MD	49	Cavafix-75 5 F
Bottino *et al.*[46]	PICC-related complications	n = 81	—	NT MD	87 3444 Cd	Silicone 5.5 F

AB: antibiotherapy; CTx: chemotherapy; IR: interventional radiologist insertion in an angiography suite; MD: physician insertion at the bedside; n: number of patients; NT: nurse team insertion of catheter at the bedside; PE: polyethylene; R: resident; Cavafix-75 (polyethylene) Braun-Melsungen, Germany; L-Cath (polyurethane), Luther Medical Products, Tustun, CA, USA; Per-Q-Cath (silastic), Gesco International, San Antonio, TX, USA; US Viggo Inc. (polyurethane), Tampa, FL, USA; V-Cath (silicone), HDC Corp. San Jose, CA, USA; XRO-2181.20 (silicone) Vygon, Europe.

PICC vs. CVC

Fewer infections with PICC? No

We found from comparative and prospective studies that acute care patients receiving a PICC or a CVC are at comparable risk of CR-BSI and total CR-I (Table 3).

Table 3.
Comparison of PICC- and CVC-related infections

Studies	Definitions and diagnosis	Rate of CR-BSI[a] % (per 1000 Cd) PICC	Rate of CR-BSI[a] % (per 1000 Cd) CVC	Rate of CR-I[b] % (per 1000 Cd) PICC	Rate of CR-I[b] % (per 1000 Cd) CVC
Cowl *et al.*[17]	"Definite" (catheter cultures positive, blood negative) "Probable" (catheter cultures positive, blood positive) "Total" (includes "local infection")	2.0 (2.1)	4.0* (1.9)	4.0 (4.2)	5.9* (5.6)
Duerksen *et al.*[18]	LCDCC "Sepsis" "Definite" (catheter cultures positive, blood positive) "Probable" (catheter cultures negative, blood positive)	– (0.9)	– (2.2)*	–	–
Alhimyary *et al.*[19]	"Catheter sepsis"	0 (–)	1.4* (–)	–	–

[a]Includes what is defined as probable and definite infection, and sepsis.
[b]Includes local infections.
*Not statistically significant, $P > 0.05$.
Cd: catheter days; CR-BSI: catheter-related bloodstream infection; CR-I: catheter-related infection; CVC: central venous catheter; LCDCC: Laboratory Center for Disease Control in Canada.

PICC vs. CVC

Table 4.
PICC-related thrombotic and phlebitic complications[a]

Studies	Diagnosis of thrombosis	Rate of UE-DVT % (per 1,000 Cd)	Definition of phlebitis	Rate of phlebitis[b] % (per 1000 Cd)
Walshe *et al.*[4]	NA	3.4 (1.14)	"Phlebitis" Maki *et al.*[7]	6.6 (2.18)
Chemaly *et al.*[46]	Duplex or venography	1.4	NA	–
Loewenthal *et al.*[40]	Duplex or venography	1.9	"Phlebitis"	5.3
Fong *et al.*[41]	NA	–	Local inflammation	4.7
Grove and Pevec[49]	Duplex	3.9	NA	–
Cowl *et al.*[17]	Duplex	7.8 (10.4)	Categorized classification of Markel and Reynen[6]	–
Ng *et al.*[2]	Duplex	1.8	Local inflammation	–
Bottino *et al.*[46]	Venography	3.4	Local inflammation	6.9

UE-DVT: Upper extremity deep venous thrombosis.
[a]Among the prospective studies cited, Chemaly *et al.* and Grove and Pevec are retrospective studies, which had thrombotic complications as their primary end-point. No prophylactic anticoagulation was given to patients in theses studies. In all studies, diagnostic test was ordered to confirm PICC-related thrombosis on the basis of patient's symptoms. Kearns *et al.*, Linder *et al.*, Curelaru *et al.*, Bennegard *et al.* are not included because the reported rates of UE-DVT did not concern entire cohorts of patients and because phlebitis rate reported did not necessarily result in PICC removal.
[b]Considered phlebitis that resulted in PICC removal.
[c]Although cited by Walshe *et al.* as a reference for definition of phlebitis-related complications, definitions of phlebitis are not found in cited Maki, DG *et al.* (JAMA 1987;258:1177).
[d]Markel S, Reynen K. Impact on patient care: 2652 PIC catheter days in alternative setting. J Interven Nurs 1994;13:347

More Catheter-related UE-DVT with PICC than with CVC? Probably

The problem we face in analyzing the significance of CVC- and PICC-related UE-DVT is that we ignore the natural history of thrombosis. From the available prospective symptom-based studies, we are not able to quantify the rate of asymptomatic thrombosis. Yet, complete occlusion of the subclavian vein by a blood clot has been documented in patients with subclavian CVC totally free of signs or symptoms.[36] The sole RCT comparing symptomatic PICC- and CVC-related UE-DVT radiologically confirmed 8% and 0% UE-DVT, respectively.[17] This

Table 5.
Comparison of PICC- and CVC-related UE-DVT

Studies	Definitions and diagnosis	Rate of UE-DVT % (per 1000 Cd) PICC	Rate of UE-DVT % (per 1000 Cd) CVC
Cowl *et al.*[17]	"Severe thrombophlebitis", UE-DVT confirmed by Duplex	7.8 (10.4)	0.0* (0)
Duerksen *et al.*[18]	"Clot formed in superior vena cava or subclavian vein" confirmed by Duplex or venography	(0.5)	(1.9)**
Alhimyary *et al.*[19]	"Thrombosis"	1.4	0.0†

Markel S, Reynen K. Impact on patient care: 2652 PIC catheter days in alternative setting. J Interven Nurs 1994;13:347
†Statistical significance not specified in this article.
*$P < 0.05$.
**$P = 0.17$

PICC vs. CVC

Table 6.
Completion of therapy and premature PICC removal[a]

Studies	Overall complications % (per 1000 Cd)	First week removal %	Completion of therapy without line complication[b] % (per 1000 Cd)	Mean duration or [median] days ± 1 SD
Walshe *et al.*[4]	33% (11)	38	60 (20)	30 [15]
Loewenthal *et al.*[40]	30	12	59	[23]
Fong *et al.*[41]	26	–	69	19
Cowl *et al.*[17]	43	30	49	10
Ng *et al.*[2]	31	–	69	40 ± 54
Kearns *et al.*[42]	–	–	–	32 ± 4
Linder *et al.*[43]	–	–	–	14 ± 18 and 7 ± 5
Curelaru *et al.*[44]	–	–	–	7 ± 5 and 5 ± 1
Bennegard *et al.*[45]	–	–	–	5.9 ± 0.6 and 5.5 ± 0.6
Bottino *et al.*[46]	–	–	64	[30]

[a]The prospective studies cited are the only ones from which we could extract data for this table.
[b]Also includes patients who died with catheter in place.
SD: standard deviation.

Complications resulting in premature line removal occurred more frequently with PICC than with CVC in the available RCT.[17] Cowl *et al.* disclosed that completion of therapy was possible for 47% PICCs versus 69% CVCs ($P < .05$) inserted exclusively for TPN. In that trial, the most frequent and significant reasons for premature PICC removal were thrombosis, phlebitis, and malposition, whereas the majority of CVCs were removed for falsely suspected line infections.[17] Prospective studies have corroborated that completion of therapy with initial PICC occurred in approximately 60% (Table 6). As for the onset of catheter complications, PICC-associated complications happened significantly earlier than CVCs in the Cowl *et al.* trial. Few prospective studies have documented the PICC first-week removal rate, which varied from 12% to 38% (Table 6). Available data comparing

PICC vs. CVC

Conclusioni:

• Studi non randomizzati e realizzati su casistiche poco omogenee; RCT?

• PICC sempre più utilizzati per:
  › minori complicanze “gravi” all’impianto
  › minori costi complessivi
  › maggiore accettabilità

• Aree “grige” (necessarie conferme da studi di buona qualità):
  › trombosi e tromboflebite (diametri?)
  › CR-BSI
  › “affidabilità”

THANK YOU FOR YOUR ATTENTION

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