How to choose the best VAD cancer in non-hospitalized patients

Paolo Cotogni

WoCoVA

MEET THE EXPERTS

9 marzo 2021

Vascular access device (VAD)

- ☒ Cancer patients require the VAD for safe administration of anticancer drugs, home parenteral nutrition, blood products, antibiotic therapy, and palliative care drugs, as well as for blood samplings or contrast injection during CT scans

- ☒ A central VAD is mandatory for non-hospitalized in need of frequent intravenous infusion

Vascular access device (VAD)

☒ **Choosing the appropriate VAD for the outpatient should need a 'proactive vascular access planning'**

☒ **The choice of the VAD should be shared by:**

- **treating physician**
- **patient and his/her caregiver(s)**
- **team that provides the VAD insertion**

VAD in oncology patients

☒ The choice of the VAD should be made on the basis of:

- patient characteristics (eg, stage of disease, life expectancy, comorbidities)
- type of use (ie, continuous vs discontinuous)
- type and expected duration of therapies
- VAD history (eg, previous line thrombosis or infection, side used)
- physical examinations of neck, chest, and upper arms
- US evaluation of upper arm veins

VAD in oncology patients

☒ The choice of the VAD should not be made on the basis of:

- clinical experience of the provider
- hospital availability of: VADs, operating theatre or staff team
- theoretical longevity of VAD (controversial classification of VAD in long-term vs medium-term)

How to choose the best VAD in non-hospitalized cancer patients

This is an open discussion

on a controversial issue

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How to choose the best VAD in non-hospitalized cancer patients

Why it is a controversial issue?

Because guidelines and position papers from scientific societies over the past 20 years have not indicated common recommendations

CA Cancer J Clin 2008;58:323–346

Vascular Access in Oncology Patients

Maurizio Gallieni, MD; Mauro Pittiruti, MD; Roberto Biffi, MD

ABSTRACT Adequate vascular access is of paramount importance in oncology patients. It is important in the initial phase of surgical treatment or chemotherapy, as well as in the chronic management of advanced cancer and in the palliative care setting. We present an overview of the available vascular access devices and of the most relevant issues regarding insertion and management of vascular access. Particular emphasis is given to the use of ultrasound guidance as the preferred technique of insertion, which has dramatically decreased insertion-related complications. Vascular access management has considerably improved after the publication of effective guidelines for the appropriate nursing of the vascular device, which has reduced the risk of late complications, such as catheter-related bloodstream infection. However, many areas of clinical practice are still lacking an evidence-based background, such as the choice of the most appropriate vascular access device in each clinical situation, as well as prevention and treatment of thrombosis. We suggest an approach to the choice of the most appropriate vascular access device for the oncology patient, based on the literature available to date. (*CA Cancer J Clin 2008;58:323–346.*)

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Published online through *CA First Look* at http://CAonline.AmCancerSoc.org.

doi:10.3322/CA.2008.0015

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TABLE 1 Features, Advantages, and Disadvantages of Different Types of Vascular Access Devices

	Tip Position	Technical Feature	VAD Material	Expected Duration	Type of Use	Ideal Setting	Main Advantage	Main Disadvantage
Short-term VADs								
Short peripheral cannulas	Peripheral	Nontunneled	Teflon, silicone	72 to 96 hours	Continuous	Hospital	Low cost	Short duration
Short-term CVCs	Central	Nontunneled	Polyurethane	1 to 3 weeks	Continuous	Hospital	Low cost	High risk for CRBSI
Medium-term VADs								
Midline catheters	Peripheral	Nontunneled	Polyurethane, silicone	<2 to 3 months	Discontinuous	Hospital and/or outpatient	Low risk of CRBSI	Peripheral route
PICCs	Central	Nontunneled	Polyurethane, silicone	3 to 12 (?) months	Discontinuous	Hospital and/or outpatient	No risk at insertion	Low flow
Hohn	Central	Nontunneled	Silicone	<2 to 3 months	Discontinuous	Hospital and/or outpatient	Low risk of thrombosis	Risk of dislocation
Long-term VADs								
Tunneled catheters (Groshong, Hickman, Broviac)	Central	Tunneled	Polyurethane, silicone	Months to years	Discontinuous	Outpatient	Indefinite duration	High cost
Ports	Central	Totally implanted	Polyurethane, silicone	Months to years	Discontinuous	Outpatient	Indefinite duration	High cost

CA Cancer J Clin 2008;58:323–346

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Figure 4. Venous access device recommendations for infusion of non–peripherally compatible infusates.

Ann Intern Med. 2015;163:S1-S39. doi:10.7326/M15-0744 www.annals.org

Annals of Internal Medicine SUPPLEMENT

The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC): Results From a Multispecialty Panel Using the RAND/UCLA Appropriateness Method

Vineet Chopra, MD, MSc; Scott A. Flanders, MD; Sanjay Saint, MD, MPH; Scott C. Woller, MD; Naomi P. O'Grady, MD; Nasia Safdar, MD, PhD; Scott O. Trerotola, MD; Rajiv Saran, MD, PhD; Nancy Moureau, BSN, RN; Stephen Wiseman, PharmD; Mauro Pittiruti, MD; Elie A. Akl, MD, MPH, PhD; Agnes Y. Lee, MD, MSc; Anthony Courey, MD; Lakshmi Swaminathan, MD; Jack LeDonne, MD; Carol Becker, MHSA; Sarah L. Krein, PhD, RN; and Steven J. Bernstein, MD, MPH

Device Type	Proposed Duration of Infusion			
	≤5 d	6–14 d	15–30 d	≥31 d
PICC	PICCs rated as appropriate at all proposed durations of infusion			
Tunneled catheter	In patients with cancer, PICCs were rated as appropriate for irritant or vesicant infusion, regardless of duration.			ed catheter and PICC for ons ≥15 d
Port	For infusion of irritants or vesicants, such as parenteral nutrition or chemotherapy, PICC use was rated as appropriate at any proposed duration of use.			No preference among port, tunneled catheter, or PICC for ≥31 d

Appropriate | Neutral | Inappropriate

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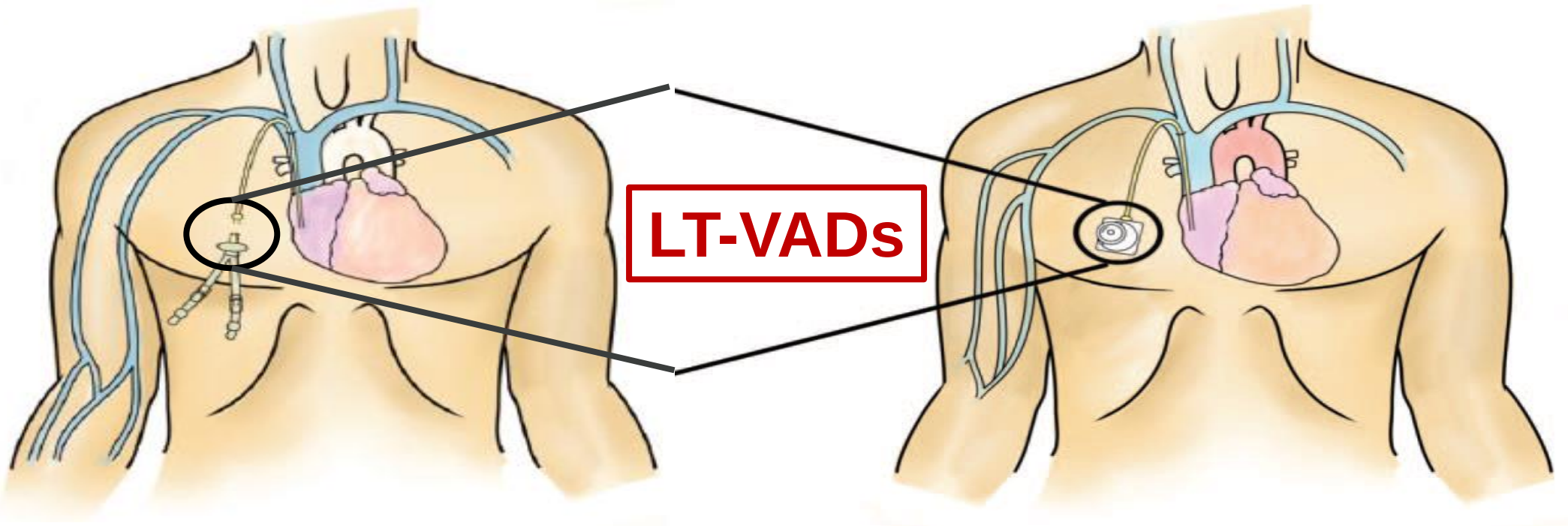
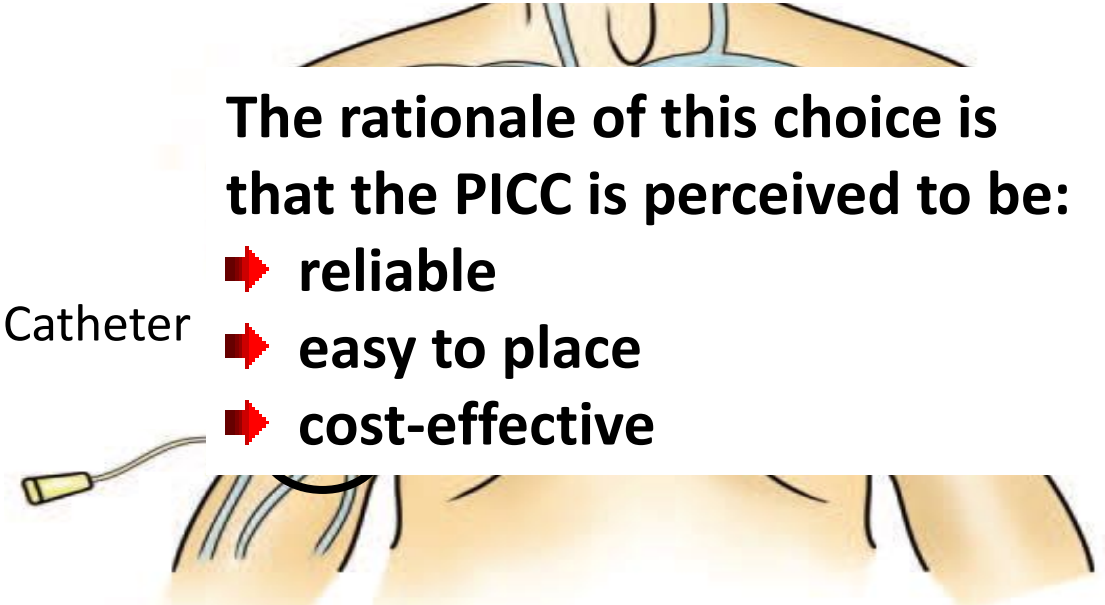


But, what about PICC overall complication and failure rates?

Peripherally Inserted Central Catheter



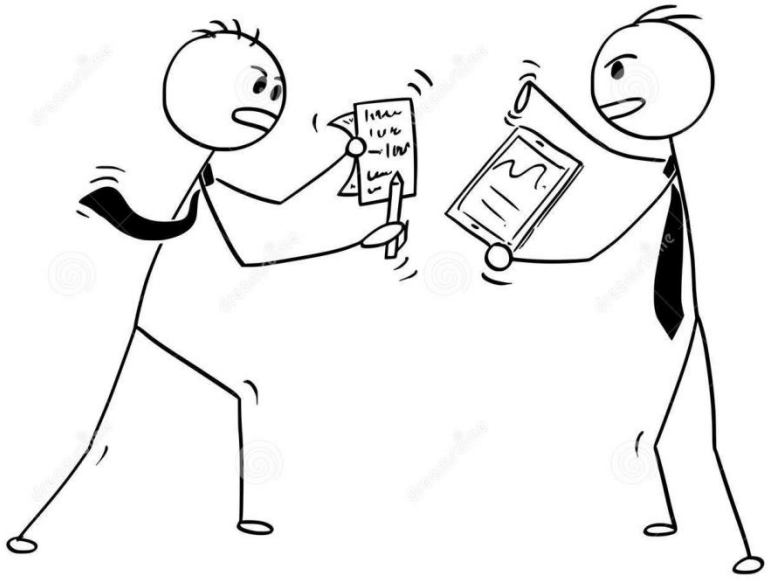
The rationale of this choice is that the PICC is perceived to be:

- **reliable**
- **easy to place**
- **cost-effective**

How to choose the best VAD in non-hospitalized cancer patients

Why it is a controversial issue?

- Because published literature reported controversial results
- Moreover, there are few comparative studies among different VADs; some studies were retrospective or data were collected by reviewing medical records



How to choose the best VAD in non-hospitalized cancer patients

VAD for patients undergoing

anticancer drug infusion

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PLOS ONE

PLOS ONE | https://doi.org/10.1371/journal.pone.0213555 March 7, 2019

RESEARCH ARTICLE

Prevalence and predictors of peripherally inserted central catheter-associated bloodstream infections in adults: A multicenter cohort study

Jae Hwan Lee[1,2¤], Eung Tae Kim[3,4*], Dong Jae Shim[5], Il Jung Kim[6], Jong Hyun Byeon[5], In Joon Lee[1,2], Hyun Beom Kim[1,2], Young Ju Choi[2], Jin Hong Lee[2]

Conclusion

Our results indicated that risk factors associated with PBSI included the number of catheter lumens, the use of PICCs for chemotherapy, and the hospital length of stay. Furthermore, PBSI-related death was common in patients undergoing chemotherapy, diabetics, and elderly patients.

☒ **This study presents several limitations:**

- **retrospective design**
- **hospitalized patients**
- **cancer patients (55%)**
- **double-lumen PICC (63%)**
- **patients undergoing chemotherapy (only 3.8%!!!)**

Support Care Cancer (2015) 23:403–409
DOI 10.1007/s00520-014-2387-9

ORIGINAL ARTICLE

Peripherally inserted central catheters in non-hospitalized cancer patients: 5-year results of a prospective study

Paolo Cotogni · Cristina Barbero · Cristina Garrino · Claudia Degiorgis · Baudolino Mussa · Antonella De Francesco · Mauro Pittiruti

Results Two hundred sixty-nine PICCs in 250 patients (98 % with solid malignancies) were studied, for a total of 55,293 catheter days (median dwell time 184 days, range 15–1,384). All patients received HPN and 71 % received chemotherapy during the study period. The incidence of catheter-related bloodstream infections (CRBSIs) was low (0.05 per 1,000 catheter days), PICC-related symptomatic thrombosis was rare (1.1 %; 0.05 per 1,000 catheter days), and mechanical complications were uncommon (13.1 %; 0.63 per 1,000 catheter days). The overall complication rate was 17.5 % (0.85 per 1,000 catheter days) and PICCs were removed because of complications only in 7 % of cases. The main findings of this study were that, if accurately managed, PICCs can be safely used in cancer patients receiving chemotherapy and/or HPN, recording a low incidence of CRBSI, thrombosis, and mechanical complications; a long catheter life span; and a low probability of catheter removal because of complications.
Conclusions Our study suggests that PICCs can be successfully utilized as safe and long-lasting venous access devices in non-hospitalized cancer patients.

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Original research article

JVA The Journal of Vascular Access

Safe use of Peripherally Inserted Central Catheters for chemotherapy of solid malignancies in adult patients: A 1-year monocentric, prospectively-assessed, unselected cohort of 482 patients

The Journal of Vascular Access
1–9

DOI: 10.1177/1129729820962905
journals.sagepub.com/home/jva
SAGE

Alessio Piredda[1], Davide Radice[2], Claudia Zencovich[1], Martina Cerri[1], Lucia Aventino[1], Francesco Naccarato[1], Giorgio Magon[3] and Roberto Biffi[4]

In conclusion, our large prospective study confirms safety and effectiveness of PICCs and supports their increasing use for long-term treatment of oncology patients candidate to chemotherapy of solid tumors. In specialized comprehensive cancer centers, PICC failure occurs in 6% only of them.

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VAD for patients undergoing

home parenteral nutrition (HPN)

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Characteristics of a Cohort of Home Parenteral Nutrition Patients at the Time of Enrollment in the Sustain Registry

Journal of Parenteral and Enteral Nutrition
Volume XX Number X
Month 201X 1–10

DOI: 10.1177/0148607115586575
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Marion F. Winkler, PhD, RD, LDN, CNSC, FASPEN[1]; Rose Ann DiMaria-Ghalili, PhD, RN, CNSC, FASPEN[2]; Peggi Guenter, PhD, RN, FAAN[3]; Helaine E. Resnick, PhD, MPH[3]; Lawrence Robinson, BS, PharmD, MS[4]; Beth Lyman, RN, MSN, CNSC[5]; Carol Ireton-Jones, PhD, RD, LDN, FASPEN[6]; Lillian Harvey Banchik, MD, FACS, CNSC[7]; and Ezra Steiger, MD, FACS, FASPEN, AGAF[8]

The first report of data from the Registry between August 2011 and February 2014 with the characteristics of patients receiving HPN in 29 U.S. sites.

Demographic Characteristic	Adult	Pediatric
Catheter type, n	1063	187
Peripherally inserted central catheter, %	47	20
Subcutaneous infusion port, %	10	4
Tunneled catheter, %	43	72
Other, %	<1	4

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Changes in Home Parenteral Nutrition Practice Based on the Canadian Home Parenteral Nutrition Patient Registry

Journal of Parenteral and Enteral Nutrition
Volume XX Number X
Month 201X 1–7

DOI: 10.1177/0148607115609289
jpen.sagepub.com
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Taís Daiene Russo Hortencio, PhD, RD[1,2]; Bianca Maria Arendt, PhD, CCRP[2]; Anastasia Teterina, PhD[2]; Khursheed N. Jeejeebhoy, MBBS, PhD, FRCPC[3]; Leah M. Gramlich, MD, FRCPC[4]; J. Scott Whittaker, MD, FRCPC[5]; David Armstrong, MA, MB BChir, FRCP(UK), FRCPC[6]; Maitreyi Raman, MD, FRCPC[7]; Roberto José Negrão Nogueira, MD, PhD[1]; and Johane P. Allard, MD, FRCPC[2,8]

Table 3. Vascular Access in HPN Patients Entering the Registry in 2005–2008 and 2011–2014.[a]

Variable	2005–2008	2011–2014	*P* Value
Type of vascular access	171	187	
Implanted catheter	24 (14.0)	17 (9.1)	.183
Tunneled catheter	110 (64.3)	71 (38.0)	<.001
PICC	37 (21.6)	99 (52.9)	<.001
Type of insertion	162	178	
Radiology	96 (59.3)	155 (87.1)	<.001
Surgical	66 (40.7)	9 (5.0)	<.001
Other	0 (0.0)	14 (7.9)	<.001
No. of lumens	154	180	
1	55 (35.7)	73 (40.6)	.369
2	98 (63.6)	106 (58.9)	.431
3	1 (0.6)	1 (0.6)	.719
Line sepsis/1000 catheter days[b]	1.58	0.97	.030

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Paolo Cotogni - 9 marzo 2021

Risk Factors for the Development of Catheter-Related Bloodstream Infections in Patients Receiving Home Parenteral Nutrition

Journal of Parenteral and Enteral Nutrition
Volume 38 Number 6
August 2014 744–749

DOI: 10.1177/0148607113491783
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Alan L. Buchman, MD, MSPH[1]; Marianne Opilla, RN[2]; Mary Kwasny, ScD[3]; Thomas G. Diamantidis, PharmD[2]; and Rodney Okamoto, RPh[2]

Abstract

Background: Risk factors for development of catheter-related bloodstream infections (CRBSI) were studied in 125 adults and 18 children who received home parenteral nutrition (HPN). *Methods:* Medical records from a national home care pharmacy were reviewed for all patients that had HPN infused at least twice weekly for a minimum of two years from January 1, 2006-December 31, 2011. Infection and risk factor data were collected during this time period on all patients although those patients who received HPN for a longer period had data collected since initiation of HPN. *Results:* In adults, 331 central venous catheters (CVCs) were placed. Total catheter years were 1157. Median CVC dwell time was 730 days. In children, there were 53 CVCs placed. Total catheter years were 113.1. Median CVC dwell time was 515 days. There were 147 CRBSIs (0.13/catheter year;0.35/1000 catheter days). In children there were 33 CRBSIs (0.29/catheter year;0.80/1000 days; $P < .001$ versus adults). In adults, univariate analysis showed use of subcutaneous infusion ports instead of tunneled catheters ($P = .001$), multiple lumen catheters ($P = .001$), increased frequency of lipid emulsion infusion ($P = .001$), obtaining blood from the CVC ($P < 0.001$), and infusion of non-PN medications via the CVC ($P < .001$) were significant risk factors for CRBSI. Increased PN frequency was associated with increased risk of CRBSI ($P = .001$) in children, but not in adults. Catheter disinfection with povidone-iodine was more effective than isopropyl alcohol alone. There were insufficient patients to evaluate chlorhexidine-containing regimens. *Conclusion:* Numerous risk factors for CRBSI were identified for which simple and current countermeasures already exist. (*JPEN J Parenter Enteral Nutr*. 2014;38:744-749)

Paolo Cotogni - 9 marzo 2021

Clinical Nutrition 34 (2015) 49–52

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Original article

A comparative study of peripherally-inserted and Broviac catheter complications in home parenteral nutrition patients

A. Touré [a], A. Duchamp [b], C. Peraldi [a], D. Barnoud [b], M. Lauverjat [a], P. Gelas [a], C. Chambrier [a,b,*]

Background & aims: Peripherally inserted central venous catheters (PICC) have become increasingly popular for medium to long-term parenteral nutrition (PN) but there is limited data on the complication rates in this sub-group. We aimed to compare the rates of complications associated with tunneled catheters (Broviac) and PICC in home PN (HPN) patients.

Methods: All adult patients in an HPN program with a new Broviac or new PICC between 2009 and 2011 were included in this prospective observational study. Complication rates were compared by using Poisson regression and Kaplan Meier survival curves were used to compare the first complications that occurred.

Results: 204 catheters (133 Broviac and 71 PICC) were inserted in 196 adult patients. Mean follow-up from catheter insertions to their removal was 276 ± 219 days for Broviac ($n = 86$) *vs.* 74 ± 140.70 days for PICC ($n = 56$); $p < 0.001$. Complications were similar between Broviac and PICC (91/133 vs. 26/71). Catheter infection rate was lower in PICC (1.87 vs. 1.05 per 1000 catheter-days; $p = 0.01$). Catheter obstruction rates were similar for both catheters. Only PICC experienced venous thrombosis (0.4/1000). The proportion of catheters removed was lower in the Broviac group than in the PICC group (62.4% *vs.* 78.8%; $p = 0.01$) but those removed for complications were not different (28.6.7%vs. 25.3%; $p = 0.64$).

Conclusions: In HPN patients, overall complications were similar in both the PICC and the Broviac groups. However, the Broviac catheter could be associated with an increase in catheter infection.

Comparison of complications associated with peripherally inserted central catheters and Hickman™ catheters in patients with intestinal failure receiving home parenteral nutrition. Six-year follow up study

Line Dahlstrøm Christensen [a, *], Mette Holst [a], Laura Fuglsang Bech [b], Lotte Drustrup [b], Louis Nygaard [b], Anders Skallerup [b], Henrik Højgaard Rasmussen [a], Lars Vinter-Jensen [a]

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Clinical Nutrition 35 (2016) 912–917

Background & aim: Patients with intestinal failure (IF) are dependent on parenteral nutrition delivered through central access such as Hickman™ catheters. The peripherally inserted central catheter (PICC) is becoming increasingly popular for the purpose. The aim of the present study was to compare complication rates between the two types of catheters.

Patients and methods: Over a six-year period (2008–2014), we included 136 patients with IF receiving home parenteral nutrition (HPN). These patients had a total of 295 catheters (169 Hickman™ catheters and 126 PICCs). Data were collected by reviewing their medical records. Incidences are given per 1000 catheter days. Data are given as means ± standard deviation (SD) and compared using independent student's t-tests, Mann–Whitney–Wilcoxon, and X^2-tests. A survival analysis for time to the first infection was conducted using Cox regression.

Results: The total number of catheter days was 54,912 days for Hickman™ catheters (mean dwell time 325 ± 402) and 15,974 days for PICCs (mean dwell time 127 ± 121), respectively. The incidence of catheter-related blood stream infection (CRBSI) per 1000 catheter days was significantly lower for Hickman™ catheters compared to PICCs (0.56 vs. 1.63, $p < 0.05$). The mean time to first CRBSI was significantly shorter for PICCs compared to Hickman™ catheters (84 ± 94 days vs. 297 ± 387 days, $p < 0.05$), which was confirmed with a cox analysis corrected for age and gender. A total of 75 catheters were removed due to CRBSI, 49 Hickman™ catheters and 26 PICCs respectively. In addition, PICCs were more often removed due to local infection/phlebitis and mechanical causes ($p < 0.001$).

Conclusion: We found a higher risk and shorter time to first CRBSI in PICCs compared to Hickman catheters supporting that PICCs should mainly be chosen for planned HPN up to 3–6 months. We therefore conclude that the choice of catheter must still be determined on an individual basis.

Original Communication

aspen LEADING THE SCIENCE AND PRACTICE OF CLINICAL NUTRITION
American Society for Parenteral and Enteral Nutrition

Journal of Parenteral and Enteral Nutrition
Volume 00 Number 0
xxx 2020 1–9

DOI: 10.1002/jpen.1939
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Comparative Complication Rates of 854 Central Venous Access Devices for Home Parenteral Nutrition in Cancer Patients: A Prospective Study of Over 169,000 Catheter-Days

Paolo Cotogni, MD, MSc[1]; Baudolino Mussa, PhD[2]; Claudia Degiorgis, RN[2]; Antonella De Francesco, MD[3]; and Mauro Pittiruti, MD[4]

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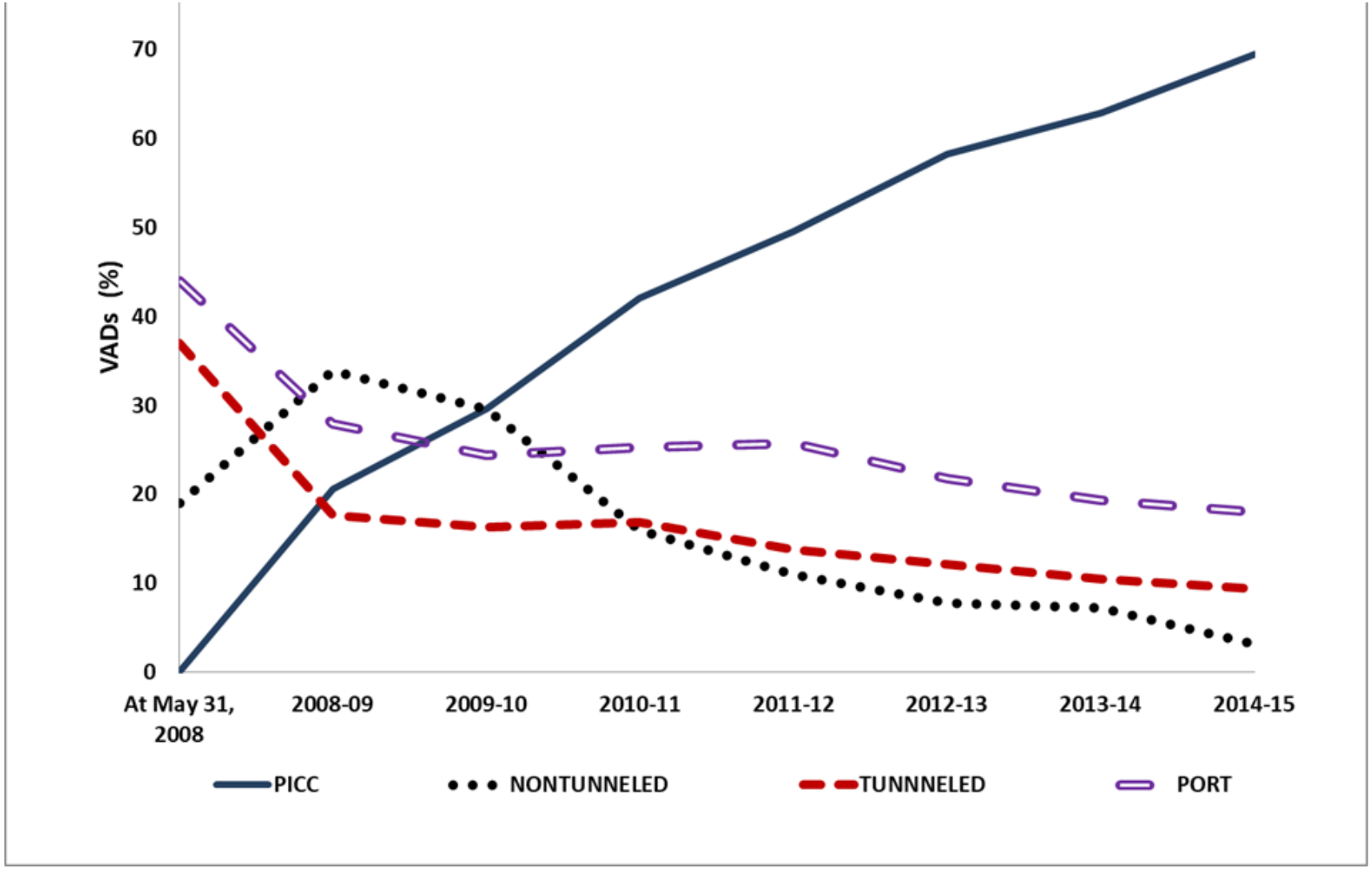
Percentage of HPN cancer patients with the different VADs *per* year



Cotogni P, et al. *JPEN J Parenter Enteral Nutr*. 2020 Jun 8. doi: 10.1002/jpen.1939.

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Paolo Cotogni - 9 marzo 2021

Table 2. Complications of Central Venous Access Devices (VADs).

	PICC	Nontunneled	Tunneled	Port	Total
VAD, no.	401 (47.0)	137 (16.0)	118 (13.8)	198 (23.2)	854 (100)
Catheter-days	82,516	25,023	22,840	38,737	169,116
Local infection, no.	6	3	5	7	21
No./1000 catheter-days	0.07	0.12	0.22	0.18	0.12
CRBSI, no.	7[a,b]	21	13	8[a,c]	49
No./1000 catheter-days	0.08	0.84	0.57	0.21	0.29
Venous thrombosis, no. (%)	7 (1.7)	4 (2.9)	2 (1.7)	2 (1.0)	15 (1.8)
No./1000 catheter-days	0.08	0.16	0.09	0.05	0.09
Mechanical complications					
Catheter dislocation, no. (%)	19 (4.7)	21 (15.3)	5 (4.2)	0	45 (5.3)
Rupture of external tract, no. (%)	4 (1.0)	3 (2.2)	6 (5.1)	NA	13 (1.5)
Lumen occlusion, no. (%)	14 (3.5)	9 (6.6)	4 (3.4)	13 (6.6)	40 (4.7)
Total	37[a] (9.2)	33 (24.1)	15[d] (12.7)	13[a] (6.6)	98 (11.5)
No./1000 catheter-days	0.45	1.32	0.66	0.34	0.58

CICC, centrally inserted central catheters; CRBSI, catheter-related bloodstream infection; NA, not applicable; PICC, peripherally inserted central catheter.

[a] $P < .001$ vs nontunneled CICC.

[b] $P < .001$ vs tunneled-cuffed CICC.

[c] P .019 vs tunneled-cuffed CICC.

[d] P .022 vs nontunneled CICC.

Cotogni P, et al. *JPEN J Parenter Enteral Nutr*. 2020 Jun 8. doi: 10.1002/jpen.1939.

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Table 3. Outcomes of Central Venous Access Devices (VADs).

	PICC	Nontunneled	Tunneled	Port	Total
VAD, no.	401 (47.0)	137 (16.0)	118 (13.8)	198 (23.2)	854 (100)
Complications, no. (%)					
Infectious	13 (3.2)	24 (17.5)	18 (15.3)	15 (7.6)	70 (8.2)
Noninfectious	44 (11.0)	37 (27.0)	17 (14.4)	15 (7.6)	113 (13.2)
Total	57[a] (14.2)	61 (44.5)	35[b] (29.7)	30[c,d] (15.2)	183 (21.4)
No./1000 catheter-days	0.69	2.44	1.53	0.77	1.08
Duration, median, d (Range)	194[c] (15–1154)	128(7–445)	169[c] (9–711)	186[c] (31–1706)	177(7–1706)
Causes of removal, no. (%)					
VAD complications	19 (5)	53 (39)	14 (12)	8 (4)	94 (11)
End of IV therapy	126 (31)	10 (7)	22 (19)	38 (19)	196 (23)
Death	256 (64)	74 (54)	82 (69)	152 (77)	564 (66)
Removal ratio[e], no. (%)	19/57[c] (33)	53/61(87)	14/35[c] (40)	8/30[c] (27)	94/183 (51)

CICC, centrally inserted central catheters; IV, intravenous; PICC, peripherally inserted central catheter.
[a] $P < .001$ vs nontunneled CICC and tunneled-cuffed CICC.
[b] P .027 vs nontunneled CICC.
[c] $P < .001$ vs nontunneled CICC.
[d] P .005 vs tunneled-cuffed CICC.
[e] Ratio between number of removals because of VAD complications and number of total complications.

Cotogni P, et al. *JPEN J Parenter Enteral Nutr*. 2020 Jun 8. doi: 10.1002/jpen.1939.

Table 4. Complications: PICC vs Tunneled-Cuffed CICC and PICC vs Port.

	PICC	95% CI	Tunneled	95% CI	IRD[a] (95% CI)	Port	95% CI	IRD[b] (95% CI)
VAD, no.	401		118			198		
Catheter-days	82,516		22,840			38,737		
Local infection	0.07	0.03–0.14	0.22	0.10–0.45	−0.15 (−0.30, 0.00)	0.18	0.09–0.34	−0.11(−0.23, 0.02)
CRBSI	0.08[c]	0.04–0.16	0.57	0.34–0.92	−0.48 (−0.69, −0.28)	0.21	0.11–0.37	−0.12 (−0.26, 0.01)
Venous thrombosis	0.08	0.04–0.16	0.09	0.03–0.24	0.00 (−0.14, 0.13)	0.05	0.02–0.14	0.03 (−0.07, 0.14)
Mechanical complications	0.45	0.33–0.60	0.66	0.40–1.03	−0.21 (−0.53, 0.12)	0.34	0.20–0.54	0.11 (−0.13, 0.36)
Total complications[d]	0.69[c]	0.53–0.88	1.53	1.10–2.08	−0.84 (−1.27, −0.41)	0.77	0.54–1.08	−0.08 (−0.41, 0.24)

The rates of complications were expressed per 1000 catheter-days (incidence rate). IRD and 95% CIs were referred to the IR in the PICC group minus that in the tunneled-cuffed CICC or port groups.

CICC, centrally inserted central catheters; CRBSI, catheter-related bloodstream infection; IRD, incidence rate difference; PICC, peripherally inserted central catheter; VAD, venous access device.

[a]PICC vs tunneled-cuffed CICC.

[b]PICC vs Port.

[c]$P < .001$ vs tunneled-cuffed CICC.

[d]Infectious and noninfectious.

Cotogni P, et al. *JPEN J Parenter Enteral Nutr*. 2020 Jun 8. doi: 10.1002/jpen.1939.

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Strengths of the study

- **Why this low rate of PICC-related complications?**

- US guidance to choose a vein with a diameter at least 3 times PICC diameter
- small diameter PICCs (4 > 5 Fr)
- single lumen
- correct tip location (deep SVC or CAJ)
- early removal when no more iv therapies are needed

Limitations of the study

- Single-center study
- Observational study; therefore, there was no randomization of patients to the different VADs
- Only cancer patients enrolled; therefore, is not generalizable to other patients
- Only patients always assisted at home by trained caregivers and specifically trained nurses

A multicenter randomized trial needs to be carried out to recommend the use of PICCs as long-term VADs in non-hospitalized cancer patients

How to choose the best VAD in non-hospitalized cancer patients.

Message to take home

It is not possible to indicate the best VAD for all non-hospitalized cancer patients.

Thus, only a policy consisting of:

- ❑ **an appropriate choice of the VAD**
- ❑ **an adequate insertion technique**
- ❑ **a proper care of the VAD at home**

can minimize catheter-related complications, which is necessary to optimize the risk/benefit ratio of having a CVAD in non-hospitalized cancer patients.

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