

La scelta dei materiali: il catetere venoso ombelicale

15 Maggio 2023

Nicola Pozzi

Terapia Intensiva Neonatale, Benevento
Past-Segretario GdS TIPI-SIN



V Convegno Nazionale
GAVePed
2023 RIMINI
15-16 Maggio



Background

The use of umbilical venous catheters (UVCs) is an essential part of neonatal care allowing delivery of intravenous fluids, nutrition, and medication.

However, the use of UVCs is associated with a number of potential complications.

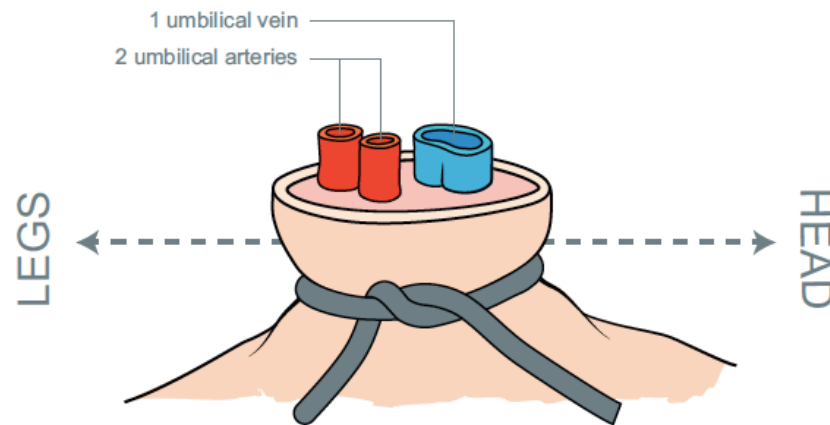


Fig. 7.6. Newborn umbilical cord showing the arteries and veins.

Guidelines UVC 2020 updated

5.0 Complications

- Sepsis (most common), especially with TPN
- Air embolism
- Pulmonary / systemic emboli
- Thrombosis i.e. intracardiac
- Catheter malposition / migration: leading to pericardial effusion/ tamponade
 - Arrhythmias (i.e. catheter moves into right atrium)
 - Intracardiac thrombus formation
 - Myocardial perforation, crossing foramen ovale to left atrium
 - Pericardial effusion / tamponade
 - Pulmonary and systemic emboli
 - Pulmonary infarction
 - Pulmonary haemorrhage
 - Hydrothorax (catheter perforated or lodged in a pulmonary vein)
 - Hepatic Necrosis
 - Portal Vein Thrombosis
 - Obstruction of pulmonary venous return (infants with TAPVD).
- Necrotising enterocolitis (especially if in situ > 24 hours)
- Thrombotic endocarditis
- Vascular damage
- Accidental dislodgement
(Schlesinger *et al.* 2002, Royal Prince Alfred Hospital 2011, Karlsen 2013, Rotunda Maternity Hospital 2013).

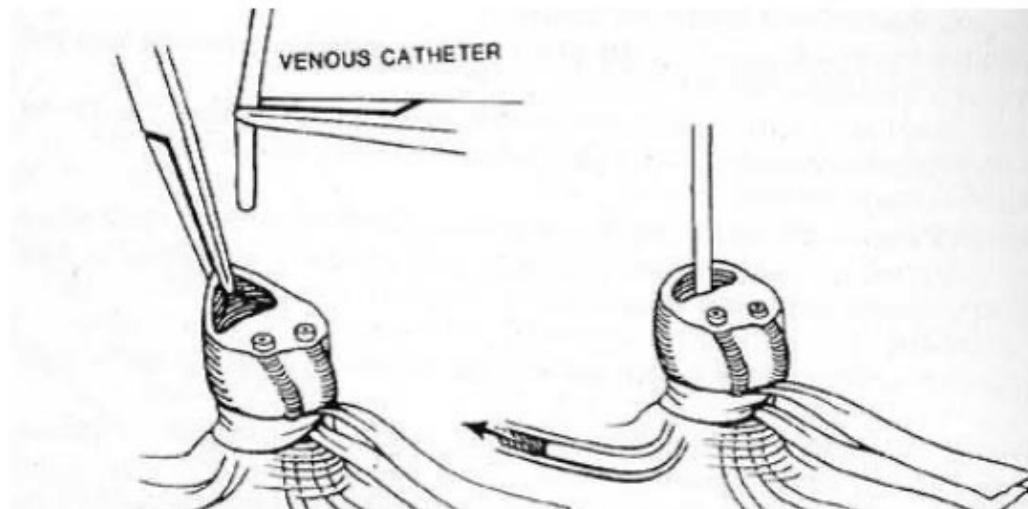
Targeting zero...

Classificazione degli accessi centrali secondo la via di accesso del catetere

Table 1. Central Lines

	• <u>Umbelical catheters</u> (Umbelical vein)*	
	• <u>Epicutaneo-caval catheters</u> (Superficial veins of limbs or scalp)*	Vene superficiali < 5-6 mm di profondità - NIR Technology
CICC •	<u>Central venous catheters</u> : tunneled, non-tunnelled, ports (central veins of the neck and of the supra/infra-clavicular region)	Ultrasound
PICC •	<u>PICC, Peripherally Inserted Central Catheters</u> (Deep veins of the arm)	Vene profonde > 5-6 mm di profondità - Ultrasound
FICC •	<u>Inferior Vena Cava catheters</u> (femoral and saphenous vein)	Ultrasound

* = *only in neonates.*

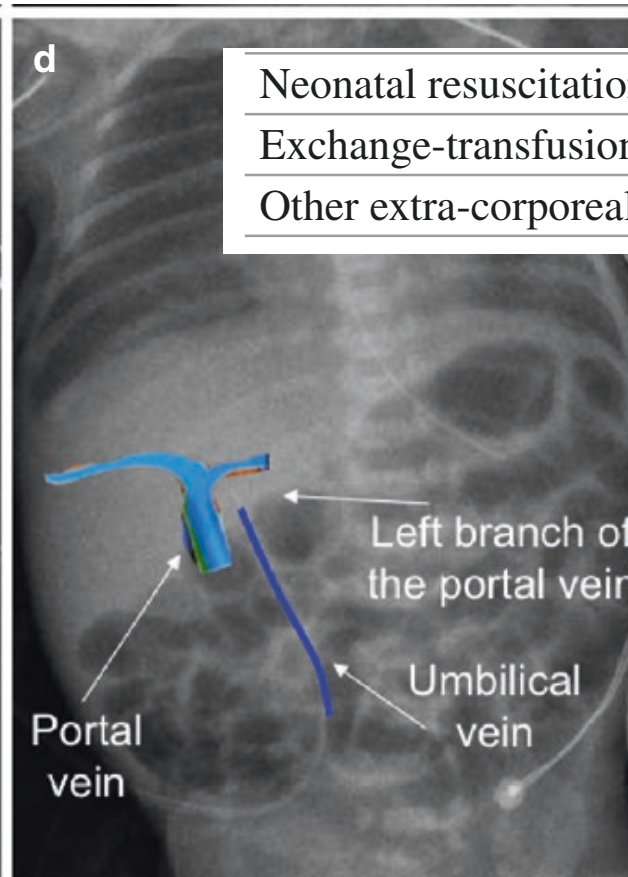
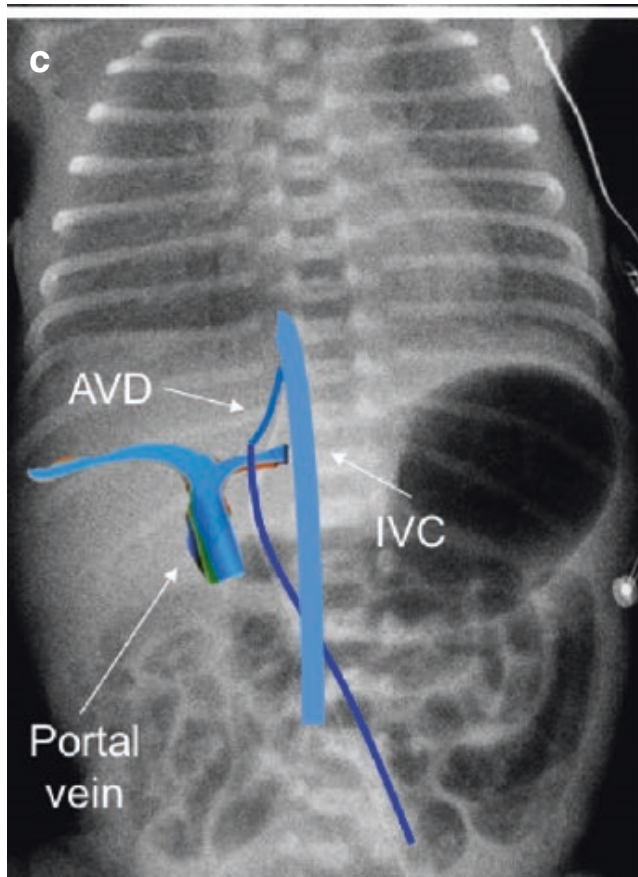


INSERZIONE: NO TRAINING

Quale materiale scegliere per i cateteri ombelicali?

- ✓ Uso
- ✓ Durata
- ✓ Performance
- ✓ Costo/benefici
- ✓ Complicazioni:
 - Infettive
 - Non infettive

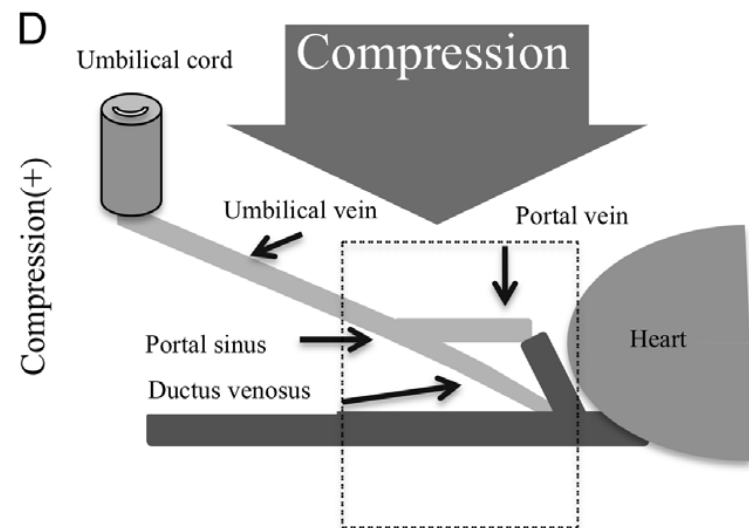
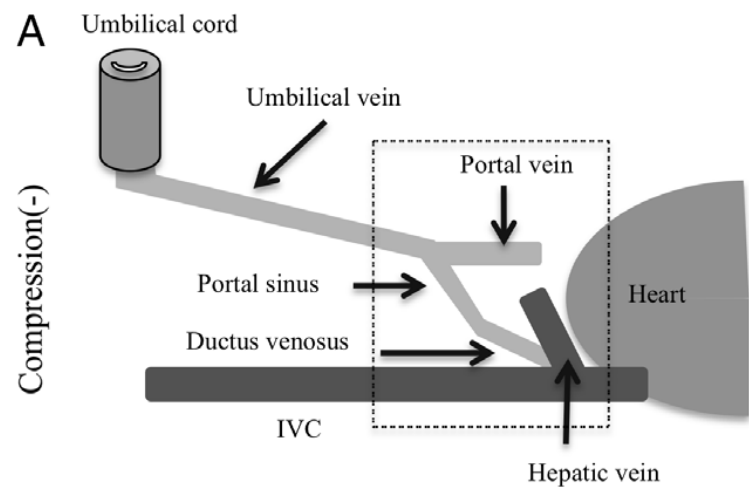
Tip location in posizione sub-epatica (UVSHC)



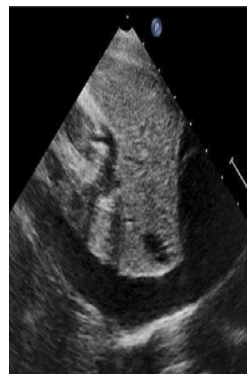
Neonatal resuscitation	UVSHC
Exchange-transfusion ^a	UVSHC or UVC
Other extra-corporeal therapies ^b	UVSHC or UVC

Somministrare soluzioni adeguate!

Rimosso il prima possibile!

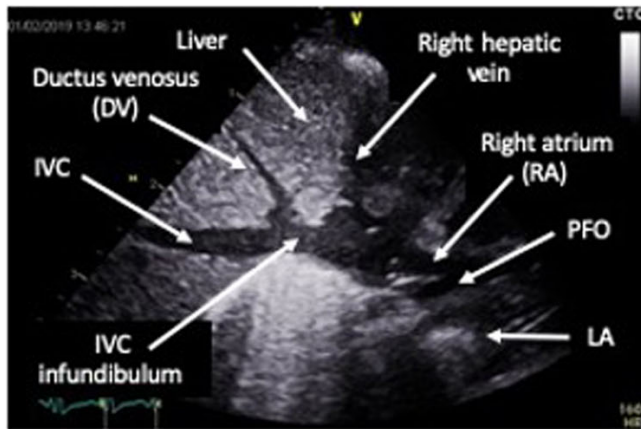


Subcostal IVC



Subxiphoid, indicator at
12 o'clock (toward the head)

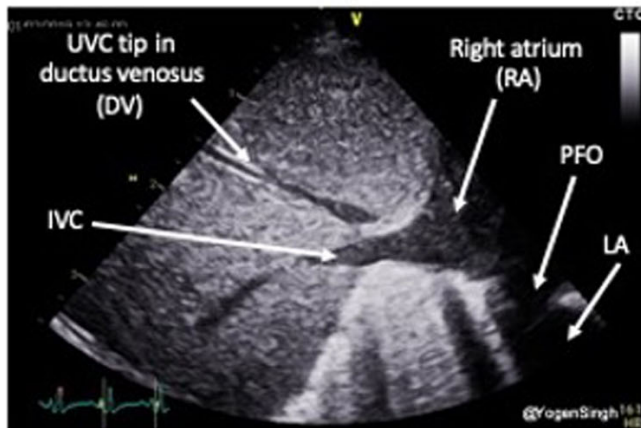
Tip location ottimale: infundibolo/giunzione cavo-atriale



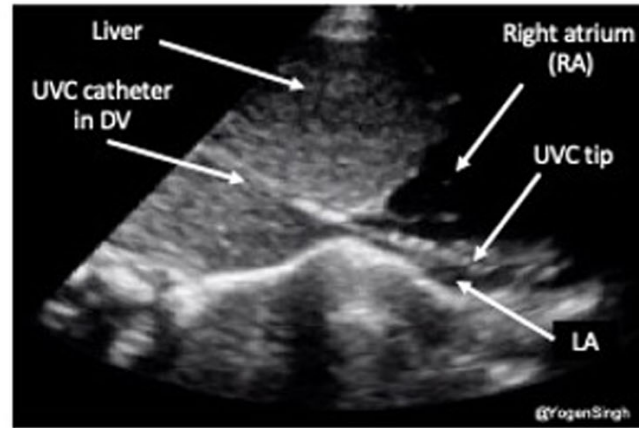
a



b



c



d

Neo-ECHOTIP

DIAMETRO DELLA VENA CAVA INF
=
CALIBRO CATETERE IN FR

Yogen Singh et al.
European Journal of Pediatrics 2021

Indications

TABLE 1 Guidelines for Vascular Access in Preterm Infants <33 Weeks' Gestation

Gestation	UVC	UAC	PIV
≤26 wk	Recommended	Recommended	
27–28 wk	Recommended	Recommended for selected cases ^a	
≥29 wk	Avoid except in selected cases ^{a,b}	Recommended for selected cases ^a	Recommended

Nurses were to inform the staff neonatologist if PIV could not be established after 4 attempts.

^a Use only if the patient is intubated and ventilated, or $F_{iO_2} > 40\%$ on continuous positive airway pressure, or the patient is hemodynamically unstable, needing fluid bolus or inotropes.

^b Difficulty establishing PIV access.

Shaneela Shahid et al.
Pediatrics 2014

Indwelling time

Remove umbilical catheters promptly when no longer needed or if a complication occurs.

1. Consider limiting UVC dwell time **to 7 to 10 days**; risks of infectious and thrombotic complications are increased with longer dwell times.18,36-41 (IV)

2.Consider UVC **removal at 4 days** followed by insertion of a PICC for continued infusion as one infection prevention strategy.42 (V)

3.Consider limiting UAC dwell time to no more than 5 days.2,18,43 (IV)



8TH EDITION

REVISED 2021

Indwelling time

•**Key Question 9:** What is the optimal duration of umbilical artery and umbilical venous catheters to prevent central line-associated blood stream infection (CLABSI) in neonatal intensive care unit (NICU) patients?

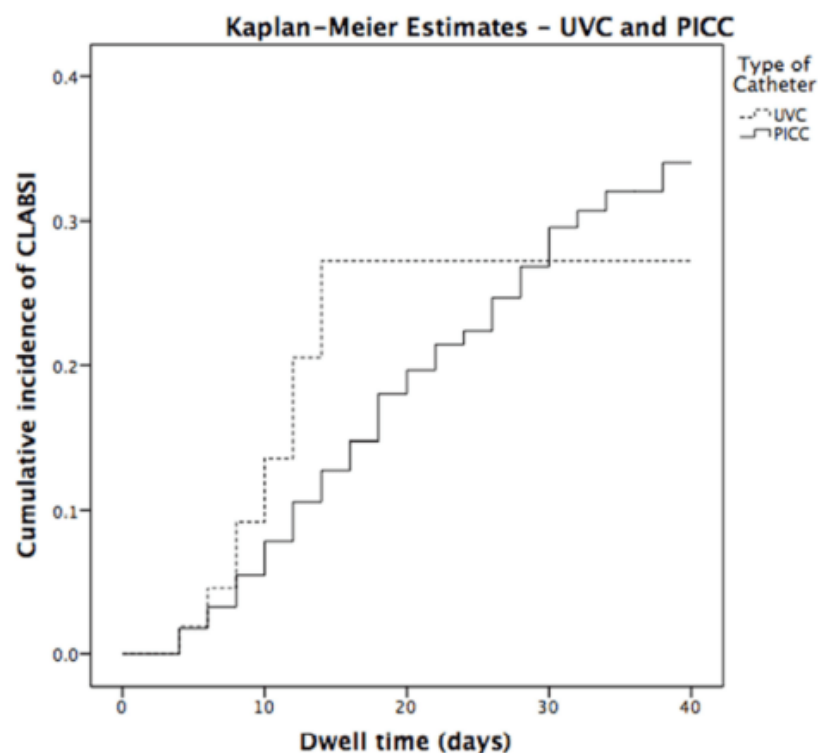
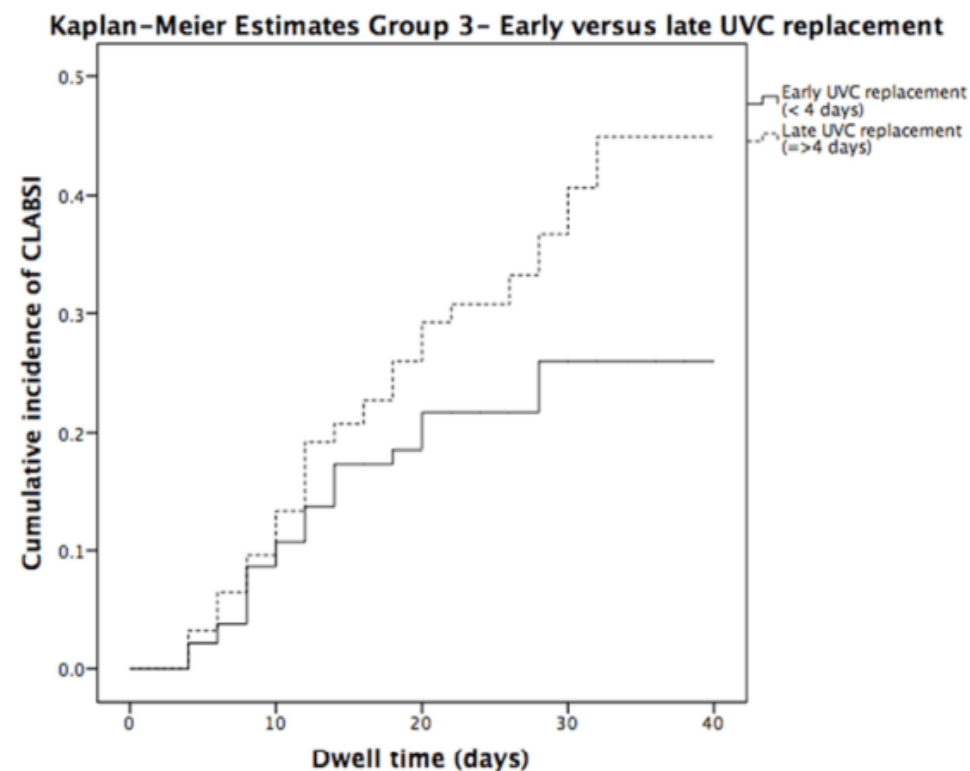
1.Recommendation 9.A. Remove umbilical venous and umbilical arterial catheters in neonatal intensive care unit (NICU) patients as soon as possible and when no longer needed due to the concern for increasing risk of central line-associated blood stream infection (CLABSI) associated with each day of increasing dwell time.

Recommendation 9.C. Consider removal of umbilical venous catheters at or before 7 days of dwell time in neonatal intensive care unit (NICU) patients. **Conditional Recommendation**



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Recommendations for Prevention and Control of Infections in Neonatal Intensive Care Unit Patients: Central Line-associated Blood Stream Infections 2022

Figure 1: Overall comparison of hazard function for CLABSI between UVC and PICC**Figure 2:** Comparison of hazard function for CLABSI in Group 3 infants between PICCs inserted as early or late elective UVC replacement

Conclusions: There was no cut-off duration beyond which PICC should be removed electively. Early UVC removal and replacement by PICC before day 4 could be considered.

42. Sanderson E, Yeo KT, Wang AY, et al. Dwell time and risk of central-line-associated bloodstream infection in neonates. *J Hosp Infect.* 2017;97(3):267-274. doi:10.1016/j.jhin.2017.06.023

Securement and stabilization

- ✓ Migrazione fisiologica del catetere
- ✓ No studi che verifichino la superiorità di un metodo di fissaggio da un altro
- ✓ Colla istoacrilica



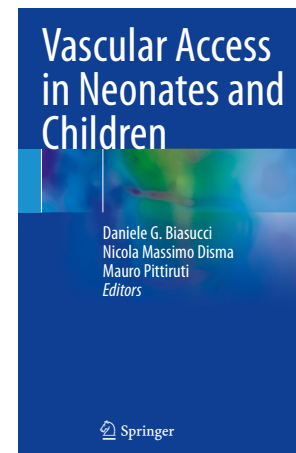
Choice of the devices and materials

Table 10.3 Characteristics of some polyurethane UVCs commonly available on the EU market

Manufacturer (model)	Diameter (Fr)	Available lumens	Length (cm)	Max flow (mL/min) [Prox./dist.]	Dead volume (mL) [Prox./dist.]
Vygon	2.5	1	30	3	0.21
	3.5	1	40	1.5	0.34
	4	1	40	18	0.36
	4	2	20	2 × 11	0.26 × 2
	4	2	40	12/11	0.26 × 2
	4	2	40	7/6	0.28 × 2
	5	1	40	24	0.46
	5	2	40	9/7	0.30 × 2
	5	3	38	—	0.32/0.19/0.19
	8	1	40	79	0.84
	8	3	38	—	0.77/0.33/0.33
Plastimed	3.5	1	30	—	—
	3.5	1	40	—	—
	4	2	15	10/9	0.15/0.13
	4	2	20	9/8	0.20/0.15
	4	2	30	7/6	0.25/0.20
	5	1	30	—	—
	5	2	30	13/12	0.30/0.25
Covidien-Medtronic	7	1	30	—	—
	2.5	1	25	—	—
	3.5	1	25	—	—
	3.5	2	38	—	—
	5	1	25	—	—
	5	3	38	—	—
	8	3	38	—	—

The table should not be considered comprehensive, as variations may happen according to market or industrial policy changes. Technical details have been collected from manufacturer where they were immediately available on their illustrative sheet or website. Different UVC and different characteristics may exist in other markets. These data are not meant to be used for clinical decisions, as readers are required to check these details with the manufacturer or its representatives

Polyurethane catheters are preferred over polyethylene and polyvinyl catheters, since they are less prone to bacterial colonization.



2022



POLIURETANO

CODICE	1270.02	1270.03	1270.04	1270.05	1270.08
Ø Est. Fr.	2.5	3.5	4	5	8
Pezzi per confezione	8	8	20	20	20

SPECIFICHE

CODICE	CATETERE (PUR) O.R.X.				FLUSSO ml/min		CAP
	Ø Est. mm	Ø Fr	Lungh. cm	Lumi	Distale	Prossimale	Distale
1272.14	1.4	4	20	2 x 20 G	15	15	0.26
1274.14	1.4	4	40	2 x 20 G	6	6	0.28
1274.17	1.7	5	40	2 x 19 G	9	9	0.30

CODICE	CATETERE (PUR) O.R.X.				Lume distale		
	Ø Est. mm	Ø Fr	Lungh. cm	Lumi	G	Flusso ml/min	Volume m
V02127315	1.5	4.5	20	3	20	7.4	0.20

Catetere ombelicale in PUR

Catetere ombelicale in PUR O.R.X.

CARATTERISTICHE

- catetere trasparente ed emocompatibile per ridurre il rischio trombogenico ed evitare il rilascio di plastificanti (DEHP-free)
- marcatura centimetrica da 4 a 25 cm
- fornito con rubinetto a 2 vie
- marcatura centimetrica da 4 a 25 cm
- scelta tra 5 diametri
- utilizzabile per via venosa o arteriosa

CONFEZIONE

v. Tabella

SINGLE LUMEN OMBILICATH®



NEONATAL CATHETER FOR INSERTION IN UMBILICAL VEIN OR ARTERY.

THIS MODEL INCLUDES:

- 1 flexible catheter to avoid perforating the blood vessel, with centimetric markings for perfect insertion control
- 1 proximal female Luer-Lock hub
- 1 open or closed rounded distal tip to reduce vascular trauma



SINGLE LUMEN OMBILICATH®

OPEN TIP UMBILICAL ARTERY OR VEIN		REFERENCE	CATH LENGTH
Fr (mm)	GAUGE		cm
3.5 [1.2]	18G	1183.12	30
5 [1.7]	16G	1183.17	30
7 [2.3]	14G	1183.23	30

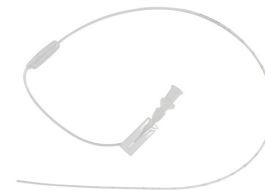
CLOSED TIP UMBILICAL ARTERY 2 LATERAL EYES		REFERENCE	CATH LENGTH
Fr (mm)	GAUGE		cm
3.5 [1.2]	18G	1194.12	40
5 [1.7]	16G	1194.17	40

POLIURETANO RADIOPACO



COVIDIEN

Argyle™ Umbilical Vessel Catheters (UVCs)



Single-lumen with side clamp

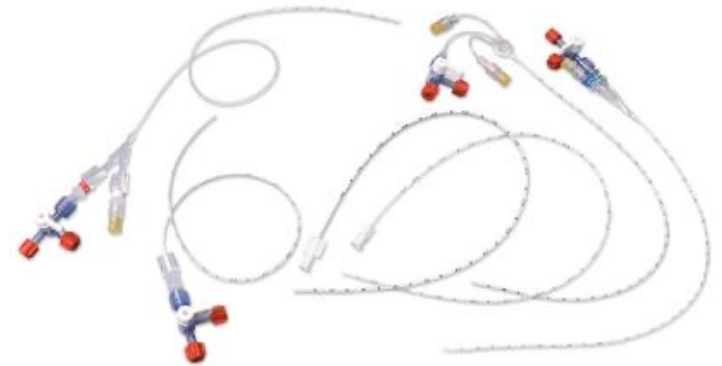
Features

- Clear, lipid resistant luer lock hubs
- Color coded I.V. extensions on triple and dual lumen catheters
- Sterile
- Not made with DEHP
- Not made with natural rubber latex

Benefits

- Polyurethane material for increased maximum strength and flow rates
- Encapsulated X-ray opaque lines
- Numerical depth markings every 1 cm from 5-25 cm
- Effective length of 25 cm

Code	French size	Primary/Secondary/ Tertiary Lumen size	Length	Pkg string
Polyurethane single-lumen UVC with luer lock hubs				
8888160325	2.5	26ga	11.5 in. (29.21 cm)	10 ea/cs
8888160333	3.5	21ga	14 in. (35.56 cm)	10 ea/cs
8888160341	5.0	18ga	13.6 in. (34.544 cm)	10 ea/cs
Polyurethane dual-lumen UVC with luer lock hubs				
8888160531	3.5	20ga / 23ga	15 in. (38.1 cm)	5 ea/cs
8888160556	5	18ga / 21ga	15 in. (38.1 cm)	5 ea/cs
Polyurethane triple-lumen UVC with luer lock hubs				
8888160648	5	18ga / 21ga / 21ga	15 in. (38.1 cm)	5 ea/cs
8888160663	8	15ga / 18ga / 18ga	15 in. (38.1 cm)	5 ea/cs



Umbili-Cath™ umbilical artery/vessel catheters are designed for ease of insertion, patient safety, and to minimize irritation to the baby's delicate tissues. **Umbili-Cath™ is available in both Silicone and Tecoflex polyurethane materials.** Silicone is known as the most biocompatible and gentle material for vascular access. Tecoflex is slightly stiffer for insertion, yet softens at body temperature to emulate the characteristics of silicone after placement. Umbili-Cath is available in sizes down to 2.8 Fr, providing access to the smallest babies. Dual and triple-lumen Umbili-Cath are available to provide a means of infusing incompatible meds or allowing for continuous monitoring during therapies.

Polyurethane

Benefits

- Larger internal diameter compared with same French size silicone catheter (4 Fr. polyurethane internal diameter approx. 0.032" compared with 4 Fr. silicone, internal diameter approx. 0.024").
- Increased flow rate due to larger internal lumen. Polyurethane requires less wall thickness for strength compared with silicone).
- Easier to insert and advance due to initial stiffness.
- Softens upon warming to body temperature which may reduce vein trauma.
- Easily coated with a variety of specialized coatings.

Disadvantages

- More difficult to modify than silicone.
- Initial stiffness may be more damaging to the vessel than softer silicone.
- Polyurethane cannot be autoclaved.

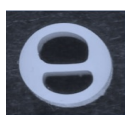
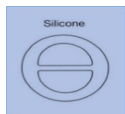
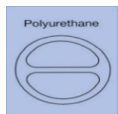
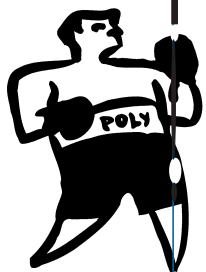
Silicone

Benefits

- Smaller internal diameter compared with same French size polyurethane catheter (4 Fr. polyurethane internal diameter approx. 0.032" compared with 4 Fr. silicone, internal diameter approx. 0.024").
- Kink resistant when extruded with greater wall thickness.
- Softness, a durometer of 50-60A, may reduce vein trauma.
- Easily modified step up, step down, suture handles etc.
- Can be autoclaved.

Disadvantages

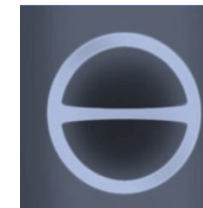
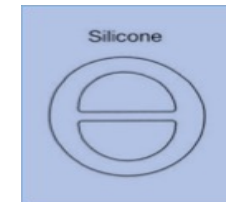
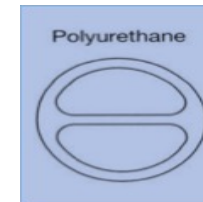
- Slightly textured surface (microscopically) may increase thrombogenesis.
- More difficult to insert and advance due to softness.
- Difficult to coat with specialized coatings
- Kinking possible in lower durometer/thin walled tubing.



Silicone catheters

Problemi:

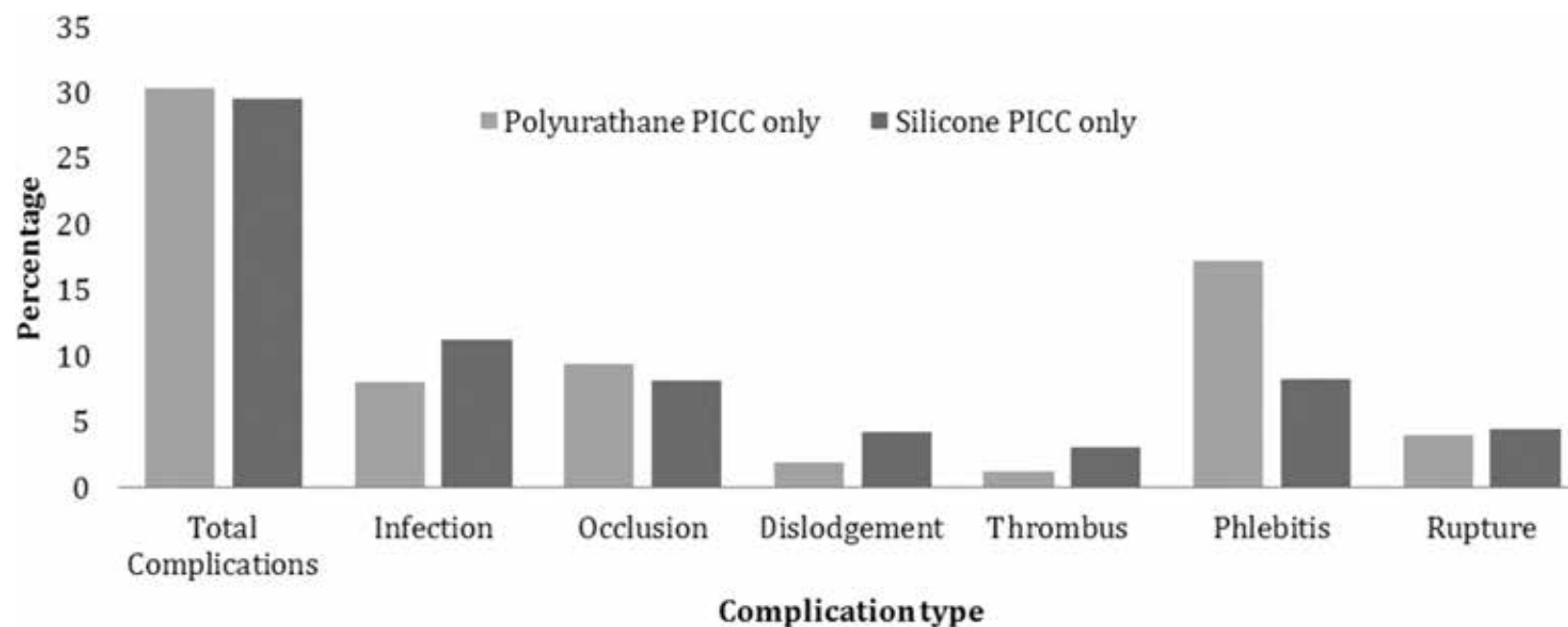
- Minima compattezza strutturale che costringe alla fabbricazione di cateteri con un più ampio divario tra diametro esterno ed interno.
- Maggiore spessore della parete a parità di calibro
- Tendenza al kinking
- Possono essere più rigidi e fragili a seconda della % di bario (porosità)
- Sensibilità verso i solventi (etere, acetone)
- Resistenza alla pressione: circa 40-60 *psi*
- Probabile rottura durante la rimozione



A comparison of silicone and polyurethane PICC lines and postinsertion complication rates: a systematic review

Tammy Seckold, Sandra Walker, Trudy Dwyer

Central Queensland University, Queensland - Australia



PEDIVAN 2017

la soft revolution



**Pediatric Vascular Access Practice:
Time for Evolution or Revolution?**

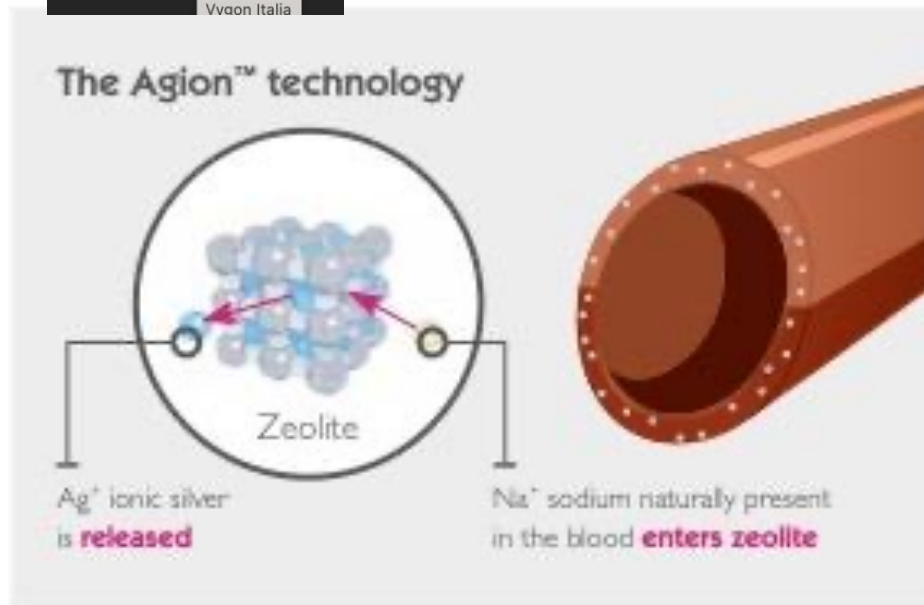
By Amanda J Ullman RN, MAppSci, PhD, Centaur Fellow, Director-at-Large;
Association for Vascular Access Pediatric Special Interest Group, Senior Lecturer;
Alliance for Vascular Access Teaching and Research (AVATAR) Group, Griffith University

2. 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)

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.

Polyurethane catheters silver-impregnated



MONOLUME- BILUME

2,5 – 8 FR

The expert umbilical catheter is the only umbilical catheter with insilver tegrated antimicrobial Agion® technology, to fight against CRBSI in NICUs.

Ag⁺ is bacteriostatic that inhibits the cell reproduction. Ag⁺ combine with bacterial proteins located in the cell wall and cytoplasm which interferes with their normal functioning. These proteins are vital for the healthy functioning of the cell therefore loss of the proteins results in the death of the bacteria.

Polyurethane UVCs that release antimicrobially active silver ions have recently become available in the market. These catheters are potentially associated with a reduced risk of CLABSI, since they decrease both endoluminal and extraluminal colonization

Polyurethane catheters silver-impregnated

ABSTRACT

Objective: The present study aims to assess if use of a silver zeolite-impregnated umbilical catheter (AgION technology) can decrease the occurrence of catheter-related bloodstream infection (CRBSIs) in preterm infants. **Study design:** Infants with gestational age < 30 weeks were randomized to receive an AgION impregnated or non-impregnated polyurethane umbilical venous catheter (UVC). The primary endpoint was the incidence of CRBSIs during the time the UVC was in place.

Results: We studied 86 infants, 41 of whom received the AgION catheter and 45 the non-impregnated catheter. During umbilical venous catheterization 2% of infants in the AgION group developed CRBSI in comparison with 22% of infants in the control group ($p = 0.005$). AgION catheters were well tolerated and none of the patients showed signs attributable to silver toxicity.

Conclusions: The AgION-impregnated UVCs were effective in decreasing the development of CRBSIs in preterm infants compared to non-impregnated polyurethane UVCs.

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Table 1

Characteristics of study groups. Mean $\pm$ (SD) or rate (%).

	Polyurethane catheter group (n = 41)	AgION catheter group (n = 45)	p
Gestational age (weeks)	26.2 $\pm$ 1.5	26.2 $\pm$ 2.0	0.99
Birth weight (g)	796 $\pm$ 203	840 $\pm$ 190	0.40
Male sex	18 (44)	20 (44)	1.00
Cesarean section	27 (65)	28 (62)	0.82
PPROM > 18 h	9 (22)	13 (29)	0.62
Antenatal steroid treatment	25 (61)	32 (71)	0.32
Antibiotic prophylaxis (days)	2.7 $\pm$ 0.8	2.6 $\pm$ 0.8	1.00
RDS	40 (97)	40 (88)	0.20
Mechanical ventilation	23 (56)	20 (44)	0.38
Duration (h)	266 $\pm$ 270	194 $\pm$ 236	0.19
Bronchopulmonary dysplasia	16 (39)	14 (31)	0.14
Intraventricular hemorrhage	9 (22)	10 (22)	0.19
Retinopathy of prematurity	6 (15)	3 (7)	0.14
Necrotizing enterocolitis	2 (5)	1 (2)	0.36
Stay in hospital (days)	85 $\pm$ 35	70 $\pm$ 33	0.04
Case fatality rate for CRBSI	4 (7)	0	0.04
Mortality	5 (10)	4 (9)	0.73
Duration of UVC (days)	8.5 $\pm$ 4.4	10.8 $\pm$ 4.7	0.02

PPROM: preterm premature rupture of membrane.

Polyurethane catheters silver-impregnated

Table 2

Occurrence of catheter colonization and catheter-related bloodstream infection (CRBSI), and blood-stream infection (BSI) in study groups. Rate (%).

	Polyurethane catheter group (n=41)	AgION catheter group (n=45)	p
Colonization, n (%)	2 (5)	2 (2)	0.66
CRBSI	9 (22)	1 (2)	0.005
• Definite, n (%)	8 (20)	1 (2)	0.01
• Probable, n (%)	1 (2)	0 (0)	NA
BSI without a source	1 (2)	1 (2)	0.48

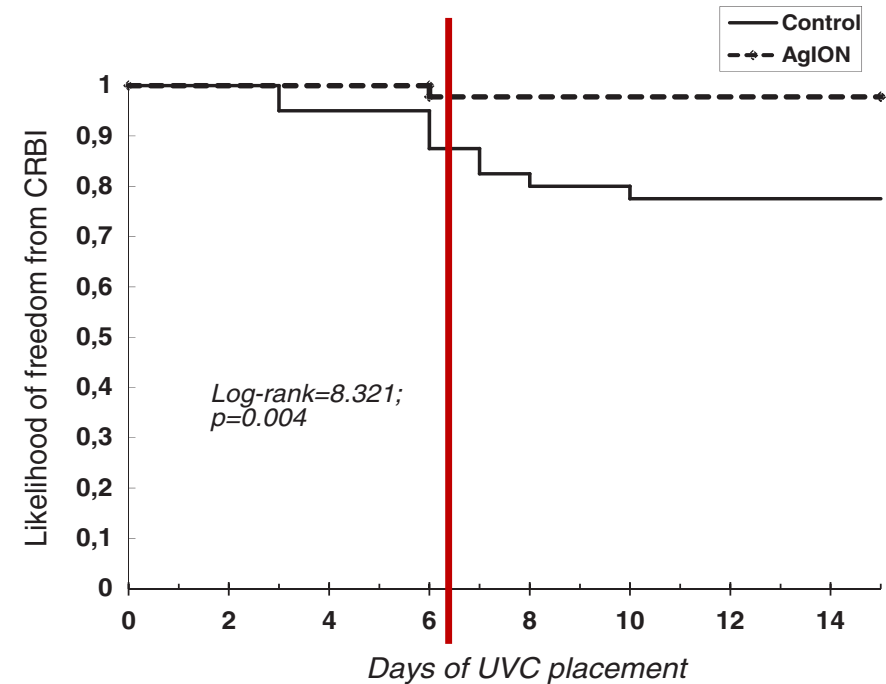


Fig. 2. Kaplan–Meier estimates of the cumulative likelihood of freedom from CRBSI in the 2 study groups.

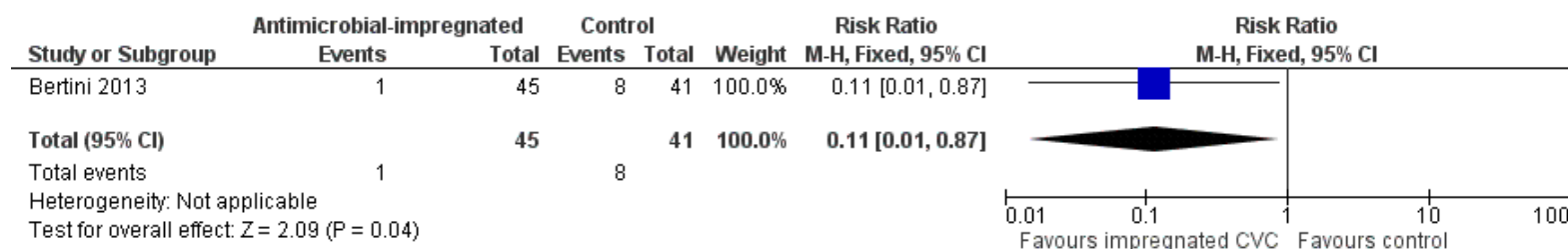
Balain M, Oddie SJ, McGuire W.

Antimicrobial-impregnated central venous catheters for prevention of catheter-related bloodstream infection in newborn infants.

Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD011078.

DOI: [10.1002/14651858.CD011078.pub2](https://doi.org/10.1002/14651858.CD011078.pub2).

Figure 1. Forest plot of comparison: 1 Antimicrobial-impregnated CVC vs. non-impregnated CVC, outcome: 1.1 Catheter-related bloodstream infection.



LIMITI: NON CIECO
PAZIENTI MORTI ESCLUSI

SHEA 2022

Unresolved Issues

1. Routine use of needleless connectors as a CLABSI prevention strategy before an assessment of risks, benefits, and education regarding proper use^{215–219}
2. Surveillance of other types of catheters (eg, peripheral arterial or peripheral venous catheters)^{11,21,22}
3. Standard, nonantimicrobial transparent dressings and CLABSI risk.
4. The impact of using chlorhexidine-based products on bacterial resistance to chlorhexidine
5. Sutureless securement
-  6. Impact of silver zeolite-impregnated umbilical catheters in preterm infants (applicable in countries where it is approved for use in children)²²⁷
7. Necessity of mechanical disinfection of a catheter hub, needleless connector, and injection port before accessing the catheter when antiseptic-containing caps are being used

Buetti N, et al. (2022). Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 Update. *Infection Control & Hospital Epidemiology*, 43: 553–569, <https://doi.org/10.1017/ice.2022.87>

PVC CATHETERS

Catetere ombelicale in PVC DEHP-free O.R.X.

CARATTERISTICHE

- catetere trasparente morbido e termosensibile
- PVC DEHP-free (senza ftalati)
- estremità distale aperta e smussata per ridurre i rischi di trauma vascolare
- marcatura centimetrica da 5 a 25 cm
- utilizzabile per via venosa o arteriosa

Vygon code	NHSSC code	Size (Fr)					
		2.5					
		3.5					
		4					
		5					
1270.08	FSY027	8	40	0.29	>10	PUR	20
0270.03	FSY013	3.5	40	0.40	>23	PUR	20
0270.04	FSY015	4	40	0.81	>100	PUR	20
0270.05	FSY016	5	37	0.19	>6	PVC	15
0270.06	FSY017	6	37	0.27	>16	PVC	15
0270.07	FSY018	7	37	0.38	>31	PVC	15
0270.08	FSY019	8	37	0.51	>52	PVC	15
			37	0.59	>80	PVC	15
			37	0.75	>106	PVC	15

Reconsidering the GAVeCeLT Consensus on catheter-related thrombosis, 13 years later

Fulvio Pinelli¹ , Paolo Balsorano¹ , Benedetta Mura²
and Mauro Pittiruti³ 

Is there any device or material that may intrinsically reduce the risk?

2007 GAVeCeLT Consensus: **Silicone and second- and third-generation polyurethane catheters are less thrombogenic than polyethylene or polyvinylchloride.** A lower diameter catheter and a single lumen

might be protective against the risk of central venous thrombosis. When the number of therapies demands a multiple-lumen catheter, the number of lumens used should be minimized.¹⁶

The choice of the device in terms of type of venous approach, material, and size plays an important role in order to minimize thrombotic risk and ensure good catheter performance.²²

Materials. Experimental and clinical evidence **confirmed that polytetrafluoroethylene and polyethylene are more thrombogenic compared with silicone and second-/third- generation polyurethane.**

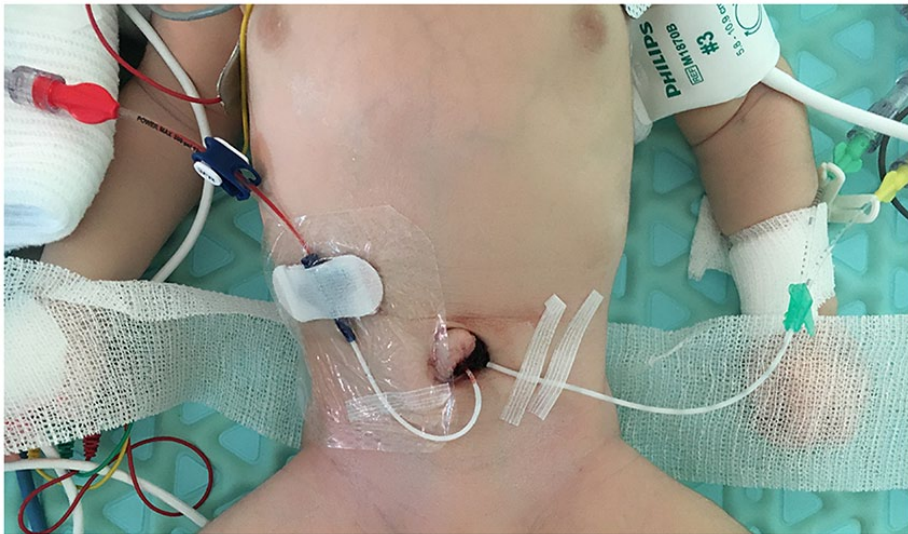
Poliuretano di 3a generazione (power injectability)

- Maggiore resistenza alla tensione ed ai carichi di rottura del catetere e delle connessioni
- Maggiore resistenza alle sollecitazioni pressorie endoluminali (*300psi*)
- Flussi elevati (*5ml/s*) a parità di ingombro vascolare
- Minore spessore parietale a parità di calibro
- Minor grip della superficie
- Minor attrito endoteliale e miglior gestione delle complicanze occlusive
- Minor trauma da decubito endoteliale (fluttuazione nel lume vascolare)
- Comportamento visco-elastico a 37°C

MIGLIOR PERFORMANCES

A) Tecoflex
B) Tecothane
C) Carbothane
D) Pellethane
E) Chronoflex

Off label use of 3a generation polyurethane PICC



1. There are three theoretical advantages for using power injectable PICC catheters as umbilical lines:

1. The catheter can be trimmed.
2. Three French PICC catheter can achieve a good arterial waveform.
3. Easier management of occlusion.

G. Barone et al. Off label use of PICC as umbilical arterial catheter: Clinical case series. J vasc acc 2021

UMBILI-CATH™

Complete Umbilical Catheter Family

DEHP
Free

Gesco® Umbili-Cath is specially designed for ease of insertion, patient safety and comfort. Umbili-Cath is available in both Silicone and Tecoflex® polyurethane materials. Silicone is known as the most biocompatible and gentle material for vascular access. Tecoflex emulates silicone after warming in vivo, and allows for triple-lumen patency support in a 5 Fr UVC. Both materials are PVC-free.

- Soft rounded tips to reduce perforation risks during placement.
- Soft rounded end holes to facilitate better fluid clearing.
- Clear depth markings every 1cm for more accurate placement.
- "Zero dead space" luer locking hub.
- Barium sulfate-loaded catheter provides radiopacity.



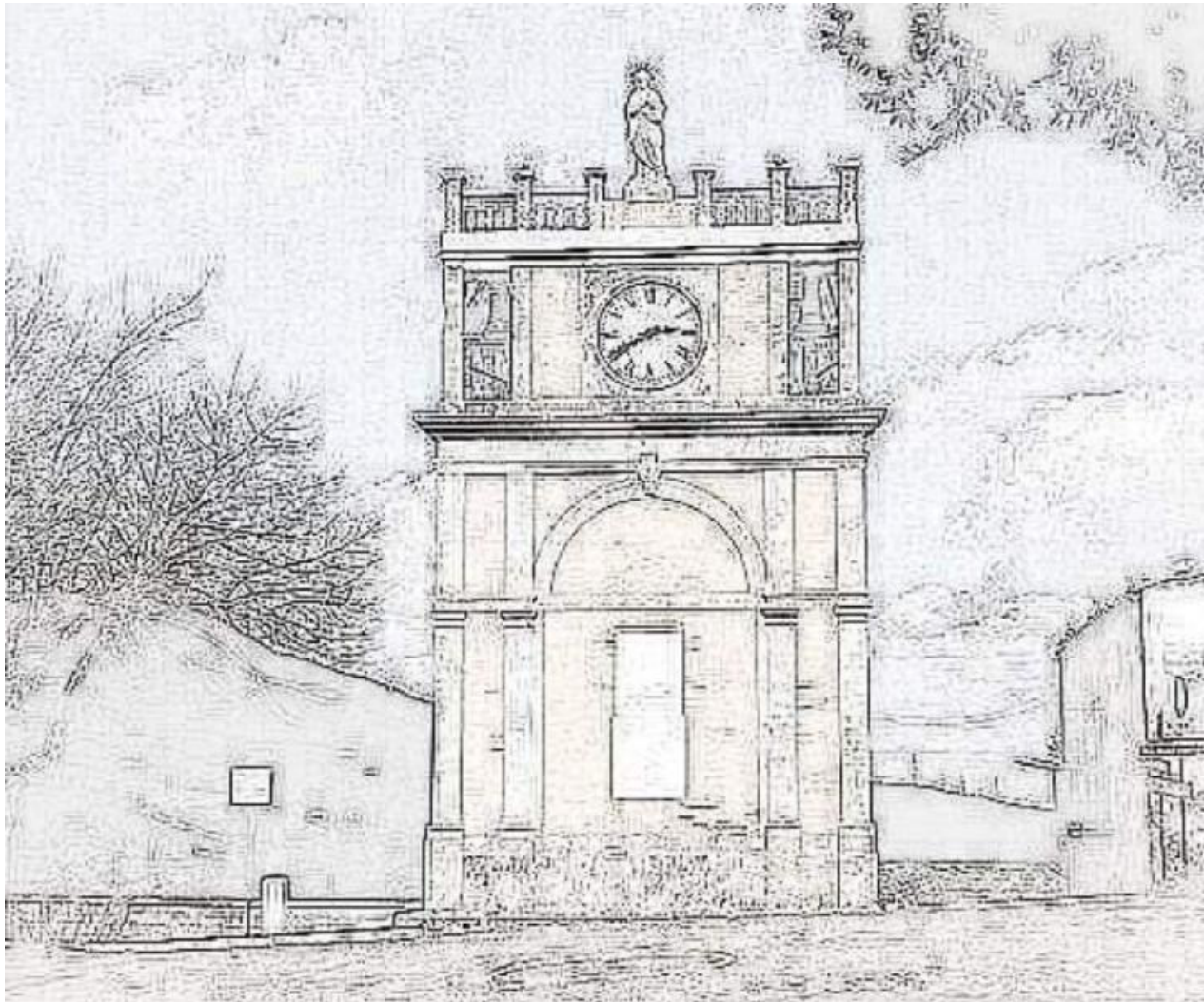
Umbili-Cath™ Configurations

Order Number	Catheter Size	Lumens	Material	Catheter Body Length	Packaging Quantity
4182805	2.8 Fr	Single (22 ga)	Tecoflex	34cm	10 / box
4282805	2.8 Fr	Dual (22/25 ga)	Tecoflex	37cm	10 / box
4173505	3.5 Fr	Single (21 ga)	Silicone	34cm	10 / box
4273505	3.5 Fr	Dual (20/23 ga)	Silicone	34cm	5 / box
4183505	3.5 Fr	Single (21 ga)	Tecoflex	34cm	10 / box
4283505	3.5 Fr	Dual (20/23 ga)	Tecoflex	37cm	10 / box
4175005	5.0 Fr	Single (18 ga)	Silicone	34cm	10 / box
4275005	5.0 Fr	Dual (19/19 ga)	Silicone	34cm	5 / box
4185005	5.0 Fr	Single (18 ga)	Tecoflex	34cm	10 / box
4285005	5.0 Fr	Dual (19/19 ga)	Tecoflex	37cm	10 / box
4385005	5.0 Fr	Triple (18/20/20 ga)	Tecoflex	37cm	10 / box
4186505	6.5 Fr	Single (15 ga)	Tecoflex	34cm	10 / box
4178005	8.0 Fr	Single (15 ga)	Silicone	34cm	10 / box

Take home messages...

Quale materiale scegliere per i cateteri ombelicali?

- Solo in Poliuretano, senza se e senza ma
- I cateteri medicati possono avere un ruolo
- Importanti i materiali usati, ma anche il diametro, le tecniche di inserzione, fissaggio, localizzazione della punta e gestione/durata del catetere
- Poliuretani power di 3a generazione (costo/benefici)



Torre dell'Orologio (1883) Accadia (Fg)

Grazie...

nicolapozzi71@gmail.com