GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine

IV Convegno Nazionale GAVePed

31 maggio

Algoritmo di scelta del dispositivo nel neonato Il sistema DAV-Expert

GAVePed
Gruppo Accessi Venosi Pediatrici

GdS Accessi Vascolari Neonatali

Giovanni Barone

Ospedale Infermi di Rimini

Algoritmo di scelta del dispositivo nel neonato
Il sistema DAV-Expert

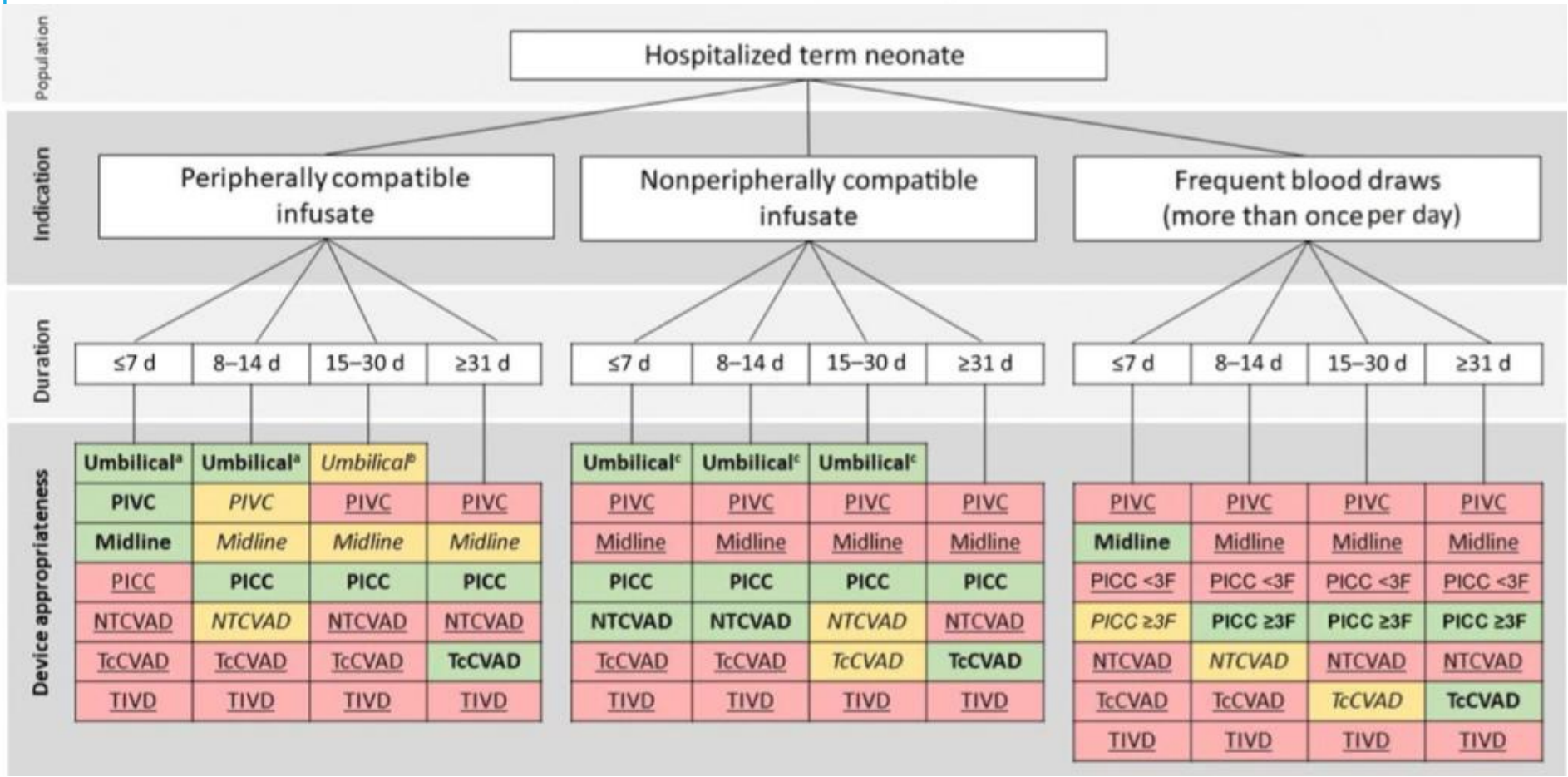
I have no actual or potential conflict of interest in relation to this presentation

PERCHÉ UN ALGORITMO DI SCELTA?

- Perché il mondo degli accessi venosi, soprattutto neonatali, sta cambiando!
- Come strumento educazionale.
- Come guida alla definizione di protocolli per la scelta del dispositivo nella singola unità operativa.
- Come 'binario' per la discussione di singoli casi clinici

The Michigan Appropriateness Guide for Intravenous Catheters in Pediatrics: miniMAGIC

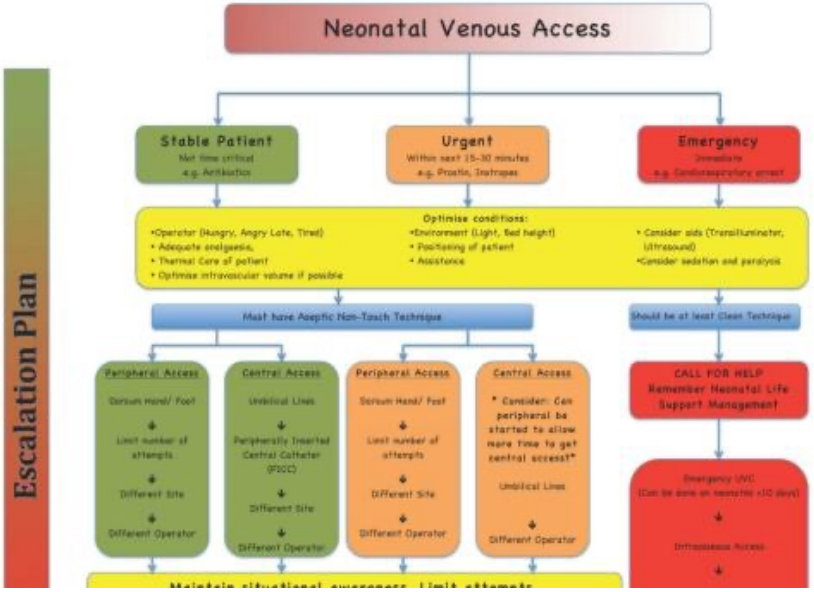
2020

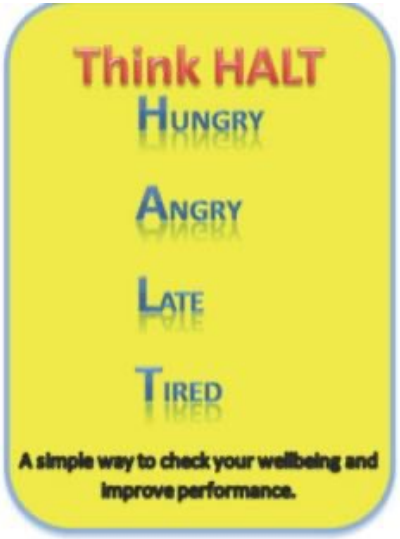


Fifteen-minute consultation: Decision-making pathway for neonatal vascular access

2021

Elizabeth Osmond , Nicholas Williams

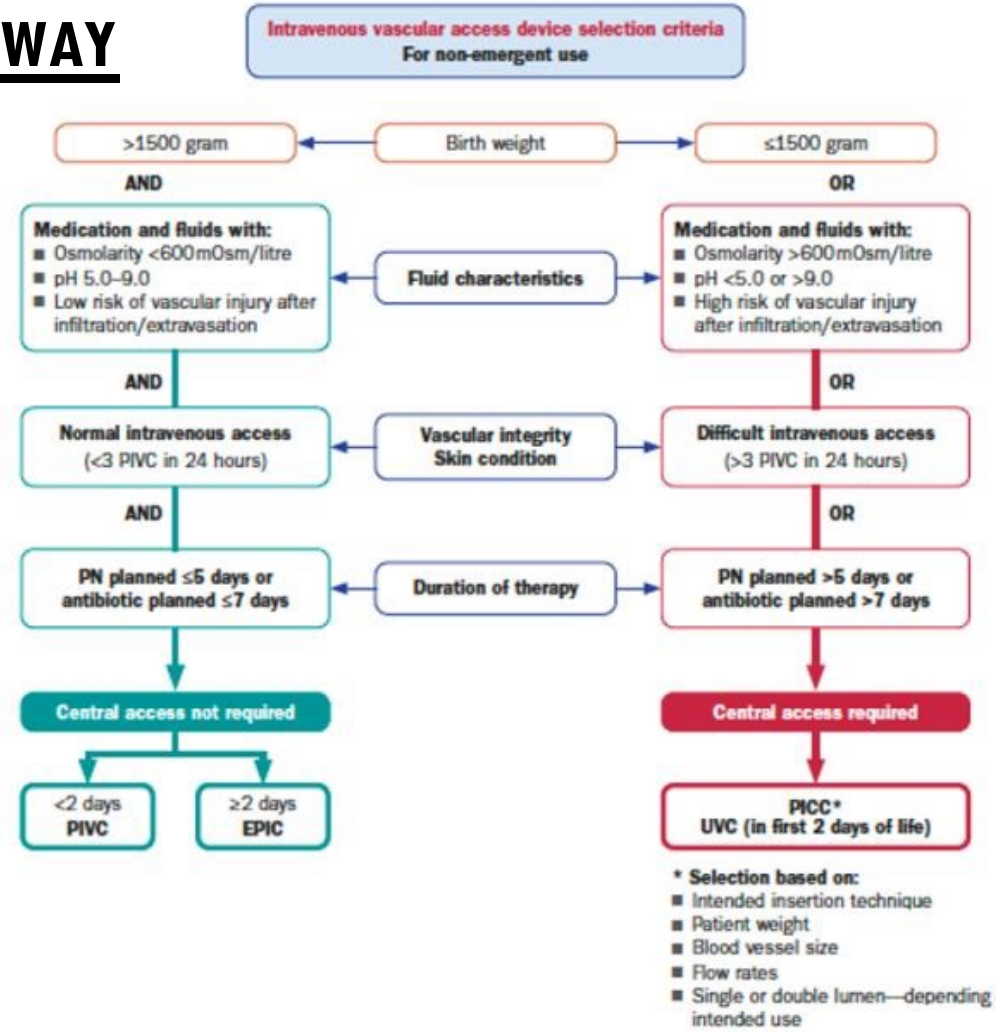




2022 in press

THE ABBA WAY

- **A**ssess the situation and patients **B**etter **B**efore initiating vascular **A**ccess
- NeoVAT
- 112 NICU Bed
- 5Rights for Vascular Access" i.e., the Right device, for the Right vein, with the Right therapy, for the Right duration, for the Right patient (same as Steere)
- 23858 VAD: 89.3% SPC; 2.9% LPC; 5.6% ECC; 2.2% UVC

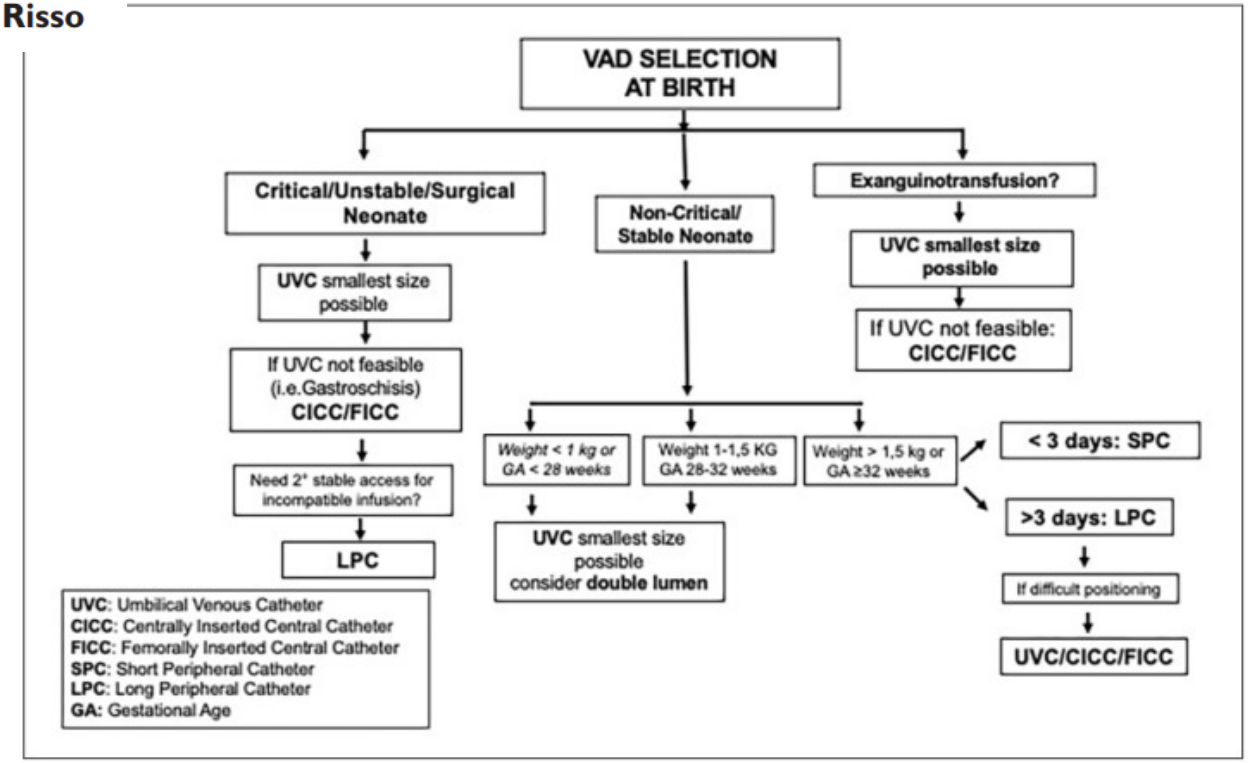


EPIC=extended dwell peripheral intravenous catheter; PICC=peripherally inserted central catheter; PIVC=peripheral intravenous catheter; PN=parenteral nutrition; UVC=umbilical venous catheter

Long peripheral catheters in neonates: filling the gap between short peripheral catheters and epicutaneous-caval catheters?

2021

Maria Grazia Romitti*, Carmen Rodriguez Perez*, Elena Pezzotti, Mario Motta and Francesco Maria Risso



FATTORI CHE INFLUENZANO LA SCELTA TRA CVO, ECC, CICC, FICC

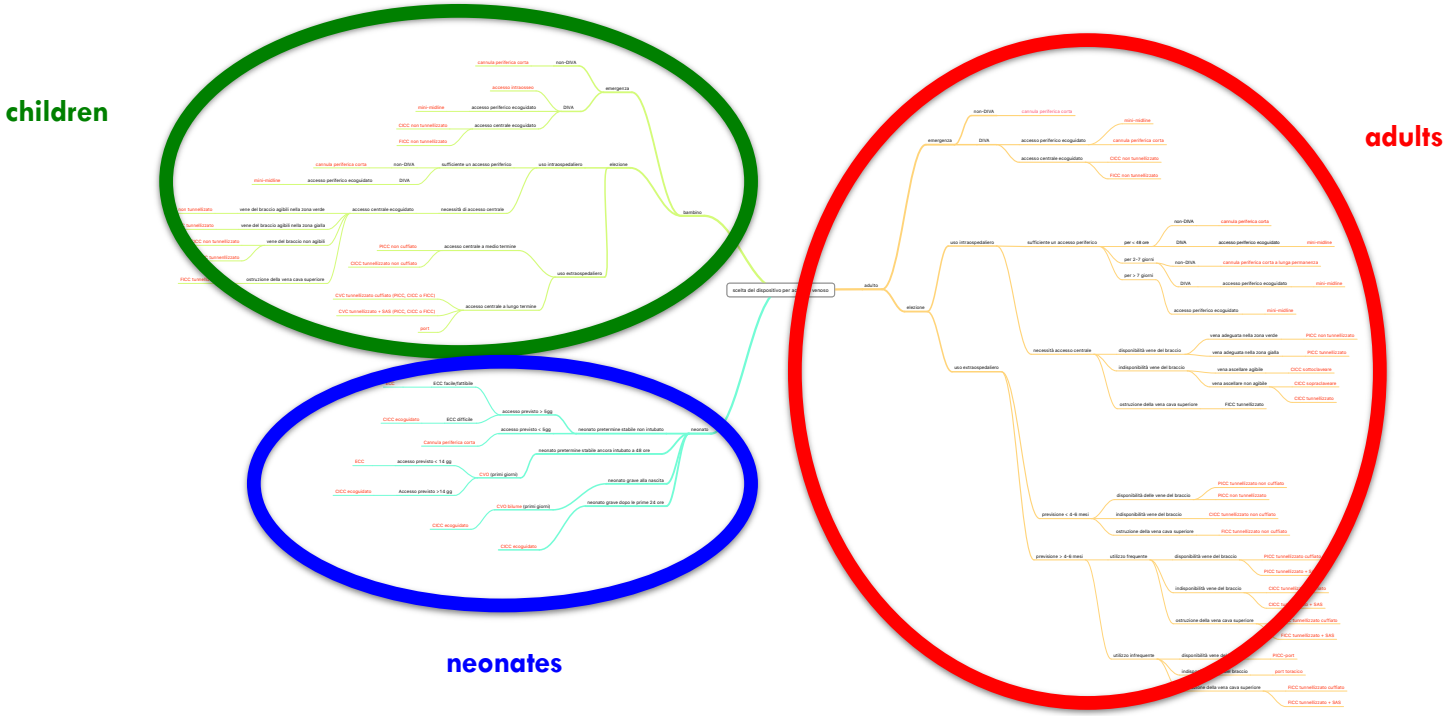
- Timing (necessità alla nascita vs. necessità dopo la nascita)
- Stato del paziente (neonato acuto grave vs. neonato stabile)
- Età gestazionale (prematuro vs. a termine)
- Patologia di base (malformazioni, patologia chirurgica, etc.)
- Indicazione alla via centrale (semplice infusione vs. infusioni + prelievi + monitoraggio emodinamico)
- Durata prevista del trattamento endovenoso
- Difficoltà/complicanze nel posizionamento di ECC o CVO
- Anatomia delle vene profonde
- ……..

2018 GAVECELT ALGORITHM

DAV Expert

DAV = Dispositivo per Accesso Venoso (VAD = Venous Access Device)
Exp = Expert system

UNDERLYING STRUCTURE



Neonato

Necessità di accesso venoso alla nascita

Non indicazione al CVO

→ Accesso venoso periferico → Cannula periferica corta

Indicazione al CVO → CVO monolume o bilume per 5-7 giorni

VANTAGGI CVO

- Facilità di posizionamento
- Stabilità rispetto ad AVP
- Possibilità di infusioni ad alta osmolarità
- Idoneo per prelievi
- Idoneo per emoderivati
- Misurazione PVC
- Poliuretano
- Flussi elevati

LIMITI CVO

- Alta incidenza di CRBSI
- Complicanze precoci e tardive, anche gravi
- Durata massimo 5-7 giorni

VANTAGGI CVO

- Facilità di posizionamento
- Stabilità rispetto ad AVP
- Possibilità di infusioni ad alta osmolarità
- Idoneo per prelievi
- Idoneo per emoderivati
- Misurazione PVC
- Poliuretano
- Flussi elevati

LIMITI CVO

- Alta incidenza di CRBSI
- Complicanze precoci e tardive, anche gravi
- Durata massima 5-7 giorni

Standardizing Umbilical Catheter Usage in Preterm Infants

BACKGROUND AND OBJECTIVE: Absence of guidelines on umbilical arterial catheter (UAC) and umbilical venous catheter (UVC) use and inability to predict the hospital course may sway the frontline staff to overuse umbilical catheters in preterm infants. Our objective was to evaluate the feasibility of implementing guidelines standardizing the use of umbilical catheters and its impact on the incidence of sepsis and resource use.

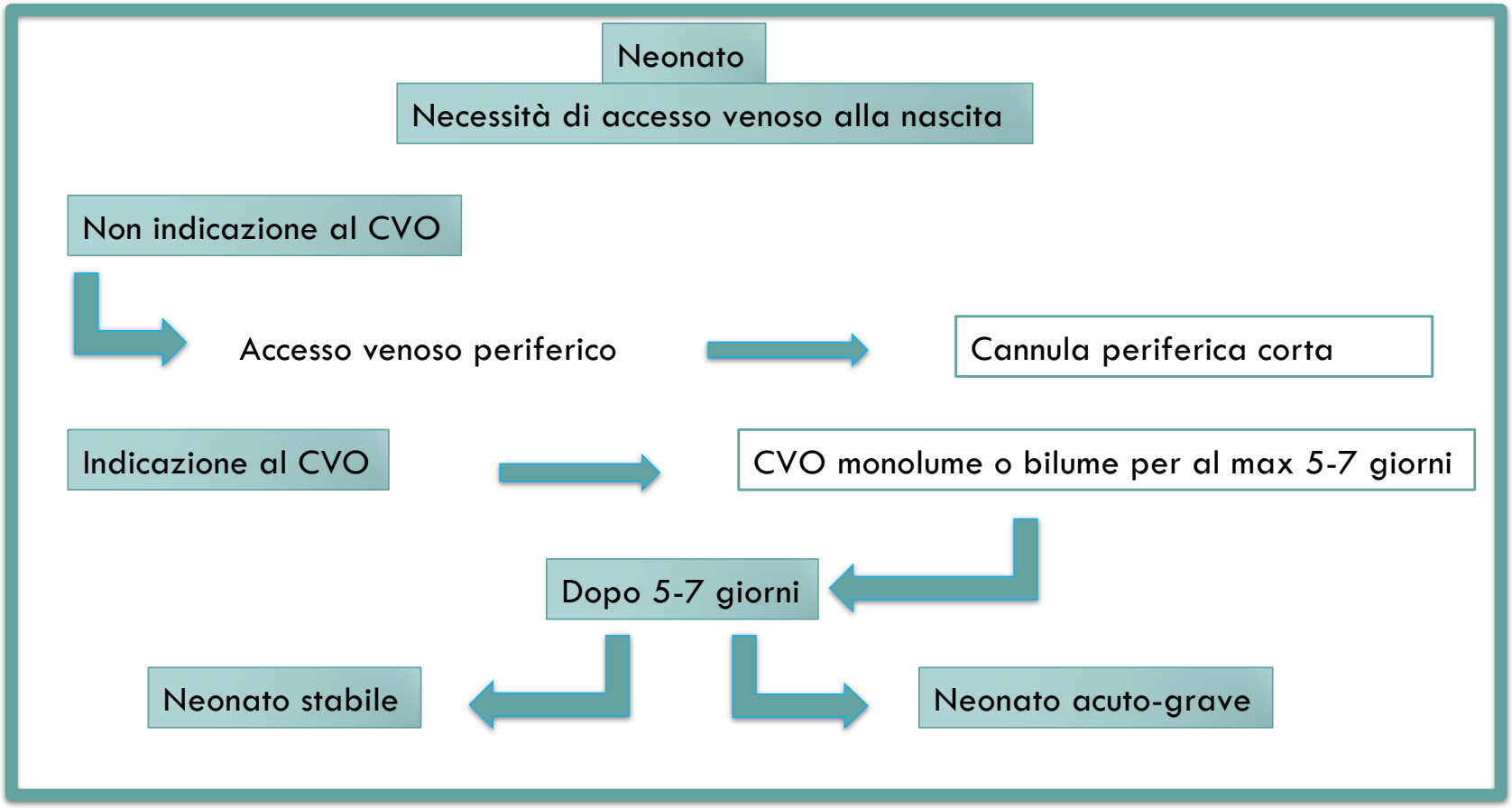
Gestation	UVC	UAC	PIV
≤26 wk	Recommended	Recommended	
27–28 wk	Recommended	Recommended for selected cases[a]	
≥29 wk	Avoid except in selected cases[a,b]	Recommended for selected cases[a]	Recommended

Standardizing umbilical cathether usage in preterm infants. Pediatrics 2015

Indicazioni

EG (sett)	Vena Omb.	Arteria Omb.	Vena Perif.
<26	SI	SI, se A o B	NO
27 - 28	SI	SI, se B	NO
29 - 31 + A o B o C o D o E o G	SI	NO	NO
29 - 31	NO	NO	SI
32 –33 + A o B o C o D o E	SI	NO	NO
32 –33 + F	NO	NO	SI
32 –33	NO	NO	NO
≥ 34 + A o B o C o D o E	SI	NO	NO
≥ 34 + F	NO	NO	SI
≥34	NO	NO	NO

A. *Ventilazione assistita con tubo OT*
B. *Instabilità emodinamica*
C. *CPAP con Fio2 >30%*
D. *Difficoltà reperire accesso periferico*
E. *SGA + centralizzazione del circolo/AED/ARED*
F. *PN < 1500 g*
G. *PN ≤ 1000 g*


Neonato
Necessità di accesso venoso alla nascita
Non indicazione al CVO
Accesso venoso periferico
Cannula periferica corta
Indicazione al CVO
CVO monolume o bilume per al max 5-7 giorni
Dopo 5-7 giorni
Neonato stabile
Neonato acuto-grave

QUALE ACCESSO SCEGLIERE?

La vera scelta cruciale è tra :

- AVP – Accesso venoso periferico
- ECC – epicutaneo cavale in vene superficiali
- CICC o FICC – catetere venoso in vene profonde

QUALE ACCESSO SCEGLIERE?

La vera scelta cruciale è tra :

- AVP – Accesso venoso periferico
- ECC – epicutaneo cavale in vene superficiali
- CICC o FICC – catetere venoso in vene profonde

INDICAZIONI AVP

Percutaneous central venous catheters versus peripheral cannulae for delivery of parenteral nutrition in neonates (Review)

Ainsworth S, McGuire W

Summary of Findings

Neonates with PICCs received higher proportions of prescribed volumes of parenteral nutrition compared with short peripheral cannulas (96.8% vs 89.7%, respectively; mean difference, 7.1% [95% CI, 3.2% to 11.0%]). No trials reported growth parameters. There were no associations of catheter type with in-hospital mortality (10/196 [5.1%] vs 8/203 [3.9%]; risk ratio [RR], 1.31 [95% CI, 0.36 to 4.81]), or extravasation injury (1/102 [1.0%] vs 5/106 [4.7%]; RR, 0.36 [95% CI, 0.07 to 1.75]) or invasive infection (67/271 [24.7%] vs 72/278 [25.9%]; RR, 0.95 [95% CI, 0.72 to 1.25]) (**Figure**). PICC use was associated with fewer subsequent catheters or cannulas inserted during the trial period (mean difference, −3.1 [95% CI, −4.1 to −2.06]).

Comparison of Findings With Current Guidelines

In 2011, the US Centers for Disease Control and Prevention Healthcare Infection Control Practices Advisory Committee guidelines[2] recommended PICC instead of a short peripheral cannula "when the duration of intravenous therapy will likely exceed six days." The findings of this meta-analysis support this.

QUALE ACCESSO SCEGLIERE?

La vera scelta cruciale è tra :

- AVP – Accesso venoso periferico
- ECC – epicutaneo cavale in vene superficiali
- CICC o FICC – catetere venoso in vene profonde

INDICAZIONI ECC

Percutaneous central venous catheters versus peripheral cannulae for delivery of parenteral nutrition in neonates (Review)

Ainsworth S, McGuire W

Summary of Findings

Neonates with PICCs received higher proportions of prescribed volumes of parenteral nutrition compared with short peripheral cannulas (96.8% vs 89.7%, respectively; mean difference, 7.1% [95% CI, 3.2% to 11.0%]). No trials reported growth parameters. There were no associations of catheter type with in-hospital mortality (10/196 [5.1%] vs 8/203 [3.9%]; risk ratio [RR], 1.31 [95% CI, 0.36 to 4.81]), or extravasation injury (1/102 [1.0%] vs 5/106 [4.7%]; RR, 0.36 [95% CI, 0.07 to 1.75]) or invasive infection (67/271 [24.7%] vs 72/278 [25.9%]; RR, 0.95 [95% CI, 0.72 to 1.25]) (**Figure**). PICC use was associated with fewer subsequent catheters or cannulas inserted during the trial period (mean difference, −3.1 [95% CI, −4.1 to −2.06]).

Comparison of Findings With Current Guidelines

In 2011, the US Centers for Disease Control and Prevention Healthcare Infection Control Practices Advisory Committee guidelines[2] recommended PICC instead of a short peripheral cannula "when the duration of intravenous therapy will likely exceed six days." The findings of this meta-analysis support this.

LIMITI ECC

- Non Power
- 1-2 Fr
- Bassi flussi (Premicath 1 ml/min; Twinflow 1.45 ml/min)
- Impossibilità di prelievo (SvO2)
- Non idoneo per emoderivati
- Durata incerta

VANTAGGI ECC

- Facilità di posizionamento
- Stabilità rispetto ad AVP
- Possibilità di infusioni ad alta osmolarità
- Idoneo soprattutto per funzioni nutrizionali nel pretermine

LIMITI ECC

- Non Power
- 1-2 Fr
- Bassi flussi (Premicath 1 ml/min; Twinflow 1.45 ml/min)
- Impossibilità di prelievo (SvO2)
- Non idoneo per emoderivati
- Durata incerta

VANTAGGI ECC

- Facilità di posizionamento
- Stabilità rispetto ad AVP
- Possibilità di infusioni ad alta osmolarità
- Idoneo soprattutto per funzioni nutrizionali nel pretermine

NON IDONEI NEL PAZIENTE CRITICO

LIMITI ECC

- Non Power
- 1-2 Fr
- Bassi flussi (Premicath 1 ml/min; Twinflow 1.45 ml/min)
- Impossibilità di prelievo (SvO2)
- Non idoneo per emoderivati
- Durata incerta

VANTAGGI ECC

- Facilità di posizionamento
- Stabilità rispetto ad AVP
- Possibilità di infusioni ad alta osmolarità
- Idoneo soprattutto per funzioni nutrizionali nel pretermine

DWELL TIME ECC

Use ECC only for intravenous therapy scheduled for 2 weeks or less

Although there is a certain uncertainty regarding the actual duration of an ECC, several reports show that – at least in preterm neonates – the risk of infective and mechanical complications of ECCs increases enormously after 14 days.[1–5] Therefore, in many neonatal intensive care units (NICUs), these lines are routinely replaced by new ones after 2 weeks. When the expected duration of intravenous infusion is beyond 2–3 weeks, a more appropriate option of central venous access is the placement of large-bore polyurethane catheters (3–4 Fr) by ultrasound-guided percutaneous puncture and cannulation of the internal jugular vein, of the brachiocephalic vein (CICC) or of femoral vein (FICC).[6] Many papers of the last few years have suggested that ultrasound-guided CICCs are feasible and safe even in very small neonates, with a high percentage of success and minimal risk, in experienced hands.[7–14] CICCs and FICCs offer several advantages not only in terms of performance (high flow, blood withdrawal, etc.), but also it is likely that they are associated with lower risk of complications (occlusion, secondary malposition, venous thrombosis, mechanical rupture, infection) if compared to ECC.[6,15,16]

Editorial

Epicutaneo-caval catheters in neonates: New insights and new suggestions from the recent literature

QUALE ACCESSO SCEGLIERE?

La vera scelta cruciale è tra :

- AVP – Accesso venoso periferico
- ECC – epicutaneo cavale in vene superficiali
- CICC o FICC – catetere venoso in vene profonde

Supraclavicular Approach to Ultrasound-Guided Brachiocephalic Vein Cannulation in Children and Neonates

Zied Merchaoui[1†], Ulrik Lausten-Thomsen[1,2†], Florence Pierre[1], Maher Ben Laiba[1], Nolwenn Le Saché[1] and Pierre Tissieres[1,2]*

[1] Pediatric and Neonatal Intensive Care Unit, Paris South University Hospitals, Le Kremlin-Bicêtre, Assistance Publique Hôpitaux de Paris, Paris, France, [2] Institute of Integrative Biology of the Cell, CNRS, CEA, University of Paris Sud, Paris Saclay University, Gif-sur-Yvette, France

Supraclavicular Ultrasound-Guided Catheterization of the Subclavian Vein in Pediatric and Neonatal ICUs: A Feasibility Study

Anne-Sophie Guilbert, MD[1]; Lorenço Xavier, MD[1]; Clément Ammouche, MD[1]; Philippe Desprez, MD[1]; Dominique Astruc, MD[2]; Pierre Diemunsch, PhD[3]; Jocelyne Bientz, MD[1]

Pediatr Surg Int (2010) 26:815–818
DOI 10.1007/s00383-010-2616-3

ORIGINAL ARTICLE

Ultrasound-guided percutaneous insertion of 2.7 Fr tunnelled Broviac lines in neonates and small infants

G. S. Arul · H. Livingstone · P. Bromley · J. Bennett

Pediatric Anesthesia

Pediatric Anesthesia ISSN 1155-5645

ORIGINAL ARTICLE

Ultrasound-guided supraclavicular cannulation of the brachiocephalic vein in infants: a retrospective analysis a case series

Christian Breschan[1], Manuela Platzer[1], Robert Jost[2], Haro Stettner[3], Georg Feigl[4] & Rudolf Lik

1 Department of Anaesthesia, Klinikum Klagenfurt, Klagenfurt, Austria
2 Department of Anaesthesia, Krankenhaus Spittal/Drau, Spittal/Drau, Austria
3 Department of Statistics, University of Klagenfurt, Klagenfurt, Austria
4 Department of Anatomy, Medical University of Graz, Graz, Austria

Ultrasound-Guided Subclavian Vein Cannulation in Low Birth Weight Neonates

Ulrik Lausten-Thomsen, MD, PhD[1]; Zied Merchaoui, MD[1]; Cécile Dubois, MD[1,2]; Sergio Eleni Dit Trolli, MD[1,3]; Nolwenn Le Saché, MD[1]; Mostafa Mokhtari, MD[1,4]; Pierre Tissières, MD, PhD[1–3]

….IN TIN

Dal neonato a termine

….IN TIN

Al neonato prematuro

....IN TIN

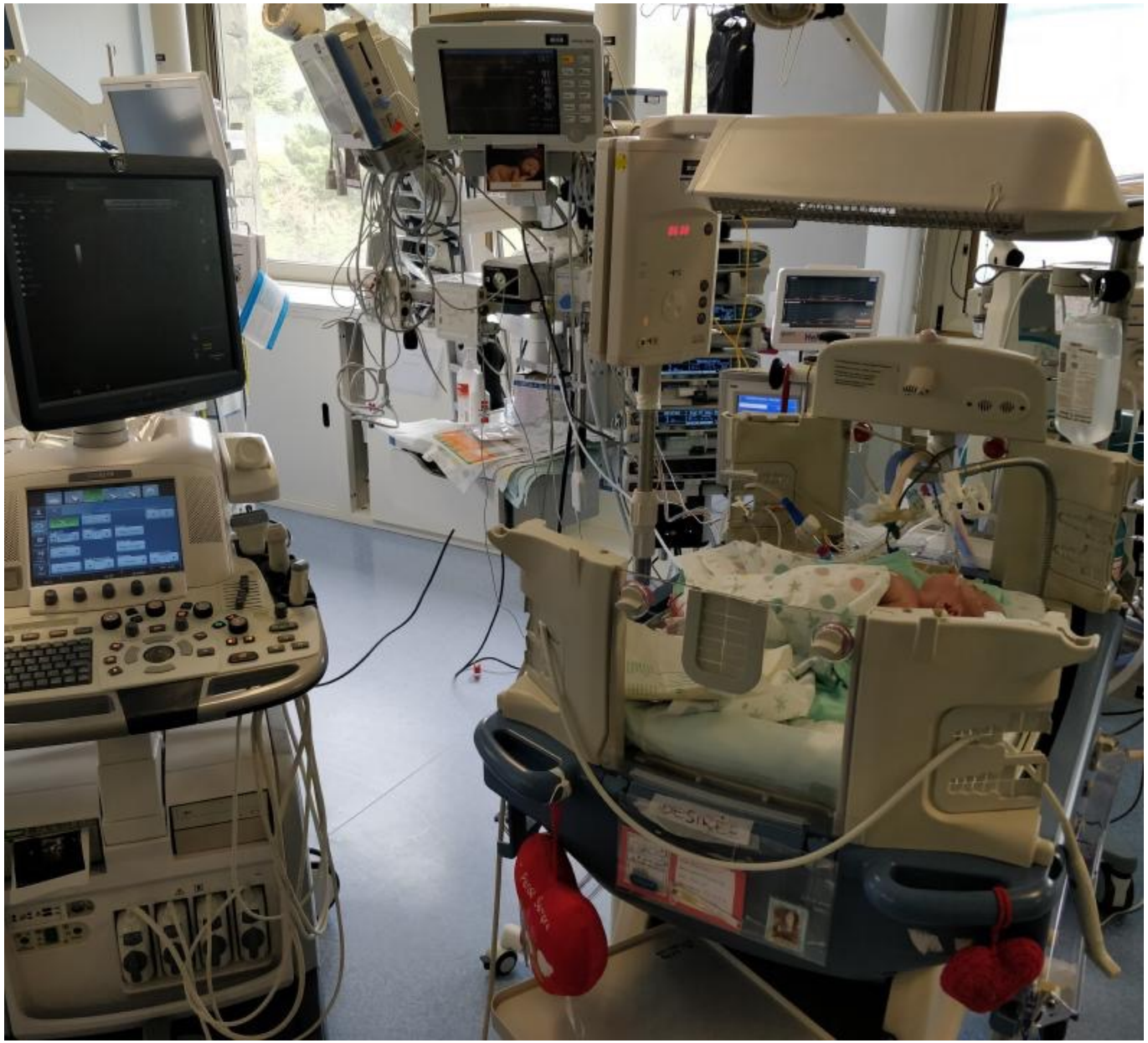


Table 4. Differences between epicutaneo-caval catheters (ECCs) and central inserted central catheters (CICCs).

	CICC	ECC
Venipuncture	Deep veins	Superficial veins
Ultrasound guidance	Yes	No
Catheter diameter	3–4 Fr	1–2.7 Fr
Sedation required	Yes	No
Power injectability	Yes	No
Maximal flow rate	60 mL/min	1 mL/min
Infusion of blood products	Yes	No
Monitoring of central venous pressure	Yes	No
Monitoring of SvO_2	Yes	No
Blood sampling	Yes	No
Tunneling	Yes	No
Tip location by intracavitary ECG	Yes	Yes
Limited dwell time	No	Yes
Possibility of CRBSI diagnosis by DTP	Yes	No

INDICAZIONI AL CICC NEL NEONATO

<u>Nel neonato acuto/grave</u>:

Neonati con instabilità emodinamica e necessità di monitoraggio della PVC e della SvO2 a qualunque età di vita (nell'impossibilità a posizionare un CVO o in caso di CVO malposizionato).

Neonato con patologia malformativa maggiore prima dell'intervento chirurgico (es atresia esofagea, onfalocele, gastroschisi etc).

Necessità di accesso centrale per rapida replezione volemica (in emergenza e/o in vista di interventi di chirurgia maggiore).

INDICAZIONI AL CICC NEL NEONATO

<u>Nei neonati pretermine stabile:</u>

Neonati pretermine con previsione di NP e terapia endovenosa prolungata (> 14 giorni).

Neonato pretermine con patologia gastrointestinale chirurgica (NEC o perforazione intestinale).

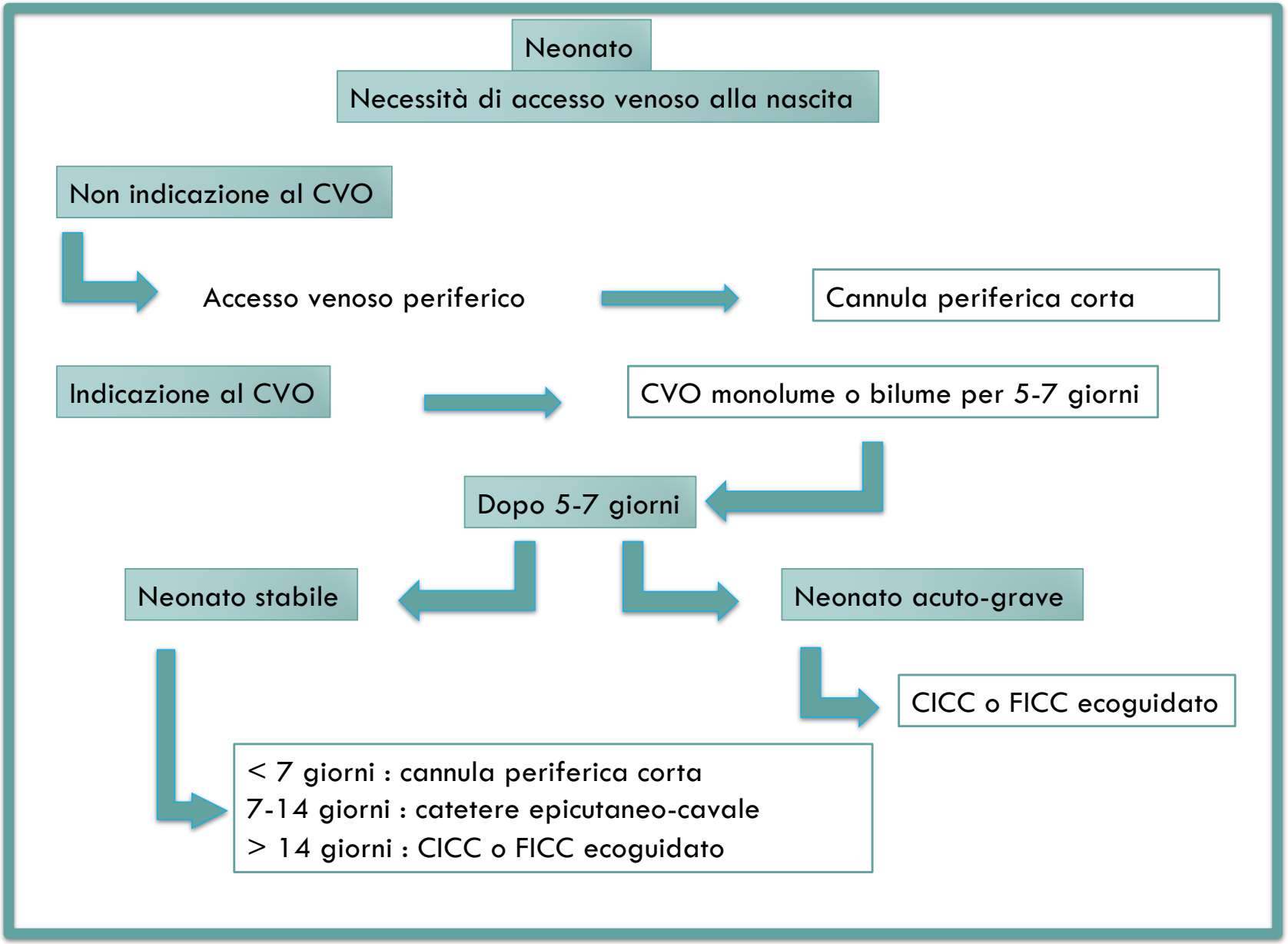
INDICAZIONI AL CICC NEL NEONATO

Altre situazioni particolari:

Neonati con BPD severa di tipo 2 (necessità di VM a 36 settimane di EPM) e necessità di terapia endovenosa.

Esaurimento del patrimonio venoso superficiale (es nel caso di necessità di ricorrere alle vene dello scalpo per esaurimento delle vene ai 4 arti).

Neonati nei quali - pur essendovi vene periferiche superficiali disponibili - la inserzione di un catetere epicutaneo cavale incontra difficoltà ripetute di posizionamento della punta.


Neonato
Necessità di accesso venoso alla nascita
Non indicazione al CVO
Accesso venoso periferico
Cannula periferica corta
Indicazione al CVO
CVO monolume o bilume per 5-7 giorni
Dopo 5-7 giorni
Neonato stabile
Neonato acuto-grave
CICC o FICC ecoguidato
< 7 giorni : cannula periferica corta
7-14 giorni : catetere epicutaneo-cavale
> 14 giorni : CICC o FICC ecoguidato

Neonato

Necessità di accesso venoso dopo la nascita (> 24h)

Neonato acuto-grave

→ CICC o FICC ecoguidato

Neonato stabile

→ < 7 giorni: cannula periferica corta
7-14 giorni: catetere epicutaneo-cavale
> 14 giorni: CICC o FICC ecoguidato

THE DAV EXPERT WORKS!

2020

JVA The Journal of Vascular Access

Original research article

The Journal of Vascular Access
1–9
© The Author(s) 2020
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1129729820940174
journals.sagepub.com/home/jva
SAGE

Centrally inserted central catheters in preterm neonates with weight below 1500 g by ultrasound-guided access to the brachio-cephalic vein

Giovanni Barone[1], Mauro Pittiruti[2], Gina Ancora[1], Giovanni Vento[3], Francesca Tota[4] and Vito D'Andrea[3]

THE DAV EXPERT WORKS!

Table 2. Patients' data, expressed as mean ± standard deviation and range or number and percentage.

Day of life at the insertion (days) (mean ± SD; min–max)	5 ± 7 (2–30)
Gestational age at birth (weeks) (mean ± SD; min–max)	26 ± 2 (23–32)
Birth weight (g) (mean ± SD; min–max)	848 ± 200 (370–1240)
Postmenstrual age at insertion (weeks) (mean ± SD; min–max)	27 ± 2 (24–32)
Weight at the time of insertion (g) (mean ± SD; min–max)	923 ± 205 (350–1500)

Table 3. Catheters' data, expressed as median ± SEM and range or number and percentage.

Dwell time; days ± SD (min–max)	37 ± 21 (2–95)
Elective removal	30 (100%)
CRBSI	0
Catheter-related thrombosis	0
Catheter malfunction	0

THE DAV EXPERT WORKS!

2021

THE JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE
https://doi.org/10.1080/14767058.2021.1922377

Taylor & Francis
Taylor & Francis Group

SHORT REPORT

Check for updates

Securement of central venous catheters by subcutaneously anchored suturless devices in neonates

Vito D'Andrea[a], Giovanni Barone[b], Lucilla Pezza[a], Giorgia Prontera[a], Giovanni Vento[a] and Mauro Pittiruti[c]

72 pazienti

Table 1. Demographics' population.

PMA at insertion (weeks)	31 ± 5.5
Weight at insertion (grams)	1400 ± 293
Indwelling time (days)	39 ± 25
Indication at insertion (n)	Surgery disease 30% (22)
	Respiratory distress syndrome 22% (16)
	BPD 20% (14)
	Prolonged parenteral nutrition 15% (11)
	Septic shock 8% (6)
	DIVAs >4% (3)
Elective removal	96%

THE DAV EXPERT WORKS!

2022

The intracavitary ECG method for tip location of ultrasound-guided centrally inserted central catheter in neonates

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

Table 1. Neonatal population and CICCs descriptive statistics. Values are expressed as median [IQR] or absolute number (percentage).

Population (*n*)	105
Gestational age (weeks)	32 [26–37]
Birth weight (g)	1890 [765–2845]
Age at time of insertion (days)	16 [7–67]
Weight at time of insertion (g)	2370 [1480–3140]
Indication at insertion (%)	Surgery disease 32 (30.4)
	respiratory distress syndrome 23 (21.9)
	BPD 21 (20)
	Prolonged parenteral nutrition 16 (15.2)
	Septic shock 9 (8.6)
	DIVAs >4 4 (3.8)
Reason for removal CICC (%)	Elective removal 85 (81)
	CRBSI 0.77/1000 line days

THE DAV EXPERT WORKS!

2022

A GAVeCeLT bundle for central venous catheterization in neonates and children: A prospective clinical study on 729 cases

Mauro Pittiruti[1], Davide Celentano[2], Giovanni Barone[3], Vito D'Andrea[4], Maria Giuseppina Annetta[5] and Giorgio Conti[2]

Table 4. Post-procedural complications.

	Neonates ($n = 68$)
Dislodgment	—
Local ecchymosis	—
Infection of the exit site	—
Local pain at the exit site	—

CONCLUSIONI

- Il DAV expert è un sistema esperto che propone un algoritmo decisionale semplice e chiaro per la scelta del dispositivo per accesso venoso più appropriato per in TIN.
- Tiene in considerazione PRO e CONTRO dei vari DAV nel neonato e delle necessità assistenziali dei pazienti.
- Tutti i lavori pubblicati dal GAVePed ne supportano la validità.
- Next steps? (sistema aperto)

Se di tanto in tanto non hai degli insuccessi, è segno che non stai facendo nulla di davvero innovativo

(W. Allen)

THANK
YOU
GRACIAS
ARIGATO
SHUKURIA
JUSPAXAR
BOLZÏN
MERCI
BIYAN
SHUKRIA
TASHAKKUR ATU
SUKSAMA
EKHMET
YAQHANYELAY
MEHRBANI
GRAZIE
DANKSCHEEN
GOZAIMASHITA
EFCHARISTO
KOMAPSUMMDA