



*Topic Expert Group: Patient safety and hygiene practice*

**Vascular access**

Van Rens R, Helder, O, Tissières P, Mader S, Thiele N, Borghesi A

*Target group*

Infants and parents

*User group*

Healthcare professionals, neonatal units, hospitals, and health services

*Statement of standard*

Vascular access is achieved in a competent, skillful and safe manner.

*Rationale*

Intravenous (IV) cannulation is among the most common and widespread medical procedures performed on critically ill infants in the NICU. (1) Treatment frequently depends on the use of peripheral or central vascular access devices (VADs) to administer fluids, nutrients, and medication. (2–4) There are several types of VADs, which are inserted into either a vein or an artery. Factors such as body weight, fluid characteristics, availability of venous access sites, and anticipated length of access needed are taken into account when siting a VAD. The frequency of complications, including infiltration/extravasation, leaking, occlusion, thrombosis, and infections, has remained relatively constant over the past 30 years. (5–15)

*Benefits*

*Short-term benefits*

- Reduced number of skin breaking and painful procedures (16,17)
- Reduced occurrence of complications e.g. infections (18)

*Long-term benefits*

- Reduced late consequences of early exposure to antibiotics (consensus)
- Reduced risk of long-term consequences of painful procedures for infants and parents (19)

*Components of the standard*

<b>Component</b>	<b>Grading of evidence</b>	<b>Indicator of meeting the standard</b>
For parents and family		
1. Parents are informed by healthcare professionals about the need and procedure for achieving vascular access.	B (High quality)	Patient information sheet
2. Parents are encouraged and guided to comfort the infant if feasible by	B (High quality)	Patient information sheet



healthcare professionals. (20) (see TEG  
Care procedures)

**For healthcare professionals**

- |  |  |                        |
|--|--|------------------------|
| 3. A unit guideline on the aseptic insertion and maintenance of vascular access devices (VADs) is adhered to by all healthcare professionals. (21)   | A (High quality)<br>B (High quality)         | Guideline              |
| 4. The necessity for ongoing vascular access is identified.  | B (High quality)                             | Guideline              |
| 5. The procedure is approached in a developmentally supportive manner using (none)-pharmacological pain relieving treatment. (10,22–26) (see TEG Infant-and family-centred developmental care) | A (Moderate quality)<br>B (Moderate quality) | Guideline              |
| 6. Training on the insertion of VADs is attended by all responsible healthcare professionals.  | B (High quality)                             | Training documentation |

**For neonatal unit**

- |  |                  |           |
|--|------------------|-----------|
| 7. A unit guideline on the aseptic insertion and maintenance of VADs is available and regularly updated. | B (High quality) | Guideline |
|--|------------------|-----------|

**For hospital**

- |  |                  |                        |
|--|------------------|------------------------|
| 8. Training on the aseptic insertion of VADs is ensured.                                       | B (High quality) | Training documentation |
| 9. Equipment to administer and monitor infusion therapy is suitable for a neonatal population. | B (High quality) | Audit report           |

**For health service**

- |   |                  |           |
|---|------------------|-----------|
| 10. A national guideline on the aseptic insertion and maintenance of VADs is available and regularly updated. | B (High quality) | Guideline |
|---|------------------|-----------|



### *Where to go – further development of care*

<b>Further development</b>	<b>Grading of evidence</b>
For parents and family N/A	
For healthcare professionals N/A	
For neonatal unit and hospital	
<ul style="list-style-type: none"><li>Optimise the use of specially trained vascular access professionals.</li></ul>	A (Low quality) B (Moderate quality)
For health service	
<ul style="list-style-type: none"><li>Develop a European Vascular Access Certification programme for all healthcare professionals in the field.</li></ul>	B (Moderate quality)

### *Getting started*

#### **Initial steps**

##### For parents and family

- Parents are verbally informed by healthcare professionals about the need and procedure for achieving vascular access.
- If present, parents are invited to support their infant before, during and after the insertion of vascular access devices (VADs).

##### For healthcare professionals

- Attend training on the aseptic insertion and maintenance of VADs.

##### For neonatal unit

- Develop and implement a unit guideline on the aseptic insertion and maintenance of VADs.
- Provide a flow chart that guarantees most appropriate Vascular Access Device to meet each infant's current and anticipated needs. (23)
- Provide a vascular visualisation device for vascular assessment and insertion support if required.
- Conduct data collection and compliance monitoring.
- Develop information material for parents on the need and procedure for achieving vascular access. (10,24,25)

##### For hospital

- Support healthcare professionals to participate in training on peripheral and central venous/arterial access.
- Provide a vascular visualisation device for vascular assessment and insertion support if required.

##### For health service

- Develop and implement a national guideline on the aseptic insertion and maintenance of VADs including indication for insertion, type of device, access visualisation, and management of access and complications.



## Source

1. Zempsky WT. Optimizing the management of peripheral venous access pain in children: evidence, impact, and implementation. *Pediatrics*. 2008 Nov;122 Suppl 3:S121-124.
2. Millam DA. Managing complications of i.v. therapy (continuing education credit). *Nursing (Lond)*. 1988 Mar;18(3):34-43.
3. Carbajal R, Rousset A, Danan C, Coquery S, Nolent P, Ducrocq S, et al. Epidemiology and treatment of painful procedures in neonates in intensive care units. *JAMA*. 2008 Jul 2;300(1):60-70.
4. Pettit J. Assessment of the infant with a peripheral intravenous device. *Adv Neonatal Care Off J Natl Assoc Neonatal Nurses*. 2003 Oct;3(5):230-40.
5. Franck LS, Hummel D, Connell K, Quinn D, Montgomery J. The safety and efficacy of peripheral intravenous catheters in ill neonates. *Neonatal Netw NN*. 2001 Aug;20(5):33-8.
6. Batton DG, Maisels MJ, Appelbaum P. Use of peripheral intravenous cannulas in premature infants: a controlled study. *Pediatrics*. 1982 Sep;70(3):487-90.
7. Reynolds J. Comparison of percutaneous venous catheters and teflon catheters for intravenous therapy in neonates. *Neonatal Netw NN*. 1993 Aug;12(5):33-9.
8. Stanley MD, Meister E, Fuschuber K. Infiltration during intravenous therapy in neonates: comparison of Teflon and Vialon catheters. *South Med J*. 1992 Sep;85(9):883-6.
9. Sheehan AM, Palange K, Rasor JS, Moran MA. Significantly improved peripheral intravenous catheter performance in neonates: insertion ease, dwell time, complication rate, and costs. *J Perinatol Off J Calif Perinat Assoc*. 1992 Dec;12(4):369-76.
10. Johnston C, Campbell-Yeo M, Disher T, Benoit B, Fernandes A, Streiner D, et al. Skin-to-skin care for procedural pain in neonates. *Cochrane Neonatal Group, editor. Cochrane Database Syst Rev [Internet]*. 2017 Feb 16 [cited 2018 May 8]; Available from: <http://doi.wiley.com/10.1002/14651858.CD008435.pub3>
11. Tobin CR. The Teflon intravenous catheter: incidence of phlebitis and duration of catheter life in the neonatal patient. *J Obstet Gynecol Neonatal Nurs JOGNN*. 1988 Feb;17(1):35-42.
12. Collinge JM, Aranda JV. Nonmetabolic complications of neonatal intravenous therapy: epidemiologic considerations. *Am J Perinatol*. 1984 Jan;1(2):185-9.
13. Phelps SJ, Cochran EB. Effect of the continuous administration of fat emulsion on the infiltration of intravenous lines in infants receiving peripheral parenteral nutrition solutions. *JPEN J Parenter Enteral Nutr*. 1989 Dec;13(6):628-32.
14. Hecker JF. Failure of intravenous infusions from extravasation and phlebitis. *Anaesth Intensive Care*. 1989 Nov;17(4):433-9.
15. Webb AA. Methods of intravenous therapy in preterm infants. *Issues Compr Pediatr Nurs*. 1987;10(4):215-21.
16. Ainsworth S, McGuire W. Percutaneous central venous catheters versus peripheral cannulae for delivery of parenteral nutrition in neonates. *Cochrane Database Syst Rev*. 2015 Oct 6;(10):CD004219.
17. Ainsworth SB, McGuire W. Peripherally Inserted Central Catheters vs Peripheral Cannulas for Delivering Parenteral Nutrition in Neonates. *JAMA*. 2016 Jun 21;315(23):2612-3.



18. Barría RM, Lorca P, Muñoz S. Randomized controlled trial of vascular access in newborns in the neonatal intensive care unit. *J Obstet Gynecol Neonatal Nurs JOGNN*. 2007 Oct;36(5):450–6.
19. Grunau RE. Neonatal pain in very preterm infants: long-term effects on brain, neurodevelopment and pain reactivity. *Rambam Maimonides Med J*. 2013;4(4):e0025.
20. Skene C, Franck L, Curtis P, Gerrish K. Parental involvement in neonatal comfort care. *J Obstet Gynecol Neonatal Nurs JOGNN*. 2012 Dec;41(6):786–97.
21. Phipps K, Modic A, O’Riordan MA, Walsh M. A randomized trial of the Vein Viewer versus standard technique for placement of peripherally inserted central catheters (PICCs) in neonates. *J Perinatol Off J Calif Perinat Assoc*. 2012 Jul;32(7):498–501.
22. Hartley KA, Miller CS, Gephart SM. Facilitated tucking to reduce pain in neonates: evidence for best practice. *Adv Neonatal Care Off J Natl Assoc Neonatal Nurses*. 2015 Jun;15(3):201–8.
23. Catelin C, Tordjman S, Morin V, Oger E, Sizun J. Clinical, physiologic, and biologic impact of environmental and behavioral interventions in neonates during a routine nursing procedure. *J Pain Off J Am Pain Soc*. 2005 Dec;6(12):791–7.
24. Vinall J, Grunau RE. Impact of repeated procedural pain-related stress in infants born very preterm. *Pediatr Res*. 2014 May;75(5):584–7.
25. Vinall J, Miller SP, Bjornson BH, Fitzpatrick KPV, Poskitt KJ, Brant R, et al. Invasive Procedures in Preterm Children: Brain and Cognitive Development at School Age. *PEDIATRICS*. 2014 Mar 1;133(3):412–21.
26. Stevens B, Yamada J, Ohlsson A, Haliburton S, Shorkey A. Sucrose for analgesia in newborn infants undergoing painful procedures. *Cochrane Neonatal Group, editor. Cochrane Database Syst Rev [Internet]*. 2016 Jul 15 [cited 2018 May 8]; Available from: <http://doi.wiley.com/10.1002/14651858.CD001069.pub5>

First version, November 2018

### *Lifecycle*

5 years/next revision: 2023

### *Recommended citation*

EFCNI, Van Rens R, Helder, O et al., European Standards of Care for Newborn Health: Vascular access. 2018.