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Alternative devices for DIVA patients and operating theatres

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16 January 2020 Edinburgh



Universitair Ziekenhuis Brussel

Universitair Ziekenhuis Brussel



- University Hospital Brussels
- 721 beds
- 30 000 hospitalisations / year
- 15 000 surgery / year





- **Intravenous therapy team**
 - Anesthesiology department
 - Specialized nurses catheter team
 - Radiology department
 - Hospital hygiene and microbiology service
 - Pharmacy
 - Oncology and paliative care departmenet
 - Surgery department
 - Intensive care department
 - Emergency department
 - Pediatric department

Meeting once a month.

Alternative devices for DIVA patients and operating theatres

- **1st step of decision making :**

What kind of intravenous access is indicated pre- and postoperatively following the guidelines

- **2nd step of decision making;**

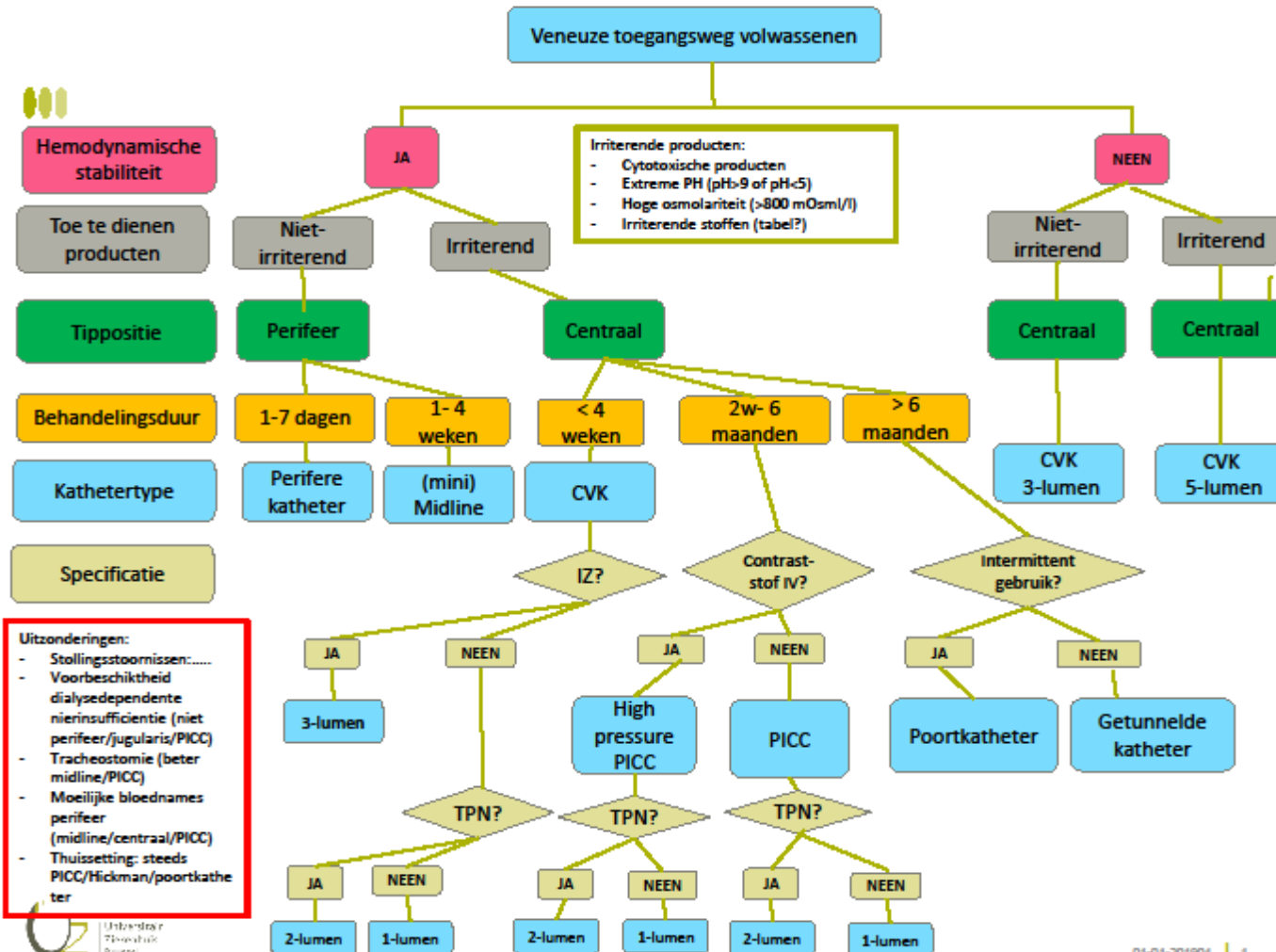
is to identify the DIVA patients

and to join the 1st and the 2nd decision making in the specific case

- **Emergency setting**

- **Specific population (children, elderly...)**

Vascular Access Device Decision Tree



A clinical pathway for the management of difficult venous access



Conclusion

The use of ultrasound guidance for peripheral intravenous catheter insertion by the after-hours clinical support team for patients with difficult venous access has been successful at our institution with 9 out of every 10 catheters inserted at first attempt with significantly lower recorded pain scores.

Pain scores were also significantly lower with ultrasound guidance compared to attempts without ultrasound.

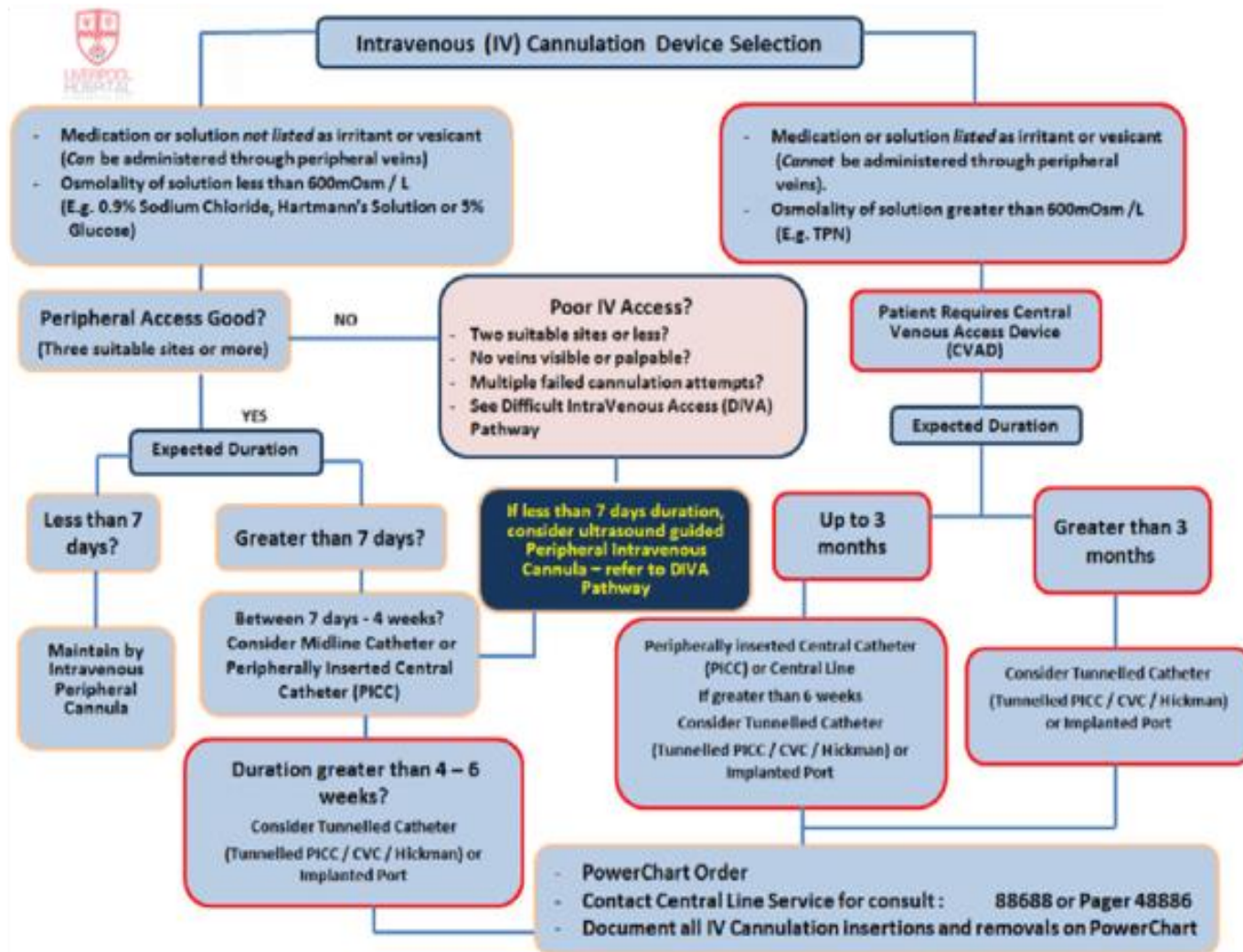
A clinical pathway for the management of difficult venous access

December 2017- BMC Nursing 16

Vanno Sou, Craig McManus, Nicholas Mifflin, Steven A, Frost, Julie Ale, Evan Alexandrou

A clinical pathway for the management of difficult venous access

December 2017 – BMC Nursing 16



Alternative devices for DIVA patients and operating theatres

The Modified A-DIVA Scale as **a Predictive Tool**



Journal of
Clinical Medicine

- 3587 participants
- The first attempt success rate was 81%
- Five variables were included in the prediction model:
 - a history of difficult intravenous cannulation,
 - a difficult intravenous access as expected by the practitioner,
 - the inability to detect a dilated vein by palpating and
 - /or visualizing the extremity, and
 - a diameter of the selected vein less than 3 millimeters

The Modified A-DIVA Scale as a Predictive Tool for Prospective Identification of Adult Patients at Risk of a Difficult Intravenous Access: A Multicenter Validation Study

Journal of Clinical Medicine-Published: 26 January 2019

Fredericus H. J. van Loon, Loes W. E. van Hooff, Hans D. de Boer, Seppe S. H. A. Koopman, Marc P. Buise, Hendrikus H. M. Korsten, Angelique T. M. Dierick-van Daele and Arthur R. A. Bouwman

The Modified A-DIVA Scale as **a Predictive Tool** for Prospective Identification of Adult Patients at Risk of a Difficult Intravenous Access: A Multicenter Validation Study

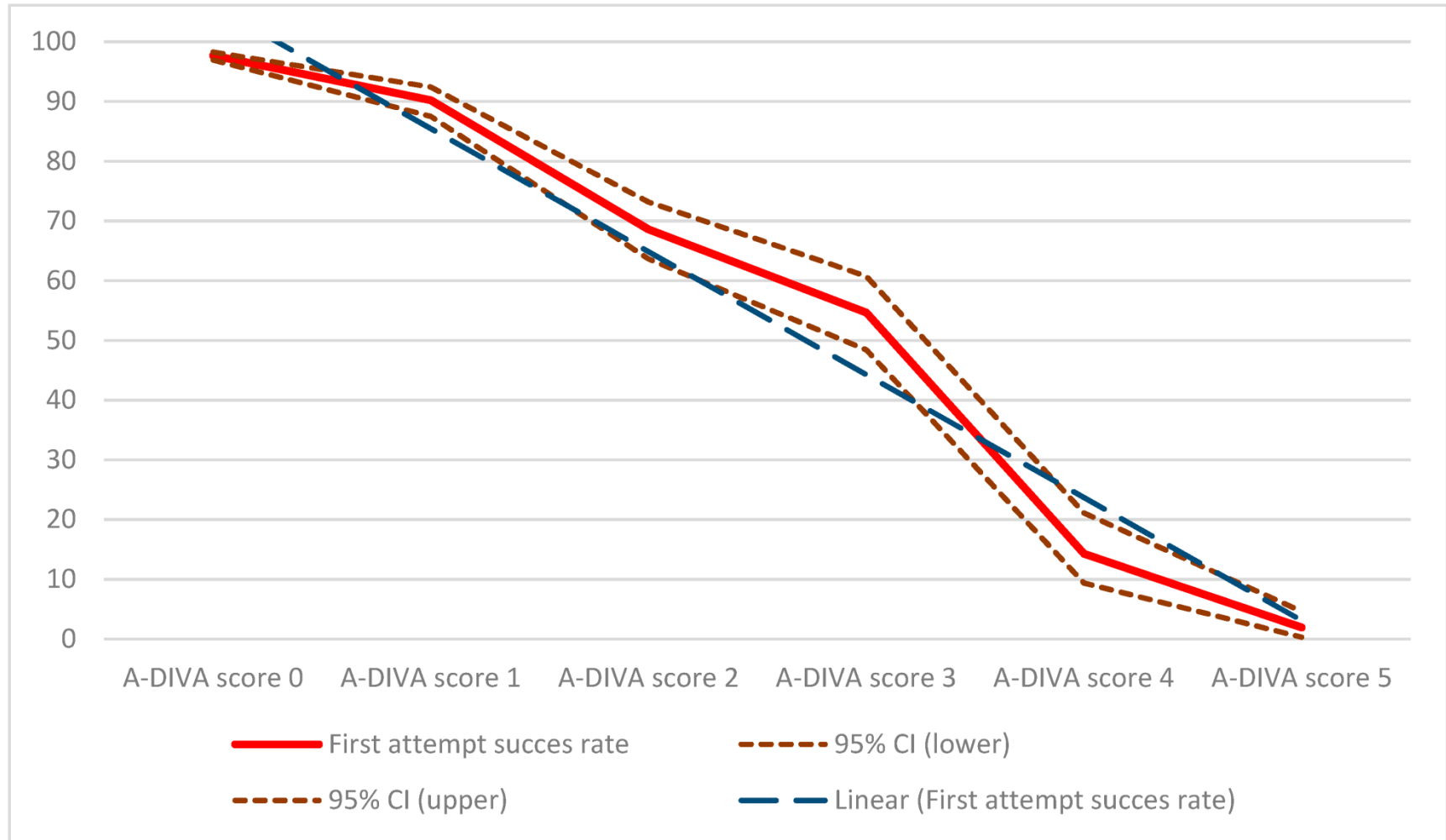
- The 1st attempt success rate of the total cohort was 81% (2923 participants)
- 2 attempts were needed in 425 participants (12%),
- whereas 138 participants (4%) needed 3 attempts,
- 33 participants (1%) needed 4 attempts, and
- 68 participants (2%) needed 5 punctures or more to create an intravenous access.

In conclusion:

the five-variable additive A-DIVA scale, as created in this study, is **a reliable and generalizable predictive scale** to identify patients at risk of a difficult intravenous access.

The **A-DIVA scale is validated** both internally and externally as a result of this study. The A-DIVA scale can therefore be used in clinical practice.

The Modified A-DIVA Scale as a Predictive Tool for Prospective Identification of Adult Patients at Risk of a Difficult Intravenous Access: A Multicenter Validation



Alternative devices for DIVA patients and operating theatres

- Catheter type
- Choice of device
- Risk assessment

Mini-midline in difficult intravenous access patients in emergency department: A prospective analysis



A total of 46 patients out of 50 were monitored. In 38 (82%) patients, the device was removed due to the end of the indication, and in six of them, it was replaced by a central venous catheter.

Conclusion:

The insertion of a mini-midline as part of the first emergency room visit in selected patients is a rapid, safe, and cost-effective procedure, which can provide the patient with stable venous access during the all hospitalization time.

Mini-midline in difficult intravenous access patients in emergency department: A prospective analysis

The Journal of Vascular Access

First Published October 24, 2019

Gilardi E., Gianuzzi R, Woldeselassi K., Piano A., Pittiruti M., Scopettuolo G,

Mini-Midline a New Device for Peripheral Venous Catheterization UN Emergency Wards



Discussion: It has been proved that a mini-midline can be rather effective in emergency wards as well. With its swiftness and highly effective placement, mini-midline turns out to be very useful for those patients that need a sound and secure vascular access because of their highly critical situation.

Conclusion:

Mini-midline, if implanted by fully qualified personnel, allows choosing more wisely the devices of venous catheterization, thus avoiding the improper use of other vascular devices like, for example, central venous catheters.

Mini-Midline a New Device for Peripheral Venous Catheterization UN Emergency Wards

The *Journal of Anesthesia & Intensive Care Medicine* (JAICM) Published: March 20, 2018
Morosini Irisneida, Lucenti Enrico, Mozzarelli Fabio and Raffo Emiliano

The Midline Catheter: A Clinical Review

Objective

To compare venous access device indications and complications, highlighting the use of midline catheters as a potentially cost-effective and safe approach for venous access in the ED.



Conclusion

The MC is a versatile venous access device with a **low complication rate, long dwell time, and high rate of first-attempt placement.**

Its utilization in the ED in patients deemed to require prolonged hospitalization or to have difficult-to-access peripheral vasculature could reduce cost and risk to patients.

The Midline Catheter: A Clinical Review

The Journal of Emergency Medicine

Volume 51, Issue 3, September 2016, Pages 252-258

Daniel Z.Adams MD ,Andrew Little DO Charles Vinsant MD Sorabh Khandelwal MD

Recommendations on the Use of Ultrasound Guidance for Central and Peripheral Vascular Access in Adults: A Position Statement of the Society of Hospital Medicine

Peripheral Venous Access Techniques

Journal of
Hospital Medicine

15) We recommend that providers should use **real-time ultrasound guidance** for the insertion of peripherally inserted central catheters (PICCs), which is associated with higher procedure success rates and may be more cost effective compared with landmark-based techniques.

16) We recommend that providers should use **real-time ultrasound guidance** for the placement of peripheral intravenous lines (**PIV**) in patients with difficult peripheral **venous access** to reduce the total procedure time, needle insertion attempts, and needle redirections. Ultrasound-guided PIV insertion is also an effective alternative to CVC insertion in patients with difficult venous access.

17) We suggest using real-time **ultrasound guidance to reduce the risk of vascular, infectious, and neurological complications during PIV insertion**, particularly in patients with difficult venous access.

Recommendations on the Use of Ultrasound Guidance for Central and Peripheral Vascular Access in Adults: A Position Statement of the Society of Hospital Medicine

Franco-Sadud R, Schnobrich D, Mathews BK, Candotti C, Abdel-Ghani S, Perez MG, Rodgers SC, Mader MJ, Haro EK, Dancel R, Cho J, Grikis L, Lucas BP; SHM Point-of-care Ultrasound Task Force, Soni NJ

J Hosp Med. 2019 Sep 6;14:E1-E22. doi: 10.12788/jhm.3287. [Epub ahead of print]

Ultrasound-guided deep-arm veins insertion of long peripheral catheters in patients with difficult venous access after cardiac surgery

Objectives

To analyze success rate, dwell-time, and complications of long peripheral venous catheters (L-PVCs) inserted under ultrasound guidance.



Conclusion

L-PVC could be a viable solution in DVA patients, as it may **reduce the need for multiple vein punctures, patients' discomfort, and nursing workload**. A **better** adherence to catheter management recommendations should further reduce complications

Ultrasound-guided deep-arm veins insertion of long peripheral catheters in patients with difficult venous access after cardiac surgery

Heart & Lung

Volume 46, Issue 1, January–February 2017, Pages 46-53

Fabiani A., Dreas L., Sanson G.

Efficacy of Ultrasound-Guided Peripheral Intravenous Access: A Systematic Review and Meta-Analysis

BACKGROUND:

Peripheral intravenous access is a common, invasive procedure that is performed in clinical practice.

Difficult intravenous access may not only jeopardize patient safety but also increase staff stress, nursing hours, and material costs.

CONCLUSIONS / IMPLICATIONS FOR PRACTICE:

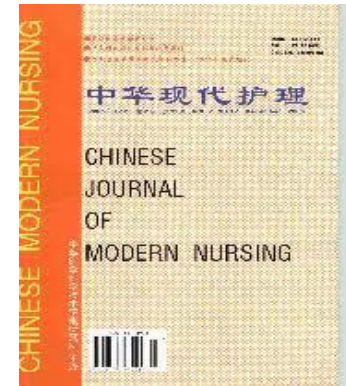
The ultrasound-guided technique **may improve the efficacy of intravenous access** by helping health care professionals visualize the peripheral veins.

We suggest that patient characteristics, ultrasound accessibility, and the feasibility of staff training be assessed in order to provide ultrasound guidance that improves the efficacy of intravenous access

Efficacy of Ultrasound-Guided Peripheral Intravenous Access: A Systematic Review and Meta-Analysis

Hu Li Za Zhi. 2016 Dec;63(6):89-101. doi: 10.6224/JN.63.6.89Dec;63(6):89-101. doi: 10.6224/JN.63.6.89.

[Kuo CC, Wu CY, Feng JJ, Lee WJ]



Ultrasound guidance for difficult peripheral venous access: systematic review and meta-analysis

OBJECTIVES: This systematic review and meta-analysis aimed to determine the clinical effectiveness of Ultrasound-guided peripheral intravenous cannulation compared with the standard technique in patients known to have difficult access.



CONCLUSION:

Ultrasound guidance increases the likelihood of successful peripheral cannulation in difficult access patients.

We recommend its use in patients who have difficult venous access, and have failed venous cannulation by standard methods.

Ultrasound guidance for difficult peripheral venous access: systematic review and meta-analysis

Emerg Med J. 2013 Jul;30(7):521-6. doi: 10.1136/emmermed-2012-201652.

Egan G¹, Healy D, O'Neill H, Clarke-Moloney M, Grace PA, Walsh SR.

Development of a nurse-led ultrasound-guided peripheral intravenous program

Conclusion:

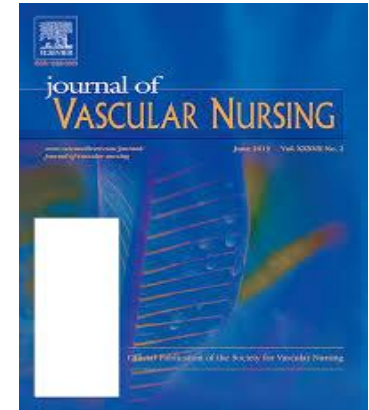
Point-of-care US to insert PIVs in patients with DVA

is becoming commonplace in the health-care arena.

For minimal cost, compared with one single CLABSI,

a nurse-led USGPVA can be established.

RNs can be effectively educated in a short period of time.



Although, first-attempt success rates vary, and through the literature, a common theme emerges: **first-attempt PIV success rates are enhanced by using US and increase as the nurse gains experience, thus reducing hospitalized acquired infections by avoiding the need for CVCs.**

Development of a nurse-led ultrasound-guided peripheral intravenous program

Journal of Vascular Nursing

Volume 37, Issue 4, December 2019, Pages 246-249

Chad Stuckey PhD, DNP, CRNA; Mary P. Curtis PhD, ANP-BC

Veinplicity versus heat treatment for vein dilation: A randomised cross-over study

BACKGROUND:

Patients with difficult venous access require special measures to facilitate cannulation. **Veinplicity applies mild electrical stimulation to forearm veins to aid vessel dilation.**

CONCLUSION:

Veinplicity dilates forearm veins **more effectively and for a longer time than commonly used heat packs.**

**Veinplicity versus heat treatment for vein dilation:
A randomised cross-over study.**

J Vasc Access. 2019 Sep;20(5):530-536. Epub 2019 Jan 4.
Barton A.



Use of intra-osseous access in adults: a systematic review

Background

Indications for intra-osseous (IO) infusion are increasing in adults requiring administration of fluids and medications during initial resuscitation.

However, this route is rarely used nowadays due to **a lack of knowledge and training.**

Conclusions

The use of IO infusion, which was initially reserved for children, is increasing in adults, and is **an alternative choice for vascular access in emergency situations** today.

Besides the patient in cardiac arrest, IO access is usable for patients with trauma, shock and, more globally, for every patient requiring emergency parenteral access and having difficult IV access.

Use of intra-osseous access in adults: a systematic review

F. Petitpas, J. Guenezan T. Vendeuvre M. Scepi, D. Oriot & O. Mimoz

Critical Care volume 20, Article number: 102 (2016)



Risk factors for a difficult intravenous access: A multicentre study comparing nurses' beliefs to evidence

JCN
Journal of
Clinical Nursing

BACKGROUND:

Peripheral intravenous cannulation is a common procedure for nurses, but rates of failure at first attempt of peripheral intravenous cannulation range 10%-40%.

Nurses' beliefs about difficult intravenous access factors might influence their clinical practice more than current evidence.

CONCLUSIONS:

An overall congruence between nurses' beliefs and evidence about risk factors for difficult intravenous access was found.

With their expertise, nurses may fill the knowledge gap of clinical evidence and open new paths for clinically meaningful research.

Risk factors for a difficult intravenous access: A multicentre study comparing nurses beliefs to evidence

J Clin Nurs. 2019 Oct;28 (19-20):3492-3504. doi: 10.1111/jocn.14941.

Epub 2019 Jun Piredda M, Fiorini J, Facchinetti G, Biagioli V, Marchetti A, Conti F, Iacorossi L, Giannarelli D, Matarese M, De Marinis MG.

Ultrasound-guided techniques for peripheral intravenous placement in children with difficult venous access

Recommendations:

- Ultrasound for vein localization (Short axis - out of plane)
- Catheter over needle
- Catheter over wire



Ultrasound-guided techniques for peripheral intravenous placement in children with difficult venous access

Paediatr Anaesth. 2019 Dec 6. doi: 10.1111/pan.13780

Munshey F. Parra DA. McDonnell C. Matava C.

4 KEY LEARNING POINTS

- The **utility of ultrasound guidance for peripheral intravenous placement in awake children** with difficult access has shown **inconsistent results and minor clinical benefits** thus far
- The **utility of ultrasound guidance for peripheral intravenous placement in children** with difficult access under **deep sedation or general anesthesia** has shown significant clinical benefits
- The **short axis out of plane ultrasound** view is more commonly used in comparison with the long axis in-plane view due to the small diameter of veins in children
- With the short axis out of plane ultrasound view, **several different needle approaches** can be used, each with its advantages and disadvantages
- **Dynamic needle tip positioning with a short axis out of plane ultrasound view** is a promising technique that allows accurate needle tip localization and may increase the success rate of peripheral intravenous placement, even in small children, under deep sedation or general anesthesia

REFLECTIVE QUESTIONS

- What percentage of the patients you provide anesthesia for have a history of DiVA?
- What alternative techniques do you use to place a PIV when a landmark technique has failed?
- What is your first attempt success rate for an US-guided PIV?
- Do you have access to phantom limb models? How much training would you need to become confident in US-guided PIV placement? Does your department have an ultrasound expert willing to provide an US-guided PIV training session?

Near-Infrared Light Device in Pediatric Intravenous Cannulation: A Randomized Controlled Trial

- Use of a near-infrared light device **did not show a benefit in first-attempt** success rate in IV placement among pediatric patients in a large children's hospital ED
- Use of the device was associated with **lower first-attempt success rates in:**
 - patients aged 0 to 1 year,
 - those weighing less than 10 kg,
 - patients with an underlying chronic disease,
 - those undergoing cannulation for a laboratory draw, or
 - those receiving topical anesthetic before cannulation
- **its use may benefit a subset of patients** such as those:
 - significantly dehydrated with subsequently less visible or palpable veins,
 - those with chronic medical conditions affecting the skin or necessitating multiple past placements, and
 - those who have high weight for age or are obese with adipose tissue overlying or interposed with their veins.

Efficacy of a Near-Infrared Light Device in Pediatric Intravenous Cannulation: A Randomized Controlled Trial

Perry, Andrew M. MD; Caviness, Alison Chantal MD, MPH, PhD; Hsu, Deborah C. MD, MEd
Pediatric Emergency Care: [January 2011 - Volume 27 - Issue 1 - p 5-10](#)

Factors affecting the first-attempt success rate of intravenous cannulation in older people

Background

In older patients who require Intravenous treatment, establishing a PIVC as fast as possible is clinically important.



Conclusion

Factors affecting first-attempt success rates in peripheral intravenous catheter placement in older emergency department patients may be listed as follows:

- the anticipated difficulty of the procedure rated by the nurse,
- previous history of a difficult intravenous cannulation,
- choosing a nonupper extremity site for cannulation,
- the level of experience of the nurse and
- the palpability of the vein

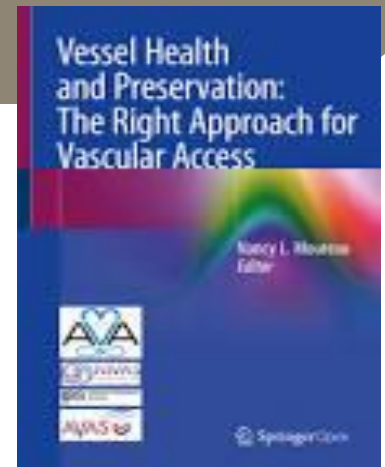
Factors affecting the first-attempt success rate of intravenous cannulation in older people

J Clin Nurs. 2019 Jun;28(11-12):2206-2213

Yalçınlı S, Akarca FK, Can Ö, Şener A, Akbınar C

Vessel Health and Preservation Device Selection

Reducing risk and unnecessary harm in the hospital environment begins with assessment of the patient's condition, history, risk assessment and relative vessel health.



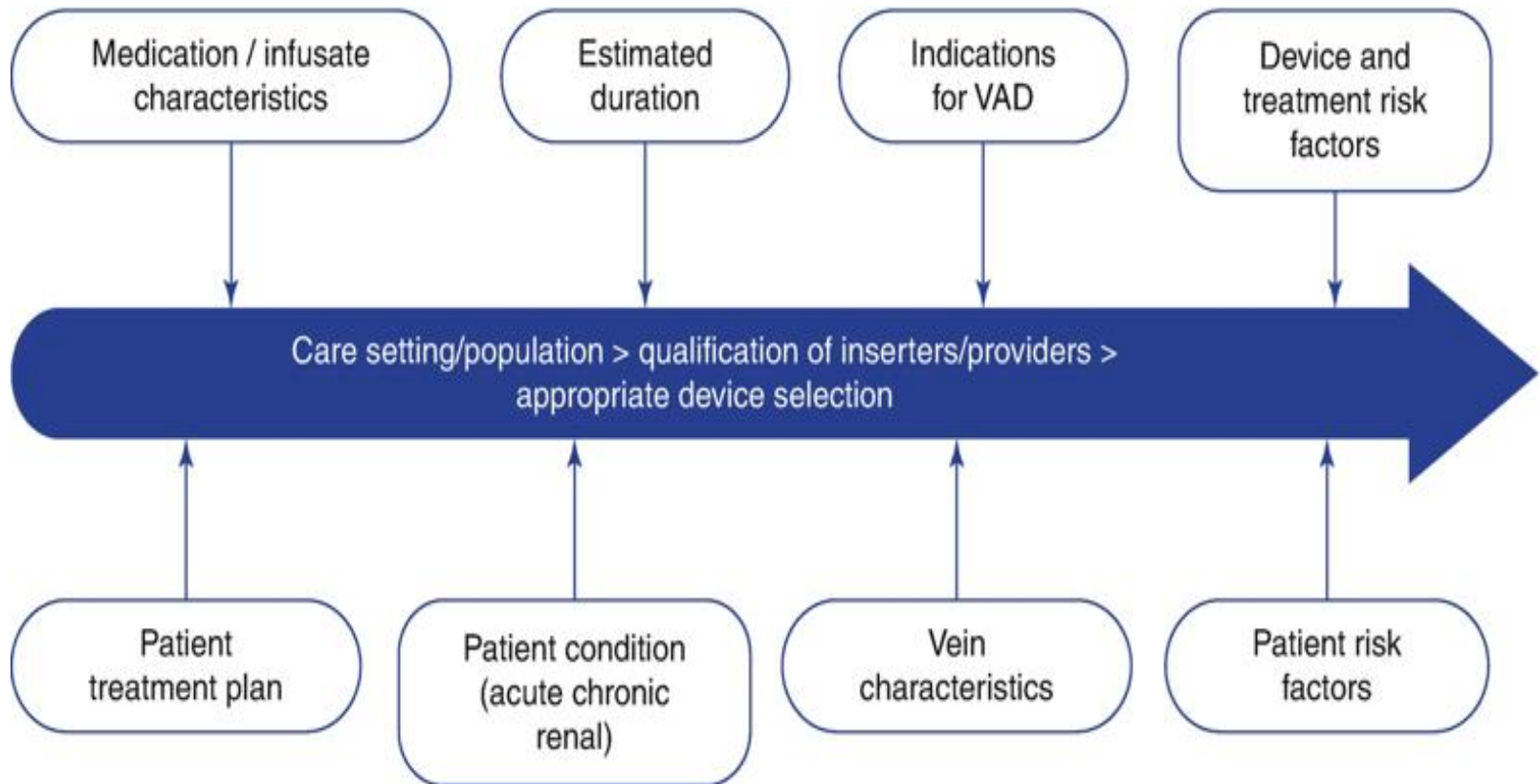
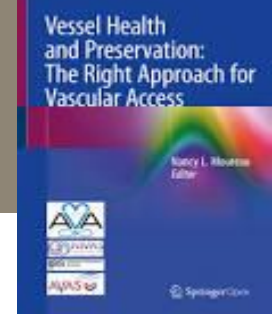
Matching the patient's current state of health with the need for intravenous access prevents unnecessary IV restarts, reduces medication delays, is economically efficient and provides for optimal outcomes.

Vessel Health and Preservation:

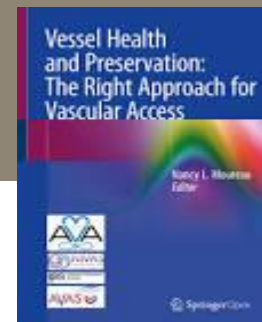
The Right Approach for Vascular Access pp 23-41 (2019)

Nancy L. Moureau, Evan Alexandrou

Device Selection



Patient risk assessment



Patient MRN: _____ Age: _____ Admission Date: _____ Discharge Date: _____

LOS: _____ Diagnosis List: 1. _____ 2. _____ 3. _____

Infusions: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____

- Daily assessment of device need documented for each day? **Yes / No**
- Documentation of device choice based on assessment of patient need and risk factors? **Yes / No**
- Documentation of vein health prior to device insertion? **Yes / No**
- Catheter / Vein Ratio Documentation? **Yes / No**
- Assessment for Right Device with in 24 hours? **Yes / No**

Vascular Access Risk Factor Selection: Check all that apply

<input type="checkbox"/> Limited Arm Use: CVA, Mastectomy, Trauma <input type="checkbox"/> Renal Failure <input type="checkbox"/> Steroid Use <input type="checkbox"/> Diabetes <input type="checkbox"/> HTN <input type="checkbox"/> IV Drug Use <input type="checkbox"/> Failed IV Access in < 24 hours <input type="checkbox"/> Previous Central Line Use	<input type="checkbox"/> Age > or = 65 years <input type="checkbox"/> History of multiple IV attempts for one successful IV <input type="checkbox"/> Metastatic Disease <input type="checkbox"/> Antibiotic Infusion <input type="checkbox"/> Chemotherapy Infusion <input type="checkbox"/> Continuous IV Drip <input type="checkbox"/> Parenteral Nutrition <input type="checkbox"/> Blood Product Transfusion
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Device Data:

Device	Attempts	Date of Insertion	Date of Removal	Dwell Time	Complication Type	Reason for Removal

- 2019

DIVA Peripheral IVA	Midline MiniMidline	PICC line
720	124	350



DIVA

Peripheral IVA

- 1st line dedicated nurse team
(operating theatre)
- 2nd line anesthesist
(operating theatre)
- Minimidline, Midline and PICC IVA
anesthesist (operating theatre)

- Separate space in the operating theatre
- Nurse team for IVA 07-18
- Postoperative Care nurse team 18-07
- Ultrasound procedures

Thank you !

