III Convegno Nazionale GAVePed

Gli Accessi Venosi nel Neonato e nel Bambino

Convegno online, in diretta streaming su www.gaveceltconnection.it

Il protocollo RaSuVA e l'utilizzo della tecnologia NIR per la visualizzazione delle vene superficiali

Vito D'Andrea

GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine

GdS Accessi Vascolari Neonatali

GAVePed
Gruppo Accessi Venosi Pediatrici

AGENDA

Tecnologia NIR

EBM sull'uso della NIR

Protocollo RaSuVa

Take Home Messages

AGENDA

Tecnologia NIR

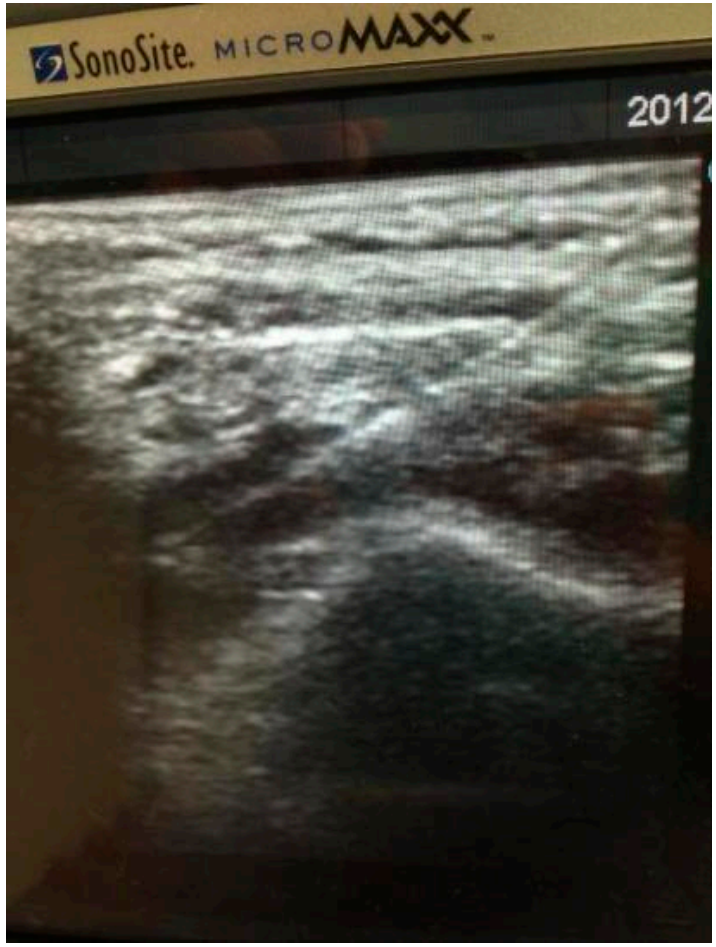
EBM sull'uso della NIR

Protocollo RaSuVa

Take Home Messages

Tecnologia NIR ed ecografia

Vene superficiali < 7 mm



Vene profonde > 7 mm

Tecnologia NIR ed ecografia

22. VASCULAR VISUALIZATION

Standard

22.1 To ensure patient safety, the clinician is competent in the use of vascular visualization technology for vascular access device (VAD) insertion. This knowledge includes, but is not limited to, appropriate vessels, size, depth, location, and potential complications.
22.2 Vascular visualization technology is used in patients with difficult venous access and/or after failed venipuncture attempts.
22.3 Vascular visualization technology is employed to increase the success with peripheral cannulation and decrease the need for central vascular access device (CVAD) insertion, when other factors do not require a CVAD.

Sono le due tecniche di imaging che hanno completamente cambiato il mondo degli accessi vascolari, in particolare nel neonato e nel bambino.

Classificazione accessi venosi nel neonato a seconda della tecnica di inserzione

INCANNULAZIONE DI VENE SUPERFICIALI *VISIBILI E/O PALPABILI*

- Accessi Venosi Periferici
  - *'Catheter over the needle'*
- Accessi Venosi Centrali
  - ECC → *'Catheter through the needle'*

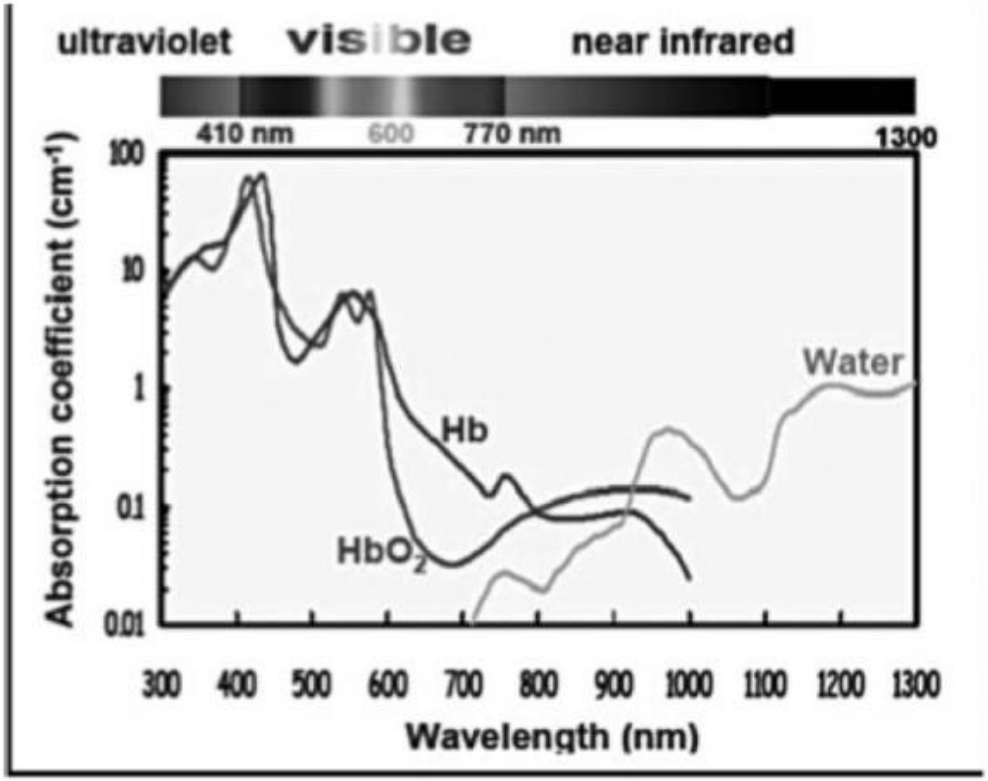
INCANNULAZIONE DI VENE SUPERFICIALI EVIDENZIATE MEDIANTE TECNOLOGIA *NIR (profondità < 7-8 mm)*

- Accessi Venosi Periferici
  - *'Catheter over the needle'*
- Accessi Venosi Centrali
  - ECC → *'Catheter through the needle'*

VENIPUNTURA *ECOGUIDATA*

- CICC o FICC – in *vene profonde*
  - Vasi venosi zona cervicale o inguinali
  - Seldinger diretto
  - Seldinger indiretto o modificato

NIR


ultraviolet
visible
near infrared
410 nm
600
770 nm
1300
Absorption coefficient (cm-1)
100
10
1
0.1
0.01
Water
Hb
HbO2
300
400
500
600
700
800
900
1000
1100
1200
1300
Wavelength (nm)

VISUALIZZAZIONE MEDIANTE FASCI DI INFRAROSSI NEAR-INFRARED TECHNOLOGY (NIR)

- Diodi ad emissione che producono una luce a infrarossi con un picco di lunghezza d'onda di 760nm
- L'irradiazione infrarossa è in grado di penetrare la pelle ad angolo retto fino a 10mm di profondità da una distanza di 61cm
- L'emoglobina presente nel sangue venoso dei vasi assorbe la luce di questa lunghezza d'onda mentre le strutture circostanti come il grasso sottocutaneo la riflettono

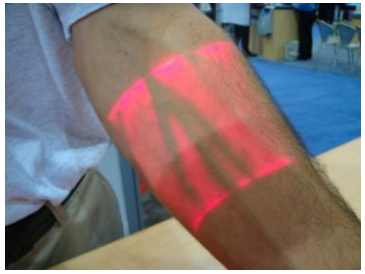
DIVERSI METODI PERMETTONO LA VENIPUNTURA AVVALENDOSI DELLA TECNOLOGIA NIR

- Diretto (Veinsite): visualizzazione diretta della vena da parte dell'operatore
- Indiretto (Accuvein, Veinviewer): la luce infrarossa permette la visualizzazione indiretta della vena sulla pelle del paziente

NIR DEVICES

VeinViewer – Vision

AccuVein



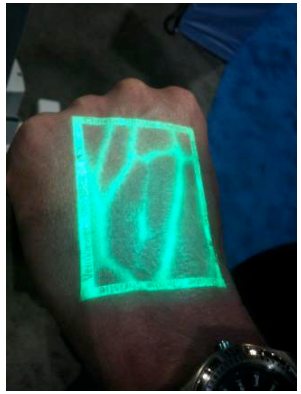
Vasculuminator

Veinsite

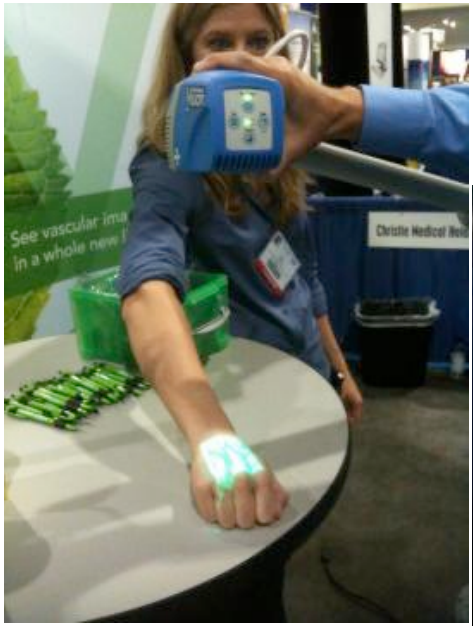
VEINVIEWER - VISION

VeinViewer utilizza la tecnologia NIR prodotta da diodi ad emissione che consente di vedere le strutture venose fino a 7-10 mm di profondità.

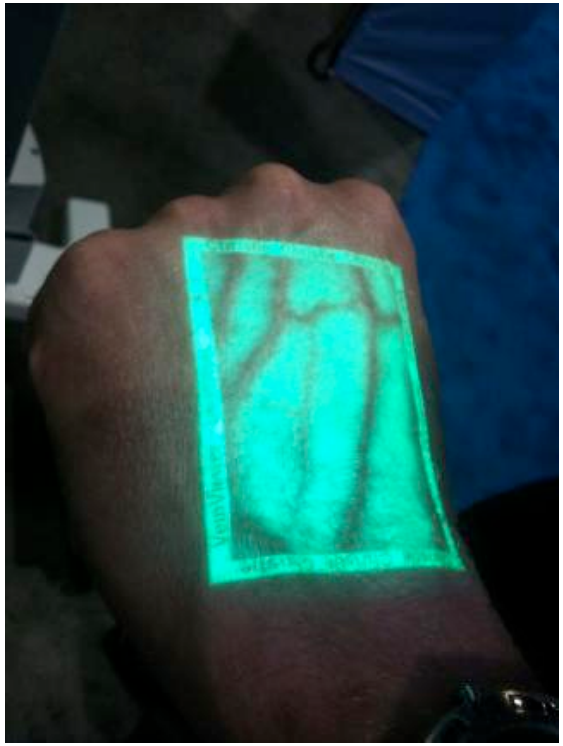
L'immagine prodotta viene proiettata sotto forma di luce verde direttamente sulla cute del paziente.



VEINVIEWER- VISION



VEINVIEWER- VISION

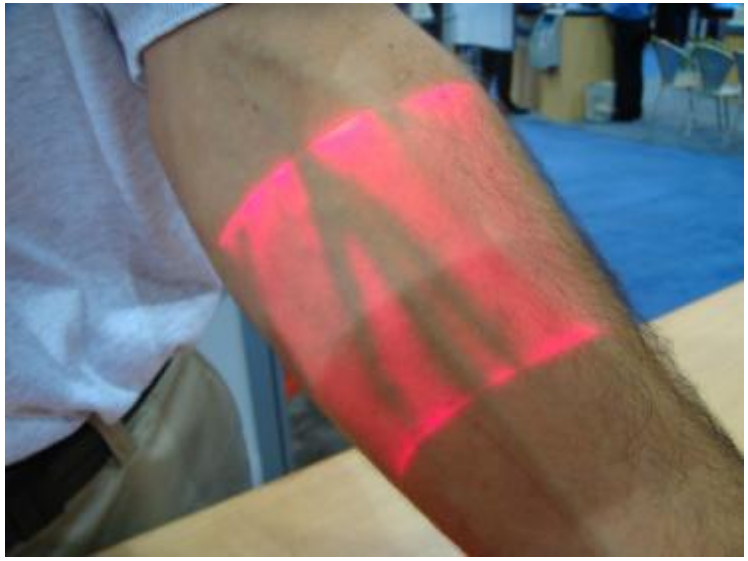


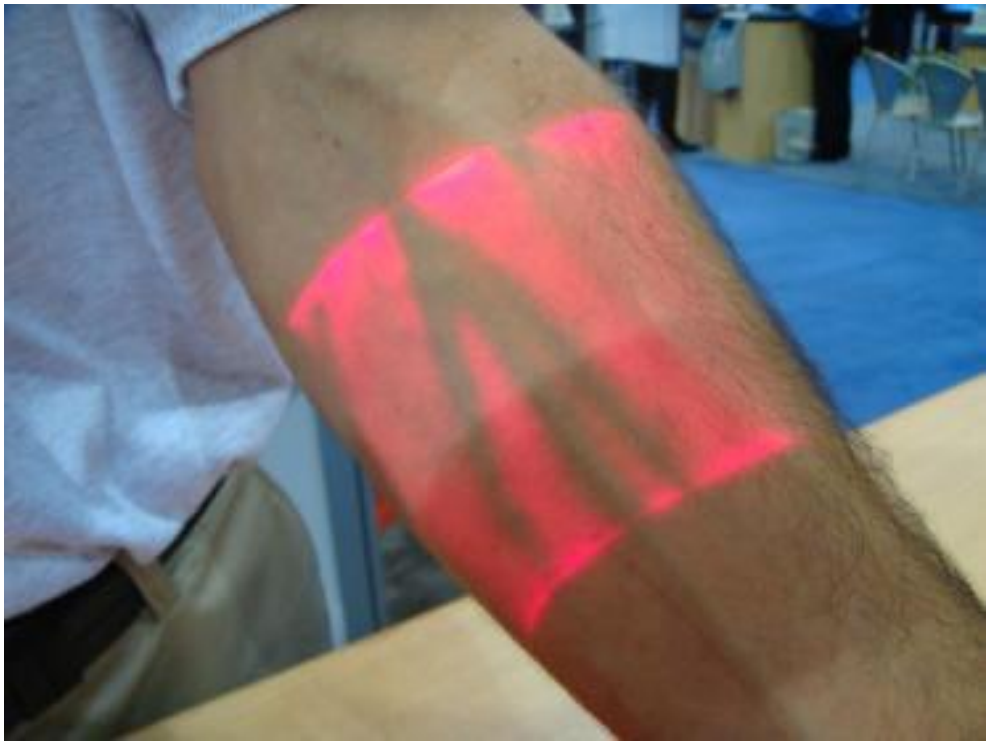
VEINVIEWER- VISION



ACCUVEIN

The AccuVein utilizza la luce laser ad infrarosso e proietta l'immagine elaborata sotto forma di luce rossa direttamente sulla cute del paziente






Equipment
Imagine ho
you could
Now you

VASCULUMINATOR

Vasculuminator utilizza la tecnologia NIR prodotta da diodi ad emissione e l'immagine elaborate appare su uno schermo sopra il sito di venipuntura

"The system is used for imaged guided vessel puncture similar to a car navigation system: you look at the display when you don't know the way (don't see vessels)"

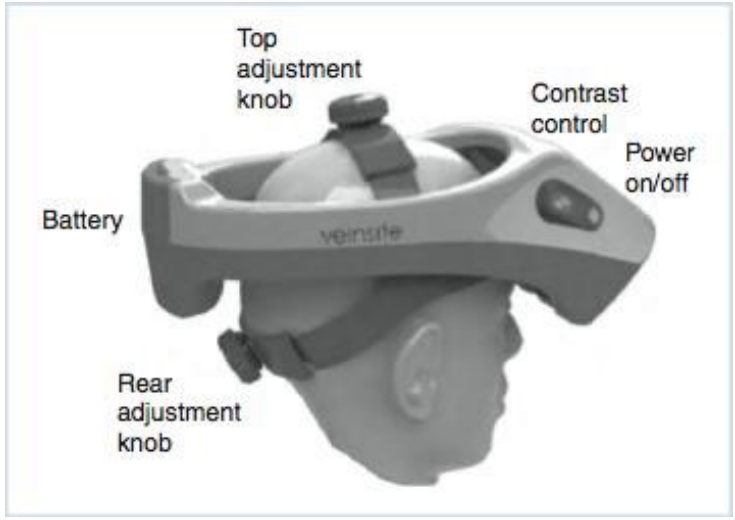
VEINSITE

«It's a head-mounted system which includes a near-infrared emitter, video acquisition, and display device

Veinsite's electro-optical technology, after converting the raw image to greyscale, allows displaying it on the headset's screen»

Veinsite


vuetek
vuetek
DELL


Top adjustment knob
Contrast control
Power on/off
Battery
veinsite
Rear adjustment knob

POTENZIALI VANTAGGI DELLA NIR

Diminuzione tentativi venipuntura

- Successo al primo tentativo

Riduzione dei tempi

Riduzione dei costi

Maggior comfort del paziente

Preservare il patrimonio venoso!!!!

VANTAGGI SPECIFICI DELLA TECNOLOGIA A RIFLESSIONE DI INFRAROSSI

- Utilizzabile su qualunque paziente, di qualunque età o razza
- Mantiene libere le mani dell'operatore
- Non invasivo, innocuo, non riscalda
- Non rischio di contaminazione
- Permette di individuare in modo dettagliato il tragitto delle vene, le biforcazioni, le valvole, etc.

PROBLEMI APERTI

- Pochi studi clinici
- Pochi studi clinici randomizzati
- Poca chiarezza sugli ‘endpoints’
- Scarsa focalizzazione sul problema del training

AGENDA

Tecnologia NIR

EBM sull'uso della NIR

Protocollo RaSuVa

Take Home Messages

AGENDA

Tecnologia NIR

EBM sull'uso della NIR

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Take Home Messages

Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

ORIGINAL RESEARCH CONTRIBUTION

Validation and Refinement of the Difficult Intravenous Access Score: A Clinical Prediction Rule for Identifying Children With Difficult Intravenous Access

Michael W. Riker, MD, Chris Kennedy, MD, Brad S. Winfrey, RN, Kenneth Yen, MD, MS, and M. Denise Dowd, MD, MPH

Predictor Variable	Scores		
Visibility	Visible = 0		Not visible = 2
Palpability	Palpable = 0		Not palpable = 2
Age	≥36 months = 0	12–35 months = 1	< 12 months = 3
Prematurity	Not premature = 0		Premature = 3
Skin shade	Light = 0	Dark = 1	

DIVA4^{Yen}: vein palpability, vein visibility, age, history of prematurity

DIVA5^{Yen}: vein palpability, vein visibility, age, history of prematurity, skin shade

DIVA4^{Riker}: vein palpability, vein visibility, age, history of NICU admission

DIVA3^{Riker}: vein palpability, vein visibility, age.

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ORIGINAL RESEARCH CONTRIBUTION

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Model	% Correctly Identified as IV Failure (*n*)/118	% Incorrectly Identified as IV Failure (*n*)/248
DIVA 4 (Yen)	61.0 (72)	27.8 (69)
DIVA 5 (Yen)	66.1 (78)	36.7 (91)
DIVA 4 (Riker)	62.7 (74)	28.2 (70)
DIVA 3 (Riker)	56.8 (67)	22.2 (55)

*Using scoring system in Table 1, with score ≥ 4 as cutoff value for predicting failure.

Vein visualization: patient characteristic factors and efficacy of a new infrared vein finder technology†

F. B. Chiao*, F. Resta-Flarer, J. Lesser, J. Ng, A. Ganz, D. Pino-Luey, H. Bennett, C. Perkins Jr and B. Witek

Department of Anesthesiology, St Lukes Roosevelt Hospital Center, Columbia University College of Physicians and Surgeons, New York, NY, USA

* Corresponding author. E-mail: fchiao@gmail.com

Editor's key points

- Factors contributing to difficult venous cannulation and the impact of new vein imaging technologies are important to safe and effective medical therapy.
- The numbers of potential i.v. cannulation sites were compared using the conventional visual method and a new infrared vein finding technology.
- Infrared vein visualization increased the number of potential cannulation sites in all subgroups.

Background. We investigated the patient characteristic factors that correlate with identification of i.v. cannulation sites with normal eyesight. We evaluated a new infrared vein finding (VF) technology device in identifying i.v. cannulation sites.

Methods. Each subject underwent two observations: one using the conventional method (CM) of normal, unassisted eyesight and the other with the infrared VF device, VueTek's Veinsite™ (VF). A power analysis for moderate effect size (β=0.95) required 54 samples for within-subject differences.

Results. Patient characteristic profiles were obtained from 384 subjects (768 observations). Our sample population exhibited an overall average of 5.8 [95% confidence interval (CI) 5.4–6.2] veins using CM. As a whole, CM vein visualization were less effective among obese [4.5 (95% CI 3.8–5.3)], African-American [4.6 (95% CI 3.6–5.5 veins)], and Asian [5.1 (95% CI 4.1–6.0)] subjects. Next, the VF technology identified an average of 9.1 (95% CI 8.6–9.5) possible cannulation sites compared with CM [average of 5.8 (95% CI 5.4–6.2)]. Seventy-six obese subjects had an average of 4.5 (95% CI 3.8–5.3) and 8.2 (95% CI 7.4–9.1) veins viewable by CM and VF, respectively. In dark skin subjects, 9.1 (95% CI 8.3–9.9) veins were visible by VF compared with 5.4 (95% CI 4.8–6.0) with CM.

Conclusions. African-American or Asian ethnicity, and obesity were associated with decreased vein visibility. The visibility of veins eligible for cannulation increased for all subgroups using a new infrared device.

Keywords: catheterization; veins

Accepted for publication: 21 December 2012

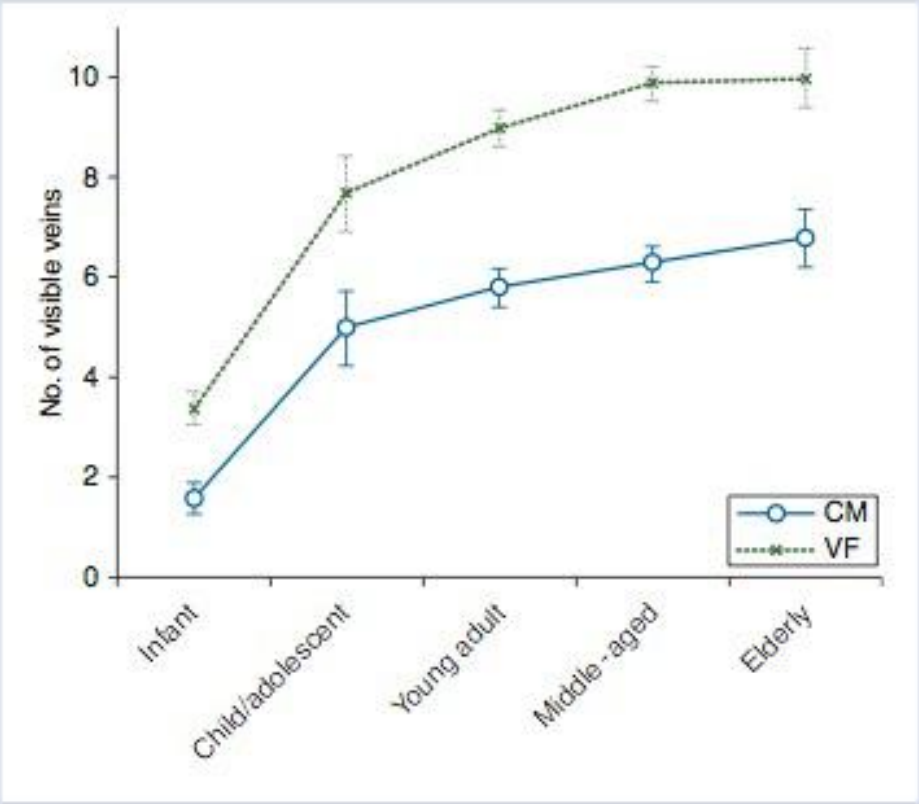

Fig 4 Comparison of VF and CM visible sites [mean (SE)] across age groups.

British Journal of Anaesthesia **110** (6): 966–71 (2013)
Advance Access publication 5 February 2013 · doi:10.1093/bja/aet003

BJA

CLINICAL PRACTICE

Vein visualization: patient characteristic factors and efficacy of a new infrared vein finder technology†

F. B. Chiao*, F. Resta-Flarer, J. Lesser, J. Ng, A. Ganz, D. Pino-Luey, H. Bennett, C. Perkins Jr and B. Witek

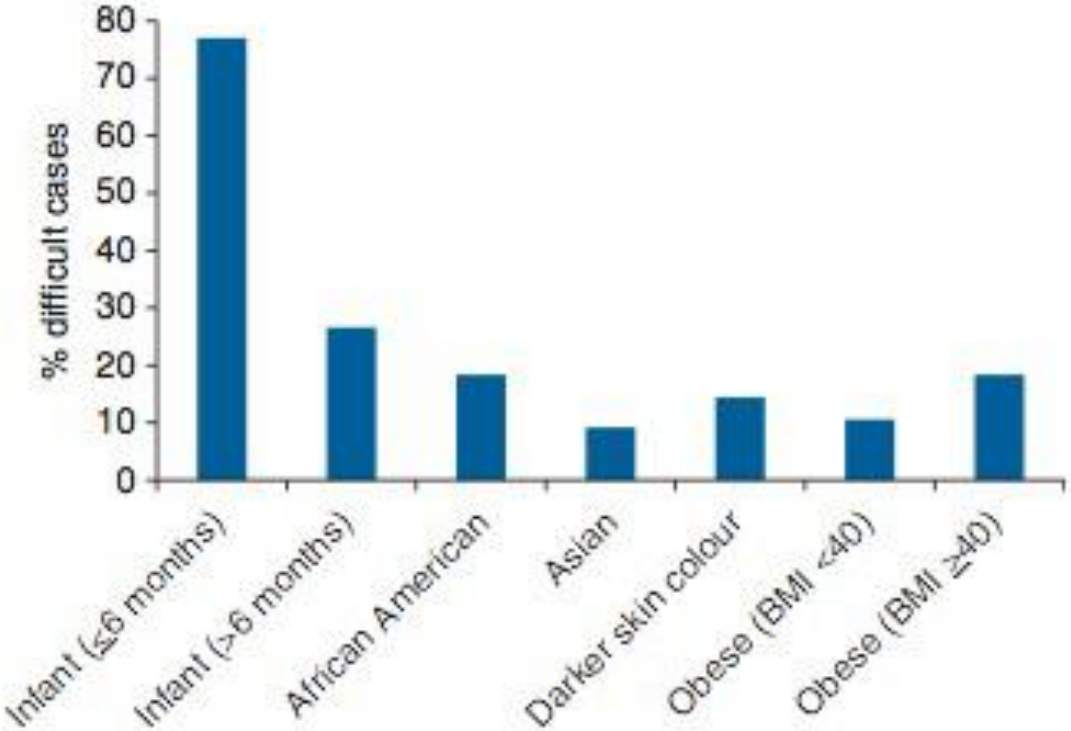

Fig 5 Patient characteristic percentages of difficult cases within populations of interest. See Table 3 for difficult case definition.

British Journal of Anaesthesia **110** (6): 888–91 (2013)
doi:10.1093/bja/aet078

EDITORIAL II

Difficult peripheral veins: turn on the lights

M. Lamperti[1]* and M. Pittiruti[2]

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[2] Department of Surgery, Catholic University, Rome, Italy

* Corresponding author. E-mail: doclampmd@gmail.com

There are three main unresolved issues regarding the use of NIR technology that makes its application still far from real life and clinical practice in our hospitals.

First: what about training? It is not clear how operators should be trained in the use of this new technology. Most of the studies do not report how many procedures the operators had to perform before being considered proficient with this new method. To define an operator proficient in a new technology or procedure, two main outcomes should be satisfied: goal achieved and time to success. Considering these devices, first-time successful cannulation should be considered the main goal and a learning curve should be calculated on this parameter;[12] this would suggest the average number of procedures required before obtaining a minimal training for getting proficiency.

Cannulation time is not less important, if we consider that these portable devices should also be used in the emergency room to obtain a prompt venous access. It is mandatory to define a training curriculum on the use of NIR devices, if we want to use them properly every time, those superficial veins are not easily visible, palpable, or both.

Second: cost-effectiveness. In other words, is this technology affordable in this period of international financial crisis? New technologies may be difficult to be accepted by our hospital managers, if not supported by a proper economical and clinical rationale. A budget impact analysis[13] of this technology should include not only the raw cost of the device (from $4500 up to $25 000) and the cost of training *vs* the time-saving benefit, but also the advantage of a convincing improvement in the quality of venous cannulation in terms of perception of pain by patients and handiness of the device by operators. Should the results of this analysis show a significant cost-effectiveness, the technique should be progressively introduced in the clinical practice, with the clinical goals of (i) preserving the peripheral vein patrimony of the patients and (ii) avoiding the risks associated with a potentially unnecessary central vein cannulation.[14]

Finally, there is a technical concern about vein visualization. Difficult venous cannulation may be related to the small diameter of the vein (as in infants) or to their deep location (as in obese patients) or to poor visibility or palpability due to other factors (oedema, pigmentation, etc.). It is still not clear whether NIR devices can be effective not only in venous visualization but also in venous cannulation; more specifically, since NIR technology does not provide a depth of field, accidental puncture of the posterior wall of the vein, and extravasation may easily occur. Ultrasound guidance has been proposed in recent years[15] [16] to improve the visualization of difficult superficial veins in paediatric patients, but the results of these studies are controversial in terms of improved success rate, first-time success, and overall time to cannulation.

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Near-Infrared Imaging in Intravenous Cannulation in Children: A Cluster Randomized Clinical Trial

Natascha J. Cuper, Jurgen C. de Graaff, Rudolf M. Verdaasdonk and Cor J. Kalkman

Pediatrics 2013;131;e191; originally published online December 10, 2012;
DOI: 10.1542/peds.2012-0968

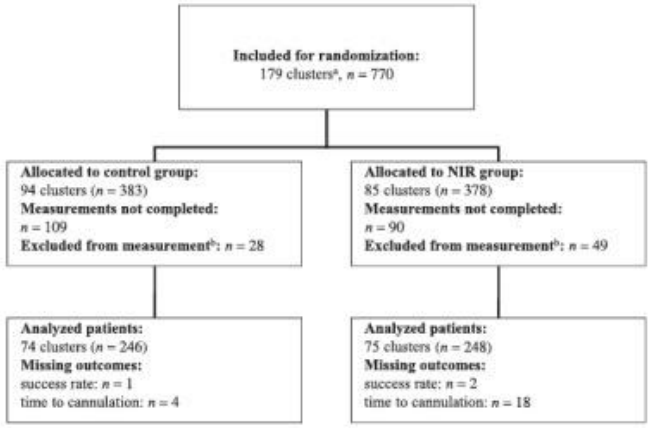


TABLE 2 Success at First Attempt (%) and Risk Difference With a 95% Confidence Interval in Both Groups

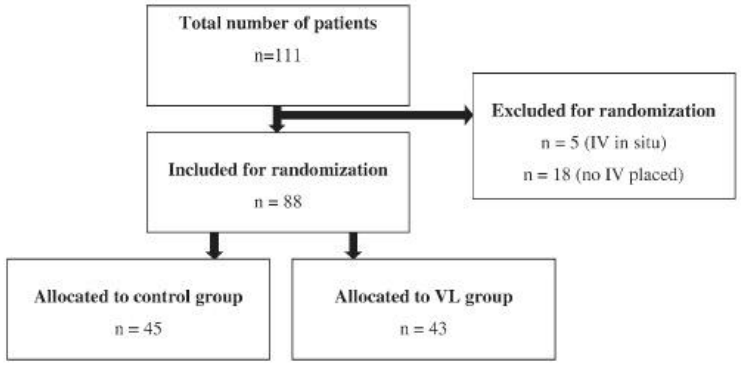
	Control Group Ratio/Total (%)	NIR Group Ratio/Total (%)	Risk Difference (95% Confidence Interval)
All patients	175/245 (71.4)	171/246 (69.5)	1.9% (−6.1 to 9.9)
Patients <3 y	52/99 (52.5)	47/86 (54.7)	2.1% (−12.1 to 16.2)
Patients ≥85th percentile[a]	21/28 (75.0)	28/40 (70.0)	5.0% (−16.9 to 24.8)

TABLE 3 Time to Cannulation in Seconds (±SD) and Hazard Ratio with a 95% Confidence Interval in Both Groups

	Control Group Mean (±SD)	NIR Group Mean (±SD)	Hazard Ratio (95% Confidence Interval)
All patients	143 (±15)	162 (±14)	0.90 (0.75 to 1.08)
Patients <3 y	228 (±35)	257 (±33)	0.78 (0.65 to 1.17)
Patients ≥85th percentile[a]	118 (±23)	179 (±36)	0.74 (0.45 to 1.21)

The Effectiveness of a Near-Infrared Vascular Imaging Device to Support Intravenous Cannulation in Children with Dark Skin Color: A Cluster Randomized Clinical Trial

Olga C. P. van der Woude, MD,* Natascha J. Cuper, DVM,† Chavalleh Getrouw, MD,‡
Cor J. Kalkman, MD, PhD,* and Jurgen C. de Graaff, MD, PhD*§



- **Bambini con pelle scura** (0-15 anni) in SO.
- VascuLuminator (V) vs Gruppo di controllo
  - ***Successo al primo tentativo*** 63% usando il V vs 51% nel gruppo di controllo
  - Tempi mediano per posizionamento accesso venoso era 53 sec nel gruppo V vs 68 sec nel gruppo di controllo
- VL ha una efficacia limitata nel migliorare il successo di incannulamento al primo tentativo nei bambini con pelle scura.

ANESTHESIA & ANALGESIA June 2013 • Volume 116 • Number 6

Near-infrared light to aid peripheral intravenous cannulation in children: a cluster randomised clinical trial of three devices*

J. C. de Graaff,[1] N. J. Cuper,[2] R. A. A. Mungra,[3] K. Vlaardingerbroek,[4] S. C. Numan[4] and C. J. Kalkman[5]

CluIn SO i neonati venivano randomizzati per l'utilizzo di ***VeinViewer***, ***AccuVein*** AV300, ***VascuLuminator*** vs un gruppo di controllo.

1913 bambini (< 18 anni) e neonati

Vene idonee per accessi venosi erano più facilmente visibili con il Viewer 307/322 (95.3%) e l'AccuVein 239/ 254 (94.1%) piuttosto che con il VascuLuminator 229/257 (89.1%)

Il successo al primo tentativo non è diverso tra i vari gruppi.

Conclusioni:

«although vein visibility is enhanced, near-infrared devices do not improve cannulation»

Near-infrared light to aid peripheral intravenous cannulation in children: a cluster randomised clinical trial of three devices*

J. C. de Graaff,[1] N. J. Cuper,[2] R. A. A. Mungra,[3] K. Vlaardingerbroek,[4] S. C. Numan[4] and C. J. Kalkman[5]

Figure 1 (a) VeinViewer in use, using reflection of near-infrared light, projecting an image of vessels in green on the skin. (b) AccuVein in use, using reflection of near-infrared laser light, projecting a red image with vessels in black on the skin. (c) VascuLuminator, using translumination of near-infrared light, projecting an image of vessels in black on the display shown. The near-infrared light source (light emitting diode) is placed underneath the hand.

Near-infrared light to aid peripheral intravenous cannulation in children: a cluster randomised clinical trial of three devices*

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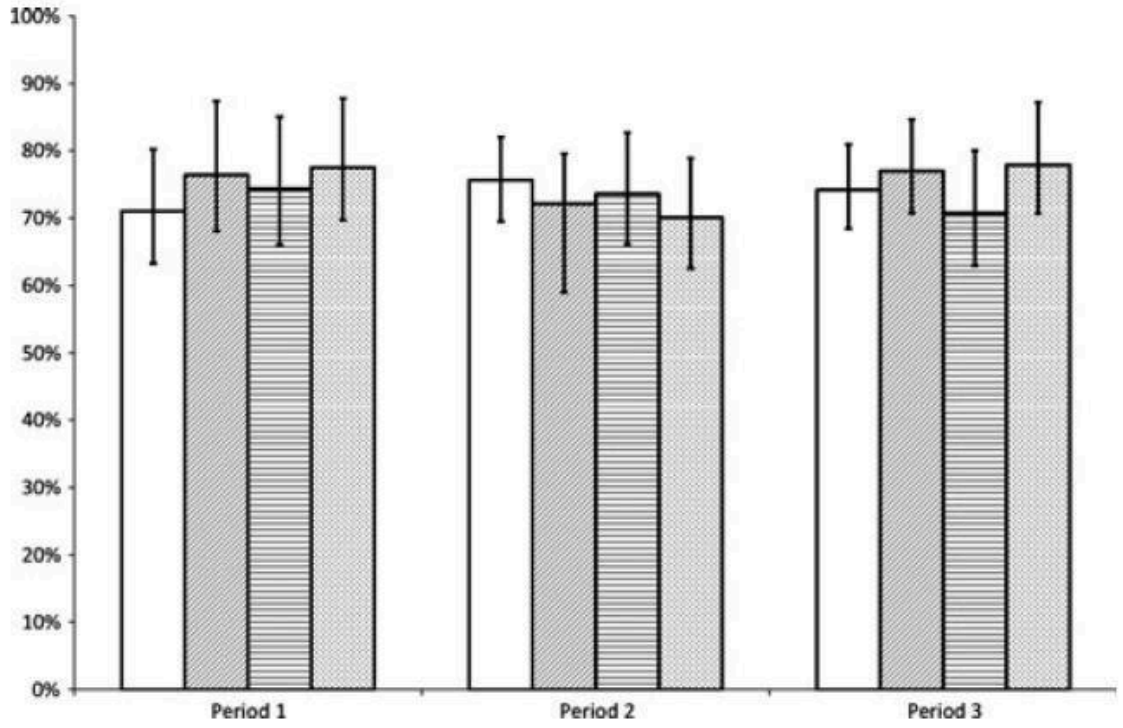
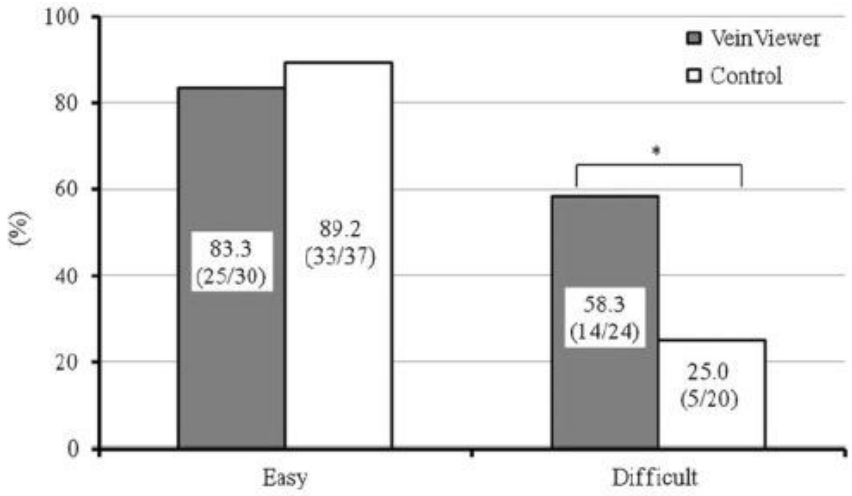


Eur J Pediatr (2012) 171:1121–1125
DOI 10.1007/s00431-012-1713-9

SHORT COMMUNICATION

Efficacy of VeinViewer in pediatric peripheral intravenous access: a randomized controlled trial

Min Joung Kim · Joon Min Park · Nuga Rhee · Sang Mo Je · Seong Hee Hong · Young Mock Lee · Sung Phil Chung · Seung Ho Kim



- Pazienti con età < 16 aa (< 1anno 17)
- RCT VeinViewer vs Gruppo di Controllo.
- Outcome % successo al primo tentativo
- 111 pz
- Nessuna differenza tra i due gruppi
- **Nei pazienti con DIVA > 4 25% vs 58% (0.0026)**

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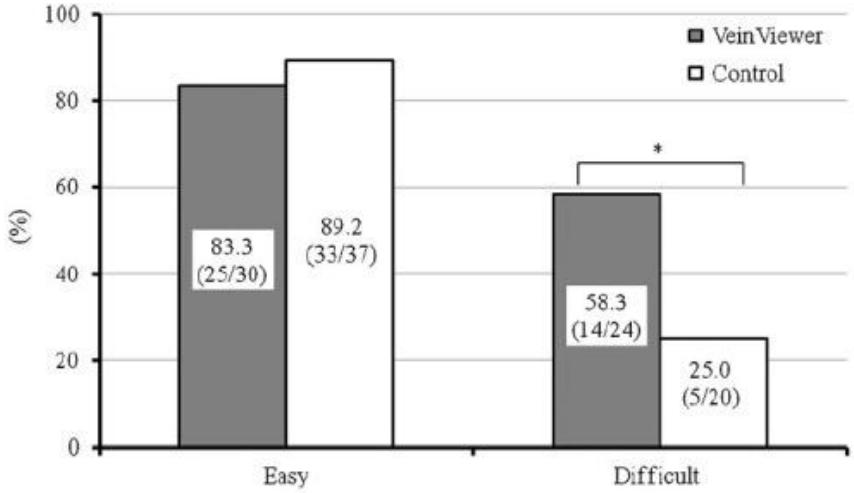

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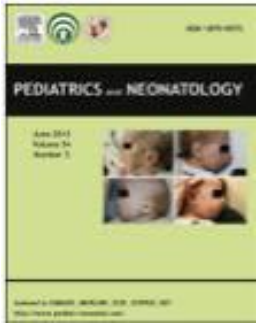
- **Nei pazienti con DIVA > 4 25% vs 58% (0.0026)**

Near-infrared Light Device Can Improve Intravenous Cannulation in Critically Ill Children

Pediatrics and Neonatology (2013) 54, 194–197

Ching-Yun Sun [a,b,†], Kuan-Chiao Lee [c,d,†], I-Hsiu Lin [a,b], Chin-Ling Wu [a,b], Hsiao-Ping Huang [a,b], Yi-Yu Lin [a,b], Ya-Fen Hsu [a,b], Hong-Ren Yu [b,e,*]



- RCT
- 60 pazienti pediatrici ricoverati in TIP
- VeinViewer vs gruppo di controllo

Table 2 Comparison between the patients with and without use of the VeinViewer.

Items	Study group	Control group	*p*
Mean time to find the first available vessel (s)	126.37 ± 26.33	383.61 ± 112.14	0.027
First-attempt success rate	56.7 % (17/30)	33.3 % (10/30)	0.059
Median of attempts per patient (range)	1 (1–5)	2 (1–5)	0.004
Total time of attempts per patient (s)	186.16 ± 38.82	497.23 ± 123.31	0.014

DOI: 10.1097/JPN.0000000000000385

CE Continuing Education

J Perinat Neonat Nurs • Volume 33 Number 1, 61–67 •

Efficacy of Vein Visualization Devices for Peripheral Intravenous Catheter Placement in Preterm Infants

A Randomized Clinical Trial

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Figure 2. AccuVein AV400.

Figure 3. Wee-Sight Transilluminator.

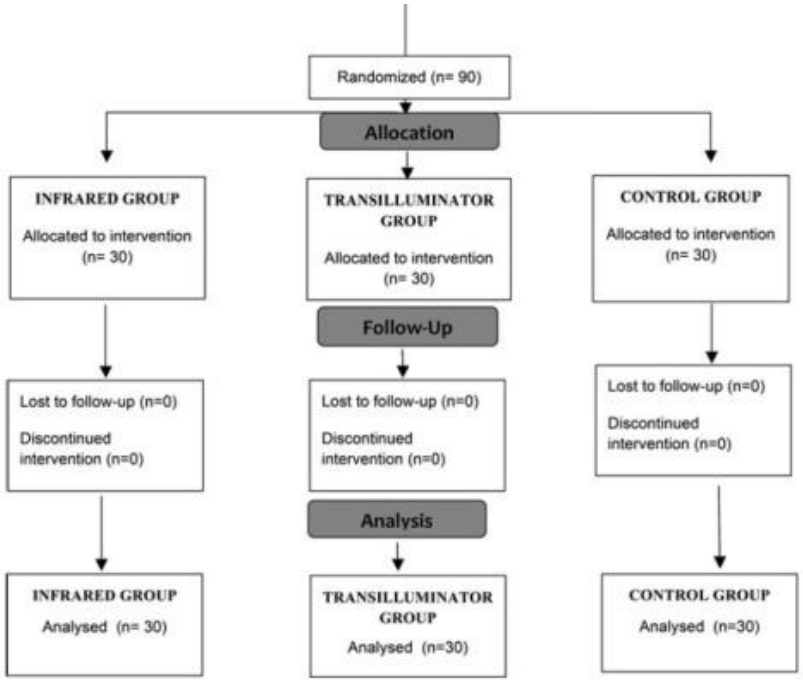

Table 2. **Comparison of the physical parameters and cannulation success of preterm infants (*N* = 90)**

Variables	Transilluminator group (*n* = 30)	Infrared group (*n* = 30)	Control group (*n* = 30)	Statistical test; *P* value
Body temperature, °C				
Preintervention	36.37 ± 0.17	36.46 ± 0.11	36.14 ± 1.78	$F = 0.773$; $P = .465$
Postintervention	36.39 ± 0.17	36.46 ± 0.11	36.44 ± 0.14	$F = 1.605$; $P = .207$
Pulse rate				
Preintervention	142.20 ± 12.75	136.70 ± 14.34	138.93 ± 17.90	$F = 0.999$; $P = .372$
Postintervention	148.00 ± 13.33	139.43 ± 13.57	143.63 ± 16.41	$F = 2.615$; $P = .079$
Respiratory rate				
Preintervention	53.73 ± 8.45	50.13 ± 5.08	50.37 ± 5.80	$F = 2.789$; $P = .067$
Postintervention	58.03 ± 10.56	51.93 ± 5.12	55.27 ± 8.50	$F = 3.991$; $P = .022$
Time to successful cannulation mean ± SD, s	45.27 ± 30.83	8.70 ± 2.56	17.30 ± 8.40	$F = 32.01$; $P = .000$
Success of the first attempt, *n* (%)				
Yes	18 (60)	24 (80)	26 (86.7)	$\chi^2 = 6.26$; $P = .04$
No	12 (40)	6 (20)	4 (13.3)	

Table 3. **Comparison of dwell time and pain scores of preterm infants (*N* = 90)**

Variables	Transilluminator group (*n* = 30)	Infrared group (*n* = 30)	Control group (*n* = 30)	Statistical test; *P* value
Dwell time of PIVC, mean ± SD, d [Min-Max]	1.27 ± 0.45 (1-2)	1.57 ± 0.50 (1-2)	1.27 ± 0.45 (1-2)	$F = 4.10$; $P = .02$
NIPS scores, mean ± SD				
Preintervention	0.17 ± 0.38	0.23 ± 0.43	0.20 ± 0.41	$F = 0.202$; $P = .817$
During seeking appropriate vein	0.60 ± 0.85	0.33 ± 0.18	0.33 ± 0.18	$F = 12.076$; $P = .000$
During cannulating the vein	1.66 ± 0.84	1.33 ± 0.96	1.26 ± 0.64	$F = 2.025$; $P = .138$

Journal of Perinatology (2012) 32, 498–501

www.nature.com/jp

ORIGINAL ARTICLE

A randomized trial of the Vein Viewer versus standard technique for placement of peripherally inserted central catheters (PICCs) in neonates

K Phipps, A Modic, MA O'Riordan and M Walsh

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	Standard (N = 56)	*Vein Viewer (N = 59)*	P
Gestational age (weeks)	28.0 (23–40)	30.0 (23–40)	0.08
Birthweight (g)	1030 (320–4160)	1160 (300–4700)	0.06
Gender, male, *N* (%)	35 (62.5)	32 (54.2)	0.37
African American, *N* (%)	29 (51.8)	27 (45.8)	0.52

	Unadjusted odds ratio (95% CI)	*Adjusted odds ratio (95% CI)*
Success on first attempt	1.26 (0.59, 2.68)	1.57 (0.71, 3.50)
Any success	2.33 (0.90, 6.04)	3.05 (1.10, 8.42)

showed a trend to more successful placement 86 versus 75%; unadjusted odds ratio 2.33 (0.90, 6.04; $P = 0.08$). Infants randomized to the Vein Viewer were more mature (30 ± 2 weeks gestational age (GA) versus 28 ± 2 weeks GA; $P = 0.08$). After adjusting for GA, use of the Vein Viewer was significantly more likely to lead to successful line placement (adjusted odds ratio 3.05 (1.10, 1.82)).

Eur J Pediatr (2016) 175:1975–1988
DOI 10.1007/s00431-016-2796-5

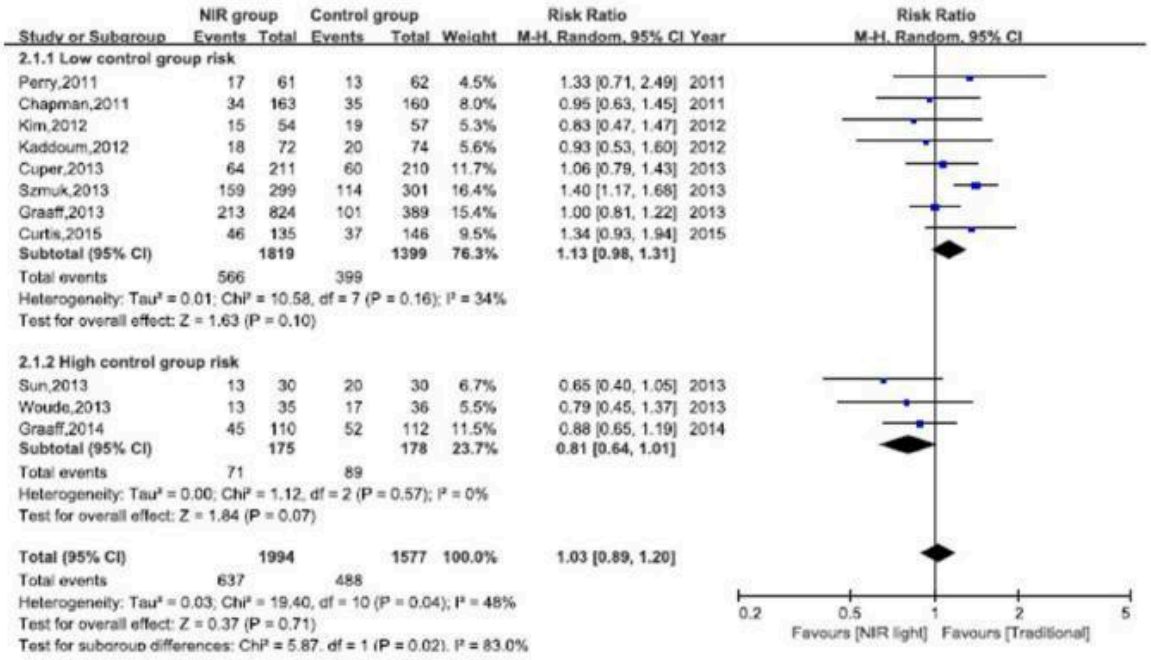
ORIGINAL ARTICLE

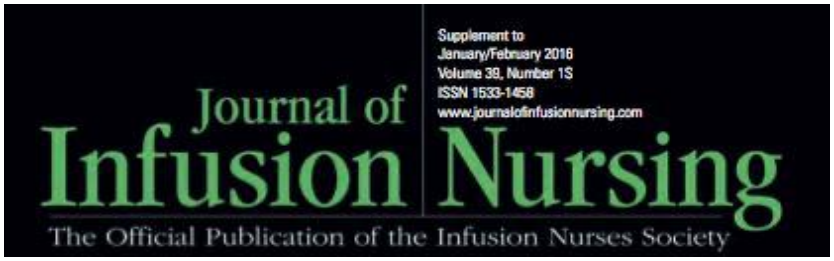
Utility of near-infrared light devices for pediatric peripheral intravenous cannulation: a systematic review and meta-analysis

Joon Min Park[1] · Min Joung Kim[2] · Hyeon Woo Yim[3] · Won-Chul Lee[3] · Hyunsuk Jeong[3] · Na Jin Kim[4]

Table 1 Study characteristics

	Study design	Country	Size (*n*)	Age	Operator	NIR light device	Place
Chapman, 2011 [3]	RCT	Island	323	0–17 years	Nurse	V	ED
Perry, 2011 [29]	RCT	USA	123	0–20 years	Nurse	V	ED
Kaddoum, 2012 [23]	RCT	USA	146	1 month–17 years	Doctor	A	OR
Kim, 2012 [25]	RCT	Korea	111	1 month–16 years	Nurse	V	Ward
Cuper, 2013 [6]	Cluster RCT	Netherland	491	0–18 years	Doctor/nurse	L	OR
Graaff, 2013 [14]	Cluster RCT	Netherland	1383	0–18 years	Doctor/nurse	A/L/V	OR
Sun, 2013 [32]	RCT	Taiwan	60	3 months–17 years	Nurse	V	PICU
Szmuk, 2013 [33]	RCT	USA	600	0–18 years	Nurse	V	Ward/OPD
Woude, 2013 [34]	Cluster RCT	Curacao(Netherland)	88	NA	Doctor	L	OR
Graaff, 2014 [9]	Cluster RCT	Netherland	226	0–17 years	Doctor	L	POCU
Curtis, 2015 [8]	RCT	Canada	281	0–16 years	Nurse	V	ED





Consider the use of near-infrared (nIR) light technology to aid in locating viable superficial peripheral venous sites and decreasing procedure time for short peripheral catheter insertion.

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Infusion Therapy Standards of Practice

1. Available technology includes hands-free devices that capture an image of the veins and reflect it back to the skin's surface or to a screen and transillumination projected to a screen. The clinician may choose to use a static process by imaging and marking the vein location on the skin or a dynamic process of using the image to guide catheter insertion. No studies have compared these various methods of device use, leaving this decision to the discretion of the clinician.[1,6,12]

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Infusion Therapy Standards of Practice

Consider nIR light technology to identify peripheral venous sites and facilitate more informed decisions about vein selection (ie, bifurcating veins, tortuosity of veins, palpable but nonvisible veins). Two nonrandomized studies have shown improvement in first-attempt success for peripheral catheter insertion using nIR; however, other studies have not shown this same outcome. Additional research is needed to address the reason(s), which could include differences in nIR devices, patient-related factors, and skill level of the inserters before using the nIR devices.[11-19] (I)

Scelta vena per ECC???

IN CONCLUSIONE

- Mancano sufficienti studi randomizzati che comprovino la efficacia e la costo-efficacia
- Necessità di training appropriato
- Limiti tecnici della visione ‘a piatto’
- La NIR permette la corretta visualizzazione e la valutazione di vene superficiale ma non visibili e/o palpabili
- La NIR è di aiuto nella scelta della vena
- La NIR è di aiuto nei DIVA come tecnica elettiva?

CERTEZZA

Permette la corretta visualizzazione e la valutazione di vene superficiale ma non visibili e/o palpabili

Protocollo di valutazione preliminare delle vene superficiali: RaSuVA

AGENDA

Tecnologia NIR

EBM sull'uso della NIR

Protocollo RaSuVa

Take Home Messages

AGENDA

Tecnologia NIR

EBM sull'uso della NIR

Protocollo RaSuVa

Take Home Messages

Classificazione accessi venosi nel neonato a seconda della tecnica di inserzione

INCANNULAZIONE DI VENE SUPERFICIALI *VISIBILI E/O PALPABILI*

- Accessi Venosi Periferici
  - *'Catheter over the needle'*
- Accessi Venosi Centrali
  - ECC → *'Catheter through the needle'*

INCANNULAZIONE DI VENE SUPERFICIALI EVIDENZIATE MEDIANTE TECNOLOGIA *NIR (profondità < 7-8 mm)*

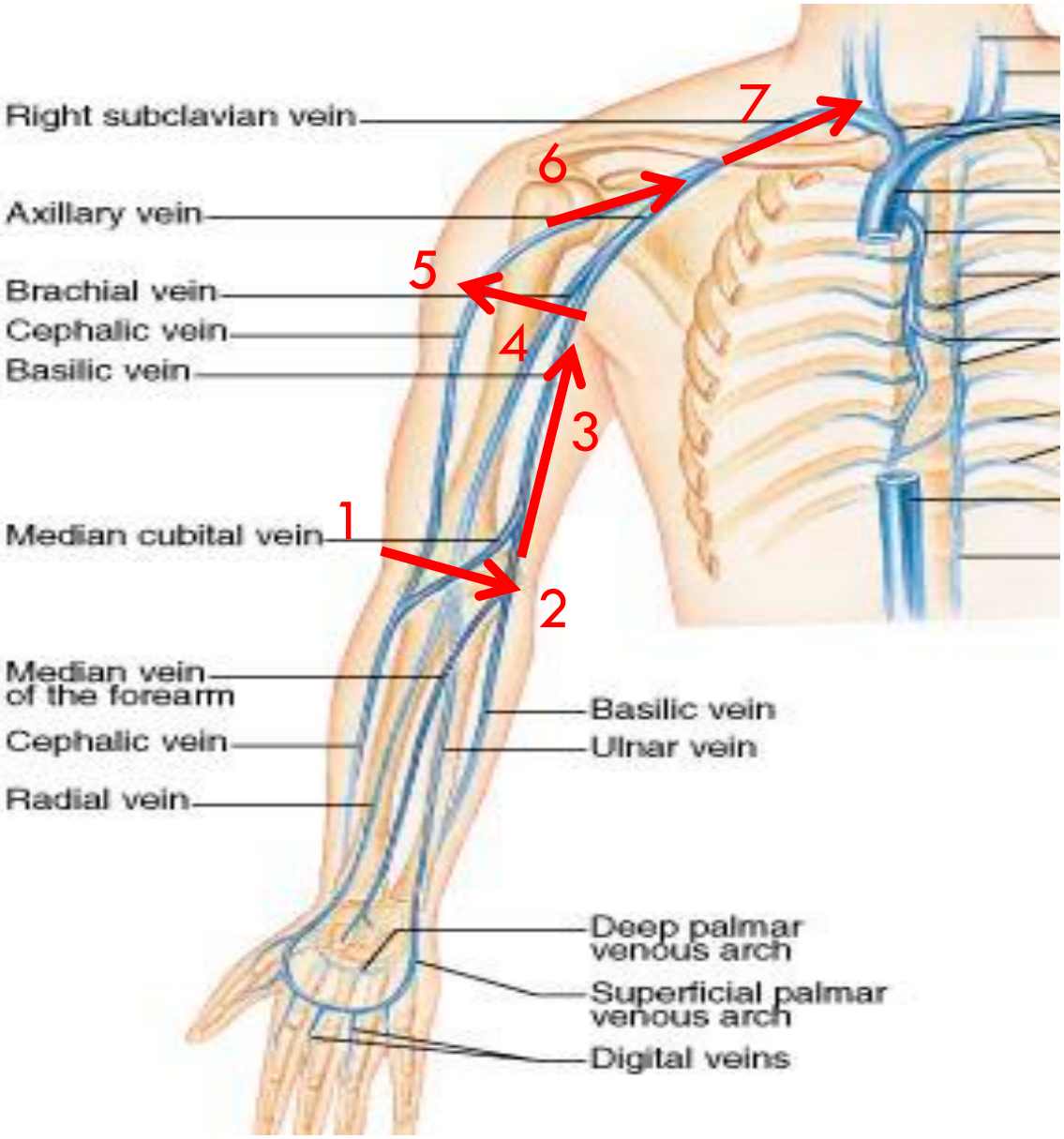
- Accessi Venosi Periferici
  - *'Catheter over the needle'*
- Accessi Venosi Centrali
  - ECC → *'Catheter through the needle'*

VENIPUNTURA *ECOGUIDATA*

- CICC o FICC – in *vene profonde*
  - Vasi venosi zona cervicale o inguinali
  - Seldinger diretto
  - Seldinger indiretto o modificato

D4.SD1.S9	There is no ideal site for cannulation in children; the best site should be determined after ultrasound examination	A

RaCeVA – Rapid Central Vein Assessment


Right subclavian vein
Axillary vein
Brachial vein
Cephalic vein
Basilic vein
Median cubital vein
Median vein of the forearm
Cephalic vein
Radial vein
Basilic vein
Ulnar vein
Deep palmar venous arch
Superficial palmar venous arch
Digital veins
1
2
3
4
5
6
7

RaPeVA

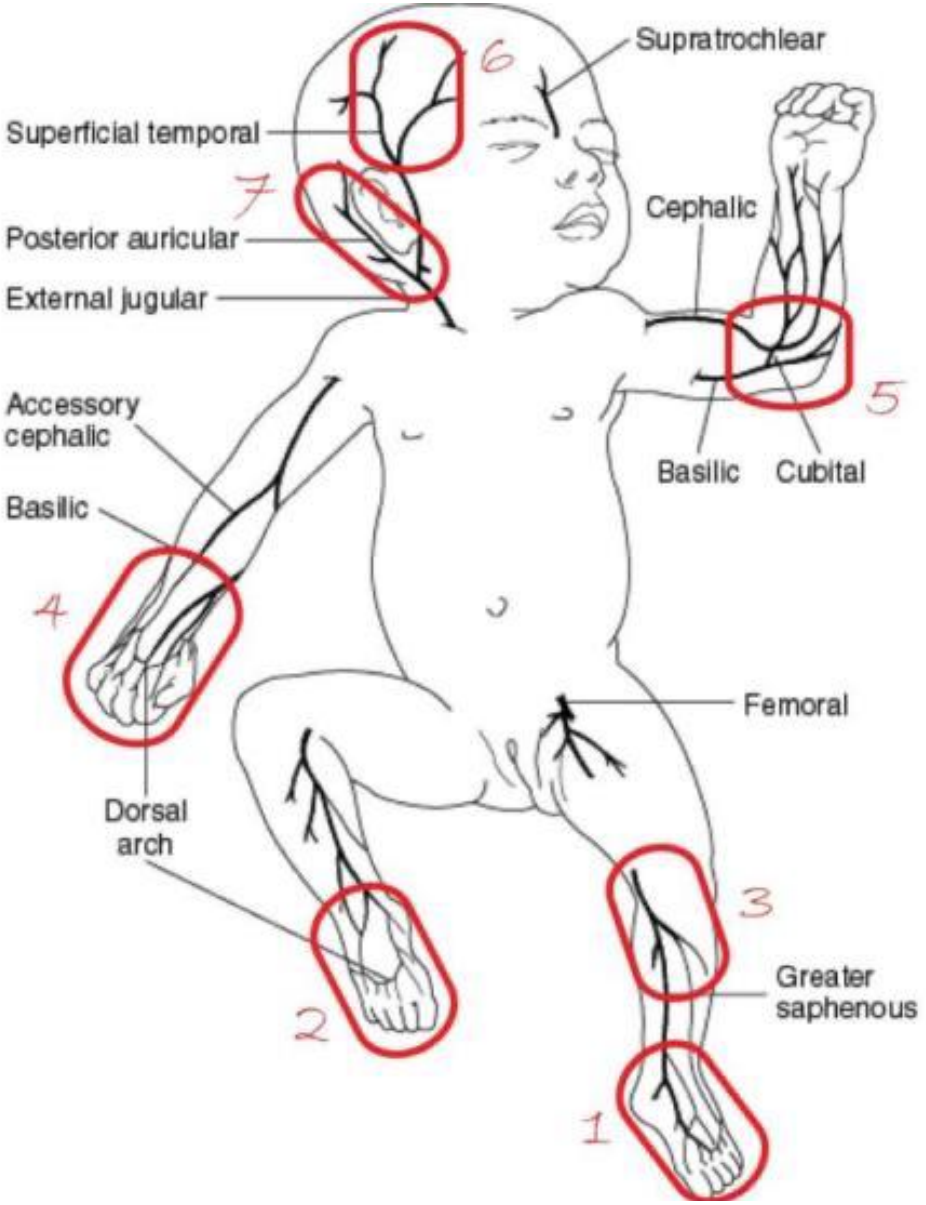
OBIETTIVI DI RACEVA E RAPEVA

1. Aumentare la % di successo
2. Aumentare la % di successo al primo tentativo
3. Procedura costo-efficace
   - Riduzione del tempo impiegato
   - Riduzione del materiale utilizzato
4. Azzerare le complicanze

la puntura più facile è la più sicura

RASUVA: UNO STRUMENTO AMBIZIOSO

- Mappatura delle vene del neonato
- Scelta delle vena più idonea (AVP vs ECC)
- Aumentare la probabilità di successo della prima venipuntura
- Preservare le vene del neonato



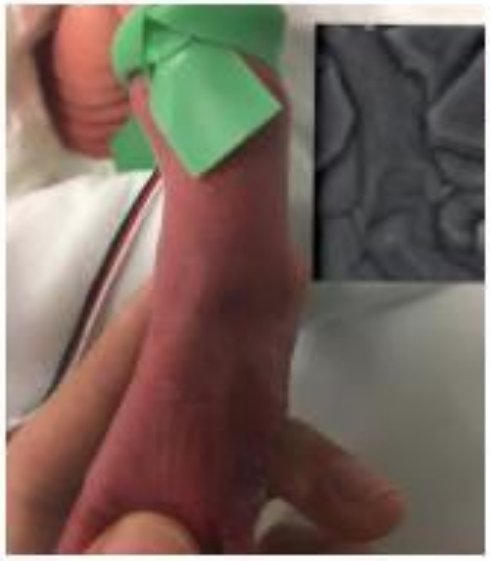
(1) medial malleolus,
(2) lateral malleolus,
(3) popliteal fossa,
(4) back of the hand and wrist,
(5) antecubital fossa,
(6) anterior scalp veins,
(7) posterior scalp veins.

«from foot to head»

(1) – MALLEOLO MEDIALE

Medial malleolus

(2) – MALLEOLO LATERALE

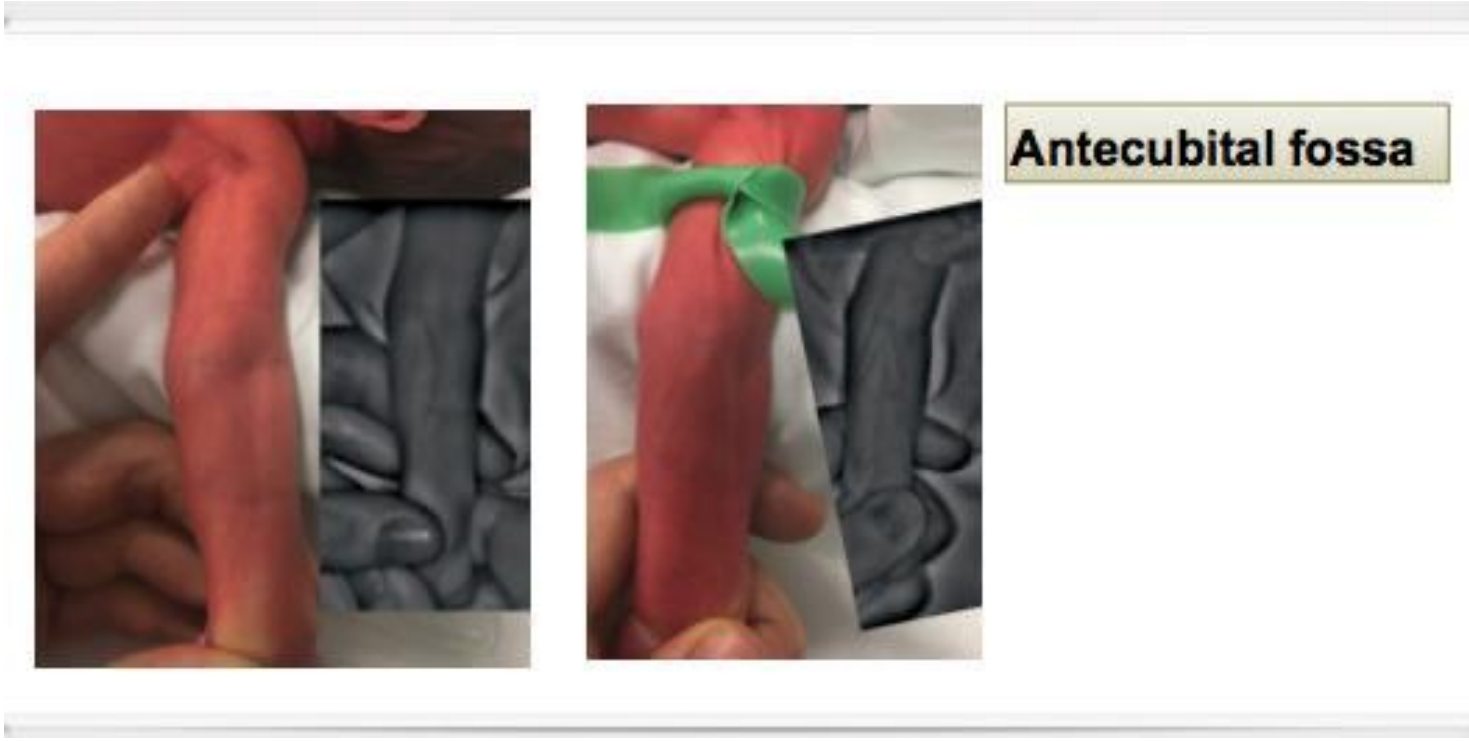


(3) – FOSSA POPLITEA

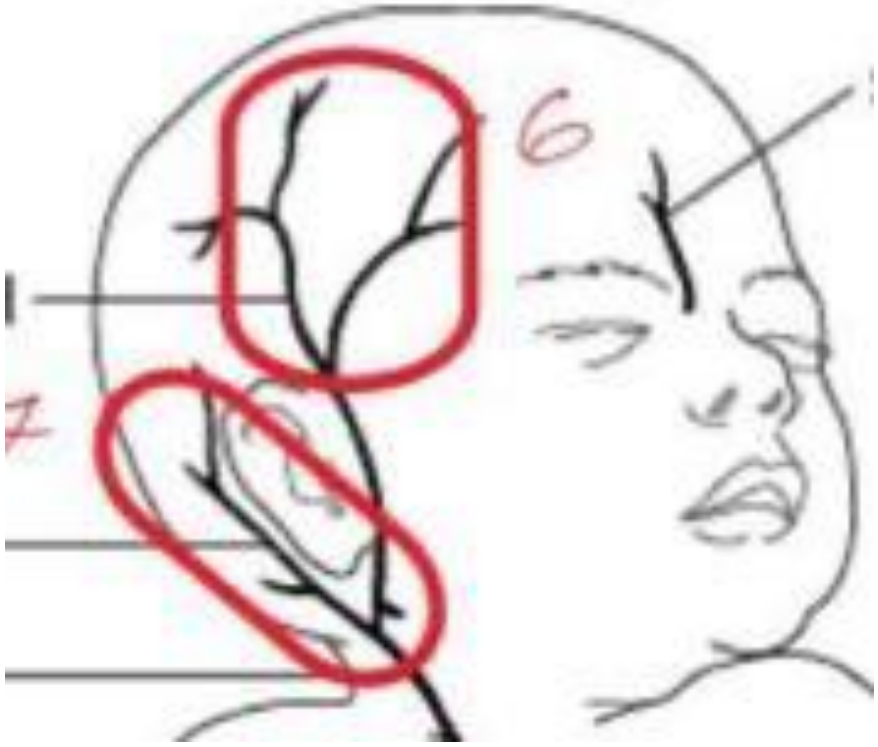
(4) – MANO E POLSO

Back of the hand and wrist

(5) – FOSSA ANTECUBITALE



(6) + (7) – VENE DELLO SCALPO



Take Home Messages

- Aumentare la consapevolezza del patrimonio venoso
- Mappare le vene dei neonati (RaSuVa)
- Fare una scelta ragionata delle vene (quale per AVP, quale per ECC)
- Utilizzo della NIR come tecnica elettiva (?) o comunque nei casi difficili dopo appropiato training
- Ricordare la regola “three strikes and you’re out”


THANK
YOU
GRACIAS
ARIGATO
SHUKURIA
BOLZÏN
MERCI
BÏYAN
SHUKRIA
DANKSCHEEN
TASHAKKUR ATU
SUKSAMA
EKHMET
MEHRBANI
GRAZIE
MAAKE
KOMAPSUMNIDA
JUSPAXAR
GOZAIMASHITA
EFCHARISTO
PALDIES
TINGKI
YAQHANYELAY
SPASSIBO
SNACHALHUYA
SPASIBO
DENKUJA
MINMONCHAR