



Sistema Socio Sanitario



Regione
Lombardia

ASST Melegnano e Martesana

Cosa è cambiato nel posizionamento dei dispositivi per accesso venoso durante e dopo la pandemia COVID

Davide Vailati

UOS Gestione Blocco Operatorio

Dipartimento Anestesia e Rianimazione

CTS AV Team Aziendale

Ospedale di Melegnano–ASST Melegnano e Martesana

2024
BOLOGNA

9-10-11 dicembre | *december 9th-10th-11th*



GOALS

To analyze how the COVID-19 pandemic has impacted the placement and management of vascular devices



Impacts on patient management
Changes in techniques and protocols
Innovations and new technologies



Editorial

**ECHOTIP: A structured protocol for
ultrasound-based tip navigation and tip
location during placement of central
venous access devices in adult patients**

JVA | The Journal of
Vascular Access

The Journal of Vascular Access
2023, Vol. 24(4) 535-544
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298211044325
journals.sagepub.com/home/jva
SAGE



A misty, foggy landscape with bare trees and rolling hills, serving as a background for the title text.

VASCULAR ACCESS & COVID

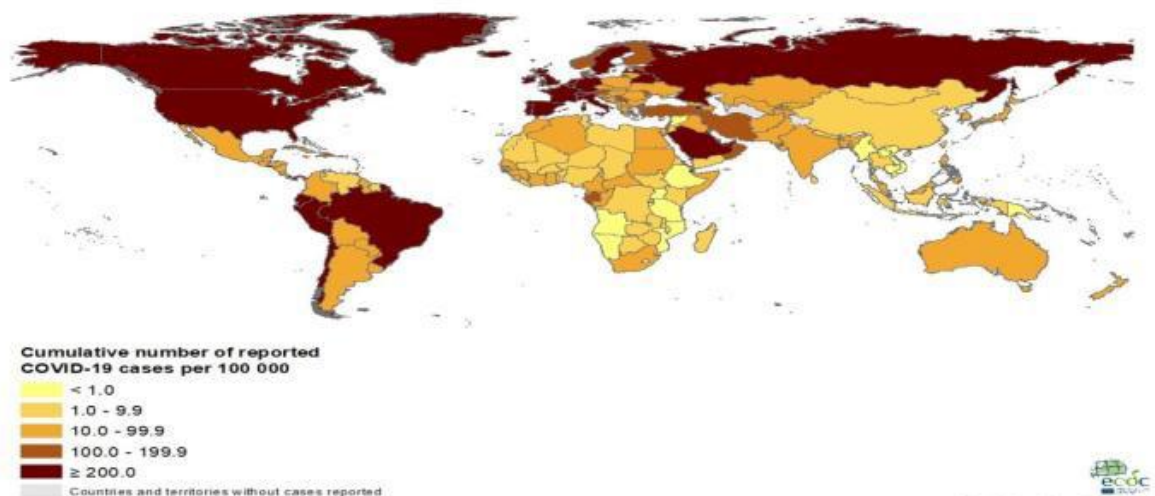
COVID: CLINICAL and MANAGEMENT ISSUES

Global health emergency

- Overload of health systems
- Reorganization of hospital resources
- Reduction of non-urgent access

Europe: 1 917 491 cases; the five countries reporting most cases are Russia (387 623), United Kingdom (271 222), Spain (238 564), **Italy (232 248)** and Germany (181 196).

Europe: deaths - Russia (4374), United Kingdom (38161), Spain (27121), **Italy (33229)** and Germany (8489)



Date of production: 29/05/2020
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union.

- Change of hospital flows and priorities
- Focus on COVID-19 emergencies
- Delays and suspension of elective surgeries

COVID CLINICAL ISSUES and VASCULAR ACCESS

- Respiratory failure with severe hypoxemia
- Dehydration (due to days of symptoms, such as fever and diarrhea)
- Inadequate nutrition
- AKI (Acute kidney Injury)



- difficulties often characterize an adequate vascular access positioning
- difficult to maintain the VA due to emergency rooms overcrowding
- ECMO and RRT

COVID CLINICAL ISSUES and VASCULAR ACCESS

NON-ICU COVID pts

- Hydration
- Supportive therapy
- Blood sampling

ICU COVID pts

- Hydration
- Supportive therapy
- Blood sampling
- Amine
- Parenteral nutrition
- CRRT
- ECMO



SIAARTI

PRO VITA CONTRA DOLOREM SEMPER

Editorial

JVA | The Journal of
Vascular Access

Choice and management of vascular access in the context of COVID-19 outbreak in Italy: Recommendations from clinical practice

**Davide Vailati¹, Giorgia Montrucchio² , Vittorio Cerotto³ ,
Giuseppe Capozzoli⁴, Fabio Gori⁵, Flavia Petrini^{6,7} and Luca Brazzi^{2,8};
on behalf of the Italian Society of Anesthesia and Intensive Care
(Società Italiana di Anestesia, Analgesia, Rianimazione e Terapia
Intensiva, SIAARTI)**

The Journal of Vascular Access
1–6

© The Author(s) 2020

Article reuse guidelines:

sagepub.com/journals-permissions

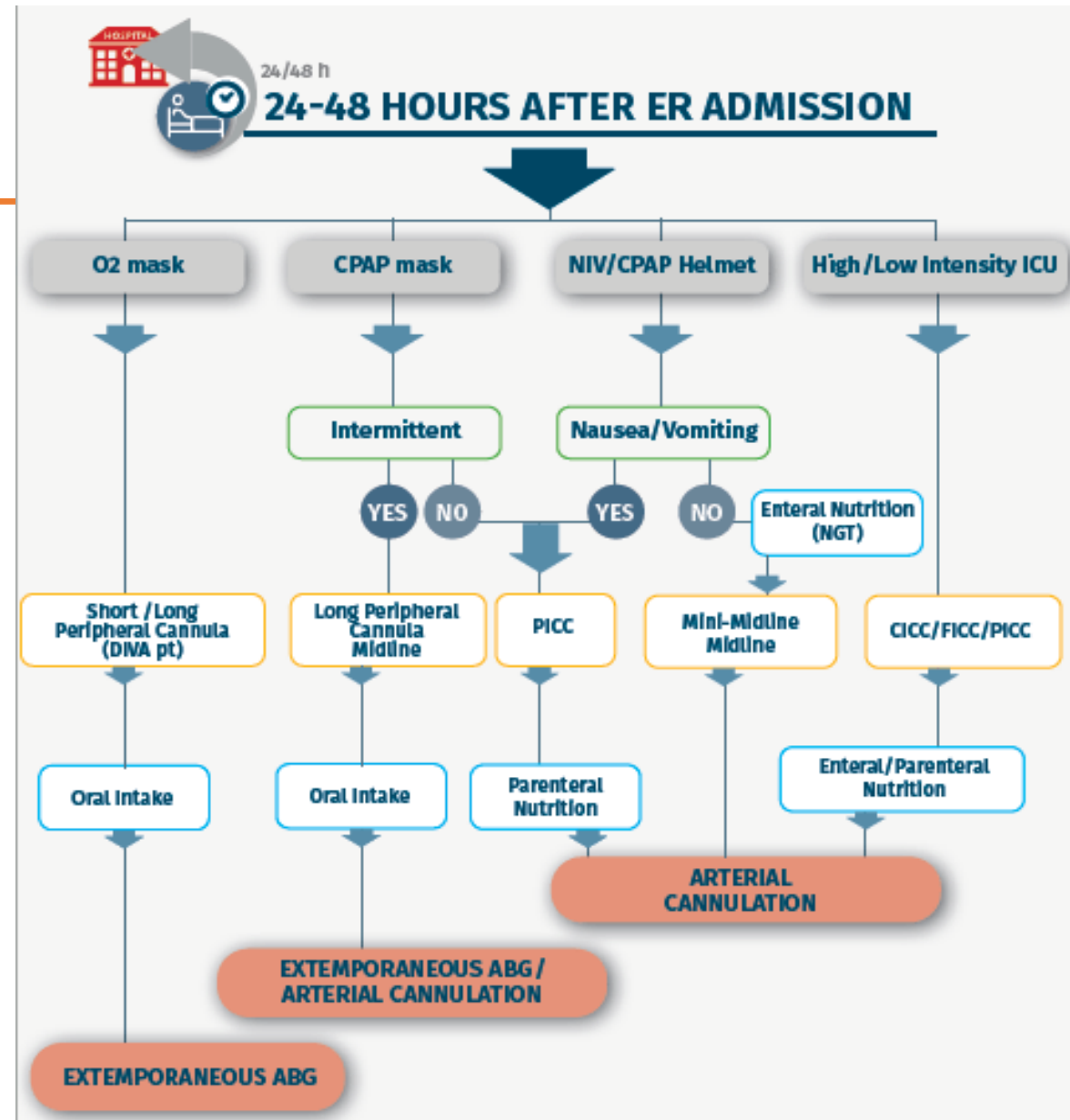
DOI: 10.1177/1129729820968415

journals.sagepub.com/home/jva

 **SAGE**

GOALS

- Establish as soon as possible a reliable vascular access, appropriate to the needs of the patient.
- Minimize the patient's discomfort.
- Optimize the patient's hydration and nutrition status.
- Reduce the risk of transmission of COVID-19 from patient to patient and from patient to operator.





Considerations on the use of vascular access devices in patients with COVID-19 (and some practical recommendations)

April 5th, 2020

Edited by Mauro Pittiruti, Fulvio Pinelli, Maria Giuseppina Annetta, Sergio Bertoglio, Daniele G. Biasucci, Roberto Biffi, Simona Biondi, Fabrizio Brescia, Massimo Buononato, Giuseppe Capozzoli, Paolo Cotogni, Elisa Deganello, Laura Dolcetti, Daniele Elisei, Stefano Elli, Davide Giustivi, Emanuele Iacobone, Antonio LaGreca, Massimo Lamperti, Giada Maspero, Giancarlo Scoppettuolo, Davide Vailati, Daniele Vezzali.

Pittiruti and Pinelli *Critical Care* (2020) 24:269
<https://doi.org/10.1186/s13054-020-02997-1>

Critical Care

COMMENTARY

Open Access

Recommendations for the use of vascular access in the COVID-19 patients: an Italian perspective



Mauro Pittiruti^{1*} , Fulvio Pinelli² on behalf of the GAVeCeLT Working Group for Vascular Access in COVID-19

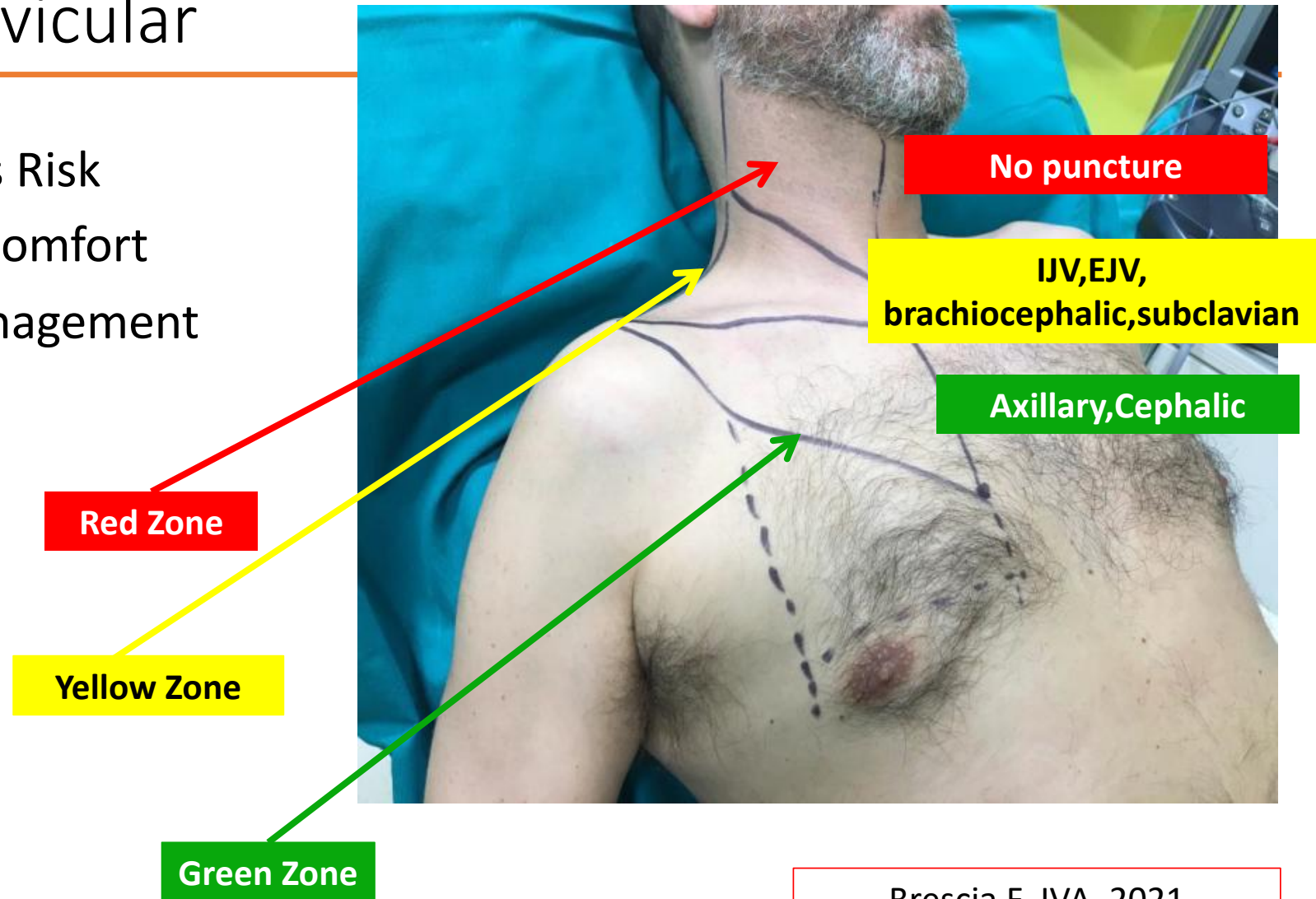
WHICH VEIN? WHICH DEVICE?

- Proactive approach
- IC-ECG or US tip positioning
- Eco guided puncture (V & A)
- Infraclavicular approach
- Wireless US/dedicated US
- Vascular Access Team



CICC infraclavicular

- Reduce Infectious Risk
- Improve patient comfort
- Improve VAD management



Brescia F. JVA, 2021

CICC infraclavicular

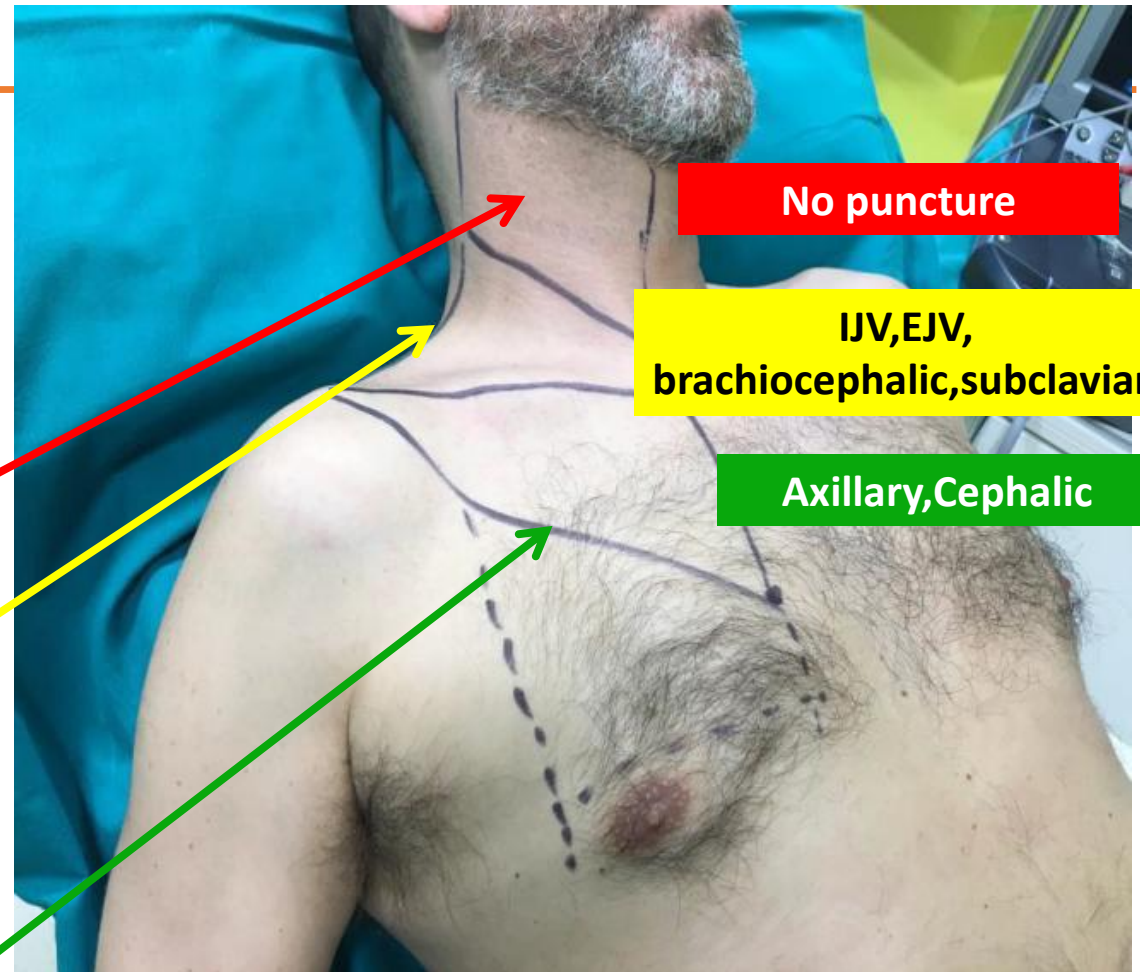
- Reduce Infectious Risk
- Improve patient comfort
- Improve VAD management



Red Zone

Yellow Zone

Green Zone



No puncture

**IJV,EJV,
brachiocephalic,subclavian**

Axillary,Cephalic

Brescia F. JVA, 2021

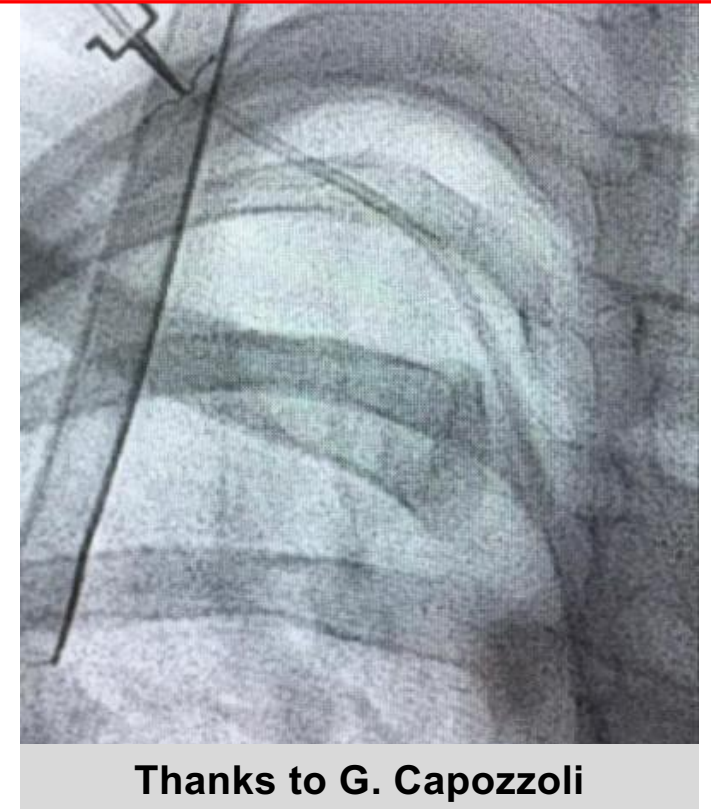
ANCHORAGE

- Accidental Removal/Dislocation



Prone position

SUBCUTANEOSLY ANCHORED SECUREMENT



Thanks to G. Capozzoli

PICC

- Reduced Accidental Removal/Dislocation in prone position



Thanks to G. Capozzoli

PRONE POSITION

Yang MX et al. Journal of Intensive Care Medicine 2021, Vol. 36(3) 373.

Central Venous Catheter Insertion in the Prone Position—A Last Resort in Critically Ill COVID-19 Patients

CICC

technique. **Conclusion:** In the setting of the COVID pandemic, many cases of acute respiratory distress syndrome require patients to be prone in order to improve gas exchange. In the most severe situations, these patients would not be able to tolerate rotating back to the supine position but would still require central venous catheter insertion urgently. We demonstrated feasibility of central venous catheter insertion in the prone position in these severely ill patients.



Figure 2. Postero-lateral approach to the right internal jugular vein. "IJ" internal jugular vein. "CA" carotid artery.

Achieving superficial femoral venous access in a critically ill COVID-19 patient in the prone position

The Journal of Vascular Access
2022, Vol. 23(3) 458–461
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1129729821989894
journals.sagepub.com/home/jva
SAGE

Matthew Ostroff^{ID}, Mourad Ismail and ToniAnn Weit

Mid-thigh femoral vein

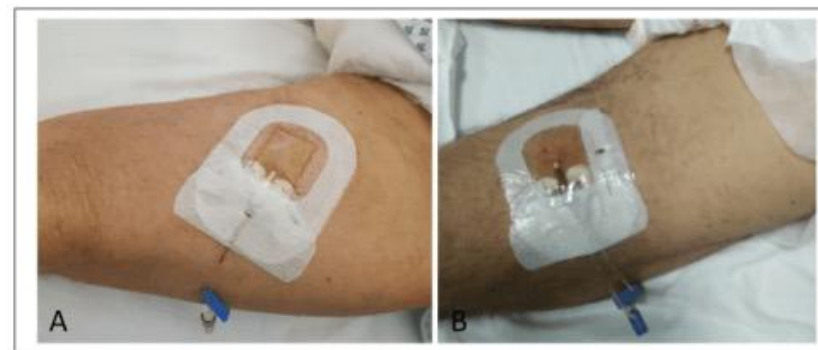


Figure 1. Critically Ill Prone COVID-19 Patient with Superficial Femoral Vein 55cm Triple Lumen Catheter

Midline peripheral catheters inserted in the superficial femoral vein at mid-thigh: Wise choice in COVID-19 acute hypoxemic respiratory failure patients with helmet continuous positive airway pressure

Antonio Gidaro¹ , Federica Samartin¹, Emanuele Salvi¹, Francesco Casella¹, Chiara Cogliati¹, Davide Giustivi² , Francesca Lugli¹, Chiara Trione¹, Chiara Melchionda¹, Arianna Bartoli¹, Antonella Foschi³, Monica Schiavini³, Marco Schiuma³, Roberto Castelli⁴ and Maria Calloni¹

MC (midline)



A) Mid-thigh peripheral catheters 4fr single lumen inserted in supine position; B) Mid-thigh peripheral catheters 7fr dual lumen inserted in prone position.

Abstract

Background: During coronavirus disease 2019 (COVID-19) pandemic, Helmet Continuous Positive Airway Pressure (h-CPAP) has been widely used to treat Acute Hypoxemic Respiratory Failure (AHRF). In COVID-19 patients undergoing h-CPAP a simple short peripheral catheter could be insufficient. According to the European Recommendations for Proper Indication and Use of Peripheral venous access consensus, a stable peripheral Vascular Access Device is indicated for intravenous treatment compatible with the peripheral route scheduled for more than 1 week.

Objective: The aim of this prospective study was to evaluate the performance and the potential complications of superficial femoral midline catheters (SFMC) inserted in the Superficial Femoral Vein by direct Seldinger technique with peripheral tip (Arrow®, Teleflex; 20 cm length four FR single lumen and seven FR dual lumen) in AHRF COVID-19 patient. Complications were divided in early (accidental puncture of superficial femoral artery (APSA); accidental saphenous nerve puncture (ASNP); bleeding) and late (Catheter Related Thrombosis (CRT); Catheter-Related Bloodstream Infections (CRBSI); Accidental Removal (AR); persistent withdrawal occlusion (PWO)).

Methods: From 1st October 2020 to 30th June 2021 we conducted a prospective observational study in COVID-19 sub-intensive wards at Luigi Sacco Hospital (Milan).

Results: Hundred seventy five SFMC (mean dwell time 11.1 ± 9.8 days) were implanted in COVID-19 patients, 107 (61.1%) during h-CPAP treatment (10.5 ± 8.9 days), the remaining 68 (38.9%) in patients with severe disease. We recorded two minor immediate/early complications (APSA without sequelae) and no major complications.

The long-term follow-up registered four CRBSI (2.3%–2.5/1000 catheters days (CD)), five CRT (2.9%: 2.6/1000 CD), 22 AR (12.6%; 11.4/1000 CD), 38 PWO (36.5%), 34 of which occurred due to fibroblastic sleeve (32.7%).

Conclusions: SFMC proved to be safe, easy and time-saving. It could be implemented, after a careful benefits and risks evaluation, in particular settings such as h-CPAP, delirium, bleeding risk factors and palliative care patients.

NEW PROTOCOL

The Journal of Vascular Access
Volume 24, Issue 4, July 2023, Pages 527-534
© The Author(s) 2021, Article Reuse Guidelines
<https://doi.org/10.1177/11297298211041442>

Sage Journals

Editorial

The SIF protocol: A seven-step strategy to minimize complications potentially related to the insertion of femorally inserted central catheters

Fabrizio Brescia ¹, Mauro Pittiruti ², Matthew Ostroff ³, Timothy R Spencer ⁴, and Robert B Dawson ⁵

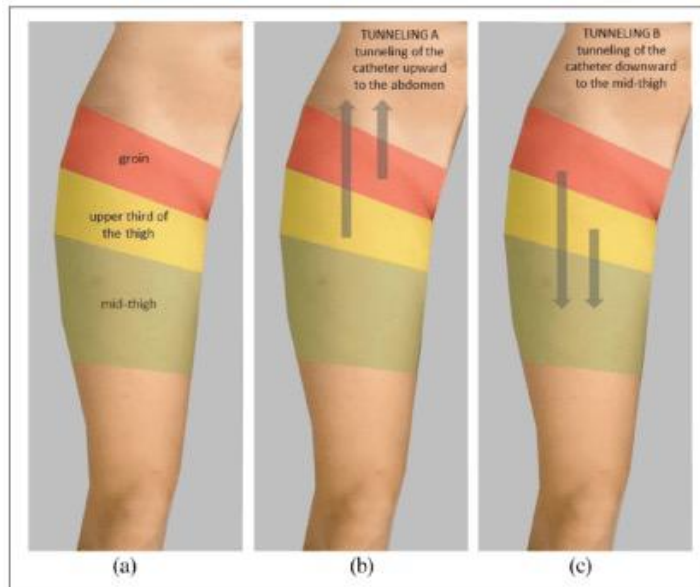
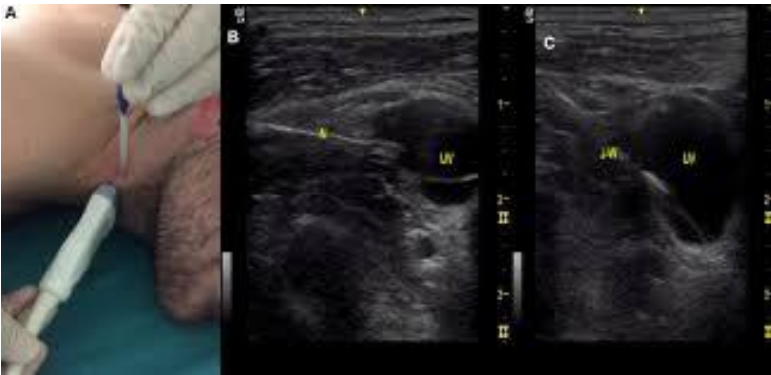


Table 1. The seven steps of the SIF Protocol.

Step 1	<i>Preprocedural evaluation</i> —choice of the vein by systematic ultrasound examination of the veins of the groin and the thigh (RaFeVA protocol) and choice of the ideal exit site (Femoral ZIM)
Step 2	<i>Appropriate aseptic technique</i> —hand hygiene, skin antisepsis with 2% chlorhexidine in 70% alcohol, maximal barrier precautions
Step 3	<i>Ultrasound-guided insertion</i> —ultrasound-guided venipuncture, ultrasound verification of the correct direction of the guidewire (tip navigation)
Step 4	<i>Intra-procedural assessment of tip location</i> —if the tip must be in IVC, use length estimation by anthropometric measurement and consider post-procedural x-ray; if the tip must be in RA or at IVC/RAJ, use intracavitary ECG and/or by transthoracic echocardiography (in subcostal view, using the “bubble test”)
Step 5	<i>Adequate protection of the exit site</i> —reduction of the risk of bleeding and risk of contamination by sealing with cyanoacrylate glue
Step 6	<i>Proper securement of the catheter</i> —stabilization of the catheter using skin-adhesive sutureless devices, transparent dressing with integrated securement, or subcutaneous anchorage
Step 7	<i>Appropriate coverage of the exit site</i> —semi-permeable transparent dressing, preferably with high breathability

MAIN CHANGES IN VASCULAR ACCESS

- Greater attention to catheter dislocation
- Greater diffusion of the infraclavicular approach
- New anatomical approaches: prone position
- New vascular approaches: superficial femoral
- TIP location: Intracavitary-EKG and ECHOTIP Protocol



Editorial

ECHOTIP: A structured protocol for ultrasound-based tip navigation and tip location during placement of central venous access devices in adult patients

JVA | The Journal of Vascular Access

The Journal of Vascular Access
2023, Vol. 24(4) 535–544
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298211044325
journals.sagepub.com/home/jva
SAGE

INFECTION and TROMBOSIS PREVENTION

Original research article

Retrospective survey from vascular access team Lombardy net in COVID-19 era

JVA | The Journal of
Vascular Access

Gidaro Antonio^{1*}, Vailati Davide^{2*}, Gemma Marco^{3*},
Lugli Francesca¹, Casella Francesco¹, Cogliati Chiara¹,
Canelli Antonio², Nadia Cremonesi², Monolo Davide⁴,
Cordio Giuseppe⁴, Frosi Chiara⁴, Destefanis Riccardo⁵,
Rossi Anna⁵, Alemanno Maria Chiara⁶, Valenza Franco⁶,
Luisoni Mara Dina⁶, Elli Stefano⁷, Caldarini Andrea⁷,
Lucchini Alberto⁷, Paglia Stefano⁸, Baroni Monica⁸
and Giustivi Davide^{8*}

Results: A total of 2206 VADs were evaluated, 1107 (50.2%) of which were inserted in COVID-19 patients. In COVID-19 cohort the first choice was Long Peripheral Cannula in 388 patients (35.1%) followed by Midline Catheter in 385 (34.8%). The number of “central tip” VADs inserted in COVID-free inpatients and COVID-19 positive were similar (307 vs 334). We recorded 42 (1.9%) CRT; 32 (79.2%) were observed in COVID-19 patients. A total of 19 CRBSI were diagnosed; 15 (78.95%) were observed in COVID-19. Accidental removals were the more represented complication with 123 cases, 85 (69.1%) of them were in COVID-19. COVID-19 significantly predicted occurrence of CRT (OR=2.00(1.85–5.03); $p < 0.001$), CRSB (OR=3.82(1.82–8.97); $p < 0.001$), and Accidental Removal (OR=2.39(1.80–3.20); $p < 0.001$) in our propensity score weighted models.

Table 1. Total number of devices with complication; COVID-19 free device with complication; COVID-19 device with complication.

Total device	N (%)	CRT (%)	CRBSI (%)	Accidental removals
CICC	159 (159/2206 7.2%)	2 (2/159 1.3%)	3 (3/159 1.9%)	10 (10/159 6.3%)
FICC	85 (85/2206 3.9%)	3 (3/85 3.5%)	4 (4/85 4.7%)	10 (10/85 11.8%)
PICC	608 (608/2206 27.6%)	8 (8/608 1.3%)	2 (2/608 0.3%)	20 (20/608 3.3%)
Midline	850 (848/2206 38.5%)	18 (18/848 2.2%)	8 (8/848 0.9%)	36 (36/848 4.2%)
Long periph. cannula	504 (500/2206 22.7%)	11 (11/500 2.2%)	2 (2/500 0.4%)	47 (47/500 9.5%)
tot	2206	42 (42/2206 1.9%)	19 (19/2206 0.9%)	123 (123/2206 5.6%)
COVID-19 free device	N (%)	CRT (%)	CRBSI (%)	Accidental removals
CICC	17 (17/1099 1.5%)	0	0	1 (1/17 5.9%)
FICC	21 (21/1099 1.9%)	1 (1/21 4.8%)	0	3 (3/21 14.3%)
PICC inpatients	269 (269/1099 24.5%)	1 (1/269 0.4%)	0	5 (5/269 1.9%)
PICC outpatients	211 (211/1099 19.2%)	1 (1/211 0.5%)	1 (1/211 0.5%)	10 (10/211 4.7%)
Midline inpatients	452 (452/1099 41.1%)	4 (4/452 0.9%)	3 (3/452 0.7%)	13 (13/452 2.9%)
Midline outpatients	13 (13/1099 1.2%)	0	0	0
Long periph. cannula	116 (112/1099 10.6%)	3 (3/112 2.7%)	0	6 (6/112 5.4%)
Tot	1099	10 (10/1099 0.9%)	4 (4/1099 0.4%)	38 (38/1099 3.5%)
COVID-19 device	N°(%)	CRT (%)	CRBSI (%)	Accidental removals
CICC	142 (142/1107 12.8%)	2 (2/142 1.4%)	3 (3/142 2.13%)	9 (9/142 6.3%)
FICC	64 (64/1107 5.8%)	2 (2/64 3.1%)	4 (4/64 6.25%)	7 (7/64 10.9%)
PICC	128 (128/1107 11.5%)	6 (6/128 4.7%)	1 (1/128 0.78%)	5 (5/128 3.9%)
Midline	385 (385/1107 34.8%)	14 (14/385 3.6%)	5 (5/385 1.3%)	23 (23/385 6%)
Long periph. Cannula	388 (388/1107 35.1%)	8 (8/388 2.1%)	2 (2/388 0.52%)	41 (41/388 10.6%)
Tot	1107	32 (32/1107 2.9%)	15 (15/1107 1.4%)	85 (85/1107 7.7%)

1)CRT
2)CRBSI
3)Accidental
removals

Table 3. Description of VADs complication.

	Number of complication	Male/ Female %	Median age	Median day insertion/ diagnosis	Pulmonary embolism	CRBSI patogen	New VAD after accidental remove	Mortality after complication
CRT COVID+	32	50%/50%	69.7 ± 11.2	8.7 ± 5.7	1			31.3%
CRT COVID FREE	10	50%/50%	67.1 ± 12.7	15.6 ± 18.1	0			20,0%
	$p < 0.001$							
CRBSI COVID+	15	40%/60%	63.2 ± 19.7	17.2 ± 8.3		GRAM + 11/ GRAM - 3/ Fungal 1		20%
CRBSI COVID FREE	4	40%/60%	62 ± 15.6	39.7 ± 50.5		GRAM + 2/ GRAM - 1/ Fungal 1		0%
	$p < 0.001$							
Accidental Remove COVID+	85	55%/45%	77.5 ± 12.5	7 ± 6.3			35%	30%
Accidental Remove COVID FREE	38	37%/63%	70.9 ± 15.8	16.8 ± 17.9			44%	12%
	$p < 0.001$							

Conclusions: CRT, CRBSI, and accidental removal are significantly more frequent in COVID-19 patients. Accidental removals are the principal complication, for this reason, the use of subcutaneously anchored securement is recommended for a shorter period than usual.

THROMBOSIS PREVENTION

COVID-19 patients have a hypercoagulable state which seems to lead often thrombotic pathologies development. One of the most significant poor prognostic features in those patients is the development of coagulopathy [C]. In patients who develop sepsis from various infectious agents, development of coagulopathy is one of the key and persistent features which is associated with poor outcomes

Intensive Care Med

<https://doi.org/10.1007/s00134-020-06022-5>

GUIDELINES

Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19)



SIAARTI
PRO VITA CONTRA DOLOREM SEMPER



Prophylactic low molecular weight heparin 100U/kg single administration or
Therapeutic dosage (100U / kg bid, or 150U / kg single administration)

INFECTION and THROMBOSIS PREVENTION

Strengthening of infection prevention guidelines



- Increased disinfection and sterilization protocols
 - Preference for the use of low-risk devices (kit)
 - Tunneling

Management of complications



- Intensive monitoring to prevent infections and thrombosis
- Techniques for managing complications in emergency settings

GLOBAL USE OF ULTRASOUND

EJA

Eur J Anaesthesiol 2020; **37**:344–376

GUIDELINES

European Society of Anaesthesiology guidelines on peri-operative use of ultrasound-guided for vascular access (PERSEUS vascular access)

Massimo Lamperti, Daniele Guerino Biasucci, Nicola Disma, Mauro Pittiruti, Christian Breschan, Davide Vailati, Matteo Subert, Vilma Traškaitė, Andrius Macas, Jean-Pierre Estebe, Regis Fuzier, Emmanuel Boselli and Philip Hopkins

BEDSIDE →

USE OF **ULTRASOUND** THROUGHOUT THE PROCEDURE OF CENTRAL VENOUS CATHETERIZATION TO ASSIST ALL STEPS OF THE PROCEDURE

When to use Ultrasound during central venous catheterization:

Pre-puncture

Sonographic evaluation

› In order to choose the safest vein to be punctured

After puncture

Use of venous ultrasound as a “tip-navigation” technique
› In order to prevent primary malposition

Don't forget about:

Pleural and lung ultrasound

Before, during and after the procedure

› In order to prevent the risk of pleural damage, pneumothorax, haemothorax or evolution of such complications

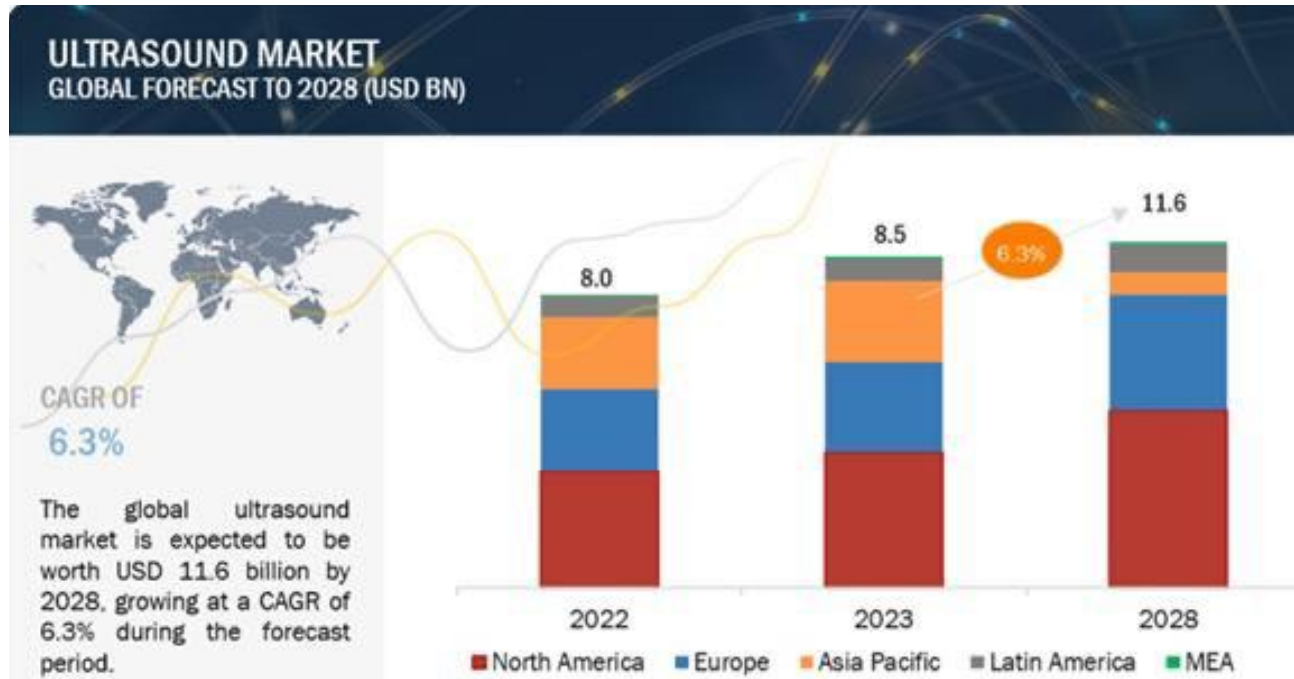
Diagnosis

With Venous ultrasound
› Confirm or rule out a suspected catheter-related thrombosis or fibrin sleeve

Tip location technique

To prevent primary malposition

TECHNOLOGY→ULTRASOUND MARKET



By End User

- Hospital, Surgical Centers, Diagnostic Centers
- Maternity Center
- Ambulatory Centers
- Research and Academia
- Other End Users

By Region

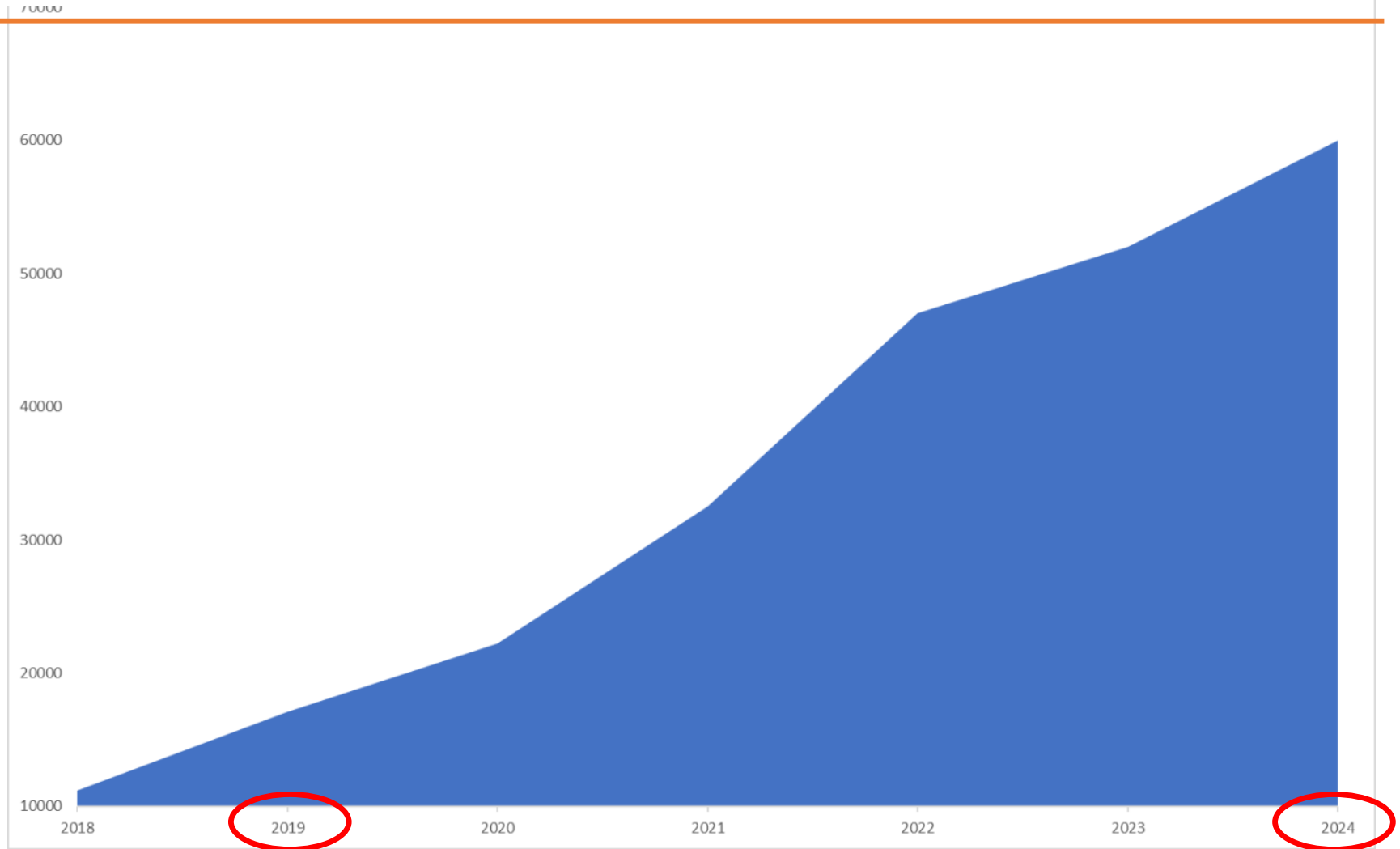
- North America
 - US
 - Canada
- Europe
 - Germany
 - France
 - UK
 - Italy
 - Spain
 - Rest of Europe
- Asia Pacific
 - Japan
 - China
 - India
 - Australia
 - South Korea
 - Rest of Asia Pacific



TREND SAS

Securacath

- Gare ARIA: increase in spending ceiling
- Increase in sales



Thanks to D.Pilotto

VASCULAR ACCESS TEAM



Disaster Medicine and Public Health Preparedness

www.cambridge.org/dmp

Brief Report

Cite this article: Hackett AP, Wells CM, Gupta R, et al. Novel multidisciplinary vascular access team helps to improve ICU workflow amidst Covid-19 pandemic. *Disaster Med Public Health Prep.* doi: <https://doi.org/10.1017/dmp.2022.111>

Keywords: critical care; vascular access devices; emergency medical service; central venous catheter; arterial line

Corresponding Author:
Anna K. Hackett,
Email: anna.hackett@mountsinai.org

Novel Multidisciplinary Vascular Access Team Helps to Improve ICU Workflow Amidst Covid-19 Pandemic

Anna K. Hackett BS¹, Celia M. Wells PhD, RN, Rohit Gupta MD, Ziya Zhang BA, Amy Brito MSN, MPH, RN, Natalie B. Kirton RN, MA, CCRN, Christy C. Chan BS, Kester Brown RN, Caitlin Wong RN, Kayla M. Leonardi RN, CCRN, Atinuke Shittu MBBS, MPH, Capri Lay MD and Roopa Kohli-Seth MD

¹ICahn School of Medicine at Mount Sinai, New York, NY, USA

Abstract

Objective: The surge in critically ill patients has pressured hospitals to expand their intensive care unit capacities and critical care staff. This was difficult given the country's shortage of intensivists. This paper describes the implementation of a multidisciplinary central line placement team and its impact in reducing the vascular access workload of ICU physicians during the height of the COVID-19 pandemic.

Methods: Vascular surgeons, interventionalists, and anesthesiologists, were redeployed to the ICU Access team to place central and arterial lines. Nurses with expertise in vascular access were recruited to the team to streamline consultation and assist with line placement.

Results: While 51 central and arterial lines were placed per 100 ICU patients in 2019, there were 87 central and arterial lines placed per 100 COVID-19 ICU patients in the sole month of April, 2020. The ICU Access Team placed 107 of the 226 vascular access devices in April 2020, reducing the procedure-related workload of ICU treating teams by 46%.

Conclusions: The ICU Access Team was able to complete a large proportion of vascular access insertions without reported complications. Given another mass casualty event, this ICU Access Team could be reassembled to rapidly meet the increased vascular access needs of patients.

- Trained personnel for catheter positioning and management
- Low number of attempts
- Low exposition time with COVID patients
- Personnel health preservation for other tasks
- Right choice of device
- Catheter management optimization
- Low complications

Original research article

The impact of the SARS-CoV-2 epidemic outbreak on the vascular access team operations after conversion to COVID-19 dedicated hospital

Elisa Deganello¹, Francesco Gastaldo¹, Sonia Masiero¹, Milena Fasson¹, Riccardo Ivan Colopi², Luciano Girotto¹, Jacopo Monticelli³, Elena Marcante⁴, Patrizia Furlan⁴, Vincenzo Baldo⁴, Claudio Pileri⁵, Piero Realdon⁴, Domenico Montemurro³, Alberto Rigo³, Patrizia Benini⁷ and Fabio Baratto¹

JVA The Journal of Vascular Access

The Journal of Vascular Access
2022, Vol. 23(5) 710-717
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journalsPermissions
DOI: 10.1177/1129729211005254
jva.sagepub.com/home/jva
SAGE

Infusion Therapy Standards of Practice

Barbara Nickel, APRN-CHS, CCRN, CRRN¹
Lisa Gorski, MS, RN, HNCHS-BC, CRRN², FAAN
Tricia Reardon, PhD, DNP, RN-BC, FAAN
Amy Kyles, MSN, APRN, AG-CHS, CV-BC³, CRRN⁴
Michelle DeVries, MPH, CIC, VA-BC, CPHQ, FAPE
Samantha Knapp, PhD, RN, FAAN
Britt Meyer, PhD, RN, CRRN⁵, VA-BC, NE-BC
Mary Jo Sarven, MSN, APRN, AOCN, CRRN⁶, LNC, VA-BC
Rachel Crickman, DNP, APRN-CHS, AOCN, OCH, RN
Jenny Ong, PharmD
Simon Clare, MSc, BA, RGN
Mary E. Hoyle, PhD, RN-BS, FAAN

9TH EDITION
REVISED 2024

INS

Infusion Nurses Society
One Edgewater Drive, Norwood, MA 02062
www.ins-nurses.org

COVID: What it left behind

- Promote new vascular approaches
- Increase subcutaneous anchorage system
- Stop X-ray for tip location and complications
- Increase US diffusion
- Diffusion of Access Vascular Team
- Specific protocols for FICC, tip location, infection and thrombosis
- Arterial cannulation: not only ICU
- Proactive approach (not just for vascular access experts!!)

**Live as if you were to die tomorrow.
Learn as if you were to live forever.**



davide.vailati@asst-melegnano-martesana.it