
# The SIP-2 Protocol - Ultrasound assessment for venous access

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# Introduction

- Ultrasound (US) technology has now revolutionized the practice of safer vascular access, for both venous and arterial cannulation.[1,2]

- The ability to visualize underlying structures of the chest, neck, and upper/lower extremities provides for greater success, speed, and safety with all vascular access procedures.[3]

# Ultrasound

- Has superior procedural advantages, but also provides a platform to perform a thorough assessment of the vascular structures to evaluate vessel health, size, and patency, including the location of other important and best avoided anatomical structures.[1]
- A large number of professional organizations highly recommend the use of US when performing vascular assessment and pre- and post-procedural care.[1,4,5]

# Professional Organizations*

Agency for Healthcare Research and Quality (**AHRQ)**
American Academy of Physician Assistants (**AAPA**)
American Association of Critical Care Nurses (**AACN**)
American Association of Nurse Anesthetists (**AANA**)
American Cardiology Association (**ACA**)
American College of Emergency Physicians (**ACEP**)
American Institute of Ultrasound in Medicine (**AIUM**)
American Society of Anesthesiologists (**ASA**)
American Society of Diagnostic and Interventional Nephrology (**ASDIN**)
American Society of Echocardiography (**ASE**)
Association for Professionals in Infection Control and Epidemiology (**APIC**)
Association for Vascular Access (**AVA**)
Association of Anaesthetists of Great Britain and Ireland (**AAGBI**)
Association of Physician Assistants in Cardiovascular Surgery (**APACS**)
Australian and New Zealand Intensive Care Society (**ANZICS**)
Australasian Society for Ultrasound in Medicine (**ASUM**)
Canadian Vascular Access Association (**CVAA**)
Cancer Nurses Society of Australia (**CNSA**)
Centers for Disease Control and Prevention (**CDC**)
European Society of Anaesthesiology and Intensive Care (**ESAIC**)
European Society for Parenteral and Enteral Nutrition (**ESPEN**)
Infusion Nurses Society (**INS**)
Institute for Healthcare Improvement (**IHI**)
Intravenous Nursing New Zealand Incorporated Society (**IVNNZ**)
Italian Group of Central Venous Access (**GAVeCeLT**)
National Institute for Health and Care Excellence (**NICE**)
National Kidney Foundation (**NKF**)
Oncology Nursing Society (**ONS**)
Registered Nurses' Association of Ontario (**RNAO**)
The Royal College of Anaesthetists (**RCA**)
Royal College of Nursing (**RCN**)
Society of Hospital Medicine (**SHM**)
The Joint Commission (**TJC**)
Society for Healthcare Epidemiology of America (**SHEA**)
World Interactive Network Focused on Critical Ultrasound (**WINFOCUS**)
World Congress on Vascular Access (**WoCoVA**)

* Some not listed

# Standardizing Safety

- To ensure procedural safety and high success rates, it is recommend using a systematic protocolized approach for US-guided vascular access in all clinical situations.[1-17]

- A standardized approach minimizes variability in clinical practice, provides a framework for education and training, facilitates implementation, and enables quality analysis.[1]

- Due to limited puncture points, the potential risks of inappropriate venipuncture/cannulation should be minimized by an accurate evaluation of the state of vessel health and by a reduction of the anatomical trauma to the vessel and to the surrounding structures.[3]
- This can be achieved through the adoption of specific venous (and arterial) assessment and device placement protocols.

# Current Recommendations[18-21]

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

Practice Parameter | January 2020

## Practice Guidelines for Central Venous Access 2020: An Updated Report by the American Society of Anesthesiologists Task Force on Central Venous Access*

FREE

+ Author and Article Information

*Anesthesiology* January 2020, Vol. 132, 8–43.

https://doi.org/10.1097/ALN.0000000000002864

Journal of Hospital Medicine

shm Society of Hospital Medicine

Position Statement | Free to Read

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

Ricardo Franco-Sadud MD, Daniel Schnobrich MD, Benji K. Mathews MD, Carolina Candotti MD, Saaid Abdel-Ghani MD, Martin G Perez MD, Sophia Chu Rodgers DNP, ACNP ... See all authors

First published: 06 September 2019 | https://doi.org/10.12788/jhm.3287 | Citations: 69

*Review*

JVA The Journal of Vascular Access

## European recommendations on the proper indication and use of peripheral venous access devices (the ERPIUP consensus): A WoCoVA project

**Mauro Pittiruti[1], Ton Van Boxtel[2], Giancarlo Scoppettuolo[1], Peter Carr[3], Evangelos Konstantinou[4], Gloria Ortiz Miluy[5], Massimo Lamperti[6], Godelieve Alice Goossens[7], Liz Simcock[8], Christian Dupont[9], Sheila Inwood[10], Sergio Bertoglio[11], Jackie Nicholson[12], Fulvio Pinelli[13] and Gilda Pepe[1]**

The Journal of Vascular Access
1–18

DOI: 10.1177/1129729821023274
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# Ensuring Practice Standardization

- Insertion bundles consist of several recommendations, based on scientific evidence, acting synergistically to prioritize various elements from device & vessel selection, pre- & intra-procedural US assessment, while optimizing insertion techniques, patient safety & securement choices, including the cost-effectiveness of a given procedure.
- Several quality, evidence-based assessment protocols now exist to standardize practice outcomes.

# Adult Assessment Protocols[3,7-11]

JVA The Journal of Vascular Access

*Review*

## Rapid Central Vein Assessment (RaCeVA): A systematic, standardized approach for ultrasound assessment before central venous catheterization

**Timothy R Spencer[1] and Mauro Pittiruti[2]**

The Journal of Vascular Access
2019, Vol. 20(3) 239–249

DOI: 10.1177/1129729818804718
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JVA The Journal of Vascular Access

*Techniques in vascular access*

## Rapid Assessment of Vascular Exit Site and Tunneling Options (RAVESTO): A new decision tool in the management of the complex vascular access patients

**Matthew D Ostroff[1], Nancy Moureau[2] and Mauro Pittiruti[3]**

The Journal of Vascular Access
1–7

DOI: 10.1177/1129729821034306
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*Techniques in vascular access*

## Rapid Superficial Vein Assessment (RaSuVA): A pre-procedural systematic evaluation of superficial veins to optimize venous catheterization in neonates

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

The Journal of Vascular Access
1–5

DOI: 10.1177/11297298221098481
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*Editorial*

## The SIC protocol: A seven-step strategy to minimize complications potentially related to the insertion of centrally inserted central catheters

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

The Journal of Vascular Access
1–6

DOI: 10.1177/1129729821036002
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JVA The Journal of Vascular Access

*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]**

The Journal of Vascular Access
1–8

DOI: 10.1177/1129729821041442
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*Editorial*

## The SIP protocol update: Eight strategies, incorporating Rapid Peripheral Vein Assessment (RaPeVA), to minimize complications associated with peripherally inserted central catheter insertion

**Fabrizio Brescia[1], Mauro Pittiruti[2], Timothy R Spencer[3] and Robert B Dawson[4]**

The Journal of Vascular Access
1–9

DOI: 10.1177/11297298221099838
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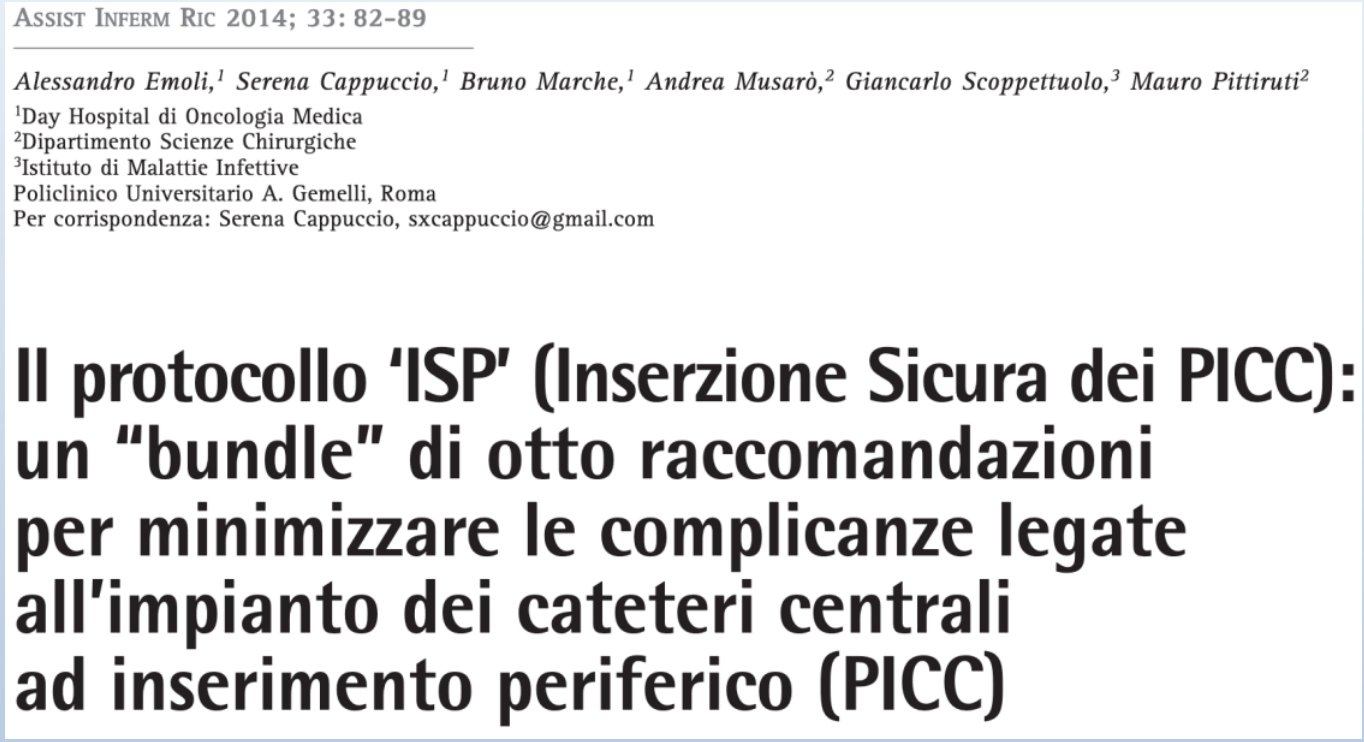
# Inserzione Sicura dei PICC (ISP)[12]



ASSIST INFERM RIC 2014; 33: 82-89

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**Il protocollo 'ISP' (Inserzione Sicura dei PICC): un "bundle" di otto raccomandazioni per minimizzare le complicanze legate all'impianto dei cateteri centrali ad inserimento periferico (PICC)**

- In 2014 GAVeCeLT developed a protocol (SIP: Safe Implantation of PICCs)[12] with the aim of minimizing the risks which may be associated with the placement of PICCs.

# The SIP-2 Protocol (update)[9]

JVA | The Journal of Vascular Access

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The Journal of Vascular Access
1–9


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## The SIP protocol update: Eight strategies, incorporating Rapid Peripheral Vein Assessment (RaPeVA), to minimize complications associated with peripherally inserted central catheter insertion

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# The SIP-2 Protocol (update)

- This updated version of the SIP protocol included new factors based upon most recent evidence-based scientific literature on PICC insertion.
- These included;

  - clinical relevance of the tunneling technique,
  - use of US for intra-procedural tip navigation and tip location,
  - new technologies for protection of exit site (cyanoacrylate glue)
  - and subcutaneous securement of the catheter.

# SIP Protocol[9]

**Table 1.** The eight steps of the SIP Protocol.

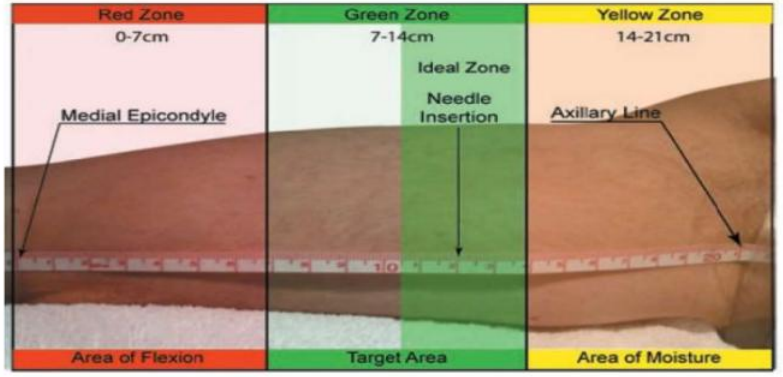
| | |
|---|---|
| Step 1 | *Pre-procedural evaluation*—choose most appropriate vein by systematic ultrasound examination of the veins of the arms (see the RaPeVA protocol) |
| Step 2 | *Appropriate antiseptic technique*—adopt a strict policy of hand hygiene, skin antisepsis with 2% chlorhexidine in 70% isopropyl alcohol, and use of maximal barrier precautions |
| Step 3 | *Choice of vein size and exit site*—evaluate the diameter of the vein so to have an ideal catheter-vein ratio (1:3 or less); place the exit site in the green zone (see Dawson's ZIM™); consider the opportunity of tunneling the catheter, if the most appropriate vein is in the yellow zone (see the RAVESTO protocol) |
| Step 4 | *Clear identification of median nerve and brachial artery*—identify each structure before venipuncture, using ultrasound |
| Step 5 | *Ultrasound-guided venipuncture*—access a deep vein of the arm (either basilic or brachial vein), preferably adopting the short axis/out-of-plane approach, and use of a micro-introducer kit |
| Step 6 | *Ultrasound-based tip navigation*—assess the correct direction of the guidewire, by a supra-clavicular ultrasound scan (see the ECHOTIP protocol) |
| Step 7 | *Intra-procedural assessment of tip location*—use intracavitary ECG and/or ultrasound (subcostal or apical view, using the "bubble test": see the ECHOTIP protocol) |
| Step 8 | *Appropriate securement of the catheter and protection of the exit site*—use sutureless devices only; reduce the risk of bleeding and bacterial contamination using cyanoacrylate glue and semi-permeable transparent membrane dressings |

# What's new? 2022 SIP protocol

- Compared to the SIP protocol proposed several years ago,16 recommendations were added, with the purpose of further reducing the risks and complications associated with PICC insertion.
- A more accurate application of the Rapid Peripheral Vein Assessment (RaPeVA) protocol, which should not be limited to a systematic evaluation of the veins of the arms, but extended also to the deep veins of the cervico-thoracic region.

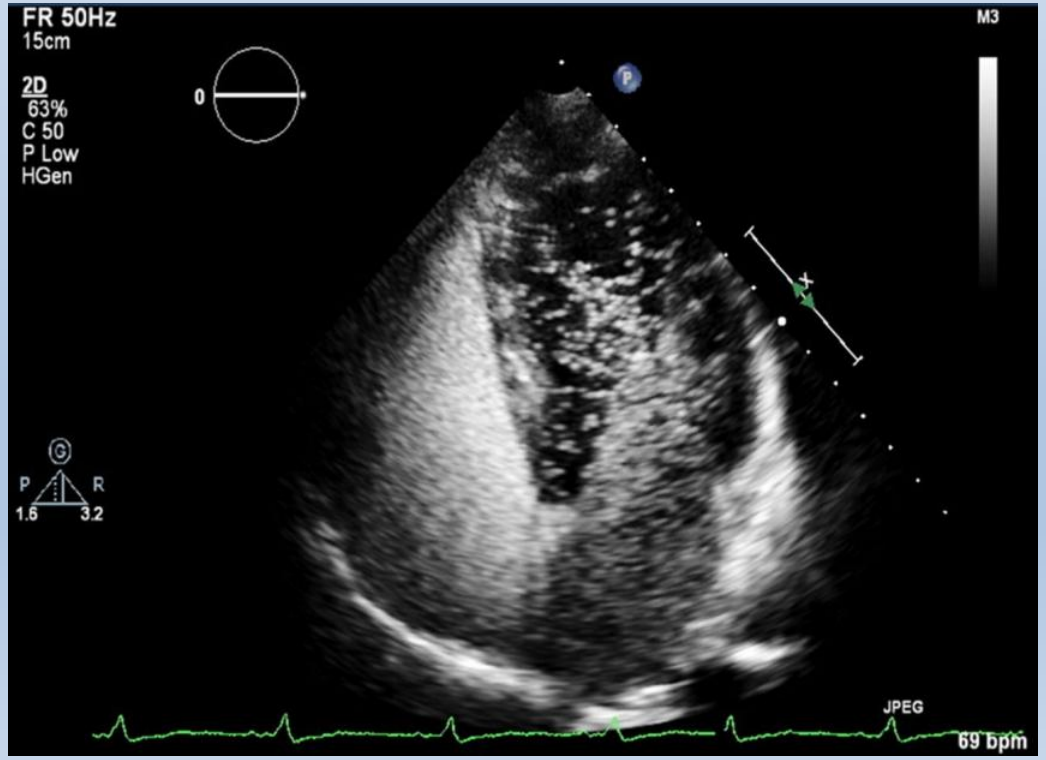
- A closer focus on the appropriate technique of skin antisepsis, to be obtained by 2% chlorhexidine in 70% isopropyl alcohol.

- The adoption of the RAVESTO protocol, which recommends to tunnel PICC if the ideal puncture site is in the yellow zone according to the Zone Insertion Method™ (ZIM™)

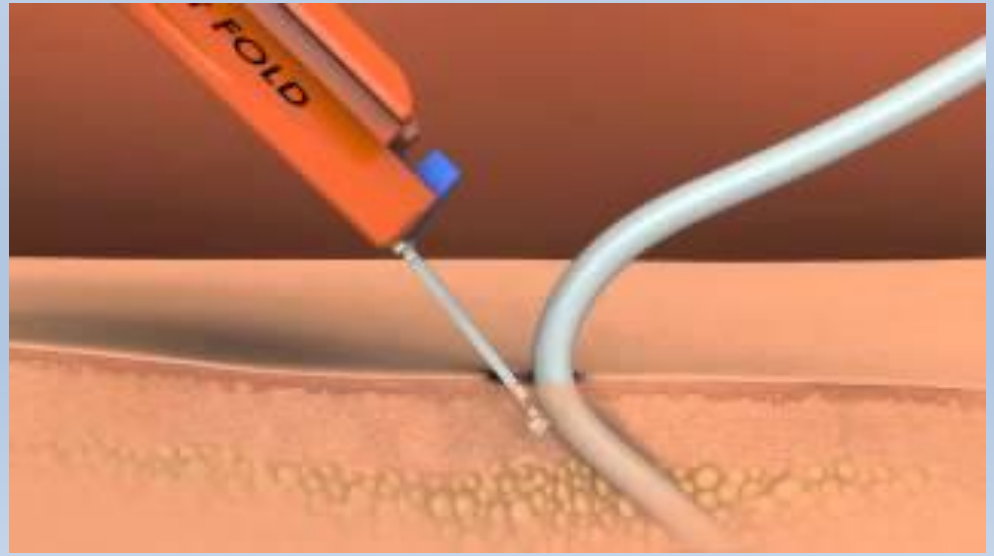


- The preference for the use of atraumatic blunt tunnelers, which are associated with minimal risk of localized bleeding, even in patients with coagulation disorders or reduced platelet counts.

- The use of ultrasound for tip navigation and for tip location, preferably using agitated saline or the "*bubble test*," when considering the ECHOTIP protocol in association (or as an alternative) to the IC-ECG method.



- A wider use of subcutaneous anchorage for catheter securement, since this strategy is safer and more effective than stabilization with skin-adhesive sutureless devices, and that it should be preferred in patient populations at high risk for catheter dislodgment (non-collaborative patients, diaphoresis, etc.)



- The consistent use of cyanoacrylate for sealing the exit site, so to avoid local bleeding and extraluminal bacterial contamination.

- Use of SPTM dressings to ensure optimal protection and breathability of the exit site, additional stabilization of the catheter, and risk reduction for MARSI.

# Summary

- The use of a standardized, systematic insertion bundle is clinician friendly, saves time and resources, safeguards patient safety-related issues, and ensures procedural cost effectiveness.
- A consistent systematic adoption the 8 recommendations of the SIP protocol may improve clinician performance while also providing a useful and evidence-based educational tool when teaching the fundamentals of PICC insertion.

# Summary

- Early and late complications are most often caused by inadequate clinical decision-making at the time of PICC insertion.
- When placing PICCs, these evidence-based strategies will assist the clinician in protecting the patient from insertion-related, delayed, or late complications,.
- These safe, effective, and *clinically beneficial* strategies are all elements of the updated SIP insertion bundle

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# Grazie mille a tutti