

**XVIII
PICC
DAY**
BOLOGNA
2-3 dicembre
2025
Palazzo dei Congressi



Strategie efficaci per la prevenzione delle occlusioni del lume



Stefano Elli
Team Accessi Vascolari
Fondazione IRCCS San Gerardo dei Tintori, Monza
Università degli studi di Milano Bicocca



Fondazione IRCCS
San Gerardo dei Tintori

Sistema Socio Sanitario



Regione
Lombardia



Bicocca
Academy

Occlusione

- Parziale
- Totale
- PWO (persistent withdrawal occlusion)



Occlusione e Trombosi
sono due fenomeni diversi.
qualche volta associati...molte volte no



Fattori legati al device (rari):

- Kinking
- Errori securement
- Malposizione primaria
- Migrazione secondaria del catetere



Fattori legati all'utilizzo (frequenti):

- Coaguli nel lume
- Depositi nel lume (cristalli, lipidi, MDC...)



Fattori indipendenti

(sui quali non abbiamo ancora molte armi a disposizione)

- **Guaina Fibroblastica (PWO)**

(i cateteri più corti vengono interessati più precocemente)



Salvo rare eccezioni, la pervietà del catetere si costruisce
giorno per giorno, turno per turno, ora per ora.





RACCOMANDAZIONI GAVeCeLT 2024
PER LA INDICAZIONE, L'IMPIANTO E LA GESTIONE
DEI DISPOSITIVI PER ACCESSO VENOSO

a cura di Mauro Pittiruti e Giancarlo Scoppettuolo

La prevenzione della occlusione si basa essenzialmente su un adeguato protocollo di lavaggio con fisiologica, tramite siringa azionata a mano con tecnica pulsante *start and stop*, prima e dopo ogni infusione.



Infusion Therapy Standards of Practice

A. Reduce the risk for VAD occlusion.



Infusion Therapy Standards of Practice

A. Reduce the risk for VAD occlusion.

1. Use recommended flushing and locking procedures

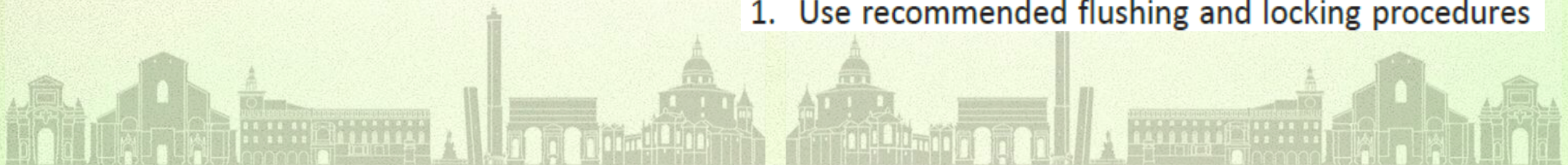


Infusion Therapy Standards of Practice

A. Reduce the risk for VAD occlusion.

2. Prevent catheter dislodgement (partial or complete) through appropriate catheter securement (refer to

1. Use recommended flushing and locking procedures



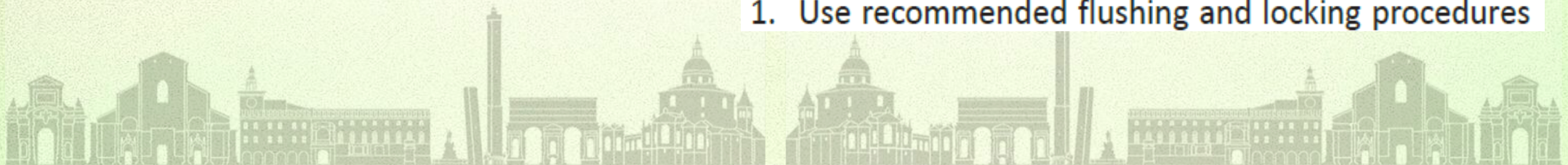
Infusion Therapy Standards of Practice

A. Reduce the risk for VAD occlusion.

3. Avoid incompatible mixing of intravenous (IV) solutions and/or medications.

2. Prevent catheter dislodgement (partial or complete) through appropriate catheter securement (refer to

1. Use recommended flushing and locking procedures



Infusion Therapy Standards of Practice

3. Avoid incompatible mixing of intravenous (IV) solutions and/or medications.

a. Check for incompatibility when 2 or more drugs/solutions are infused together (eg, combined in same container, administered as an intermittent solution for a short-term infusion or a manual injection, or administered concomitantly through the same VAD). Consult with a



Infusion Therapy Standards of Practice

3. Avoid incompatible mixing of intravenous (IV) solutions and/or medications.

b. Identify medications/solutions at high risk for precipitation. These may include alkaline drugs such as phenytoin, diazepam, ganciclovir, acyclovir, ampicillin, imipenem, and heparin; acidic drugs such as vancomycin and parenteral nutrition (PN) solutions; ceftriaxone and calcium gluconate; and mineral precipitate in PN solutions with increased levels of calcium and phosphate.¹⁻⁵ (IV)



Infusion Therapy Standards of Practice

b. Identify medications/solutions at high risk for precipitation. These may include alkaline drugs such as phenytoin, diazepam, ganciclovir, acyclovir, ampicillin, imipenem, and heparin; acidic drugs such as vancomycin and parenteral nutrition (PN) solutions; ceftriaxone and calcium gluconate; and mineral precipitate in PN solutions with increased levels of calcium and phosphate.¹⁻⁵ (IV)

- Fenitoina
- Diazepam
- Ganciclovir
- Aciclovir
- Ampicillina
- Imipenem
- Vancomicina
- Ceftriaxone
- Nutrizione parenterale
- Calcio gluconato



- Always check for incompatibility when two or more drugs are infused together, as precipitation of incompatible drugs is a recognized cause of lumen obstruction. Always flush between two incompatible drugs to create a barrier between two drugs.³³

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

The Journal of Vascular Access
1-18
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298211023274
journals.sagepub.com/home/jva
SAGE

Mauro Pittiruti¹, Ton Van Boxtel², Giancarlo Scoppettuolo¹, Peter Carr³, Evangelos Konstantinou⁴, Gloria Ortiz Miluy⁵, Massimo Lamperti⁶, Godelieve Alice Goossens⁷, Liz Simcock⁸, Christian Dupont⁹, Sheila Inwood¹⁰, Sergio Bertoglio¹¹, Jackie Nicholson¹², Fulvio Pinelli¹³ and Gilda Pepe¹

- Work in collaboration with the pharmacy department to assess the best practices surrounding the proper use of drugs (dilution, stability, compatibility).





- Work in collaboration with the pharmacy department to assess the best practices surrounding the proper use of drugs (dilution, stability, compatibility).



bility reference when unsure of compatibility; if no compatibility information is found, consider the mixture as incompatible.¹⁻⁵ (IV)



Infusion Therapy Standards of Practice

- c. Perform a gentle, pulsatile flush **between infusions** with 10 mL of preservative-free 0.9% sodium chloride (less in pediatric/neonatal, fluid restricted patients) or use separate catheter lumens, if available (refer to Standard 38, *Flushing and Locking*).



Infusion Therapy Standards of Practice

- c. Perform a gentle, pulsatile flush between infusions with 10 mL of preservative-free 0.9% sodium chloride (less in pediatric/neonatal, fluid restricted patients) or use separate catheter lumens, if available (refer to Standard 38, *Flushing and Locking*).

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

The Journal of Vascular Access
1-18
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298211023274
journals.sagepub.com/home/jva
SAGE

Mauro Pittiruti¹, Ton Van Boxtel², Giancarlo Scoppettuolo¹, Peter Carr³, Evangelos Konstantinou⁴, Gloria Ortiz Miluy⁵, Massimo Lamperti⁶, Godelieve Alice Goossens⁷, Liz Simcock⁸, Christian Dupont⁹, Sheila Inwood¹⁰, Sergio Bertoglio¹¹, Jackie Nicholson¹², Fulvio Pinelli¹³ and Gilda Pepe¹

- Always check for incompatibility when two or more drugs are infused together, as precipitation of incompatible drugs is a recognized cause of lumen obstruction. Always flush between two incompatible drugs to create a barrier between two drugs.³³

A GAVeCeLT consensus on the indication, insertion, and management of central venous access devices in the critically ill

The Journal of Vascular Access
1–19
© The Author(s) 2024
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298241262932
journals.sagepub.com/home/jva
Sage

Fulvio Pinelli¹, Mauro Pittiruti², Maria Giuseppina Annetta³,
Francesco Barbani¹, Sergio Bertoglio⁴, Daniele G Biasucci⁵, Denise Bolis⁶,
Fabrizio Brescia⁷, Giuseppe Capozzoli⁸, Sonia D'Arrigo³, Elisa Deganello⁹,
Stefano Elli¹⁰, Adam Fabiani¹¹, Fabio Fabiani⁷, Antonio Gidaro¹²,
Davide Giustivi¹³, Emanuele Iacobone¹⁴, Antonio La Greca²,
Ferdinando Longo¹⁵, Alberto Lucchini¹⁶, Bruno Marche¹⁷, Stefano Romagnoli¹,
Giancarlo Scoppettuolo¹⁸, Valentina Selmi¹⁹, Davide Vailati²⁰, Gianluca Villa¹
and Gilda Pepe²

(a) adequate protocols of flushing the lumen with saline, before and after each infusion, and (b) adequate protocols of locking the lumen when not in use, locking non-dialysis catheters with saline only and locking catheters utilized for dialysis or apheresis with heparin or citrate. (*Strong agreement: 26 agree, 0 uncertain, 0 disagree*)



International experts consensus on optimal central vascular access device selection and management for patients with cancer

The Journal of Vascular Access
1–12
© The Author(s) 2024
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298241300792
journals.sagepub.com/home/jva
S Sage

Mohammad Jahanzeb¹, Ching-Yang Wu², Howard Lim³,
Kei Muro⁴, Lichao Xu⁵, Manjiri Somashekhar⁶,
Sampige Prasannakumar Somashekhar S P⁶, Xiaotao Zhang⁷,
Xiaoxia Qiu⁸, Ying Fu⁹ and Mauro Pittiruti¹⁰ 

Background. Flushing the CVAD is important to maintain its patency and prevent device occlusion. Current evidence while external catheters (PICC, CICC, and FICC) should be flushed weekly. According to all current guidelines, flushing should be performed with saline only, and not



- Always check for incompatibility when two or more drugs are infused together, as precipitation of incompatible drugs is a recognized cause of lumen obstruction. Always flush between two incompatible drugs to create a barrier between two drugs.³³
- Work in collaboration with the pharmacy department to assess the best practices surrounding the proper use of drugs (dilution, stability, compatibility).

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

The Journal of Vascular Access
1-18
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298211023274
journals.sagepub.com/home/jva
SAGE

Mauro Pittiruti¹ , Ton Van Boxtel² , Giancarlo Scoppettuolo¹, Peter Carr³, Evangelos Konstantinou⁴, Gloria Ortiz Miluy⁵, Massimo Lamperti⁶, Godelieve Alice Goossens⁷, Liz Simcock⁸, Christian Dupont⁹, Sheila Inwood¹⁰, Sergio Bertoglio¹¹ , Jackie Nicholson¹², Fulvio Pinelli¹³  and Gilda Pepe¹

- Consider the use of active infusion systems (volumetric pumps for example) to prevent lumen occlusion.





RACCOMANDAZIONI GAVeCeLT 2024
PER LA INDICAZIONE, L'IMPIANTO E LA GESTIONE
DEI DISPOSITIVI PER ACCESSO VENOSO

a cura di Mauro Pittiruti e Giancarlo Scoppettuolo



Altro aspetto importante nella prevenzione delle occlusioni è la adozione di NFC (*needlefree connectors*) a 'pressione' neutra, allo scopo di evitare reflusso di sangue dentro il catetere al momento della disconnessione dalla linea venosa.

I NFC, oltre a garantire una maggiore sicurezza dell'operatore nella somministrazione di infusioni endovenose attraverso cateteri vascolari in considerazione del non utilizzo di aghi, se caratterizzati da un particolare meccanismo interno (*displacement* neutro) prevengono la occlusione dei cateteri venosi riducendo o addirittura azzerando il fenomeno del *backflow* al momento della disconnessione delle linee infusionali.



Original research article

JVA | The Journal of
Vascular Access

Effect of different needleless connector technologies on backflow volume in the long peripheral catheter: A bench study

The Journal of Vascular Access
1–6
© The Author(s) 2025
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298251336805
journals.sagepub.com/home/jva
S Sage

Davide Giustivi¹ , Antonio Gidaro² , Elisa Nardin³,
Silvia Revere³, Stefania Fiorini³, Nicolò Capsoni⁴, Lucrezia Rovati⁵
and Daniele Privitera³

The clamp decisively reduces BV in NCs with positive and negative displacement. Neutral and anti-reflux NCs are the best solution when clamping is not used. These two latter

Original research article

JVA | The Journal of
Vascular Access

Evaluating needle-free connectors associated backflow in Midline and peripherally inserted central catheters: A top bench study

The Journal of Vascular Access
1–6
© The Author(s) 2025
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11297298251340469
journals.sagepub.com/home/jva
S Sage

Daniele Privitera^{1,2}, Davide Giustivi³ , Elisa Nardin¹,
Enrico Gianfranceschi¹, Stefania Fiorini¹, Elisabetta Fiorina⁴,
Silvia Revere¹ and Nicolò Capsoni^{5,6}

The study also investigated the impact of various clamping sequences on BV reduction when utilizing neutral and anti-reflux NFCs. The results showed no significant differences across the different clamping sequences.

Clamp si, clamp no?



Infusion Therapy Standards of Practice

- F. In multilumen CVADs, treat all catheter lumens with partial, withdrawal, or complete occlusion. Do not leave an occluded lumen untreated because another lumen is functional; prolonged fibrin formation is a risk factor for catheter-associated bloodstream infection (CABSI).^{3,4} (V)



Infusion Therapy Standards of Practice

- F. In multilumen CVADs, treat all catheter lumens with partial, withdrawal, or complete occlusion. Do not leave an occluded lumen untreated because another lumen is functional; prolonged fibrin formation is a risk factor for catheter-associated bloodstream infection (CABSI).^{3,4} (V)

In aggiunta...

Se mi posso permettere di
lasciare una via occlusa,
sto mantenendo in sede un
catetere non appropriato



Take home message

Possiamo fare tante cose ma...

La cosa più importante è lavare il catetere, ancora
più importante è farlo

tutti e bene.

Per prevenire le occlusioni, le risorse meglio spese
sono quelle spese in formazione.



**XVIII
PICC
DAY**
BOLOGNA
2-3 dicembre
2025
Palazzo dei Congressi



Grazie

stefanomarielli@gmail.com



Stefano Elli
Team Accessi Vascolari
Fondazione IRCCS San Gerardo dei Tintori, Monza
Università degli studi di Milano Bicocca



Fondazione IRCCS
San Gerardo dei Tintori

Sistema Socio Sanitario



Regione
Lombardia

