Flushing Frequencies and Use of Heparin

<table>
<thead>
<tr>
<th>CVAD TYPE and Approximate Priming Volume (ml)</th>
<th>Heparin Use/NS Flushing Frequency for CVAD in Intermittent Mode</th>
<th>Heparin Use/NS Flushing Frequency for CVAD in Maintenance Mode</th>
</tr>
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| Central non-tunneled closed end or valved [i.e., Bard Solo Power PICC] | Adults:  
- Flush with 10 ml NS before and after each use or every 24 hours (or per mfr. recommendations) (4).  
  
Pediatrics:  
- If PICC > 3FR flush with 2-3 ml NS (or amount specified per physician order) before and after each use or every 12 hours (or per physician order) (8).  
  - After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) *#*. | Adults:  
- Flush with 10 ml NS once weekly (or per physician order or mfr. recommendations) (3, 4).  
  
Pediatrics:  
- If PICC > 3FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (9).  
  - After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) *#*. |
| Pediatrics:  
  - approximate priming volume (B) | 1.9 F 0.06 ml  
  3-3.5 F 0.2 - 0.5 ml  
  5 F 0.4 - 0.8 ml  
  6 F 0.5 - 0.6 ml |  |
| Non-Centrally Inserted Venous Access Device and Approximate Priming Volume (ml) | Heparin Use/NS Flushing Frequency for Device in Intermittent Mode | Heparin Use/NS Flushing Frequency for Device in Maintenance Mode |
| Midline catheter open or closed end, or valved | Adults:  
- If being used a minimum of every 8 hours, flush with 10 ml NS before and after each use or every 24 hours (or per mfr. recommendations) (4).  
  
Pediatrics:  
- If Midline > 2 FR flush with 2-3 ml NS (or amount specified per physician order) before and after each use or every 12 hours (or per physician order) (4, 8).  
  - After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) *#*. | Adults:  
- Flush with 10 ml NS every 24 hours (or per physician order or mfr. recommendations) (3, 4).  
  
Pediatrics:  
- If Midline > 2 FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (4, 8).  
  - After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) *#*. |
| Pediatrics:  
  - approximate priming volume (B) | 3 F 0.16 ml  
  4 F 0.19 ml  
  5 F 0.22 ml |  |

*When administering pediatric medications the SASH technique should be used: Saline, Antibiotic/ Medication, Saline, Heparin. If dextrose is to be used in place of 0.9% NS, for compatibility, pharmacy should have instructions on label(s) (4, 9). |

*Heparin volume should be determined by physician order (4). Consideration must be given to approximate priming volume of device and tubing configurations when determining appropriate heparin volume to be administered (8, 9). |

*In an effort to avoid systemic anticoagulation of the patient during use of heparin flushes in pediatric patients, multiple doses of heparin over a short time period (defined here as 4 hours), that result in an average total of heparin dosage greater than 25 units/kg/hour may constitute systemic anticoagulation. All administrations of heparin must be considered when calculating total heparin dosage: heparin in running IV lines, and administration through all lines and lumens of central lines being flushed (4, 8, 9). |
The purpose of the guidelines is to standardize the out of hospital care of patients with central venous catheters in order to optimize safe medication administration across the continuum of care and improve patient outcomes.

The development of these guidelines has been a joint effort of the organizations listed below. In May 2011, this group convened and began developing the guidelines, assigning themselves and the project the acronym SCORCH—Standardizing Central Catheter Care in the Omaha Region: Care from Hospital to Home. We hope that the information in these guidelines will be useful in the provision of best practices to patients dismissed from hospital with central venous catheters in place. These guidelines are for guidance only and are not a substitute for physician or nursing judgment or consultation with experts with respect to individual patients.

The Nebraska Medical Center
Regina E. Nadin, RN, PhD, Project Lead
Clinical Nurse Researcher
Nursing Research and Quality Outcomes
maler@unmc.edu

Sarah J. Ciriaco, RN, CPN
Clinical Nurse Specialist
Children’s Home Healthcare

Cheryl Havekost, RN, BSN
Supervisor of Home Services

Debra Veres, RN, BSN, BC
Supervisor of Home Services

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4. SCORCH Consensus – agreed upon content based on clinical experience and judgment of committee members in absence of definitive or conclusive research or other evidence.


10. A single use syringe should never be used more than once (even on the same lumen) (4).

11. A 10 ml syringe filled with normal saline should not be divided into several doses and used for multiple lumens (2).

12. To prevent catheter damage, and unless otherwise directed by the manufacturer, the minimum syringe size that should be used when flushing a CVAD and for subsequent flush (post-medication administration) is 10 ml (2).

13. A minimum volume of twice the internal volume of the catheter should be used to flush the CVAD (2).

14. In general, for the adult population, 10 ml is sufficient; for the pediatric population, 1-5 ml is sufficient for the majority of catheters (4).

15. Flushing technique will depend upon the type of catheter and type of connector valve being used.

16. For catheters with negative pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion, maintaining pressure at the end of the flush to prevent reflux back into the catheter (positive pressure technique).

17. Positive pressure is maintained while flushing a catheter by clamping the extension tubing while still flushing the line (3, 6, 7).

18. For catheters with positive pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion.

19. For catheters with neutral pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion.

20. Clamp sequence is not required; clamping can be done before or after disconnection of syringe (6, 7).

21. On order to additional covers contact: Regina Nadin RN, PhD

Clinical Nurse Researcher
Nursing Research and Quality Outcomes
Children’s Home Healthcare
98742 Nebraska Medical Center
Omaha, NE 68198-7442
Phone: 402-552-6561

22. 0.9% NaCl (normal saline [NS]) solution should be used to flush lines before and after each use (2) (See Table at End of Guidelines for Schedule of Flushing and/or Use of HepaRIN).
Introduction

This is the second edition of the guidelines for hospital to home central venous access devices (CVAD). The purpose of the guidelines is to standardize the out of hospital care of patients with central venous catheters in order to optimize safe medication administration across the continuum of care and improve patient outcomes.

The development of these guidelines has been a joint effort of the organizations listed below. In May 2011, this group convened and began developing the guidelines, assigning themselves and the project the acronym SCORCH – Standardizing Central Catheter Care in the Omaha Region: Care from Hospital to Home. We hope that the information in these guidelines will be useful in the provision of best practices to patients discharged from hospital with central venous catheters in place. These guidelines are for guidance only and are not a substitute for physician or nursing judgment or consultation with experts with respect to individual patients.

Contributing Authors

The Nebraska Medical Center
Regina E. Nalon, RN, PhD, Project Lead
Clinical Nurse Researcher
Nursing Research and Quality Outcomes
malon@unmcmed.com

Susan O’Neal, RN
Staff Nurse, Peggy Cowdrey Patient Care Center

Sue Wardian Hartung, RN, MSN, OCN
Nurse Coordinator, Patient Education
Cancer Service Line

L. Kate Tone, RN, BSN, CIC
Infection Preventionist

Patti Tomb, RN, BSN
Vascular Access Specialist

University of Nebraska Medical Center
Mark E. Rupp, MD, Project Co-Lead
Professor and Chief, Division of Infectious Diseases
Medical/Directorate/Healthcare Epidemiology
mmenup@unmc.edu

Keri A. Simmons, MD
Assistant Professor of Pediatrics,
Section of Pediatric Infectious Diseases

Program Director, Pediatric Infectious Diseases Fellowship

Medical Adviser, Douglas County Health Department

Children’s Home Care Hospital
Children’s Hospital & Medical Center
Sarah J. Ciriaco, RN, CPN
Clinical Services Manager

Kimberly A. Peterson, MSN
APRN-PCNS-BC, CPN
Clinical Nurse Specialist

Amy Phillips, MSN, APRN-CNIS, CCRN
Clinical Nurse Specialist

Alegent Health at Home
DeAnn Worth, RN, BSN
Home Care/Infusion Team Coordinator

Home Nursing with Heart
Julie Harding, RN, BSN
President

Infsilcience, a Bioscrip Company
Paul Wettengel, PharmD
General Manager

Methodist Home Health and Hospice
Cindy Harris, RN, BSN
Regulatory Compliance Coordinator

Debra Verges, RN, BSN, BC
Superintendent of Home Services

Visiting Nurse Association of the Midlands
Wanda J. Berkey, RN, BSN
Infusion Clinical Manager

Patti Tomb, RN, BSN, CRN
Vice President of Home Care

Cheryl Haverstock, RN, BSN
Clinical Liaison Specialist

Lorraine Johnson, RN, BSN, CRNI
Clinical Liaison Specialist

Debra Verges, RN, BSN, BC
Vice President of Operations

Consultant
Ruth VanGoor, RN, MS, APRN-CNS, AOCNS
Clinical Nurse Specialist

Clinical Nurse Researcher
Nursing Research and Quality Outcomes
The Nebraska Medical Center
198742 Nebraska Medical Center
Omaha, NE 68198-7442
Phone: 402-552-6561

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4. SCORCH Consensus – agreed upon content based on clinical experience and judgment of committee members in absence of definitive or conclusive research or other evidence.


10.抗生素感染の予防に関する臨床手順と教育. Oncology Nursing Nursing, 34(1S), S1-S80.


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20. Antibiotics infection prevention guideline. Oncology Nursing Nursing, 34(1S), S1-S80.


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30. Antibiotics infection prevention guideline. Oncology Nursing Nursing, 34(1S), S1-S80.


**DRAWING BLOOD FOR LABORATORY TESTING**

**Pre-draw**
For pediatric patients, draw blood samples per physician order. Drawing blood samples peripherally is the preferred method (4).

When drawing blood for therapeutic drug levels, draw blood from a lumen other than the lumen being used for the drug infusion when possible (2).
- Refer to and follow troubleshooting steps to the extent that time permits and the patient care situation allows if other lumen is problematic (4).

Use caution in interpreting results when therapeutic drug levels are drawn from same lumen being used to administer the medications (2, 3).
- If laboratory values appear to be grossly inaccurate, redraw a blood sample from a peripheral vein (2, 3).

If CVAD is connected to an infusion, stop all infuses for at least one minute before drawing blood sample (3).

For adult patients, flush CVAD with 10 ml NS before blood sample is drawn (2).

For pediatric patients, flush CVAD with 3-5 ml NS or as directed by the physician before blood sample is drawn (4).

**Discard**
To avoid contamination and blood clot formation, do not reinforce the discard septum following blood draw (2).

Discard 1.5 – 2 times the volume of the internal catheter lumen (5 ml is sufficient for adult patients; 3 ml is sufficient for pediatric patients) before drawing blood sample (3).

**Post-draw**
Following blood draw, flush CVAD with 20 ml NS for adults, and 3-5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (3, 4).

**DRAWING BLOOD CULTURES**

**General information**
Use of blood drawn from a CVAD is not recommended for blood cultures, unless the CVAD is suspected to be the source of infection (4).

There are two methods appropriate for drawing blood from a CVAD for blood cultures.

**Pre-draw and obtaining specimen**
A) Remove the access cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds, and replace with a new access cap. Draw the blood culture specimen from the new access cap after scrubbing the access cap for a minimum of 5 seconds with a 70% alcohol pad (3).

OR

B) Remove the access cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds. Draw the blood culture specimen directly from the catheter hub (3).

**Discard**
Do not discard blood sample when obtaining specimen for blood cultures (4).

**Post-draw**
Replace new access cap when blood draw is complete (unless new cap was placed immediately before specimen was drawn) (4).

Following blood draw, flush CVAD with 20 ml NS for adults, and 3-5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (3, 4).

Document the site (specifying lumen used, if multiple lumens CVAD) and the time when the blood culture specimen was drawn on the lab specimen container and/or on the specimen label (4).

**DRESSING CHANGE**

**General information**
With a well-healed tunneled CVAD, consideration may be given to no dressing (2, 3).

Assess every CVAD within 24 hours of insertion to verify integrity and assess for post-insertion complications (4).

Replace catheter site dressing if the dressing becomes damp, loosen, or visibly soiled (1, 2, 3).

Replace catheter site dressing at least every 7 days for transparent dressings, and every 2 days for gauze dressings (1, 2) except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing (1).

When gauze is placed under a transparent dressing, it should be considered a gauze dressing and changing every 2 days (1). Placement of a gauze dressing under a transparent dressing should be considered a gauze dressing and changed every 2 days.

- If gauze is used underneath a transparent dressing to support the noncoring needle in an implanted port and does not prevent visualization of the insertion site, it is not considered a gauze dressing (2).

**Access cap change**
Change the access cap at least every 7 days or per manufacturer’s recommendations and in the presence of any of the following:
- Access cap is removed to initiate an infusion or draw blood (4).
- Blood cannot be completely flushed from the access cap after blood draw (2).
- Signs of blood, precipitate, cracks, leaks, or other defects are noted (3).
- Access cap septum is no longer intact (e.g., after multiple uses) (3, 4).
  - If access cap change is performed with dressing change, the provider should don a mask and have the patient don a mask during the access cap change unless the patient is able to turn their head away and maintain this position throughout the procedure (4).
  - There is conflicting evidence regarding wearing a mask when accessing a CVAD catheter hub or changing an access cap (2). If the access cap change is done at a time other than the time of a dressing change, the use of a mask should be compliant with agency policy (4).

**Dressing change procedure**
Perform hand hygiene (see hand hygiene guidelines) and don clean gloves to remove old dressing.

- After the dressing is removed, remove gloves, perform hand hygiene.
- Don a mask and have the patient don a mask unless the patient is able to turn their head away and maintain this position throughout the procedure (4).
- Change dressing per sterile technique using sterile gloves (2, 4).

Use chlorhexidine solution for skin antisepsis as part of CVAD site care, for patients older than 2 months of age (1, 2).

When cleansing the insertion or exit site, use gentle friction for 30 seconds to ensure that the disinfectant has adequate skin penetration and contact time (3).

Allow the antiseptic to air dry completely. Do not fan (4).

There is conflicting evidence regarding the use of chlorhexidine in infants aged < 2 months (4).

Use of chlorhexidine in infants younger than 2 months should comply with agency policy or physician order (4).

If chlorhexidine is used with a patient younger than 2 months of age, clean the exit site for 30 seconds using gentle friction, allow to air dry completely. Wipe with sterile NS (4).

Chlorhexidine solution is preferred for skin antisepsis as part of CVAD site care. If there is a contraindication to the use of chlorhexidine, there is no directive to use one specific product over another. One should preferentially use:
- A povidone-iodine with alcohol combination solution. If this is not available, use:
  - Iodophor (povidone-iodine), 70% alcohol, or one percent to two percent tincture of iodine may be used (2, 3).
  - Dried povidone-iodine used with infants younger than 2 months of age or with patients with compromised skin integrity should be removed with NS wipes or sterile water (2).
**DRAWING BLOOD FOR LABORATORY TESTING**

**Pre-draw**
For pediatric patients, draw blood samples per physician order. Drawing blood samples peripherally is the preferred method (4).

When drawing blood for therapeutic drug levels, draw blood from a lumen other than the lumen being used for the drug infusion when possible (2).
- Refer to and follow troubleshooting steps to the extent that time permits and the patient care situation allows if other lumen is problematic (4).
- Use caution in interpreting results when therapeutic drug levels are drawn from same lumen being used to administer the medications (2, 3).
- If laboratory values appear to be grossly inaccurate, redraw a blood sample from a peripheral vein (2, 3).

If CVAD is connected to an infusion, stop all infusates for at least one minute before drawing blood sample (3).

For adult patients, flush CVAD with 10 ml NS before blood sample is drawn (2).

For pediatric patients, flush CVAD with 3-5 ml NS or as directed by the physician before blood sample is drawn (4).

If total parenteral nutrition (TPN) is infusing in the lumen from which blood is to be drawn, flush line with 20 ml NS before blood is drawn in adults (2, 3) and 5 ml NS in pediatric patients (4).

**Discard**

To avoid contamination and blood clot formation, do not reinfuse the discard specimen following blood draw (2).

Discard 1.5 – 2 times the volume of the internal catheter lumen (5 ml is sufficient for adult patients; 3 ml is sufficient for pediatric patients) before drawing blood sample (3).

**Post-draw**
Following blood draw, flush CVAD with 20 ml NS for adults, and 3-5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (3, 4).

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OR

B) Remove the access cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds. Draw the blood culture specimen directly from the catheter hub (3).

**Discard**

Do not discard blood sample when obtaining specimen for blood cultures (4).

**Post-draw**
Replace with new access cap when blood draw is complete (unless new cap was placed immediately before specimen was drawn) (4).

Following blood draw, flush CVAD with 20 ml NS for adults, and 3-5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (3, 4).

Document the site (specifying lumen used, if multiple lumen CVAD) and the time when the blood culture specimen was drawn on the lab specimen container and/or on the specimen label (4).

**DRESSING CHANGE**

**General information**
With a well-healed tunneled CVAD, consideration may be given to no dressing (2, 3).

Assess every CVAD within 24 hours of insertion to verify integrity and assess for post-insertion complications (4).

**Access cap change**
Change the access cap at least every 7 days or per manufacturer’s recommendations and in the presence of any of the following:
- Access cap is removed to initiate an infusion or draw blood (4).
- Blood cannot be completely flushed from the access cap after blood draw (2).
- Signs of blood, precipitate, cracks, leaks, or other defects are noted (3).
- Access cap septum is no longer intact (e.g., after multiple uses) (3, 4).
  - If access cap change is performed with dressing change, the provider should don a mask and have the patient don a mask during the access cap change unless the patient is able to turn their head away and maintain this position throughout the procedure (4).
  - There is conflicting evidence regarding wearing a mask when accessing a CVAD catheter hub or changing an access cap (2). If the access cap change is done at a time other than the time of a dressing change, the use of a mask should be compliant with agency policy (4).

**Dressing change procedure**
Perform hand hygiene (see hand hygiene guidelines) and don clean gloves to remove old dressing.
- After the dressing is removed, remove gloves, perform hand hygiene.
- Don a mask and have the patient don a mask unless the patient is able to turn their head away and maintain this position throughout the procedure (4).
- Change dressing per sterile technique using sterile gloves (2, 4).

Use chlorhexidine solution for skin antisepsis as part of CVAD site care, for patients older than 2 months of age (1, 2).

When cleansing the insertion or exit site, use gentle friction for 30 seconds to ensure that the disinfectant has adequate skin penetration and contact time (3).
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There is conflicting evidence regarding the use of chlorhexidine in infants aged <2 months (4).

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- A povidone-iodine with alcohol combination solution. If this is not available, use:
  - Iodophor (povidone-iodine), 70% alcohol, or one percent to two percent tincture of iodine may be used (2, 3).
  - Dried povidone-iodine used with infants younger than 2 months of age or with patients with compromised skin integrity should be removed with NS wipes or sterile water (2).
Heparin use
When administering lipids intermittently, the administration set should be changed with administration sets (1).

Primary continuous infusion administration sets
Primary administration sets used for continuous infusions that enhance microbial growth (i.e., lipids, TPN with lipids) should be changed every 24 hours after initiation of therapy (1, 2, 3).

Secondary continuous infusion administration sets
Primary administration sets used for intermittent infusions should be changed every 24 hours (2).

Intravenous fat emulsions
When administering lipids intermittently, the administration set should be changed with each new container (2).

Heparin use
There is conflicting evidence regarding the use of heparin to maintain patency.

- Consider individualized patient needs for indications for heparin use (2).
- If heparin is to be used, the least amount of heparin needed to maintain patency is desired (4).
- If heparin is being used, the preferred concentration is 10 units/ml for adults unless otherwise indicated or per physician order (3).
Dressing change with chlorhexidine-impregnated dressings
There are no specific clinical indications or relevant studies that detail the need to change a soiled chlorhexidine-impregnated dressing before the seven-day dressing cycle ends (4).

Change the chlorhexidine-impregnated dressing if it is approximately 2/3 saturated with organic matter (4).

Troubleshooting Access Barriers
When a provider assesses for and identifies signs of CVAD occlusion, including the inability to withdraw blood, sluggish flow, and/or inability to flush or infuse through the device, the following steps should be taken:

1. Assess for potential causes of catheter occlusion;
2. Have the patient change position by lifting arm on the side of the body of the insertion site, turning from side-to-side, coughing, or other maneuvers to change body/CVAD position. If this does not alleviate the problem, remove the access cap and attempt to flush/withdraw blood using the direct method of connecting the 10 ml syringe to the catheter hub, and then replace with a new access cap. If it is an implanted port, consider changing the needle if steps in #3 do not alleviate the problem.
3. Consider changing the CVAD site dressing. If this does not alleviate the problem, consult with a physician and consider next steps in troubleshooting the occluded CVAD such as obtaining an X-ray to verify agent is ineffective, fibrinolytic agent indwelling up to 24 hours before proceeding with next steps in troubleshooting. If the fibrinolytic agent is ineffective,
4. Consult with a physician and consider next steps in troubleshooting the occluded CVAD such as obtaining an X-ray to verify

Other Information

Equipment
Minimize connections (i.e., number of extension sets) in infusion administration sets (1, 4).

Change the needless components at least as frequently as the administration set is changed (1).

A new sterile compatible covering device (i.e., a new needless connector) should be attached using aseptic technique to the end of the administration set after each intermittent use (2).

Primary continuous infusion administration sets
Primary administration sets used for continuous infusions that enhance microbial growth (i.e., lipids, TPN with lipids) should be changed every 24 hours after initiation of therapy (1, 2, 3).

Primary administration sets used for continuous infusions that do not enhance microbial growth should be changed twice weekly and at least every 96 hours, unless contraindicated by medication being administered (1, 2, 3).

• Scheduled weekdays of administration set change to be determined per agency policy (4).

Secondary continuous infusion administration sets
Primary administration sets used for intermittent infusions should be changed every 24 hours (2).

A secondary administration set that is detached from the primary administration set is considered a primary intermittent administration set and should be changed every 24 hours (2).

Intravenous fat emulsions
When administering lipids intermittently, the administration set should be changed with each new container (2).

Heparin use
There is conflicting evidence regarding the use of heparin to maintain patency.

• Consider individualized patient needs for indications for heparin use (2).

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CVAD TYPE and Approximate Priming Volume

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Heparin Use/NS Flushing Frequency for CVAD in Intermittent Mode

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<td>- Flush with 10 ml NS before and after each use or every 24 hours (or per mfr. recommendations) (4).</td>
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PEDIATRIC:

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<td>- After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) <em>#</em>.</td>
</tr>
</tbody>
</table>

Heparin Use/NS Flushing Frequency for CVAD in Maintenance Mode

<table>
<thead>
<tr>
<th>Adults:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Flush with 10 ml NS once weekly (or per physician order or mfr. recommendations) (3, 4).</td>
</tr>
</tbody>
</table>

PEDIATRIC:

<table>
<thead>
<tr>
<th>Pediatric:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If PICC &gt; 3FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (8).</td>
</tr>
<tr>
<td>- After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) <em>#</em>.</td>
</tr>
</tbody>
</table>

Non-Centrally Inserted Venous Access Device and Approximate Priming Volume

<table>
<thead>
<tr>
<th>Midline catheter open or closed end, or valved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric: approximate priming volume (B)</td>
</tr>
<tr>
<td>3 F</td>
</tr>
<tr>
<td>4 F</td>
</tr>
<tr>
<td>5 F</td>
</tr>
</tbody>
</table>

Heparin Use/NS Flushing Frequency for Device in Intermittent Mode

<table>
<thead>
<tr>
<th>Adults:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If being used a minimum of every 8 hours, flush with 10 ml NS before and after each use or every 24 hours (or per mfr. recommendations) (6).</td>
</tr>
</tbody>
</table>

PEDIATRIC:

<table>
<thead>
<tr>
<th>Pediatric:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If Midline &gt; 2 FR flush with 2-3 ml NS (or amount specified per physician order) before and after each use or every 12 hours (or per physician order) (8, 9).</td>
</tr>
<tr>
<td>- After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) <em>#</em>.</td>
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</tbody>
</table>

Heparin Use/NS Flushing Frequency for Device in Maintenance Mode

<table>
<thead>
<tr>
<th>Adults:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Flush with 10 ml NS every 24 hours (or per physician order or mfr. recommendations) (3, 4).</td>
</tr>
</tbody>
</table>

PEDIATRIC:

<table>
<thead>
<tr>
<th>Pediatric:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If Midline &gt; 2 FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (8, 9).</td>
</tr>
<tr>
<td>- After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) <em>#</em>.</td>
</tr>
</tbody>
</table>

* When administering pediatric medications the SASH technique should be used: Saline, Antibiotic/Medication, Saline, Heparin. If dextrose is to be used in place of 0.9% NS, for compatibility, pharmacy should have instructions on label(s) (4, 9). |

# Heparin volume should be determined by physician order (4). Consideration must be given to approximate priming volume of device and tubing configurations when determining appropriate heparin volume to be administered (8, 9). |

^ In an effort to avoid systemic anticoagulation of the patient during use of heparin flushes in pediatric patients, multiple doses of heparin over a short time period (defined here as 4 hours), that result in an average total of heparin dosage greater than 25 units/kg/hour may constitute systemic anticoagulation. All administrations of heparin must be considered when calculating total heparin dosage: heparin in running IV lines, and administration through all lines and lumens of central lines being flushed (8, 9).