

# Chronic Kidney Disease: Vein Preservation

(FINAL March 9, 2011/Rev Aug 17, 2012)



## Vascular Access Guideline

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### 1.0 Scope

This guideline makes recommendations for the preservation of veins in patients with chronic kidney disease (CKD).

Related Guideline(s):

- Canadian Society of Nephrology Guidelines. Chapter 4: Vascular Access, *Journal of American Society of Nephrology*, 17: S16–S23, 2006.
- *Fistula First*, Vein Preservation and Hemodialysis Fistula Protection & Recommendations for the Minimal Use of PICC Line ([www.fistulafirst.org](http://www.fistulafirst.org))
- National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Guideline 1: Patient Preparation for Permanent Hemodialysis Access, *American Journal of Kidney Disease*, 48:S188 – S191, 2006 (suppl 1).
- *Selection of Permanent HD VA*, BCPRA, Approved May 2007  
<http://www.bcrenalagency.ca/default.htm>.

## 2.0 Recommendations, Rationale, & Evidence

**Recommendation 1: Initiate vein preservation strategies in patients with known stage 4 or 5 (eGFR<30) chronic kidney disease, including patients currently on dialysis (hemo or peritoneal) or with a functional kidney transplant.**

**Table 1: Stages of Chronic Kidney Disease (CKD)**

Stage	Description	eGFR (mL/min/1.73 m <sup>2</sup> )
1	“Normal” renal function	≥90
2	“Mild” renal dysfunction	60-89
3	“Moderate” renal dysfunction	30-59
4	“Severe” renal dysfunction	15-29
5	“End-Stage” renal disease	<15

### *Rationale:*

The order of preference for HD access for patients requiring chronic hemodialysis is arterio-venous fistula (AVF), then arterio-venous graft (AVG), then catheter. AVFs have the lowest rate of thrombosis and require the fewest interventions, resulting in longer access survival rates. As well, the costs of implantation and access maintenance of AVFs are lower than for AV grafts (AVGs) or catheters. The thrombosis and infection rates are reported to be approximately one-sixth and one-tenth respectively for AVFs in comparison to AVGs and the difference is even more dramatic when compared to catheters. AVFs are associated with increased survival and fewer hospitalizations (BCPRA VA Guideline: Selection of Permanent HD VA, Approved May 11, 2008).

The ability to establish an AVF is dependent on having a patent peripheral vein, of sufficient size and elasticity to allow for dilation and maturation after surgical construction. Further, the function of the AVF is dependent on a healthy venous circuit back to the heart. Frequent venipuncture and the indiscriminate use of peripheral intravenous lines and peripherally inserted catheters can damage veins, impair venous circulation and jeopardize future AVF construction or function (Hoggard et al, Mar/Apr 2008). Preservation of arm and central veins is important to the success of an AVF.

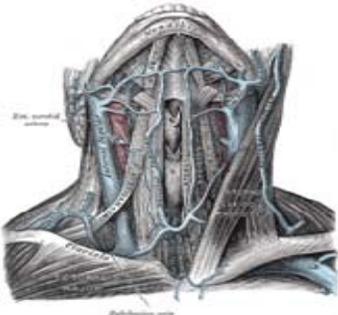
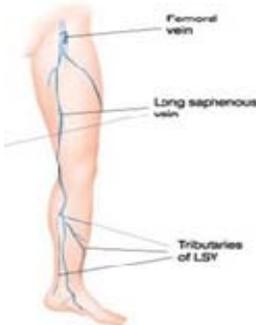
Preservation of veins in patients with advanced kidney disease not currently on dialysis is important as these veins will be needed if the patient requires hemodialysis (HD). Similarly, preservation of veins in patients currently on PD or with a functioning kidney transplant is important as failure of either modality may result in the need for HD. Finally, preservation of veins in patients currently on HD is important in the event a new access is required.

**Recommendation 2: Preferred locations for venous access are:**

*Phlebotomy &/or peripheral venous access:*

 <p><b>1<sup>st</sup> choice:</b></p> <ul style="list-style-type: none"> <li>• If access in place, dorsal veins of the hand of the arm without the access</li> <li>• If no access in place, dorsal veins of the dominant hand (to save non-dominant hand in case fistula/graft needed)</li> </ul> <p><b>2<sup>nd</sup> choice:</b></p> <ul style="list-style-type: none"> <li>• If access in place, dorsal veins of the hand of the arm with the access</li> <li>• If no access in place, dorsal veins of the non-dominant hand</li> </ul>	 <p><b>3<sup>rd</sup> choice:</b></p> <ul style="list-style-type: none"> <li>• If access in place, forearm veins of the arm without the access</li> <li>• If no access in place, forearm veins of the dominant arm (to save non-dominant arm in case fistula/graft needed)</li> </ul> <p><b>Last resort:</b></p> <ul style="list-style-type: none"> <li>• If access is in place, forearm veins of the arm with the access</li> <li>• If no access in place, forearm veins of the non-dominant arm</li> </ul>
<p align="center"><b>Remember: No tourniquets on or above the access.</b></p>	

*Central venous access (small bore, tunneled CVC or port):*

	
<p><b>1<sup>st</sup> choice:</b> Internal jugular veins <b>2<sup>nd</sup> choice:</b> External jugular veins</p>	<p><b>3<sup>rd</sup> choice:</b> Femoral veins</p>

*Try to avoid the use of peripherally inserted central catheters (PICC).*

*Try to avoid the use of the subclavian veins for central venous access in order to reduce the chance of central vein stenosis.*

### **Rationale for avoiding PICC lines whenever possible:**

**PICC lines can damage peripheral and central veins that may be needed for a fistula or graft in patients with chronic kidney disease.**

Patients have only four superficial upper arm veins that have the potential for creating AVFs or AVGs – the cephalic and basilic veins in each arm. It is important that these veins be preserved.

Several studies have shown that PICC lines are associated with both a high risk of central vein stenosis and thrombosis, in addition to scarring of the peripheral veins. These studies showed that it may take only a short time to render a vein useless for hemodialysis access. This can occur within weeks to months following PICC line placement, ruining vessels that could otherwise have been used to create HD accesses.

References re issues with PICC lines in patients with chronic kidney disease:

- A prospective study by Grove and Pevac (2000; <http://www.jvir.org/article/S1051-0443%2807%2961797-7/abstract>) and a retrospective study by Allen et al (2000; <http://www.jvir.org/article/S1051-0443%2807%2961307-4/abstract>) both assessed venous thrombosis associated with PICC placement.
- Turcotte, Dube and Beauchamp (2006; <http://cat.inist.fr/?aModele=afficheN&cpsidt=18032154>) provide a comprehensive review of the topic, including a breakdown and results from nine prospective trials.
- Additionally, in anecdotal reports, contrast injection and duplex vessel mapping studies documented complete destruction of the involved veins within weeks to months following PICC line placement, ruining vessels that could otherwise have been used to create HD accesses.
- Rationale and references were extracted from the Fistula First Recommendations for the Minimal Use of PICC Lines.

See Appendix 1 for a proposed algorithm of decision-making for venous access.

***Recommendation 3: Utilize a standardized approach to “flag” patients that meet the criteria for “vein preservation:”***

- ***Educate patients and families about veins to preserve and ways to communicate to health care providers.***
- ***Provide patients with a wallet card and purple wristband “I’m a Renal Patient: Use Hand Veins Only” as per Appendix 2. Suggest wearing wristband on the arm that is to be used for bloodwork (i.e., non-access arm or arm least likely to be used for an access).***
- ***Put poster at the patient’s bedside (sample in Appendix 3).***
- ***Ask care providers to stamp lab requisitions “RENAL PATIENT: Try to use hand veins for venipuncture.”***

- ***If computer system allows, flag patients in the hospital/office/laboratory computer system (ideally, the system would automatically print an alert on relevant laboratory and radiology requisitions).***

*Rationale:*

Implementation of a standardized approach to “flag” patients that require “vein preservation” will improve the chances of compliance to vein preservation strategies.

Purple wrist bracelets and wallet cards not only help with the “flagging” and education of high risk CKD patients but can also empower the patients in the protection of their own veins. Electronic medical records have the potential to automatically identify a stage 4 or 5 CKD patient on hospital admission and facilitate individual bed, door or room signs to help prevent indiscriminate phlebotomy or intravenous access placement (Hoggard et al, 2008)

***Recommendation 4: Educate health care providers about vein preservation strategies in CKD patients.***

*If the patient has a working HD access (AV fistula or graft):*

**DO:**

- Use the dorsum of the hand of the non-access arm for venipuncture and IV infusions. Use as small a needle as possible (general rule: 22 gauge or smaller).
- Rotate venipuncture sites.
- Draw labs at the time of hemodialysis when possible.
- If patient requires an indwelling catheter for home antibiotics or other medications, insert a small bore (<8 french), tunneled internal jugular line and try to avoid PICC lines.

**DO NOT:**

- Use the limb with the fistula or graft for blood pressure readings (use the other arm or a thigh or ankle cuff).
- Use the access limb for venipuncture or an IV infusion or arterial line.
- Use the access for diagnostic studies or treatments.
- Use the cephalic veins of either arm for blood draws or IV infusions.
- Place a subclavian catheter, unless as a last resort.
- Place a PICC line, unless unable to obtain a tunneled small bore (<8 french) central venous catheter.

*If the patient has stage 4 or 5 CKD (eGFR<30), whether or not on dialysis:*

**DO:**

- Use the dorsum of the hand for venipuncture and IV infusions. Use as small a needle as possible (general rule: 22 gauge or smaller).
- Rotate venipuncture sites.
- Use a manual blood pressure device (less pressure on arm).

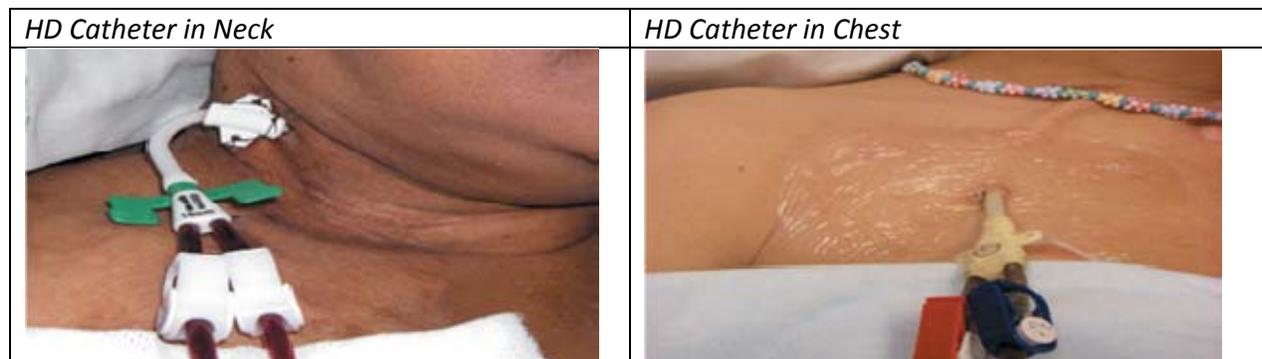
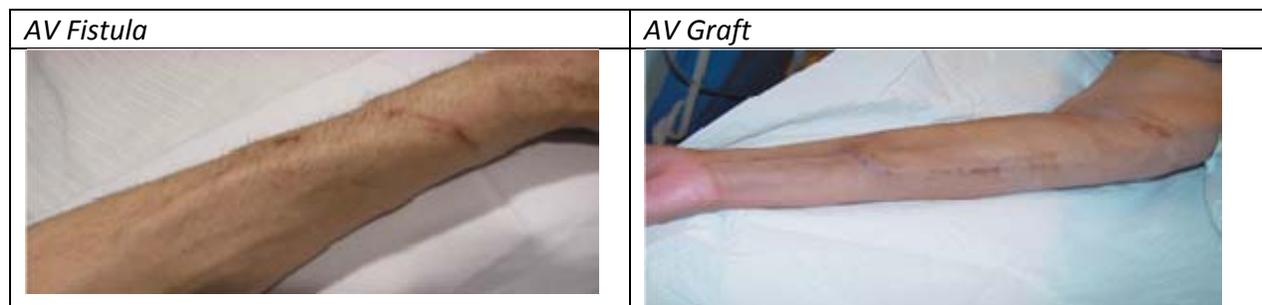
- If patient requires an indwelling catheter for home antibiotics or other medications, insert a small bore (<8 french), tunneled internal jugular line and avoid PICC lines.

**DO NOT:**

- Use the cephalic veins of either arm for blood draws or IV infusions.
- Place a subclavian catheter, unless as a last resort.
- Place a PICC line, unless unable to obtain a tunneled small bore (<8 french) central venous catheter.

If you are unsure whether a patient with CKD has a hemodialysis access (AV fistula, graft or catheter):

- Ask the patient or family member who is with them
- Call their referring nephrologist or primary care provider



See Appendix 4 for a sample staff information sheet *Vein Preservation and Hemodialysis and AV Fistula/Graft Protection*.

## 4.0 References

1. Allen, A.W., Megargell, J.L., Brown, D.B., Lynch, F.C., Singh, H., Singh, Y., et al. (2000). Venous thrombosis associated with the placement of peripherally inserted central catheters. *J Vasc Interv Radiol*; Nov-Dec; 11(10): 1309-1314.
2. Canadian Society of Nephrology Guidelines. Chapter 4: Vascular Access, *Journal of American Society of Nephrology*, 17: S16–S23, 2006.

3. *Fistula First*, Vein Preservation and Hemodialysis Fistula Protection & Recommendations for the Minimal Use of PICC Line ([www.fistulafirst.org](http://www.fistulafirst.org))
4. Grove, J.R., & Pevac, W.C. (2000). Venous thrombosis related to peripherally inserted central catheters. *J Vasc Interv Radiol*; 11 (7): 837-840.
5. Hoggard, Jeffrey et al, Guidelines for Venous Access in Patients with Chronic Kidney Disease, A Position Statement from the American Society of Diagnostic and Interventional Nephrology Clinical Practice Committee & the Association for Vascular Access, *Seminars in Dialysis*, 21(2): 186-191, March/April 2008.
6. National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. Guideline 1: Patient Preparation for Permanent Hemodialysis Access, *American Journal of Kidney Disease*, 48:S188 – S191, 2006 (suppl 1).
7. *Reducing the Use of PICC Lines in Chronic Kidney Disease Patients (the PICC Avoidance Toolkit)*, the Renal Network, Inc, <http://www.therenalnetwork.org/home/form1.php>
8. *Selection of Permanent HD VA*, BCPRA, Approved May 2007 <http://www.bcrenalagency.ca/default.htm>.
9. Turcotte, S., Dube, S., & Beauchamp, G. (2006). Peripherally inserted central venous catheters are not superior to central venous catheters in the acute care of surgical patients on the ward. *World J Surg*; 30: 1605-1619.

## 5.0 Sponsors

This provincial guideline was developed to support improvements in the quality of vascular access care delivered to patients with chronic kidney disease in BC. Based on the best information available at the time it was published, the guideline relies on evidence and avoids opinion-based statements where possible. When used in conjunction with pertinent clinical data, it is a tool health authorities and health professionals can use to develop local guidelines.

Developed by a Vascular Access Working Group of multidisciplinary care providers from across BC, the guideline was approved by the Provincial Vascular Access Services Team and the BC Provincial Renal Agency Medical Advisory Committee. It has been adopted by BCPRA as a provincial guideline.

## 6.0 Effective Date

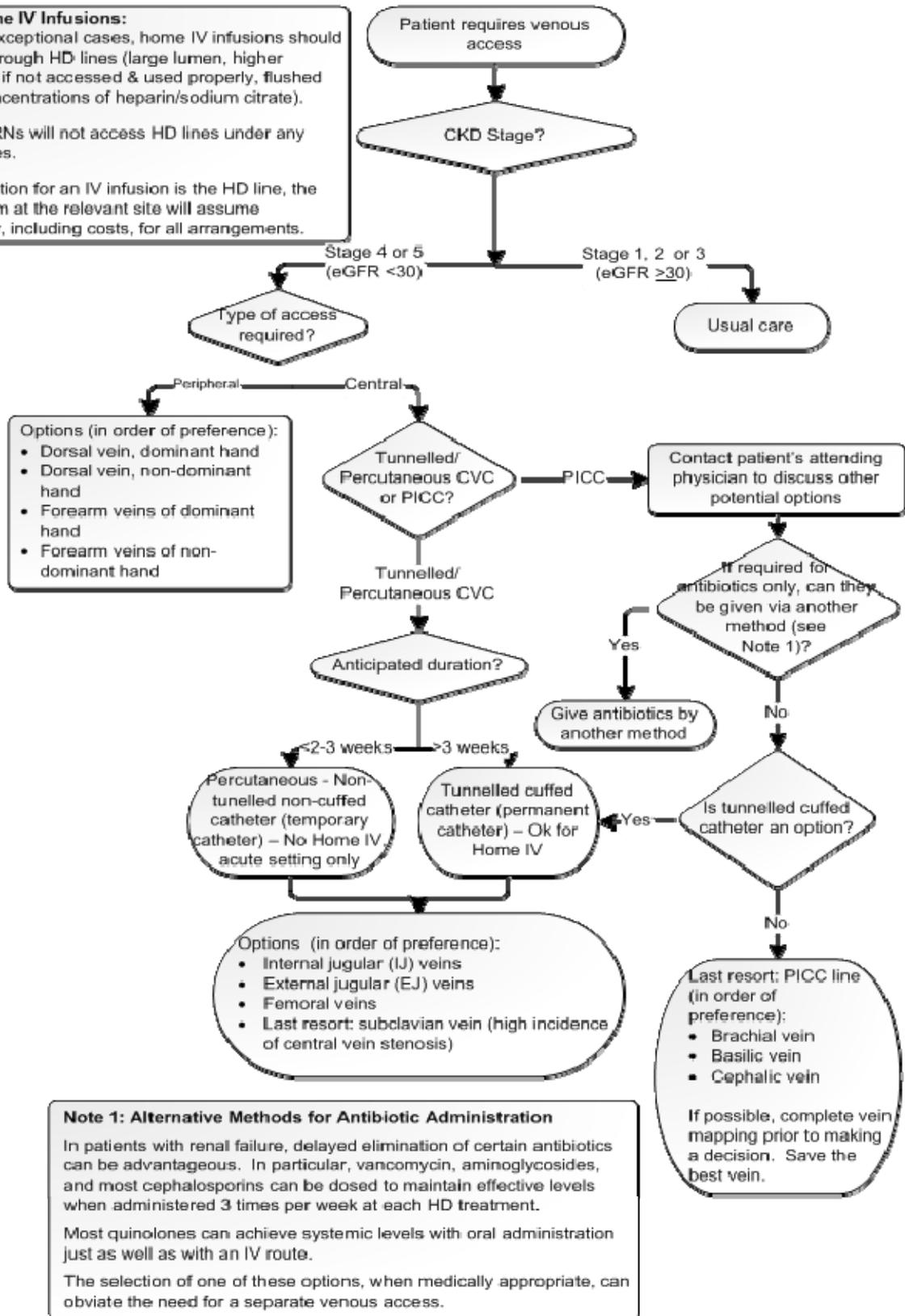
- Effective date: March 9, 2011/Revised Aug 17, 2012.
- This guideline is based on scientific evidence available at the time of the effective date; refer to [www.bcrenalagency.ca](http://www.bcrenalagency.ca) for most recent version.

## 7.0 Appendices

- Appendix 1: Algorithm for Selection of Venous Access Sites
- Appendix 2: Sample Wallet Card & Purple Wrist Band
- Appendix 3: Poster to Alert Health Care Providers of the Need for “Vein Preservation”
- Appendix 4: Vein Preservation and Hemodialysis AV Fistula/Graft Protection: Staff Information Sheet

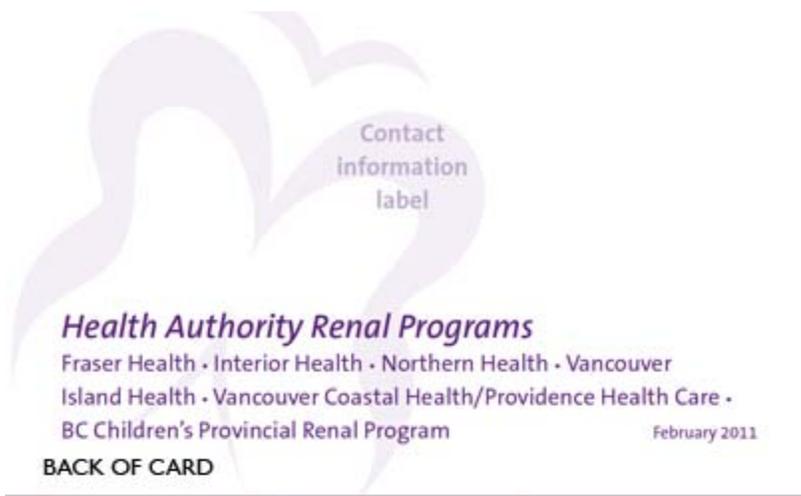
## Appendix 1: Algorithm for Selection of Venous Access Sites

**Note re Home IV Infusions:**  
 Other than exceptional cases, home IV infusions should not be run through HD lines (large lumen, higher infection risk if not accessed & used properly, flushed with high concentrations of heparin/sodium citrate).  
 Home care RNs will not access HD lines under any circumstances.  
 If the only option for an IV infusion is the HD line, the renal program at the relevant site will assume responsibility, including costs, for all arrangements.



**Note 1: Alternative Methods for Antibiotic Administration**  
 In patients with renal failure, delayed elimination of certain antibiotics can be advantageous. In particular, vancomycin, aminoglycosides, and most cephalosporins can be dosed to maintain effective levels when administered 3 times per week at each HD treatment.  
 Most quinolones can achieve systemic levels with oral administration just as well as with an IV route.  
 The selection of one of these options, when medically appropriate, can obviate the need for a separate venous access.

## Appendix 2: Wallet Cards and Wristband



## Appendix 3: Poster to Alert Health Care Providers of the Need for “Vein Preservation”



# Important Info About My Veins



### For Patients with a Fistula or Graft for Dialysis

- Use the veins on either of my hands or my \_\_\_\_\_ (non-fistula/graft) arm for IVs or blood draws
- No needle punctures in my forearm or the inside of the elbow of my arm with the fistula/graft
- No BPs on my arm with fistula/graft
- If long-term central line is required, use tunneled internal jugular vein. Use PICC lines as last resort

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### For Blood Work and/or IVs



\* Use as small a needle as possible (general rule: 22 gauge or smaller)

**1<sup>st</sup>**  
**CHOICE** Veins on the backs of either of my hands

**2<sup>nd</sup>**  
**CHOICE** Forearm veins in my dominant arm (if fistula/graft in place, use non-fistula/graft arm)

**3<sup>rd</sup>**  
**CHOICE** Veins in the inside of the elbow of my dominant arm (if fistula/graft in place, use non-fistula/graft arm)



## **Appendix 4: Vein Preservation and Hemodialysis AV Fistula/Graft Protection: Staff Information Sheet**

People with chronic kidney disease (CKD) face the possibility of hemodialysis. Hemodialysis is done using a *vascular access* (arterio-venous (AV) fistula, graft or catheter). *The dialysis access is a patient's lifeline and must be protected.* Patients with CKD may be taught to protect their arm veins.

*If the patient has a working HD access (AV fistula or graft):*

**DO:**

- Use the dorsum of the hand of the non-access arm for venipuncture and IV infusions. Use as small a needle as possible (general rule: 22 gauge or smaller).
- Rotate venipuncture sites.
- Draw labs at the time of hemodialysis when possible.
- If patient requires an indwelling catheter for home antibiotics or other medications, insert a small bore (<8 french), tunneled internal jugular line and try to avoid PICC lines.

**DO NOT:**

- Use the limb with the fistula or graft for blood pressure readings (use the other arm or a thigh or ankle cuff).
- Use the access limb for venipuncture or an IV infusion or arterial line.
- Use the access for diagnostic studies or treatments.
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- Place a subclavian catheter, unless as a last resort.
- Place a PICC line, unless unable to obtain a tunneled small bore (<8 french) central venous catheter.

*If the patient has stage 4 or 5 CKD (eGFR<30), whether or not on dialysis:*

**DO:**

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- Rotate venipuncture sites.
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**DO NOT:**

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- Place a subclavian catheter, unless as a last resort.