

Table 1. Root causes of low AVF rates

	Root Cause	Problem in facility?	Potential to change
Patient Factors			
Awareness/ knowledge	• Lack awareness of long-term risks of catheters as opposed to fistulas		Yes
	• Lack awareness of benefit of fistulas compared with grafts		Yes
Physical factors that make a fistula more challenging or difficult**	• Obesity		No
	• Diabetes		No
	• Other disease affecting vasculature (e.g. scleroderma)		No
	• Vascular abnormalities that predispose to steal syndrome		No
	• Smoking		No
	• Long-term steroid use ^δ		No
	• History of or active drug abuse		No
	• Medical instability		No
	• Hypotension, severe cardiomyopathy with poor cardiac output that precludes keeping a fistula patent.		No
	• Recent bacteremia or other infection causing deferral of any surgical procedure*		No
	• Suitable veins (especially superficial veins) thrombosed or stenosed by years of IVs and lab draws ^δ		No
	• Prior failed accesses, especially grafts, which may be associated with venous damage above the graft		No
• Repeated catheter failures (infections, poor flows, bad dialysis) that make a working arm access more urgent, thus increasing the likelihood that a graft will be placed which has a shorter maturation ^δ		Yes/No	
Communication/ Education	• Failure to inform healthcare professionals of pre-ESRD or ESRD status		Yes
Social	• Patient misses surgery appointments out of fear, lack of support (e.g. transportation)*		Yes
	• No insurance*		No
Other	• Preference for catheters since catheters do not require a “stick”		Yes
	• Preference for grafts because they are easier to stick than fistulas		Yes
	• Reluctance to self-cannulate		Yes
	• Plan for transplant (scheduled or hopeful) soon.		Yes
	• Plan for peritoneal dialysis		Yes
	• Prior bad experiences		Yes
	• Fear of pain, including pain of needlesticks, surgery, etc		Yes
	• Unsightly body image		No
• Patient complacency		Yes	
Nephrologist Factors			
General	• Total reliance on surgeon decision.		Yes
	• Failure to act as Vascular Access Team Coordinator (includes making recommendations to vascular surgeon, assisting in vein preservation and mapping, and working closely with HD unit staff to assure knowledge and skills re: access and cannulation)		Yes
	• Late referral to surgery for access placement		Yes
	• Sense of urgency to have a working arm access		Yes
	• Waiting for completion of transplant evaluation before making access plans*		Yes

Stated Reason for low Fistula Rates:

Nephrologist Factors cont.	Root Cause	Prob. in facility?	Potential to change
Awareness/ knowledge	<ul style="list-style-type: none"> Lack awareness that placement of catheters at certain sites may limit future access options 		Yes
	<ul style="list-style-type: none"> Lack of valid information about the benefit of AV fistulas in the long-term 		Yes
	<ul style="list-style-type: none"> Failure to recognize that peritoneal dialysis (PD) may be used while awaiting AVF 		Yes
	<ul style="list-style-type: none"> Failure to recognize the value of PD as an alternative to HD 		Yes
	<ul style="list-style-type: none"> Lack of awareness that even patients awaiting transplant and patients undergoing PD may need access placement 		Yes
Communication/ Education	<ul style="list-style-type: none"> Failure to communicate to the surgeon their preference to have an AVF place 		Yes
Training/experience	<ul style="list-style-type: none"> Failure to educate patients re: vascular access options, protecting potential access sites (e.g. no IV lines and no blood draws from non-dominant arm in patients with impending renal failure). 		Yes
Training/experience	<ul style="list-style-type: none"> Lack of training re: vascular access (residency-based or postgraduate CME) 		Yes
Facility Factors			
Awareness/ knowledge	<ul style="list-style-type: none"> Lack awareness of long-term risks of catheters as opposed to fistulas 		Yes
	<ul style="list-style-type: none"> Lack awareness of benefit of fistulas compared with grafts 		Yes
	<ul style="list-style-type: none"> Lack awareness that episodes of hypotension need to be avoided, especially in patients with fresh or immature fistulas 		Yes
Communication/ Education	<ul style="list-style-type: none"> Inadequate communication between facility and nephrologist, surgeon, radiologist 		Yes
Training/experience	<ul style="list-style-type: none"> Techs and nurses may lack adequate training/experience in accessing fistulas and grafts (including the rotation of needle sites), development of immature fistulas, preservation of fistulas, and maintenance of fistulas leading to premature access failure and patient fear or reluctance 		Yes
	<ul style="list-style-type: none"> Staff preference for grafts because they are easier to cannulate than fistulas, thus requiring less time to initiate a dialysis treatment 		Yes
	<ul style="list-style-type: none"> Impatience with the slow-to-develop fistula 		Yes
Administrative	<ul style="list-style-type: none"> Lack of and/or failure to use a Quality Improvement program to monitor vascular access 		Yes
	<ul style="list-style-type: none"> Lack of and/or failure to use a stenosis monitoring program 		Yes
	<ul style="list-style-type: none"> Lack of and/or failure to use protocols for fistula development, preservation, and maintenance; clamp management; and dressing management 		Yes
	<ul style="list-style-type: none"> Lack of and/or failure to use protocols for management of new or fragile fistulas (e.g. rest the fistula following infiltration) 		Yes
	<ul style="list-style-type: none"> Lack of and/or failure to use protocols for tunneled catheter management, such that failing or infected catheters lead to more urgent permanent access placement 		Yes
	<ul style="list-style-type: none"> Lack of and/or failure to use an educational program to instruct patients about post-op care, signs and symptoms of problems, etc 		Yes
	<ul style="list-style-type: none"> Lack of and/or failure to use a policy to request/demand/receive surgical reports regarding access placements and revisions. 		Yes
Other facility factors	<ul style="list-style-type: none"> Lack of support for self-cannulation 		Yes
	<ul style="list-style-type: none"> Inadequate dialysis related to facility factors may increase the urgency for a working arm access, thus increasing the likelihood that a graft will be placed which has a shorter maturation 		Yes
Vascular Surgeon Factors			
Awareness/ knowledge	<ul style="list-style-type: none"> Misconception that the need to dialyze immediately (or very soon) requires that a graft be placed. 		Yes
	<ul style="list-style-type: none"> Belief that a patient's lifespan is so limited that a successful graft will be more useful and less problematic than a fistula that may develop slowly¹⁴ 		Yes
	<ul style="list-style-type: none"> Belief that sonography is not helpful for mapping vasculature prior to access placement 		Yes
	<ul style="list-style-type: none"> Lack of recognition of the requirements for success, e.g., fistula lengths must be adequate for cannulation, minimum blood flows that are necessary for dialysis must be achievable (not just a dopplerable blood flow), positions need to allow for appropriate needle placement during dialysis, etc. 		Yes
	<ul style="list-style-type: none"> Failure to recognize importance of Vascular Access Team and surgeon's and nephrologist's roles on it. 		Yes
	<ul style="list-style-type: none"> Failure to recognize the importance of routinely providing a dialysis unit with the operative report for access placements and revisions 		Yes
Communication/ Education	<ul style="list-style-type: none"> Failure to educate the patient on post-op care and monitoring of a fistula 		Yes

Vas Surgeon Factors cont.	Root Cause	Prob. in facility?	Potential to change
Communication/ Education cont.	<ul style="list-style-type: none"> Failure to provide the patient with a pictorial description of the access for their own records, and for sharing with other care providers 		Yes
Training/experience	<ul style="list-style-type: none"> Lack of training re: AVFs (includes mapping and surgical techniques). Surgical training programs place little emphasis on vascular access approaches, techniques and troubleshooting, especially for the more complicated procedures 		Yes
	<ul style="list-style-type: none"> Graft is technically less difficult than a brachial cephalic or transposition fistula 		No
	<ul style="list-style-type: none"> Lack of experience with placement of tunneled cuffed catheters or PD for short-term use while a fistula is maturing such that a graft is placed instead, especially if the surgeon has a perceived sense of urgency to have an arm access in place. 		Yes
	<ul style="list-style-type: none"> Surgeon may lack the patience, training, or commitment to manage the fistula that is not maturing properly—may be quick to convert to a graft if a fistula is not maturing quickly or they are experiencing difficulties with it. 		Yes
Business	<ul style="list-style-type: none"> Lack of tools &/or reimbursement to fully assess patients as to whether or not they are suitable candidates for AVFs (e.g. sonography units not available, not funded, or lack expertise related to mapping). 		No
	<ul style="list-style-type: none"> Lack of surgeons that are interested in access, lack of O.R. availability – some excellent vascular surgeons choose not to do access work 		No
	<ul style="list-style-type: none"> Access work is seen as cumbersome due to the complicated patient population involved. The surgical procedure itself may not take long, but getting medication lists, problem lists, H&P, other necessary steps in getting to the OR takes a lot of extra time. 		No
	<ul style="list-style-type: none"> Reimbursement by Medicare for placement of a graft is higher than the reimbursement for fistula placement. 		No
Social	<ul style="list-style-type: none"> Surgeons may prefer grafts due to their shorter maturation period which allows them to complete the “episode of care” for a difficult, challenging patient more quickly (i.e. they do not have to continue to care for the patient as long). 		No
	<ul style="list-style-type: none"> Unlike transplant surgeons, access surgeons get little or no recognition from patients or colleagues for great access results. 		Yes
Insurance/ Reimbursement			
	<ul style="list-style-type: none"> Nonpayment for sonography in the surgeon's office or O.R. 		No
	<ul style="list-style-type: none"> Delayed surgical referral due to managed care problems (need to get referrals through PCP, no vascular access surgeon on panel, etc.) 		Yes
	<ul style="list-style-type: none"> No access to well qualified surgeon due to insurance/managed care or geographic reasons. 		?
	<ul style="list-style-type: none"> Surgeon may not be reimbursed for the follow-up care, especially for the poorly maturing fistula 		No
	<ul style="list-style-type: none"> Both facilities and providers may wait for Medicare coverage to begin before placing an access. This delay in access placement may then lead to a perceived urgency to have an arm access and the choice of a graft over a fistula. 		Yes
	<ul style="list-style-type: none"> Delays in access placement related to delays in the approval process for Managed Care patients may lead to a perceived urgency to have an arm access and the choice of a graft over a fistula. 		Yes

Comments:

Other Factors	Root Cause	Prob. in facility?	Potential to change
	• ER/ICU/General surgery staff and others may be unaware that subclavian lines can impact vascular access decisions		Yes
	• Late referral, or nonreferral, to nephrology, causing the need for temporary catheters which may impact on future access and cause a sense of urgency for a working permanent access		Yes
	• PIC lines are being used with increased frequency, sometimes even indiscriminately, and may impact future access options.		Yes
	• Fistula outflow veins are difficult to declot requiring catheter placement. Because of recurrent problems, a graft may be opted for.		Yes
	• Patients in crisis not identified quickly enough by other physicians to avoid placement of lines that affect future access decisions (e.g. a patient in ICU for several days may have had several peripheral IVs, multiple blood draws, central lines, etc. that could "ruin" vessels).		Yes
	• Lack of focus on access surgery with regard to quality assurance. Some surgical procedures and outcomes are tracked for QA purposes. There is no similar focus on access and there are no generally accepted standards in the surgical community related to access.		Yes
	• Hospitals (nursing floors, labs) lack good protocols that preclude venipuncture in arms designated for access		Yes
	• Delays in access placement related to limited available OR space and/or surgeon-time may lead to a perceived urgency to have an arm access and the choice of a graft over a fistula.		Yes
	• Lack of adequate sonography services (including familiarity on the part of the sonographer with the specific needs of vascular access mapping)		Yes
	• Lack of adequate tunneled catheter support, e.g., surgical or interventional radiology support for placement.		?
	• Hospital medical records departments and/or surgical departments fail to recognize the importance of providing the operative reports for access placements and revisions to dialysis units and lack systems to assure that they are sent		Yes

Comments:

Top 5 Reasons for low fistula rates:

1. _____
2. _____
3. _____
4. _____
5. _____