**National Quality Forum—Evidence (subcriterion 1a)**

**Measure Number** (*if previously endorsed*)**:** 0251

**Measure Title**: Vascular Access—Functional Arteriovenous Fistula (AVF) or AV Graft or Evaluation for Placement

**IF the measure is a component in a composite performance measure, provide the title of the Composite Measure here:** Not applicable

**Date of Submission**: 2/27/2015

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| **Instructions**  *For composite performance measures:*  *A separate evidence form is required for each component measure unless several components were studied together.*  *If a component measure is submitted as an individual performance measure, attach the evidence form to the individual measure submission.*   * Respond to all questions as instructed with answers immediately following the question. All information needed to demonstrate meeting the evidence subcriterion (1a) must be in this form. An appendix of *supplemental* materials may be submitted, but there is no guarantee it will be reviewed. * If you are unable to check a box, please highlight or shade the box for your response. * Maximum of 10 pages (*incudes questions/instructions*; minimum font size 11 pt; do not change margins). ***Contact NQF staff if more pages are needed.*** * Contact NQF staff regarding questions. Check for resources at [Submitting Standards webpage](http://www.qualityforum.org/Measuring_Performance/Submitting_Standards.aspx). |

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| **Note: The information provided in this form is intended to aid the Steering Committee and other stakeholders in understanding to what degree the evidence for this measure meets NQF’s evaluation criteria.**   1a. Evidence to Support the Measure Focus The measure focus is evidence-based, demonstrated as follows:   * Health outcome: [**3**](#Note3) a rationale supports the relationship of the health outcome to processes or structures of care. Applies to patient-reported outcomes (PRO), including health-related quality of life/functional status, symptom/symptom burden, experience with care, health-related behavior. * Intermediate clinical outcome: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4)that the measured intermediate clinical outcome leads to a desired health outcome. * Process: [**5**](#Note5) a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured process leads to a desired health outcome. * Structure: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured structure leads to a desired health outcome. * Efficiency: [**6**](#Note6) evidence not required for the resource use component.   **Notes**  **3.** Generally, rare event outcomes do not provide adequate information for improvement or discrimination; however, serious reportable events that are compared to zero are appropriate outcomes for public reporting and quality improvement.  **4.** The preferred systems for grading the evidence are the U.S. Preventive Services Task Force (USPSTF) [grading definitions](http://www.uspreventiveservicestaskforce.org/uspstf/grades.htm) and [methods](http://www.uspreventiveservicestaskforce.org/methods.htm), or Grading of Recommendations, Assessment, Development and Evaluation [(GRADE) guidelines](http://www.gradeworkinggroup.org/publications/index.htm).  **5.** Clinical care processes typically include multiple steps: assess → identify problem/potential problem → choose/plan intervention (with patient input) → provide intervention → evaluate impact on health status. If the measure focus is one step in such a multistep process, the step with the strongest evidence for the link to the desired outcome should be selected as the focus of measurement. Note: A measure focused only on collecting PROM data is not a PRO-PM.  **6.** Measures of efficiency combine the concepts of resource use and quality (see NQF’s [Measurement Framework: Evaluating Efficiency Across Episodes of Care](http://www.qualityforum.org/Publications/2010/01/Measurement_Framework__Evaluating_Efficiency_Across_Patient-Focused_Episodes_of_Care.aspx); [AQA Principles of Efficiency Measures](http://www.aqaalliance.org/files/PrinciplesofEfficiencyMeasurementApril2006.doc)). |

**1a.1.This is a measure of**: (*should be consistent with type of measure entered in De.1*)

Outcome

Health outcome: Click here to name the health outcome

Patient-reported outcome (PRO): Click here to name the PRO

*PROs include HRQoL/functional status, symptom/symptom burden, experience with care, health-related behaviors*

Intermediate clinical outcome (*e.g., lab value*): Click here to name the intermediate outcome

Process: Click here to name the process

Structure: Click here to name the structure

Other: Click here to name what is being measured

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**HEALTH OUTCOME/PRO PERFORMANCE MEASURE**  *If not a health outcome or PRO, skip to* [*1a.3*](#Section1a3)

**1a.2.** **Briefly state or diagram the path between the health outcome (or PRO) and the healthcare structures, processes, interventions, or services that influence it.**

**1a.2.1.** **State the rationale supporting the relationship between the health outcome (or PRO) to at least one healthcare structure, process, intervention, or service (*i.e., influence on outcome/PRO*).**

*Note: For health outcome/PRO performance measures, no further information is required; however, you may provide evidence for any of the structures, processes, interventions, or service identified above.*

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**intermediate outcome, PROCESS, or STRUCTURE PERFORMANCE measure**

**1a.3.****Briefly state or diagram the path between structure, process, intermediate outcome, and health outcomes**. Include all the steps between the measure focus and the health outcome.

ANTECEDENTS: A graded morbidity and mortality risk dependent on vascular access type has been identified in hemodialysis patients, with catheters carrying the highest risk, followed by AV grafts, then AVFs >> PROCESS: Assessment of the proportion of a provider’s hemodialysis patient population being dialyzed via an AVF or AV graft >> Identification of hemodialysis patients with vascular access types other than AVF or AV graft >> Evaluation of all hemodialysis patients without a functional autogenous AVF (defined as two needles used or a single-needle device) or AV graft for evaluation by a vascular or other surgeon qualified in the area of vascular access for a functional AVF or AV graft >> OUTCOME: Placement of an AVF or AV graft in all candidate patients as appropriate >> Increased overall AVF and AV graft rates >> Reduced overall morbidity and mortality in hemodialysis patients.

**1a.3.1.** **What is the source of the systematic review of the body of evidence that supports the performance measure?**

Clinical Practice Guideline recommendation – ***complete sections*** [***1a.4***](#Section1a4)***, and*** [***1a.7***](#Section1a7)

US Preventive Services Task Force Recommendation – ***complete sections*** [***1a.5***](#Section1a5) ***and*** [***1a.7***](#Section1a7)

Other systematic review and grading of the body of evidence (*e.g., Cochrane Collaboration, AHRQ Evidence Practice Center*) – ***complete sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7)

Other – ***complete section*** [***1a.8***](#Section1a8)

*Please complete the sections indicated above for the source of evidence. You may skip the sections that do not apply.*

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**1a.4. CLINICAL PRACTICE GUIDELINE RECOMMENDATION**

**1a.4.1.** **Guideline citation** (*including date*) and **URL for guideline** (*if available online*):

National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. *Am J Kidney Dis.* 2006;48(suppl 1):S1-S322.

**1a.4.2.** **Identify guideline recommendation number and/or page number** and **quote verbatim, the specific guideline recommendation**.

KDOQI Clinical Practice Guidelines and Recommendations for Vascular Access:

Guideline 2.1: A structured approach to the type and location of long-term hemodialysis access should help optimize access survival and minimize complications. The order of preference for vascular access in patients with kidney failure who choose hemodialysis as their initial mode of KRT should be (in descending order of preference):

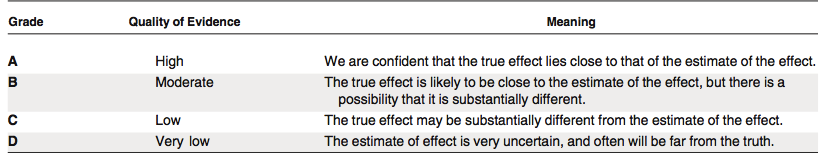
* 2.1.1 Preferred: Fistula. (B)
* 2.1.2 Acceptable: AV graft of synthetic or biological material. (B)
* 2.1.3 Avoid if possible: Long-term catheters. (B)
* 2.1.4 Patients should be considered for construction of a primary fistula after failure of every dialysis AV access. (B)

**1a.4.3.** **Grade assigned to the quoted recommendation with definition of the grade:**

KDOQI grades the strength of its recommendation to use permanent access types instead of other forms of vascular access in chronic hemodialysis patients as “B”, defined as “moderately strong evidence that the practice improves health outcomes; it is recommended that clinicians routinely follow the guideline for eligible patients.”

**1a.4.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: If separate grades for the strength of the evidence, report them in section 1a.7.*)

KDOQI grades for quality of evidence in guidelines:

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**1a.4.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.4.1*)**:**

Not applicable.

**1a.4.6. If guideline is evidence-based (rather than expert opinion), are the details of the quantity, quality, and consistency of the body of evidence available (e.g., evidence tables)?**

Yes **→ *complete section*** [***1a.7***](#Section1a7)

No **→ *report on another systematic review of the evidence in sections*** [***1a.6***](#Section1a6) ***and*** [***1a.7***](#Section1a7)***; if another review does not exist, provide what is known from the guideline review of evidence in*** [***1a.7***](#Section1a7)

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**1a.5.** **UNITED STATES PREVENTIVE SERVICES TASK FORCE RECOMMENDATION**

**1a.5.1.** **Recommendation citation** (*including date*) and **URL for recommendation** (*if available online*):

**1a.5.2.** **Identify recommendation number and/or page number** and **quote verbatim, the specific recommendation**.

**1a.5.3.** **Grade assigned to the quoted recommendation with definition of the grade**:

**1a.5.4. Provide all other grades and associated definitions for recommendations in the grading system.** (*Note: the* *grading system for the evidence should be reported in section 1a.7.*)

**1a.5.5. Citation and URL for methodology for grading recommendations** (*if different from 1a.5.1*)**:**

***Complete section*** [***1a.7***](#Section1a7)

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**1a.6. OTHER SYSTEMATIC REVIEW OF THE BODY OF EVIDENCE**

**1a.6.1.** **Citation** (*including date*) and **URL** (*if available online*):

**1a.6.2.** **Citation and** **URL for methodology for evidence review and grading** (*if different from 1a.6.1*)**:**

***Complete section*** [***1a.7***](#Section1a7)

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**1a.7. FINDINGS FROM SYSTEMATIC REVIEW OF BODY OF THE EVIDENCE supporting the measure**

*If more than one systematic review of the evidence is identified above, you may choose to summarize the one (or more) for which the best information is available to provide a summary of the quantity, quality, and consistency of the body of evidence. Be sure to identify which review is the basis of the responses in this section and if more than one, provide a separate response for each review.*

**1a.7.1.** **What was the specific structure, treatment, intervention, service, or intermediate outcome addressed in the evidence review?**

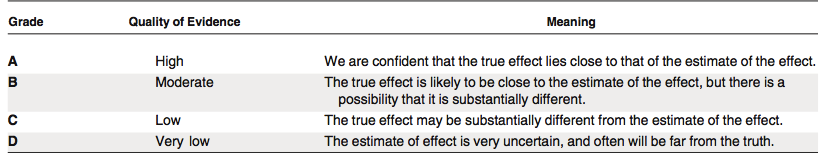
Both the measure and the evidence reviewed focus on reducing use of indwelling central venous catheters and increasing use of permanent vascular access types in hemodialysis patients.

**1a.7.2.** **Grade assigned for the quality of the quoted evidence with definition of the grade**:

KDOQI grades the strength of its recommendation to use permanent access types instead of other forms of vascular access in chronic hemodialysis patients as “B”, defined as “moderately strong evidence that the practice improves health outcomes; it is recommended that clinicians routinely follow the guideline for eligible patients.”

**1a.7.3. Provide all other grades and associated definitions for strength of the evidence in the grading system.**

KDOQI grades for quality of evidence in guidelines:

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**1a.7.4.** **What is the time period covered by the body of evidence? (*provide the date range, e.g., 1990-2010*). Date range**: 1991-2004

**QUANTITY AND QUALITY OF BODY OF EVIDENCE**

**1a.7.5.****How many and what type of study designs are included in the body of evidence**? (*e.g., 3 randomized controlled trials and 1 observational study*)

With the advent of the National Kidney Foundation’s (NKF) Kidney Dialysis Outcome and Quality Initiative (KDOQI) and CMS’ Fistula First National Vascular Access Improvement Initiative, much emphasis has been placed on increasing AVF use in hemodialysis patients recent years. Accordingly, the body of related evidence is vast. We limit our focus to the peer-reviewed literature that informed the 2006 KDOQI Clinical Practice Guidelines for Vascular Access, as the recommendations contained therein served as the foundation for this measure. The following is a summary of the body of evidence upon which the relevant KDOQI guidelines are based, consisting of seven studies and two review articles that together encompass more than 300,000 hemodialysis patients in the United States, the United Kingdom, and Canada. KDOQI grades the strength of its recommendation to use AVFs over other forms of vascular access in chronic hemodialysis patients as “B”, indicating that the recommendation is based on moderately strong evidence that the practice improves health outcomes.

**1a.7.6.** **What is the overall quality of evidence across studies in the body of evidence**? (*discuss the certainty or confidence in the estimates of effect particularly in relation to study factors such as design flaws, imprecision due to small numbers, indirectness of studies to the measure focus or target population*)

KDOQI grades the strength of its recommendation to use AVFs over other forms of vascular access in chronic hemodialysis patients as “B”, indicating that the recommendation is based on moderately strong evidence that the practice improves health outcomes.

**ESTIMATES OF BENEFIT AND CONSISTENCY ACROSS STUDIES IN BODY OF EVIDENCE**

**1a.7.7.** **What are the estimates of benefit—magnitude and direction of effect on outcome(s) across studies in the body of evidence**? (*e.g., ranges of percentages or odds ratios for improvement/ decline across studies, results of meta-analysis, and statistical significance*)

Research has clearly and consistently illustrated the net benefit of the use of permanent vascular access types over central venous catheters. The studies cited demonstrate a graded morbidity and mortality risk dependent on vascular access type in hemodialysis patients, with catheters carrying the highest risk, followed by AV grafts, then AVFs. (1-9)

As noted in the KDOQI guidelines, AVFs are preferred over all other forms of access because of their functional advantages and lower complications rates. Specifically, AVFs have the lowest rate of thrombosis (1) and require the fewest interventions (1,2), and thus provide longer survival of the access. (1-4) The number of access events is three– to seven–fold greater in prosthetic bridge grafts than in native AVFs. (1,2,4) As a result, costs of implantation and access maintenance are the lowest for AVFs. (4-6) Moreover, vascular access infections in hemodialysis patients are common, can be severe, and contribute to infection being the second leading cause of death in patients with CKD stage 5. (7) AVFs have been demonstrated to have lower rates of infection than grafts, which, in turn, are less prone to infection than percutaneous catheters and subcutaneous port catheter systems. (8) Consequently, AVFs are associated with increased survival and lower hospitalization rates than either AV grafts or catheters. (9) Research indicates that patients dialyzed via catheters and grafts have a greater mortality risk (relative risk = 2.3 and 1.47, respectively) than patients dialyzed with AVFs (9), and epidemiological evidence confirms that greater use of AVFs reduces morbidity and mortality. (9–12)

**Citations for Body of Evidence:**

1. Perera G, Mueller M, Kubaska S, Wilson S, Lawrence P, Fujitani R. Superiority of autogenous arteriovenous hemodialysis access: maintenance of function with fewer secondary interventions. Ann Vasc Surg. 2004;18:66–73.

2. Huber T, Carter J, Carter R, Seeger J. Patency of autogenous and polytetrafluoroethylene upper extremity arteriovenous hemodialysis accesses: a systematic review. J Vasc Surg. 2003;38:1005–11.

3. Pisoni R, Young E, Dykstra D, et al. Vascular access use in Europe and the United States: results from the DOPPS. Kidney Int. 2002;61:305–16.

4. Mehta S. Statistical summary of clinical results of vascular access procedures for haemodialysis, in Sommer BG, Henry ML (eds): Vascular Access for Hemodialysis-II (ed 2). Chicago, IL, Gore, 1991, pp 145–57.

5. The Cost Effectiveness of Alternative Types of Vascular access and the Economic Cost of ESRD. Bethesda, MD, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 1995, pp 139–57.

6. Eggers P, Milam R. Trends in vascular access procedures and expenditures in Medicare’s ESRD program, in Henry ML (ed): Vascular Access for Hemodialysis-VII. Chicago, IL, Gore, 2001, pp 133–43.

7. Gulati S, Sahu K, Avula S, Sharma R, Ayyagiri A, Pandey C. Role of vascular access as a risk factor for infections in hemodialysis. Ren Fail. 2003;25:967–73.

8. Nassar G and Ayus J. Infectious complications of the hemodialysis access. Kidney Int. 2001;60:1–13.

9. Dhingra R, Young E, Hulbert-Shearon T, Leavey S, and Port F. Type of vascular access and mortality in U.S. hemodialysis patients. Kidney Int. 2001;60:1443–51.

10. Woods J and Port F. The impact of vascular access for haemodialysis on patient morbidity and mortality. Nephrol Dial Transplant. 1997;12:657–9.

11. Xue J, Dahl D, Ebben J, and Collins A. The association of initial hemodialysis access type with mortality outcomes in elderly Medicare ESRD patients. Am J Kidney Dis. 2003;42:1013–19.

12. Polkinghorne K, McDonald S, Atkins R, and Kerr P. Vascular access and all-cause mortality: a propensity score analysis. J Am Soc Nephrol. 2004;15:477–86.

**1a.7.8.** **What harms were studied and how do they affect the net benefit (benefits over harms)?**

Not applicable. Research has clearly and consistently illustrated the net benefit of the use of permanent vascular access types over central venous catheters. The studies cited demonstrate a graded morbidity and mortality risk dependent on vascular access type in hemodialysis patients, with catheters carrying the highest risk, followed by AV grafts, then AVFs. (1-9)

**UPDATE TO THE SYSTEMATIC REVIEW(S) OF THE BODY OF EVIDENCE**

**1a.7.9.** **If new studies have been conducted since the systematic review of the body of evidence, provide for each new study: 1) citation, 2) description, 3) results, 4) impact on conclusions of systematic review**.

Our literature review identified the following 8 published, peer-reviewed articles. The publications include retrospective cohort, cross-sectional, and review studies, as well as expert consensus opinion.

**Port F, Pisoni R, Bommer J, et al. Improving outcomes for dialysis patients in the international Dialysis Outcomes and Practice Patterns Study. *Clin J Am Soc Nephrol.* 2006;1:246-255.**

Summary: The international Dialysis Outcomes and Practice Patterns Study (DOPPS) is well suited to evaluate levels of deviation from emerging and established guidelines to clinical practice of hemodialysis, over time and by country. The DOPPS can also evaluate whether the target levels that are chosen in the guidelines are in agreement with outcomes such as elevated risk for mortality, hospitalization, and vascular access failure. At a special DOPPS symposium during the 2004 congress of the American Society of Nephrology, the authors presented such findings; key points from that symposium are presented in this article, focusing on vascular access, mineral metabolism, dialysis dose, and anemia management. Although an observational study cannot prove causality, DOPPS suggests large opportunities to improve care and outcomes of dialysis patients. The international perspective of DOPPS assists in the new efforts for international guidelines. Some encouraging trends in recent years are documented in these areas

**Wasse H, Kutner N, Zhang R, and Huang Y. Association of initial hemodialysis vascular access with patient-reported health status and quality of life. *Clin J Am Soc Nephrol.* 2007;2:708-714.**

*Background:* Although the arteriovenous fistula (AVF) is the recommended form of vascular access for patients with ESRD, its impact on patient perception of health status, quality of life (QOL), or satisfaction is unknown.

*Design:* This study compared patient-reported health status and QOL scores and vascular access type among a national random sample of 1563 patients at dialysis initiation and day 60 of ESRD during 1996 to 1997. Patients were stratified into five categories: AVF at first dialysis and day 60 of ESRD, arteriovenous graft (AVG) at first dialysis and day 60, central venous catheter (CVC) at first dialysis and AVF at day 60, CVC at first dialysis and AVG at day 60, and CVC at first dialysis and day 60.

*Results:* Ten percent (n = 154) of patients had an AVF, 21% (n = 326) had an AVG, and 69% (n = 1083) had a CVC at dialysis initiation; those who were most likely to use an AVF were white and male. After statistical adjustment, patients with persistent AVF use reported greater physical activity and energy, better emotional and social well-being, fewer symptoms, less effect of dialysis and burden of kidney disease, and better sleep compared with patients with persistent CVC use, whereas measures such as cognitive and sexual function did not differ by access type.

*Conclusions:* Compared with persistent CVC use, early persistent AVF use is associated with the perception of improved health status and QOL among patients with ESRD. Future longitudinal studies may help to clarify further the association between QOL and vascular access.

**Bradbury B, Fissell R, Albert J, et al. Predictors of early mortality among incident U.S. hemodialysis patients in the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Clin J Am Soc Nephrol.* 2007;2:89-99.**

*Abstract:* Mortality risk among hemodialysis (HD) patients may be highest soon after initiation of HD. A period of elevated mortality risk was identified among US incident HD patients, and which patient characteristics predict death during this period and throughout the first year was examined using data from the Dialysis Outcomes and Practice Patterns Study (DOPPS; 1996 through 2004). A retrospective cohort study design was used to identify mortality risk factors. All patient information was collected at enrollment. Life-table analyses and discrete logistic regression were used to identify a period of elevated mortality risk. Cox regression was used to estimate adjusted hazard ratios (HR) measuring associations between patient characteristics and mortality and to examine whether these associations changed during the first year of HD. Among 4802 incident patients, risk for death was elevated during the first 120 d compared with 121 to 365 d (27.5 versus 21.9 deaths per 100 person-years; P = 0.002). Cause-specific mortality rates were higher in the first 120 d than in the subsequent 121 to 365 d for nearly all causes, with the greatest difference being for cardiovascular-related deaths. In addition, 20% of all deaths in the first 120 d occurred subsequent to withdrawal from dialysis. Most covariates were found to have consistent effects during the first year of HD: Older age, catheter vascular access, albumin <3.5, phosphorus <3.5, cancer, and congestive heart failure all were associated with elevated mortality. Pre-ESRD nephrology care was associated with a significantly lower risk for death before 120 d (HR 0.65; 95% confidence interval 0.51 to 0.83) but not in the subsequent 121- to 365-d period (HR 1.03; 95% confidence interval 0.83 to 1.27). This care was related to approximately 50% lower rates of both cardiac deaths and withdrawal from dialysis during the first 120 d. Mortality risk was highest in the first 120 d after HD initiation. Inadequate predialysis nephrology care was strongly associated with mortality during this period, highlighting the potential benefits of contact with a nephrologist at least 1 mo before HD initiation.

1. **Allon M. Current management of vascular access. *Clin J Am Soc Nephrol.* 2007;2:786-800.**

*Abstract:* Optimizing vascular access outcomes remains an ongoing challenge for clinical nephrologists. All other things being equal, fistulas are preferred over grafts, and grafts are preferred over catheters. Mature fistulas have better longevity and require fewer interventions, as compared with mature grafts. The major hurdle to increasing fistula use is the high rate of failure to mature of newly created fistulas. There is a desperate need for enhanced understanding of the mechanisms of failure to mature and the optimal type and timing of interventions to promote maturity. Grafts are prone to frequent stenosis and thrombosis. Surveillance for graft stenosis with preemptive angioplasty may reduce graft thrombosis, but recent randomized clinical trials have questioned the efficacy of this approach. Graft stenosis results from aggressive neointimal hyperplasia, and pharmacologic approaches to slowing this process are being investigated in clinical trials. Catheters are prone to frequent thrombosis and infection. The optimal management of catheter-related bacteremia is a subject of ongoing debate. Prophylaxis of catheter-related bacteremia continues to generate important clinical research. Close collaboration among nephrologists, surgeons, radiologists, and the dialysis staff is required to optimize vascular access outcomes and can be expedited by having a dedicated access coordinator to streamline the process. The goal of this review is to provide an update on the current status of vascular access management.

**Ravani P, Spergel L, Asif A, et al. Clinical epidemiology of arteriovenous fistula in 2007. *J Nephrol.* 2007;20:141-149.**

*Abstract:* The native arteriovenous fistula (AVF) is considered the best access for hemodialysis due to its longer survival and lower complication rates as compared with other forms of vascular access. However, broad practice variation exists in the use of AVF among different countries and even within the same country among different regions and centers. Several barriers to AVF placement have been identified in the last decade that might explain its suboptimal use among both prevalent and incident patients. The present review summarizes and discusses recent findings from epidemiological studies on practice patterns and risk factors for AVF failure. Special emphasis is devoted to drawbacks and payoffs consequent upon the choice of the AVF as access for dialysis. In fact the AVF requires major investments in the short run but far less assistance and rework thereafter. Primary AVF failure, due to early failure or lack of maturation, is currently considered a key area of investigation to improve vascular access outcomes. The main challenge for the nephrologist today is to minimize the risk of primary failure while attempting to provide most patients with a native AVF. Improving vascular access outcomes is clearly a complex and difficult task. Recent experience from the United States suggests that multidisciplinary management is the most appropriate approach to deal with all the multifaceted aspects of end-stage renal disease care and to increase the likelihood of success.

**Bradbury B et al. Conversion of vascular access type among incident hemodialysis patients: description and association with mortality. *Am J Kidney Dis*. 2009;53(5);804-814.**

*Background:* Limited data exist describing vascular access conversions during the first year on dialysis therapy or the effect of converting to and from a catheter on subsequent mortality risk.

*Design:* Retrospective cohort study.

*Setting and Participants:* We studied a random sample of incident US hemodialysis patients (initiated long-term dialysis < 30 days before study entry) in the Dialysis Outcomes and Practice Patterns Study (DOPPS; 1996-2004).

*Predictors:* At dialysis therapy initiation, we assessed vascular access type in use (arteriovenous fistula [AVF], arteriovenous graft [AVG], or catheter) and other patient characteristics. We characterized changes in vascular access type (conversions) by using regularly collected functional status information.

*Outcome and Measurements:* We assessed time to all-cause mortality. We first described conversions, then used time-dependent Cox regression to estimate mortality hazard ratios (HRs) for conversions from a catheter to a permanent vascular access (versus no conversion) and conversions from a permanent vascular access to a catheter (versus no conversion).

*Results:* The study included 4,532 patients; 69.2% were dialyzing with a catheter; 17.6%, with an AVG; and 13.1%, with an AVF. In patients initiating therapy with an AVF or AVG, 22% experienced a conversion (failure), and median times to first failure were 62 and 84 days, respectively. In catheter patients, 59% converted to an AVF/AVG (predominantly AVG [57%]); median times to first conversion were 92 and 66 days, respectively. Conversion to a permanent access was associated with an adjusted mortality HR of 0.69 (95% confidence interval, 0.55 to 0.85). The effect was similar for conversion to an AVF or AVG, and these persisted across demographic groups and facilities with different conversion practices. Conversion from a permanent vascular access to a catheter was associated with an adjusted mortality HR of 1.81 (95% confidence interval, 1.22 to 2.68).

*Conclusion:* Vascular access conversions are common in incident patients. Continued efforts to increase early nephrologist referral and permanent vascular access placement may help decrease mortality risk in incident dialysis patients.

**Ethier J et al. Vascular access use and outcomes: an international perspective from the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Nephrol Dial Transplant.* 2008;23(10):3219-3226.**

*Background:* A well-functioning vascular access (VA) is essential to efficient dialysis therapy. Guidelines have been implemented improving care, yet access use varies widely across countries and VA complications remain a problem. This study took advantage of the unique opportunity to utilize data from the Dialysis Outcomes and Practice Patterns Study (DOPPS) to examine international trends in VA use and trends in patient characteristics and practices associated with VA use from 1996 to 2007. DOPPS is a prospective, observational study of haemodialysis (HD) practices and patient outcomes at >300 HD units from 12 countries and has collected data thus far from >35,000 randomly selected patients.

*Methods:* VA data were collected for each patient at study entry (1996-2007). Practice pattern data from the facility medical director, nurse manager and VA surgeon were also analysed.

*Results:* Since 2005, a native arteriovenous fistula (AVF) was used by 67-91% of prevalent patients in Japan, Italy, Germany, France, Spain, the UK, Australia and New Zealand, and 50-59% in Belgium, Sweden and Canada. From 1996 to 2007, AVF use rose from 24% to 47% in the USA but declined in Italy, Germany and Spain. Moreover, graft use fell by 50% in the USA from 58% use in 1996 to 28% by 2007. Across three phases of data collection, patients consistently were less likely to use an AVF versus other VA types if female, of older age, having greater body mass index, diabetes, peripheral vascular disease or recurrent cellulitis/gangrene. In addition, countries with a greater prevalence of diabetes in HD patients had a significantly lower percentage of patients using an AVF. Despite poorer outcomes for central vein catheters, catheter use rose 1.5- to 3-fold among prevalent patients in many countries from 1996 to 2007, even among non-diabetic patients 18-70 years old. Furthermore, 58-73% of patients new to end-stage renal disease (ESRD) used a catheter for the initiation of HD in five countries despite 60-79% of patients having been seen by a nephrologist >4 months prior to ESRD. Patients were significantly (P < 0.05) less likely to start dialysis with a permanent VA if treated in a faciity that (1) had a longer time from referral to access surgery evaluation or from evaluation to access creation and (2) had longer time from access creation until first AVF cannulation. The median time from referral until access creation varied from 5-6 days in Italy, Japan and Germany to 40-43 days in the UK and Canada. Compared to patients using an AVF, patients with a catheter displayed significantly lower mean Kt/V levels.

*Conclusions:* Most countries meet the contemporary National Kidney Foundation's Kidney Disease Outcomes Quality Initiative goal for AVF use; however, there is still a wide variation in VA preference. Delays between the creation and cannulation must be improved to enhance the chances of a future permanent VA. Native arteriovenous fistula is the VA of choice ensuring dialysis adequacy and better patient outcomes. Graft is, however, a better alternative than catheter for patients where the creation of an attempted AVF failed or could not be created for different reasons.

**Astor B et al. Type of vascular access and survival among incident hemodialysis patients: the Choices for Health Outcomes in Caring for ESRD (CHOICE) Study. *J Am Soc Nephrol.* 2005;16(5):1449-1455.**

*Background:* Few reports have shown an association between access type and inflammatory marker levels in a longitudinal cohort. We investigated the role of access type on serial levels of inflammatory markers and the role of inflammatory markers in mediating the association of access type and risk of mortality in a prospective study of incident dialysis patients.

*Study Design:* Cohort study, post hoc analysis of the CHOICE (Choices for Healthy Outcomes in Caring for ESRD) Study.

*Setting and Participants:* In 583 participants, inflammation was assessed by measuring serum C-reactive protein (CRP) and interleukin 6 (IL-6) after access placement and at multiple times during 3 years' follow-up. Type of access was categorized as central venous catheter (CVC), arteriovenous graft (AVG), and arteriovenous fistula (AVF), and changes over time were recorded.

*Predictor:* Access type, age, sex, race, body mass index, diabetes, cardiovascular disease, and serum albumin level.

*Outcomes:* CRP level, IL-6 level, and mortality.

*Measurements:* We used mixed-effects pattern mixture models to study the association between access type and repeated measurements of inflammation and survival analysis to investigate the association of access type and mortality, adjusting for predictors.

*Results:* In a mixed-effects pattern mixture model, compared with AVFs, the presence of CVCs and AVGs was associated with 62% (P=0.02) and 30% (P=0.05) increases in average CRP levels, respectively. A Cox proportional hazards model yielded nonsignificant associations of CVC and AVG use (vs AVFs) with risk of mortality when adjusted for inflammatory marker levels. Higher CRP levels were associated with increased risk of CVC failure than lower CRP levels.

*Conclusions:* CVCs, compared with AVFs, are associated with a greater state of inflammation in incident hemodialysis patients, and the association of catheter use and mortality may be mediated by access-induced inflammation. Our findings support recommendations for the early removal or avoidance of CVC placements.

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**1a.8 OTHER SOURCE OF EVIDENCE**

*If source of evidence is NOT from a clinical practice guideline, USPSTF, or systematic review, please describe the evidence on which you are basing the performance measure.*

**1a.8.1** **What process was used to identify the evidence?**

Not applicable.

**1a.8.2.** **Provide the citation and summary for each piece of evidence.**

Not applicable.