when the vascular access eventually fails. This applies to all populations in need of dialysis access, including CKD patients with a failing transplant, PD patients who require transition to HD, pediatric CKD patients, other established CKD patients, or patients needing an urgent start to dialysis. A proactive approach to the pediatric CKD patient with failing eGFR is imperative to avoid CVC placement for HD initiation. This means allowing adequate maturation time to enable the AV access to be usable on the day of HD initiation—typically several months of lead time for AVF creation and a few weeks for an AVG placement. CVC avoidance for elective HD is achievable with adherence to the ESKD Life-Plan. It is imperative that health care providers communicate the ESKD Life-Plan and vascular access creation, contingency, and succession plans to provide continuity in KRT and dialysis access care.

Future Research

- It is known that medium-sized peripheral arteries (radial and ulnar) of >2 mm can develop AVF to support adequate dialysis.[104] Future research can inform on the impact of both larger and smaller vessels used for AV access creation. For example, for larger arteries, identify what characteristics are associated with a greater risk of high flow–associated problems. For smaller vessels, determine what characteristics allow for adequate AVF maturation and use.
- Weigh the potential options for vascular access type and location, as discussed; to determine and study more accurate patient-specific estimates of the predicted duration of HD and predicted probability of AVF maturation and consider the results when choosing access type and location.
- More prospective research to determine whether endoAVF creation can result in a clinically durable and cost-effective AV access compared with traditional surgical AV access creation and maintenance.

Guideline 4. AV Access Types and Materials

Please refer to Box 1 to understand the evidence basis for the Guideline Statements.

Note: When a statement indicates that "There is inadequate evidence for KDOQI to make a recommendation," the Work Group cannot make any recommendation, suggestion, or other evidence-based guidance (in either direction) based on the very low, low, or inadequate quality of evidence amassed by the ERT.

Statements: Novel AV Access Types and Materials

4.1 **KDOQI suggests that the choice of material for an AVG should be based on the nephrologist's or operator's discretion and best clinical judgment since the current evidence does not demonstrate that one graft material or modification thereof is associated with improved outcomes in terms of patency or complications. (*Conditional Recommendation, Low Quality of Evidence*)**

4.2 **KDOQI considers it reasonable to use early cannulation grafts as a CVC-sparing strategy in appropriate patients, considering their ESKD Life-Plan. (*Expert Opinion*)**

Rationale/Background

Effective hemodialysis requires a suitable access for the withdrawal and return of blood. The ideal hemodialysis access should provide adequate flow rates to sustain prescribed dialysis; be easy to access/cannulate, cost effective, and acceptable to patients; and be associated with excellent long-term patency and minimal complications. A mature, functional autogenous AV access or AVF may be the most ideal access, although not all patients have suitable veins for an AVF, and not all of the veins mature sufficiently for cannulation, thereby negating their potential advantages. Furthermore, in the culture of patient-centered care, an AVF may not always be the appropriate access, given individual circumstances. Acceptable AV access can be created by using a variety of AVGs, including prosthetic, biologic, and autogenous materials. Expanded polytetrafluoroethylene (PTFE) has been the most commonly used graft material since its original description and has served as the comparator or criterion standard for numerous randomized trials. A variety of other prosthetic graft materials are commercially available, although none have proven to be superior to PTFE in terms of the patency or complications. Similarly, a variety of graft modifications have been made to improve AVG performance, including changes in wall thickness, surface modifications, diameter changes, and external support, but none have proven superior to the standard wall 6-mm PTFE graft. The use of autogenous and biological grafts had largely been abandoned with the introduction of PTFE, although some limited recent evidence suggests that nonautogenous saphenous vein and bovine carotid artery biological grafts may be associated with fewer infectious complications and improved patency, respectively. The current KDOQI statements on this topic are consistent with the previous 2006 KDOQI guideline.

Detailed Justification

PTFE has been the most widely used prosthetic material for AVGs since its introduction more than 40 years ago.[105] There have been a variety of RCTs and observational studies (Supplement 3, Table S17) evaluating various AVG materials and configurations. For example, there have been comparisons of tetrafluoroethylene (Dacron, Dupont)[106,107] or polyurethane[108,109] to PTFE, although none have proven superior in terms of patency or complication rates. Similarly, the brand of PTFE does not appear to make a difference in terms of outcome.[110,111]