

endorses that can be useful to decrease infection rates and complications in patients requiring dialysis with a CVC, and these are covered in [Guidelines 24 and 25](#). These core interventions include⁵⁷² (1) infection surveillance and feedback, (2) strictly following proper hand hygiene practices, (3) strictly following proper CVC/vascular access care protocols, (4) staff education and competency, (5) patient education and engagement, (6) CVC reduction efforts, (7) chlorohexidine for skin antisepsis, (8) CVC hub disinfection, and (9) antimicrobial ointment.

Multidisciplinary team surveillance and management of CVC-related infections has been demonstrated to reduce infections and improve outcomes in hemodialysis patients who require a CVC for dialysis access.^{309,324}

Future Research

- Clinical sequelae of disrupting a fibrin sheath in patients with CRBSI requires further study.
- Prospective studies comparing treatment of CRBSI using antibiotic locks in conjunction with systemic antibiotics versus CVC exchange or removal in conjunction with systemic antibiotics is needed.

Guideline 26. Other Vascular Access-Related Complications

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.

Statement: Treatment and Intervention of Asymptomatic Central Venous Stenosis Without Clinical Indicators

26.1 KDOQI considers it reasonable that if asymptomatic central venous stenosis (without clinical indicators) is identified and/or associated with the prior or current presence of a CVC, it should not be treated. (Expert Opinion)

See [Table 26.1](#) for clinical indicators of central venous stenosis.

Rationale/Background

Stenoses or occlusions in the major intrathoracic veins (ie, central veins—internal jugular, subclavian, brachiocephalic, superior vena cava) can compromise AV access function and lead to ineffective dialysis. These lesions can also lead to marked venous hypertension due to the increased flow associated with the AVF with sequelae ranging from mild to severe symptoms (ie, positive clinical indicators) as characterized by varicosities, arm edema, dermatosclerosis, ulceration, and superior vena cava syndrome ([Table 26.1](#) and [Fig 26.1](#)). Female patients can

Table 26.1. Signs and Symptoms (Clinical Indicators) of Central Venous Stenosis

Timing of Occurrence	Sign or Symptom	Comments
Early signs and symptoms	Swelling	Typically asymmetric, affecting the hands and arms
	Pain	Pain that can be attributed to central venous stenosis/occlusion, such as aching and heaviness of an extremity, when other causes have been excluded
	Cutaneous findings	Venous collaterals Skin discoloration (red, purple, or blue discoloration)
Late signs and symptoms	Swelling	More widespread, affecting the arms, head, neck, or trunk (including breasts) Swelling may be unilateral, bilateral, or involve only the head, face, and neck.
	Pain	Persistent pain attributed to central venous stenosis/occlusion (eg, persistent aching, chest or extremity heaviness)
	Cutaneous findings	Venous collaterals Skin discoloration (red, purple, or blue discoloration; chronic pigmentation changes) Lymphatic blistering or weeping Stasis ulcers Phlebitis Infection (cellulitis, cannulation site abscess) Nonhealing wounds or incisions
	Respiratory compromise	Hoarse voice and/or respiratory distress from laryngeal edema, pleural effusion, or chest (or breast) swelling that can cause restrictive pulmonary compromise
	Neurologic symptoms	Visual or auditory disturbances, exophthalmos, cognitive disabilities, headaches, or seizures when other causes have been excluded

occasionally present with ipsilateral breast edema despite a normal or only moderately swollen extremity. These stenotic lesions can lead to clinical signs and symptoms such as prolonged bleeding after removal of the dialysis cannulas and/or elevated venous pressures during routine monitoring with high AV access recirculation. Central vein stenoses (CVS) or occlusions have been reported to occur in up to 5% to 50% of cases^{237,619-622} and represent the Achilles heel of maintaining or creating a functional AV access. They can preclude the placement of an ipsilateral AV access and likely account for the leading etiology of complex or tertiary AV access problems.

The central vein lesions are likely caused by an initial injury to the vascular endothelium that precipitates a local