VI.3 Prevention of infection: management of the vascular access

Guideline VI.3.1

A. To prevent infection, vascular access should be a native fistula whenever possible.  
(Evidence level: B)

Commentary on Guideline VI.3.1

The single most frequent site of infection in HD patients is the vascular access site [9,10,23]. The risk of vascular access infection is strongly associated with the type of vascular access. In a standardized surveillance of HD vascular access systems, 4.6 infections per 1000 dialysis sessions (ds) were identified. This rate was 2.5/1000 ds for permanent fistulae or grafts, 13.6/1000 ds for permanent catheters and 18.4/1000 ds for temporary catheters [114]. Patients with a PFTE graft were found to have a 29–33% greater risk of bacteraemia than patients with a native fistula [8,14].

Many studies have demonstrated that bacterial infections are more frequent with external catheters [11,12,14,23,63,115–117]. This high risk of infection is linked to the presence of foreign material and to the special affinity of bacteria for artificial devices [118]. Once bacterial contamination enters these systems, bacteria may easily stick to the polymer materials and to the fibrin sheath that covers them.

Guideline VI.3.2

A. For permanent arteriovenous fistula or grafts:

- Patients should adopt good personal hygiene habits.  
  (Evidence level: B)
- Clean technique for skin preparation should be used before cannulation of native fistula.  
  (Evidence level: C)
- Aseptic technique should be optimally used and is strongly recommended for cannulation of grafts.  
  (Evidence level: C)
- HD staff training for fistula cannulation is mandatory to avoid poor needle insertion.  
  (Evidence level: C)

Commentary on Guideline VI.3.2

All vascular access systems may become infected due to breaches in the protective barrier and frequent manipulation. In HD patients poor personal hygiene is a risk factor for vascular access infection [82].

Cannulation of an access site places the HD patients at risk for infection by bacterial contamination. An aseptic technique for skin preparation is as follows: the patient washes the access arm just before being positioned for cannulation, the needle cannulation sites are located and palpated prior to skin preparation, dialysis staff handwash and wear sterile gloves. All materials used to cannulate the access except fluid containers are placed on a sterile area next to the patient. Povidone-iodine or chlorhexidine solution is applied to the skin over the access and allowed to dry for 2–3 min. Sterile barriers are placed above and below the prepared area. The fistula needles are then inserted and the insertion sites are covered with sterile band-aids.

In a retrospective study, this technique has been shown to control outbreaks of access-site infections due to *S. aureus* [82] but in a prospective randomized study, no significant difference in vascular access-site infection was found between patients prepared with aseptic technique and those prepared using clean technique [82]. The clean technique differs from the aseptic technique by the use of clean barriers and non-sterile gloves.
Guideline VI.3.3

A. Insertion of (permanent) central venous catheters should be considered as a surgical procedure and only be performed by trained and experienced medical staff in a dedicated clean area under aseptic conditions.

(Evidence level: C)

B. Only appropriately trained staff should perform catheter dressing changes and catheter manipulation.

(Evidence level: B)

C. Catheter connection, disconnection, and interventions should be performed under aseptic conditions by trained dialysis staff with the patient wearing a surgical mask.

(Evidence level: A)

D. A dialysis catheter should only be used for HD or related procedures.

(Evidence level: C)

Commentary on Guideline VI.3.3

The difficulties of insertion predispose to infection [119] and infection rates increase when catheter dressing changes and manipulations are performed by inadequately trained staff [120]. *Staphylococcus aureus* is the leading cause of catheter-exit infection and bacteraemia in HD patients. Bacteraemia and tunnel-tract infection are the leading causes of catheter loss [121]. *Staphylococcus aureus* nasal carriage is frequent in HD patients and a surgical mask worn by the patient and the nurse when the catheter is accessed reduces the spread of infectious droplets and reduces contamination of the catheter site [12,103,104,122].

Full barrier precautions during insertion of the central venous catheter (sterile gloves, long sleeved sterile gown, mask, cap, and large sterile sheet drape) reduce the incidence of catheter-related bacteraemia compared with standard (sterile gloves and small drape) precautions: 0.08/1000 and 0.5/1000 catheter days respectively, \( P = 0.02 \) [123].

Excessive manipulation of central venous catheters increases the risk for catheter-related infection [124].