



BRIEF ANSWERS  
TO SPECIFIC  
CLINICAL  
QUESTIONS

## Q: When should central venous catheters be changed in the intensive care unit? Should there be a rigid time-based protocol for doing so?

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**A:** EVIDENCE SUGGESTS that the decision should be made on a case-by-case basis, rather than on the basis of a time-based protocol. Changing a central venous catheter (CVC) is frequently necessary to manage or prevent infection, but unnecessary manipulation can increase the risk of infection. In general, the line should be changed whenever catheter-related infection is suspected or proven, or whenever central venous access is compromised.

### ■ CATHETER-RELATED INFECTIONS

Bloodstream infections associated with CVCs are an important cause of morbidity and mortality in the intensive care unit. More than 16,000 episodes occur each year, with mortality estimates ranging from 3% to 25%.<sup>1</sup> These infections are associated with increased lengths of stay and added hospital costs of up to \$460 million.<sup>1</sup> Unfortunately, few well-controlled, randomized, and adequately powered studies have been done on CVC-associated infection. Nevertheless, accepted infection control principles can be used to reduce infection rates.

### ■ CHANGING A CVC DURING KNOWN OR SUSPECTED INFECTION

A CVC-related infection should be suspected when the patient has fever, organism-positive blood cultures, or erythema or purulent drainage at the CVC insertion site.

\*This paper discusses therapies that are not approved by the Food and Drug Administration for the use under discussion.

If infection is documented or obvious, the catheter should be removed and placed in a new anatomic site.

If infection is only suspected (for example, when a patient has an unexplained fever), a useful strategy is to change the catheter over a guidewire and send the catheter tip for quantitative culture analysis. If organism colonization on the removed catheter is found to exceed the significance level accepted by the hospital's microbiology laboratory, the newly placed catheter should be removed. Because this procedure will allow clinicians to avoid unnecessarily changing the catheter site, it can be useful especially when central venous access is difficult. Great care must be taken, however, to avoid inadvertently contaminating the guidewire and the new catheter.

Any CVC placed with nonsterile technique, such as one placed on an emergency basis during resuscitation efforts or trauma, should also be changed when the patient is stabilized.

### ■ CHANGING THE CATHETER SITE

Although no randomized studies have been done, several observational studies suggest that subclavian venous sites are the least likely to become infected, followed by internal jugular sites, and then by femoral vein sites.<sup>2</sup> Hence, changing a femoral venous catheter to a subclavian or internal jugular site may be warranted even in the absence of any sign of infection.

Thrombosis of the vein in which the CVC is placed is an additional indication for changing the catheter to a new site.

However, in general, changing to a new site in the absence of an infection or throm-

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bosis adds to non-infection risks of central venous line placement without decreasing the infection rate.<sup>3</sup>

### ■ TIME-BASED PROTOCOLS ARE NOT RECOMMENDED

Following a time-based protocol for changing lines is not supported by the literature. Routinely changing the catheter has not been definitively shown to offer any benefit, whereas increased CVC catheter manipulation is independently associated with an increased risk of catheter-related bacteremia.<sup>3</sup>

A better strategy is to perform routine evaluations of the continued need for a CVC, which may avoid unnecessary catheter use.<sup>4,5</sup>

### ■ OTHER FACTORS AFFECTING INFECTION RISK

Other strategies may be helpful in reducing the risk of catheter-related bloodstream infections.

**Equipment and techniques.** The practice of changing a catheter over a guidewire may add to infection risk because it involves additional catheter manipulation.<sup>3</sup> In contrast, subcutaneous tunneling to separate the cutaneous puncture from the venous entry site by several centimeters decreases the infection rate.<sup>1</sup>

**Parenteral nutrition.** Minimizing the use of CVCs for total parenteral nutrition (eg, by switching to enteral nutrition as soon as possible) has been associated with lower infection rates.<sup>6</sup>


**Sterile technique and antimicrobials.** Strict adherence to sterile technique in the

placement of catheters reduces the infection rate. Caregivers must use appropriate skin antisepsis, full-length sterile barrier drapes, and caps, masks, sterile gowns, and sterile gloves.<sup>7</sup> Sterile plastic pulmonary artery catheter sheaths can also reduce infection risk.<sup>8</sup>

Antimicrobial-coated catheters have recently been shown to reduce infection rates.<sup>9</sup> Using such catheters during short-term catheterization may contribute to safety but does not eliminate the need for sound infection control and hygienic practices.

**Catheter hub.** An important source of catheter infection is colonization of the catheter hub.<sup>10</sup> Limiting access to the hubs and avoiding using them for drawing blood may reduce the risk of hub colonization. Contamination risk may also be reduced by using alcohol, povidone, or sterile swabs to disinfect the hub and hub connector before and after access.<sup>11</sup> Although some evidence suggests that multiple-lumen catheters have higher infection rates, other studies failed to find differences except for the increased risks associated with total parenteral nutrition and with frequent access to the hubs.<sup>12,13</sup>

**Personnel.** Using specialized teams for insertion, inspection, and dressing changes has been shown to reduce CVC infection rates.<sup>14</sup> Similarly, an adequate nurse-to-patient ratio reduces nosocomial infection rates.<sup>14</sup>

**Anticoagulation.** Low-dose anticoagulation has also been associated with a reduced rate of catheter tip thrombus formation and subsequent infection.<sup>15,16</sup> Thus, the use of low-dose heparin for short-term catheters and very low-dose warfarin for long-term catheters appears warranted. 

**Routinely evaluate the need for the catheter**

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