

DR. DAROUICHE

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## **Finding Solutions for Device-Related Infections: The Risks of Indwelling Catheters**

- NARRATOR: Welcome to Part Two of our conversation with Dr. Rabih Darouiche.
- C. TUCKER: Which patients are more likely to develop problems? Is it the short-term catheters or long-term catheters?
- DR. DAROUICHE: In fact, both. If you take the population with indwelling central venous catheters, generally the average rate of catheter-related infection is about 4 to 5 percent. But that incidence is distributed over an average of seven-day duration of short-term catheter placement. In the context of long-term central venous catheters, the incidence of infection per hundred catheter days is less than that of short-term catheters, but the overall cumulative rate of catheter-related bloodstream infection is essentially comparable.
- C. TUCKER: Can you go more into the cost? You were explaining some of the effects that can happen from the infection. How does that affect the cost of medical care?
- DR. DAROUICHE: Yes. The cost of treating a single case of catheter-related bloodstream infection ranges anywhere from \$10,000 in patients residing outside the intensive care unit, up to \$52,000 in patients residing in the intensive care units.
- C. TUCKER: Does that increased cost affect all patients in general?
- DR. DAROUICHE: Generally it does; more so critically ill than non-critically ill patients because you have to keep in mind that a major portion of that additional cost is due to prolonged hospitalization. The cost of an extra hospital day is much higher in the ICU than in regular nursing floors.
- C. TUCKER: Does the type of catheter, or placement of the catheter, affect the chances of developing an infection?
- DR. DAROUICHE: Yes. In terms of placement of the catheter — what we refer to usually as the site of insertion of the catheter — if it is a short-term central venous catheter, you can insert the catheter in one of three sites. You can insert it either in the subclavian vein, which is here just below the clavicle, or the internal jugular vein in the neck, or the femoral vein in the groin. Generally, the rate of infections of catheters inserted in the subclavian vein tend to be lower than infections associated with internal jugular catheters, which in turn is less likely to be infected than femoral venous catheters. The reason is because, for example, (with) the femoral central

venous catheters, that area is generally very moist and is adjacent to the genital organs as well as to the anus, where high concentrations of bacteria may exist. In terms of a higher incidence of infection of catheters inserted in the internal jugular vein versus subclavian vein, that is probably again due to the presence of hair follicles, at least in men, at the neck. As well as the fact that in patients who are in the ICU and are being ventilated, sometimes tracheal secretions may disseminate into the area of catheter insertion in the internal jugular vein and cause bacterial colonization and subsequent infection.

C. TUCKER: What can health care professionals do to prevent the infections?

DR. DAROUICHE: As we all know, prevention is much more important than treatment; particularly with this entity, where the medical and economic consequences are tremendous. The most important and basic measure for preventing infections associated with central venous catheters, as well as infections associated with other procedures or surgeries, is essentially the adherence to basic infection-control measures, in terms of making sure that the environment under which the catheter is inserted is as sterile as possible.

C. TUCKER: What other research has to be done? What are the next steps that you are taking, or others are taking in this field, to see how far this can go?

DR. DAROUICHE: So far there have been a number of prospective, randomized clinical trials demonstrating that minocycline- and rifampin-coated central venous catheters significantly reduce the rate of catheter-related bloodstream infection compared to either control uncoated catheters or another type of antimicrobial-coated catheter. Those studies have been done both in the context of short-term catheters as well as long-term catheters. I think in the future it is important to investigate the utility of this antimicrobial-coating approach in other seriously ill patients that have not been studied; for example, in burn patients. So far, we have studied patients at high risk for catheter-related infection, including patients with cancer, HIV, critically ill patients, immunocompromised patients. So I think other potential populations at high risk for developing catheter-related infections, like burn patients, probably would be an area that would be reasonable to investigate. I also think that that antimicrobial approach would be reasonable to explore when applied to other devices that are either percutaneously inserted or completely surgically implanted, but share a similar microbiology, like percutaneously inserted central venous catheters.

**NARRATOR:** Rabih Darouiche, MD, is Professor of Medicine and Physical Medicine and Rehabilitation, and Director of the Center for Prostheses Infection, Baylor College of Medicine, and Michael E. DeBakey Veterans Affairs Medical Center, Houston, Texas. He is the co-inventor of the minocycline rifampin technology, and this technology is licensed to Cook Medical. Dr. Darouiche is entitled to compensation through a royalty-sharing contract with the Baylor College of Medicine.