

Chlorhexidine/silver sulfadiazine vs. minocycline/rifampin catheters

COMPARING ANTIMICROBIAL CATHETERS BASED ON SPECTRUM OF ACTIVITY, PREVENTING ADHERENCE AND LONGEVITY

A catheter-related infection starts with a potential pathogen adhering to the catheter. Adherence can occur even on an antibiotic catheter when a zone of inhibition (ZOI) is present.¹ That's why an antimicrobial catheter's

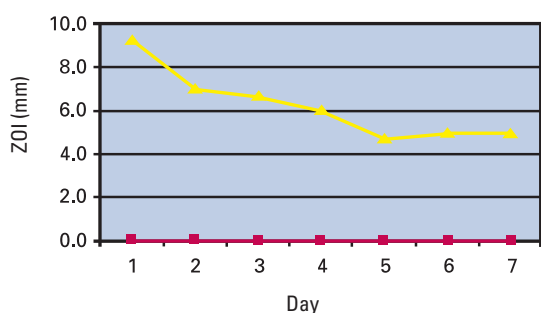
efficacy should be based on more than zone size:

- Effectiveness against a broad spectrum of pathogens
- Ability to prevent adherence
- Longevity of the antimicrobial agents
- Protection of critical catheter surfaces

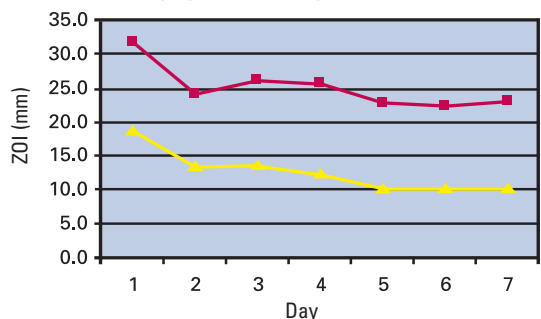
To illustrate this, here are head-to-head comparisons of the performance of chlorhexidine/silver sulfadiazine (CSS) catheters and minocycline/rifampin (MR) catheters against three common sources of catheter-related bloodstream infection (CRBSI).²

Charts show cultivation following daily transfers

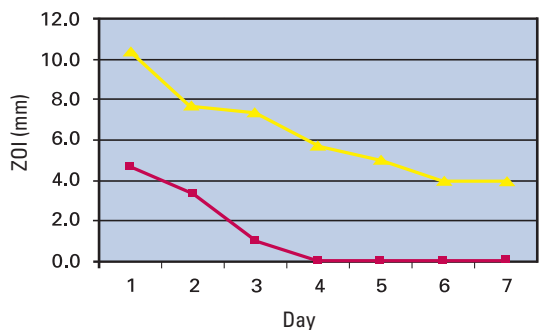
Candida albicans ATCC 10231



Staphylococcus epidermidis ATCC 35983



Pseudomonas aeruginosa ATCC 27853



—■— MR: Minocycline/Rifampin
—▲— CSS: Chlorhexidine Silver Sulfadiazine

Candida albicans

The MR catheter produces no ZOI against *C. albicans*; the CSS catheter does. **At least two studies have reported similar results—and found that antibiotic catheters may actually encourage *Candida*.**^{3,4} For example, Wright et al. notes, "... antibiotic-coated central lines were not associated with any benefit in this critically ill patient population. They were associated with increased *Candida* colonization and the development of rifampin resistance to *Staphylococcus epidermidis*."³ While in a multicenter trial in Spain, León et al. found that MR catheters were associated with "a significant increase in *Candida* spp."⁴

INCIDENCE vs. MORTALITY

	Incidence	Mortality
<i>C. albicans</i>	8% ⁸	40% ⁸
<i>S. epidermidis</i>	32% ⁸	21% ⁸

Staphylococcus epidermidis

Both catheters maintain a ZOI at day seven (the CSS catheter yields significant antimicrobial effect against *S. epidermidis* up to 46 days^{5,6}), yet CSS's ZOI is smaller. Tambe et al. noted a similar phenomenon. In their study, CSS catheters prevented bacterial adherence; "... on the other hand, the antibiotic catheter showed adherence despite a larger zone size. These results indicate that unlike in the case of antibiotic catheters, the relatively smaller zones of inhibition with antiseptic catheters do not appear to be predictive of lack of efficacy."¹ There are other downsides to using MR catheters, including:

- ▶ Increased *Candida* colonization,⁴ which has a higher mortality rate than *S. epidermidis* (see chart above)
- ▶ Encouraging rifampin resistance³

Pseudomonas aeruginosa

The CSS catheter maintains a ZOI through day seven, while the MR catheter does not. This is meaningful for three reasons. First, as a group, gram-negative bacilli (including *P. aeruginosa* and *Enterobacteriaceae*) account for 14% of CRBSIs.⁷ Second, ***P. aeruginosa* is noted for its resistance to antibiotics**; the few that are effective include fluoroquinolones, gentamicin and imipenem, and even these do not work against all strains.⁹ Third, MR has no effect on *P. aeruginosa* growth.^{10,11}

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WHAT MAKES THE DIFFERENCE

Antiseptics

Arrow's use of antiseptics, rather than antibiotics, provides a broad spectrum of activity, eliminating the potential for antibiotic resistance. Is this a real concern? As stated in a recent review of commercially available antimicrobial catheters, co-authored by one of the inventors of the MR technology, the authors state, "...there is a potential for these devices to select for resistant gram-negative bacteria and *Candida* organisms, leading to breakthrough bacteremias and fungemias."¹³

Spectrum of activity

Arrow's two powerful antiseptic agents, chlorhexidine and silver sulfadiazine, result in a spectrum of activity against the wider range of clinically significant potential pathogens.^{2,13,14} While MR catheters perform well against gram-positive bacteria, many investigators have found that there was limited or no activity against gram-negative bacteria and *Candida* organisms, and even resulted in the emergence of rifampin-resistant *Staphylococcus epidermidis*.^{1,2,3,4,13,14}

Unique hub protection

Arrow's AGB⁺ catheters are unique in protecting all critical catheter surfaces both outside and inside the catheter. In addition to intraluminal protection, AGB⁺ catheters alone offer broad spectrum chlorhexidine protection for the entire fluid path, including both the extension lines and the hubs.¹⁴ Over 20% of CRBSI are derived from intraluminal contaminants, and since hubs are repeatedly accessed during catheter use, they pose a significant risk of becoming colonized with pathogens.¹⁵ Arrow's AGB⁺ catheters are the only antimicrobial catheters currently available with hub and extension line protection.¹⁴

ARROWgard Blue PLUS[®] exhibits antimicrobial activity out to at least 46 days^{5,6} and provides a broader spectrum of antimicrobial activity than MR catheters^{3,4,10,11,12} against two of the most common and virulent, potentially pathogenic organisms.^{7,8,9,10,12}

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PATENTS:

ARROWgard/ARROWgard Blue PLUS[®]: U.S. Patent Nos. 5,019,096, 6,706,024 and 6,872,195

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