



# The Influence of an Antimicrobial Peripherally Inserted Central Catheter on Central Line-Associated Bloodstream Infections in a Hospital Environment

Glenell S. Rutkoff, MSN, RN, CGRN

Chula Vista Medical Center, Chula Vista, CA

## Abstract

**Background:** Federal agencies such as the Centers for Disease Control and Prevention have mandated reduction of hospital-acquired infections and recommended the use of antimicrobial catheters in clinical settings where central line-associated bloodstream infection (CLABSI) rates have remained high. The Infusion Nurses Society also recommends antimicrobial catheters for specific patient populations. At a California hospital, evidence-based infection prevention strategies for CLABSI prevention had been in effect for several years, but the CLABSI rate remained at an unacceptable level. For this reason, the effect of an antimicrobial peripherally inserted central catheter (PICC) on the incidence of CLABSI was studied.

**Methods:** A quasiexperimental design was used with concurrent data collection on patients in an intervention group who received an antimicrobial PICC. Retrospective data were collected for patients in a nonintervention group who received nonantimicrobial PICCs the previous year.

**Results:** The 257 patients in the nonintervention group experienced 8 CLABSIs with an infection rate of 4.18/1,000 line days. The 260 subjects in the intervention group experienced 1 CLABSI with an infection rate of 0.47/1,000 line days. The decrease in the number of infections per 1,000 line days for the intervention group was statistically significant.

**Conclusions:** The use of an antimicrobial PICC in conjunction with current infection prevention practices resulted in a statistically significant decrease in infection rate, which supports the recommendation for continued use of antimicrobial catheters. Treatment cost savings, which overcame the higher initial cost for the devices, were found to be an additional benefit of using antimicrobial catheters.

**Keywords:** antimicrobial catheter, central line-associated bloodstream infection, CLABSI, peripherally inserted central catheter, PICC

## Background

A years-long public/private campaign in the United States to minimize central line-associated bloodstream infections (CLABSIs) has so far produced mixed results. Notable success has been achieved in critical care unit settings

by institutions implementing—and enforcing use of—best practices and preventive technologies. That success has not yet been matched in the general setting of acute care hospitals.<sup>1</sup>

The prevention and elimination of CLABSIs in critical care units became the focus of research more than a decade ago.<sup>2</sup> As a result, infection prevention strategies have been steadily adopted as standard practice for reducing CLABSI rates in intensive care units throughout the country.<sup>1</sup> Studies by the Centers for Disease Control and Prevention (CDC) document sharp reductions in the incidence of these infections. A retrospective study on the incidence of central line infections published in 2011 by the CDC estimated that during 2001, 43,000 central line infections occurred in patients cared for in US critical care units.<sup>1</sup> By 2009 that number had decreased to approximately 18,000 central line infections in patients cared for in

Correspondence concerning this article should be addressed to [glenell.rutkoff@sharp.com](mailto:glenell.rutkoff@sharp.com)

<http://dx.doi.org/10.1016/j.java.2014.06.002>

Copyright © 2014, ASSOCIATION FOR VASCULAR ACCESS. Published by Elsevier Inc. All rights reserved.

CE indicates that continuing education contact hours are available for this activity. Earn the contact hours by reading this article and completing the test available at [www.avainfo.org/JAVACE](http://www.avainfo.org/JAVACE).

**Table 1. Rationale for Undertaking an Antimicrobial PICC Study**

|   |
|---|
| • Above-benchmark central line-associated bloodstream infection rate in this California facility  |
| • National central line-associated bloodstream infection reduction strategies were not specific to the hospital's current circumstances, where catheters were present in the acute care environment and many were PICCs |
| • Availability of an antimicrobial PICC without a relevant evidence base in acute care environments   |
| • Opportunity to reduce risk of central line-associated bloodstream infection-related deaths  |
| • Central line-associated bloodstream infection-related costs   |
| • Accountability by nursing leadership for supporting infection reduction strategies  |
| • Influence of nurse leadership-designed research on frontline nursing behavior   |

PICC = peripherally inserted central catheter.

US critical care units. The reduction was credited to widespread implementation of evidence-based central line insertion practices.<sup>1</sup>

But CLABSI rates remain high in general in acute care hospitals. The just-cited CDC report estimated that as many as 23,000 CLABSIs occurred in US general care wards during 2009.<sup>1</sup> The CDC, Joint Commission, and the Centers for Medicare and Medicaid Services responded by promoting a national goal of 50% reduction in CLABSIs across acute care environments by 2013.<sup>1</sup> Nursing leadership will have to play a major role in achieving CLABSI rate reductions—both by driving the implementation of best practices and technologies and by promoting compliance with their nursing staff.

There is a paucity of research about how to reduce CLABSI rates in acute care wards when compared with critical care units. The CDC has identified the difficulties faced by hospitals when attempting to reduce the incidence of CLABSI outside of critical care units.<sup>1</sup> The organization called for additional research in acute care areas to identify strategies that would successfully eliminate patient risk in those environments.

In line with these needs, our 241-bed, not-for-profit California community hospital undertook a study to analyze the effect of an antimicrobial peripherally inserted central catheter (PICC) on the incidence of PICC-associated CLABSI across adult care units. The study was undertaken for several related reasons (see [Table 1](#)).

#### ***Above-benchmark CLABSI rate***

The CDC guidelines include the following category 1A (highest level) recommendation for the use of antimicrobial/antiseptic central venous catheters: “Use a chlorhexidine/silver sulfadiazine-impregnated or minocycline/rifampin impregnated CVC in patients whose catheter is expected to remain in place >5 days if, after successful implementation of a comprehensive strategy to reduce rates of CLABSI, the CLABSI rate is not decreasing. The comprehensive strategy should include at minimum the following three components: 1) education of caregivers who insert and maintain catheters, 2) use of maximal sterile barrier precautions, and 3) a >0.5% chlorhexidine preparation with alcohol for skin antiseptics during CVC insertion.”<sup>3</sup>

The study hospital introduced a program in 2006 that focused on strategies to reduce rates of CLASBI. These strategies included assessment of line necessity, a central venous catheter (CVC) insertion checklist, intensive education on central line and PICC insertion, the use of maximum barrier precautions, and use of chlorhexidine/alcohol skin preparation before catheter insertion. Despite these measures, our CLABSI rate remained at an unacceptable level—as of 2012, it was reported by the California Department of Public Health to be in the 25th percentile for the state.<sup>4</sup> Thus, the hospital conditions detailed by the CDC described the hospital in our study.

The Infusion Nurses Society, an organization recognized as the global authority in infusion nursing, has also developed practice standards that address benchmark CLABSI rates. Standard of Practice 32—which addresses central venous access devices, nontunneled catheters, PICCs, tunneled catheters, and implanted ports—identifies specific patient populations that should receive antimicrobial PICCs when it states, “The nurse should collaborate with the multidisciplinary team to consider use of anti-infective catheters in the following circumstances: expected dwell points of more than 5 days; CRBSI rate remains high even after employing other protective strategies, neutropenic, transplant, burn, hemodialysis, or critically patients, catheter insertion or exchange with infection or bacteremia; or for emergency situations.”<sup>5</sup>

#### ***Evidence Base Not Specific to Hospital Circumstances***

The scientific evidence supporting the CDC recommendation reflected research solely conducted in critical care environments. Whereas some might expect that such research would be generalizable across all acute health care settings, the nursing models, clinical practices, and patient priorities are different between acute and critical care. In addition, the evidence base for the CDC recommendation covered only 1 type of vascular device: a CVC. Our hospital more widely used PICCs than CVCs in its general, acute care units, in part because PICCs are longer dwelling. During 2011 in our facility, PICCs were associated with approximately 68% of CLABSIs.

Download English Version:

<https://daneshyari.com/en/article/2659269>

Download Persian Version:

<https://daneshyari.com/article/2659269>

[Daneshyari.com](https://daneshyari.com)