

Introduction of an antimicrobial PICC in response to high PICC CLABSI incidence

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ABSTRACT

Objective: To reduce the incidence of CLABSI in PICC lines through the introduction of an antimicrobial catheter as recommended in evidence-based guidelines and standards.

Design: Quality improvement project comparing incidence of infections pre- and postimplementation of the new catheter.

Setting: 582 bed community, teaching hospital in Northwest Indiana.

Methods: Ongoing analysis of surveillance data indicated that 50% of central line associated bloodstream infections (CLABSI) were occurring in patients with peripherally inserted central catheters (PICC) in situ. A gap analysis was performed to review institutional practices against evidence-based recommendations. The use of an antimicrobial catheter was supported in each of the documents consulted. Following introduction of the new device, performance was measured in a prospective manner using standardized Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) surveillance protocols for CLABSI and internal data sources for other measures.

Results: After 28 months of data collection, the PICC CLABSI incidence reduced from baseline rate of 1.83/1000 PICC days to 0.176/1000 PICC days (90.38% reduction, p=0.0003)

Conclusion: Combined with continued compliance with basic prevention strategies (ie, use of a central line insertion checklist/insertion bundle), and optimization of device selection and lumen justification, the introduction of an antimicrobial PICC was associated with a significant reduction in CLABSI.

EVIDENCE REVIEWED

Reference	Recommendation
CDC Guideline for the Prevention of Intravascular Catheter Associated Infections (2011)	Use a (chlorhexidine/silver sulfadiazine 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 least the following three components: educating persons who insert and maintain catheters, use of maximal sterile barrier precautions, and a >0.5% chlorhexidine preparation with alcohol for skin antisepsis during CVC insertion. (CATEGORY IA)
Infusion Therapy Standards of Practice (2016)	Collaborate with the interprofessional team to consider anti-infective CVADs in the following circumstances, as anti-infective CVADs have shown a decrease in colonization and/or CLABSI in some settings. (I) - Expected dwell of more than 5 days. - CLABSI rate remains high even after employing other preventive strategies - Patients with enhanced risk of infection (ie, neutropenic, transplant, burn, or critically ill patients). - Emergency insertions.
SHEA: Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update	Use antiseptic- or antimicrobial-impregnated CVCs in adult patients (quality of evidence: I). a. The risk of CLABSI is reduced with some currently marketed antiseptic-impregnated (eg, chlorhexidine- silver sulfadiazine) catheters and antimicrobial-impregnated (eg, minocycline-rifampin) catheters. Use such catheters in the following instances. i. Hospital units or patient populations have a CLABSI rate above institutional goals despite compliance with basic CLABSI prevention practices. Some evidence suggests that use of anti- microbial CVCs may have no additional benefit in patient care units that have already established a low incidence of catheter infections. ii. Patients have limited venous access and a history of recurrent CLABSI. iii. Patients are at heightened risk of severe sequelae from a CLABSI (eg, patients with recently implanted intravascular devices, such as a prosthetic heart valve or aortic graft).

BACKGROUND

In 2016, as part of the organization’s annual infection control risk assessment, a gap analysis was performed regarding CLABSI reduction activities. 50% of CLABSI were occurring in patients with PICC lines, which continued through the next year prior to implementation of the new device. The guidelines and standards reviewed were all aligned in favor of antimicrobial device use when CLABSI rates remain elevated despite adherence to central line insertion bundle and other prevention strategies. Previous studies have reviewed performance in acute care as well as long term acute care settings although not all have demonstrated decrease in infections. In our gap analysis the only other items beyond antimicrobial catheters that were noted as significantly discrepant from the reviewed recommendations were the team’s over reliance on triple and double lumen catheters (single lumen devices were not used at the time) and the absence of a trained observer for up to 50% of line placements. The nurse-led vascular access team presented a proposal through Shared Governance to pilot and ultimately adopt an antimicrobial line (Arrowg+ard Blue Advance™ PICC). Additionally, lumen justification criteria were introduced into order sets, and the team added single lumen devices to their available stock.

RESULTS /DISCUSSION

Baseline bloodstream infection rates for PICCs placed by the team from January – September 2017 was 1.83/1000 PICC days (11 occurrences, in 6012 measured days). Statistically significant CLABSI reduction in the PICCs placed by the team was achieved within 6 months of implementation (0 infections in 2165 PICC days; p=0.0339). The first full year of implementation, demonstrated an 80% reduction (p=0.02) from baseline in PICC CLABSI, with a year end rate of 0.374/1000 PICC days. Data is now complete on 28 months of post implementation findings, totaling 1285 devices and 11,388 inpatient central line days. With the inclusion of this entire time period, post-implementation the rate dropped to 0.176/1000 PICC days, a 90.38% reduction from baseline (p=.0003). The second full calendar year of implementation had zero additional CLABSI.

Overall completion of therapy for the PICCs over the 28 month period was 94.47%. This number encompasses lines removed due to completion of therapy, patient discharge (with our without the PICC remaining in place and patient death. The highest complication rate was due to device dislodgment at 4%. No other complication exceeded 1% as a reason for removal. DVT rate reflects only symptomatic DVTs as recorded in the medical record. Lumen distribution during the same period was 41.62% single lumen, 32.42% double lumen and 25.95% triple lumen PICCs.

LIMITATIONS

This was a single center study in a large community hospital. Inserters were largely experienced vascular access nurses, but care and maintenance remain the responsibility of the bedside nurse. Complications are primarily obtained through review of the electronic medical record and only reflect those events that are noted to have resulted in device removal so may underrepresent the true incidence of some occurrences, particularly occlusion or asymptomatic DVT.

CONCLUSION

Combined with continued compliance with basic prevention strategies (ie, use of a central line insertion checklist/insertion bundle), and optimization of device selection and lumen justification, the introduction of an antimicrobial PICC was associated with a significant reduction in CLABSI.

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