Nanocermic Coating of Central Venous Catheters Has Inhibitory Effect on Colonization by E. coli and Bacillus cereus

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Central line associated bloodstream infections (CLABSIs) in patients cause an attributable mortality of up to 35%. Colonizing bacteria grow by forming a biofilm which protects against antibiotics and the host immune system. Currently, the best preventive strategy is to use aseptic techniques when handling central venous catheters. Strategies to inhibit biofilm formation can reduce CLABSI. Boron carbonitride (BCN) nanoparticle coating of central venous catheters may interfere with bacterial adhesion and biofilm formation and thereby reduce colonization by bacteria. 1cm segments of catheters (BCN coated and uncoated) were immersed individually in sterile tubes containing serial dilutions of live suspensions of E.coli and B.cereus. After 15 mins, the catheters were plated on to agar plates by the roll plate method. Culture plates were incubated at 36C for 24hrs and colonies were counted manually. Total numbers of colony forming units (CFU) were compared between the coated and uncoated catheters. One-tailed student t-test was used to analyze the significance of differences in mean between the two samples in E.coli and B.cereus. There was a statistically significant reduction in the mean number of CFU of E.coli and B.cereus adherent to BCN coated catheters when compared to uncoated catheters. The average percent reduction in CFU in BCN coated catheters was 85.03% in E.coli (p-value 0.02) and 76.05% in B.cereus (p-value 0.0001). The results support my hypothesis that nanoceramic BCN coating of central venous catheters reduces colonization by Escherichia coli and Bacillus cereus. Reducing bacterial colonization on catheters will reduce CLABSI incidence and associated mortality.

Awards Won:
Third Award of $1,000