High-Level Resistance to Quaternary Ammonium Compounds in Clinical MRSA Isolates

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Inhibited bacterial growth after 24 h of incubation at 37°C was considered the MIC.

Minimum Inhibitory Concentrations (MICs) were determined using a microdilution method. An inopin (RN1203 and RN1203/GO1) was included to examine the influence of the gene on MIC. Standard Plur was used to detect the presence of the gene (qacE, qacF, qacG, qacH). MICs were performed by the microdilution method at 0–100% according to the Clinical and Laboratory Standards Institute (CLSI) M7-21 using a 15-s contact time.

Results: BZE, MICs for S. aureus strains ranged from 2 to 10 µg/ml. Higher MBCs were associated with the presence of a gene. The concentration of BZE required to achieve complete kill in 15-s Time-Kill experiments was much higher and ranged from 0.005 to 1% (10–100 µg/ml) compared to the highest concentration of BZE tested (0.1%). The highest concentration of BZE tested (0.1%) was shown to be the typical concentration of BZE used in hand sanitizers. However, the MIC and MBC values measured were below those used in alcohol-free hand sanitizers. Because no correlation was found between BZE resistance and the presence of a gene, a novel mechanism may be involved. Further research is needed to determine whether S. aureus strains are resistant to BZE-based products in actual use.

Introduction: There is a large body of research pertaining to resistance of microorganisms to quaternary ammonium compounds (QACs). Previous studies have demonstrated that QACs are effective for use in the disinfection of various areas. However, the resistance of these agents against different QACs varies. MICs of the same QACs has grown in S. aureus USA200, S. aureus USA300, and S. aureus USA500. The concentration for BZE in the group of USA200 was near the in-use level (1000 µg/ml or 0.1%) and was 10-fold above the in-use levels. BZE significantly increased the MIC of USA200, whereas MICs for USA300 and USA500 were much lower and at the same level as the MICs for USA200. In addition, the presence of a gene was not significantly associated with the MIC of USA300 and USA500. These results demonstrate that S. aureus strains are not resistant to BZE in actual use conditions. Further research is needed to determine whether S. aureus strains are resistant to BZE-based products in actual use.

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Methods: Twelve strains of S. aureus were used in this study. Seven MRSA isolates were from the National MRSA and MR Human Isolate Registry in Staphylococcus aureus (NARS): NRS121 USA 400, NRS123 USA 1000, NRS125 USA 500, NRS181 USA 500, NRS404 USA 500, NRS405 USA 1100. To determine the presence of qacE/MIC resistance to BZE, the MBC of S. aureus was determined using a microdilution method. In this way, the MBC of S. aureus was determined using a microdilution method. In this way, the MBC of S. aureus was determined using a microdilution method.

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