PREVALENCE AND CHARACTERIZATION OF MRSA IN A REGIONAL HOSPITAL IN CUENCA, ECUADOR

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Introduction

Methicillin-resistant Staphylococcus aureus (MRSA) is an antibiotic-resistant strain of the bacterium Staphylococcus aureus that is responsible for many hospital-acquired infections worldwide. Very little information is currently available on the prevalence of MRSA colonization among patients and staff in Ecuadorian hospitals.(1,4)

During the summer of 2012, nasal swabs were collected from 494 volunteers in a regional public hospital in Cuenca, Ecuador, to determine the prevalence of MRSA colonization within the hospital.

MRSA isolates from volunteer samples were presumptively identified through culture-based methods. Confirmation of presumptive MRSA isolates was performed using a multiplex PCR protocol that amplified regions of the 16s rRNA, FemB, and mecA genes(2). Confirmed MRSA isolates were genetically typed in specific Staphylococcus cassette chromosome (SCCmec) groups utilizing another multiplex PCR protocol(3). The overall prevalence of MRSA colonization within the hospital was determined to be 1.8% with six positives from staff volunteers and three positives from patient volunteers. All nine MRSA isolates were genetically classified as belonging to SCCmec Type IV. In addition to the MRSA identified, other species of Methicillin-resistant Staphylococcus (MRS) were observed through cultural identification and PCR confirmation with a 6.1% MRS prevalence when including MRSA.

There were a total of 19 MRSA from staff, eight MRSA from patients and one MRS neither identified to be from staff or patient. These results indicate that MRSA and other MRS are present within the Ecuadorian hospital examined, and the potential for hospital-acquired infections exists.

Materials and Methods

Culture Identification:

Samples were obtained through nasal swabs from patients and staff at Jose Carrasco Arteaga IESS Cuenca Hospital in Cuenca, Ecuador. These were then inoculated onto Mannitol Salt Agar and Oxacillin to identify MRSA colonies. Further tests were completed, including Gram staining, catalase, latex agglutination and rabbit plasma coagulase, to confirm these species of Staphylococcus. Those able to grow on Oxacillin, in addition to being Gram positive coccus and catalase test positive, were presumptive MRSA. Those samples that additionally showed positive results for the latex agglutination and rabbit plasma coagulase tests were potential samples of MRSA.

PCR MRSA Confirmation:

Polymerase chain reaction (PCR) was completed for presumptive MRSA. DNA was isolated from the samples prior to the PCR. This multiplex PCR then utilized three pairs of primers to amplify conserved portions of the genes mecA, femB, and 16s rRNA. A 2% agarose gel was used for electrophoresis to complete the confirmation of these three genes in the presumptive MRSA.

MRSA Genotyping:

Genotyping was completed on the PCR confirmed samples of MRSA to analyze the SCCmec cassette, which are inclusive of the key methicillin-resistant mecA gene. DNA of the samples were again isolated and a multiplex PCR system was run with the following primer pairs: Kdp, CIPs, RifS, SCCmec III, SCCmecV, Mec I, des, Mec A, ccr B2, and ccr C. A 3% Seakem LE gel in TBE was used for electrophoresis to verify the SCCmec type.

Results

A total samples were collected from the local hospital in Cuenca, Ecuador, of those nine (1.8%) were MRSA. The total number of MRSA among the hospital staff was six (1.6%), while the total number among the patients was three (2.4%). MRSA was seen to be confined to specific regions of the hospital including laboratory and emergency for staff and gynecology and trauma for patients. Analysis of the SCCmec cassette indicated that all identified MRSA isolates belonged to the SCCmec Type IV. The results indicate a 6.1% MRSA prevalence including MRSA and all other presumptive MRS species, with 6.6% prevalence in patients and 5.2% prevalence in staff. The results also indicate a total of 1.8% prevalence MRSA with 2.5% MRSA prevalence in patients and a 6.6% MRSA prevalence in staff. Furthermore, these results indicate that MRSA and other MRS species are present in this regional hospital. The findings therefore suggest that the potential for hospital-acquired infections exists.

Discussion

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References