Epidemiological Alert:

Vancomycin-resistant *Staphylococcus aureus*

27 June 2013

In light of the isolation of the first *Staphylococcus aureus* resistant to vancomycin in Latin America, the Pan American Health Organization/World Health Organization (PAHO/WHO) recommends that Member States continue to establish and maintain their capacity for rapid detection and reporting of this resistance mechanism to antibiotics for the implementation of infection prevention and control measures associated with health care.

Current situation

In 2002, the first two isolates of vancomycin-resistant *Staphylococcus aureus* (VRSA) were reported in the United States.[1,2] Isolates with vancomycin resistance mechanism were associated with the combination of the resistance genes of type *Enterococcus faecalis* Van A. By 2012, 11 isolates of VRSA had been reported, 9 of which were isolated in the United States, one in Iran and one in India.[3,4,5] Most of the 9 isolates in the United States were isolated in the state of Michigan. In general, they caused skin and soft tissue infections in patients with underlying chronic diseases.

The first finding of VRSA in Latin America was reported in Brazil, by the Microbiology Laboratory of the Hospital de Clinicas, of the Faculty of Medicine, University of São Paulo, Brazil. According the information reported to PAHO/WHO, a methicillin-resistant strain and vancomycin was isolated in the blood culture of a patient at that hospital in December 2012. The presence of the resistance mechanism in the isolation has been confirmed through the collaboration of microbiologists in Bogota, Colombia, and the United States.

This is the first isolation from a blood culture sample. The concerned patient is a 35 year old male, who had been diagnosed with Sezary syndrome, was diabetic, and had other associated infections for which he had previously been treated with vancomycin and teicoplanin. The bacteremia was controlled with daptomycin, however, the

[1] Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5126a1.htm
[2] Centers for Disease Control. Morbidity and Mortality Weekly Report. Available at: http:www.cdc.gov/mmwr/preview/mmwrhtml/mm5140a3.htm
[3] Zhu W, et al. 2010. Dissemination of an Enterococcus Inc18-like vanA plasmid associated with vancomycin-resistant Staphylococcus aureus. Antimicrob. Agents Chemother. 54:4314–4320.
[4] Aligholi, M., M. Emaneini, F. Jabalameli, S. Shahsavan, H. Dabiri, and H. Sedaghat. 2008. Emergence of high-level vancomycin-resistant Staphylococcus aureus in the Imam Khomeini Hospital in Tehran. Med. Princ. Pract. 17: 432–434.
[5] Saha, B., A. K. Singh, A. Ghosh, and M. Bal. 2008. Identification and characterization of a vancomycin-resistant Staphylococcus aureus isolated from Kolkata (South Asia). J. Med. Microbiol. 57:72–79.

patient continued to have different episodes of infection and died three months after the isolation of VRSA.

Molecular studies of the isolation revealed the presence Van A gene; this gene was also detected in the *E. faecalis* isolated from the patient as part of routine surveillance. The finding suggests that the latter is the genetic donor mechanism. Further molecular studies are underway. No secondary cases have been reported.

Recommendations

Surveillance measures and epidemiological investigation

1. Increase national laboratories' participation in the surveillance systems of health care services for the early detection of this resistance mechanism and for corresponding reporting to the relevant authorities to implement early control measures.

2. Ensure the application of the Clinical and Laboratory Standards Institute (CLSI) guidelines by laboratory participants in the national surveillance network of antimicrobial resistance, for the proper detection of this resistance mechanism; implement necessary detection tests, including determining the minimum inhibitory concentration and molecular methods for confirmation.

3. Refer the vancomycin resistant isolates detected by standardized methods to national or regional reference laboratories for confirmation and molecular typing.

4. Disseminate information obtained through national surveillance activities in order to employ appropriate antimicrobial treatment and to implement infection control measures at health care facilities.

Laboratory detection

These isolates are characterized as methicillin-resistant *Staphylococcus aureus* (MRSA), and the first line of detection is performed by using cefoxitin as per the CLSI (2013).[6] The minimum vancomycin inhibitory concentration should then be determined.[7]

The results are interpreted in accordance with the *Antimicrobial susceptibility Determination Standard,* M100 S23.

The isolates with vancomycin resistance which are confirmed in accordance with the abovementioned methodologies must be submitted to a national or regional reference center for molecular characterization.

[6] Determination of Antimicrobial Susceptibility broadcast by the methodology, M02-A11-.
[7] Dilution methods to determine the antimicrobial susceptibility of bacteria that grow aerobically, M07-A9.

Antimicrobial treatment

Given limited clinical experience, antimicrobial treatment decisions should be made on a case-by-case basis, taking into consideration the clinical situation, localization of infection and the resistance profile. Options for treatment could include linezolid and daptomycin.

Infection prevention and control

The following precautions are recommended, in addition to standard precautions, when a patient has been identified as being colonized or infected with VRSA:

- Strictly implement hand hygiene measures such as using soap and water or glycerine alcohol before and after contact with the patient or their environment and contaminated objects.[8]

- Implement contact precautions, as recommended for containment of other multiresistant bacteria.[9]

- It is mandatory to wear gloves and a clinical robe for the care of patients infected with VRSA.

- Isolation in a single room or cohort. If there is a cohort, ensure separation between beds of more than 1 meter.

- Cleaning the environment with chlorine (bleach) diluted (1:100).

[8] http://new.paho.org/hq/index.php?option=com_content&view=article&id=6246&Itemid=4343&lang=en
[9] http://new.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=18671&Itemid= (in Spanish)

Additional References

1. Zhu W, et al. 2010. Dissemination of an Enterococcus Inc18-like vanA plasmid associated with vancomycin-resistant *Staphylococcus aureus*. Antimicrob. Agents Chemother. 54:4314–4320.

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3. Saha, B., A. K. Singh, A. Ghosh, and M. Bal. 2008. Identification and characterization of a vancomycin-resistant *Staphylococcus aureus* isolated from Kolkata (South Asia). J. Med. Microbiol. 57:72–79.

4. Gould I. M. 2011. Clinical activity of anti-Gram-Positive agents against methicillin-resistant *Staphylococcus aureus*. J. Antimicrob. Chemother. 66 (suppl 4): iv17-iv21. doi: 10.1093/jac/dkr073

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7. PAHO/WHO. Hand Hygiene Techniques: How to handrub; how to handwash? http://www2.paho.org/hq/dmdocuments/2010/Hand_Hygiene_Techniques.pdf