Editorial

Methicillin-Resistant *Staphylococcus aureus*

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On May 16, 1990, Division L (Nosocomial Infections) of the American Society for Microbiology (ASM) held a seminar on methicillin-resistant *Staphylococcus aureus* (MRSA) as part of the Society's 90th annual meeting. The seminar was convened by Maury E. Mulligan, MD, and one of the editors (AIH). Subsequently, the speakers submitted manuscripts related to topics they presented. Because of the marked interest in and many controversies surrounding MRSA in hospital epidemiology circles, *Infection Control and Hospital Epidemiology* agreed to publish these papers.

James H. Jorgensen, PhD, begins by describing the mechanism for methicillin resistance (a unique penicillin-binding protein, PBP 2_a which has a very low affinity for all b-lactam antibiotics) that is identical in all strains of methicillin-resistant staphylococci. The differences between MRSA and other S *aureus* isolates less susceptible but not resistant to methicillin are reviewed. These other isolates have been described as borderline resistant (BORSA) and modified (MODSA) S *aureus*. BORSA and MODSA isolates do not contain PBP 2_a. Furthermore, unlike MRSA, BORSA and MODSA are of as yet unknown epidemiologic significance, and clinically infected patients can and should be preferentially treated with B-lactam antibiotics. He concludes by emphasizing the need for clinical laboratories to use one of three standardized methods for the accurate detection of methicillin resistance in S *aureus*. A recently described DNA probe for the direct detection of PBP 2_a may supplant these phenotypic tests of methicillin resistance in staphylococci when kit tests become commercially available.'

Maury E. Mulligan, MD, and Robert D. Arbeit, MD, review tests used for strain differentiation of MRSA isolates. Such tests may be of value to the epidemiologist interested in investigating the endemicity or epidemicity of specific MRSA strains. Alternatively, clinicians may use these tests to examine isolates from pretreatment and posttreatment cultures of patients. Identity of sequential isolates suggests failure or relapse, whereas differences between sequential isolates suggests a new infection or new colonization. The tests classically used for S *aureus* strain differentiation-antibiotic susceptibility patterns and bacteriophage typing—are inadequate. MRSA strains can become resistant in vitro and in vivo to many antibiotics once exposed, and many MRSA isolates are nontypable when tested with the usually available phage sets. Among the newer methods, restriction endonuclease analysis of plasmid DNA (REAP DNA fingerprinting) has been most widely studied, is highly reproducible, has good discriminatory power, and is offered by some laboratories as a service test. Tests that may be even more effective in typing

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strains of MRSA (immunoblotting, analysis of chromosomal DNA, ribotyping, etc.) await proof of discriminatory power and/or service testing availability.

Henry F. Chambers, MD, reviews progress in the development of antimicrobials effective against MRSA isolates and MRSA infections. While many new agents are active in vitro against MRSA (fluoroquinolones, teicoplanin, daptomycin, coumermycin, fosfonomycin, etc.), none have as yet performed as well as the agent of choice, vancomycin, for the treatment of MRSA infections in patients. Whether therapy for the colonized patient (or staff) is indicated and what the best therapy for "decolonization" is remain highly controversial issues.

Larry J. Strausbaugh, MD, and colleagues describe a highly endemic MRSA in their Veterans' Affairs Hospital's affiliated nursing facility. Points to "take home" include the impossibility of applying stringent containment precautions in an environment such as theirs, which emphasizes rehabilitative efforts, the ease with which both the organism and drug resistance in the organism (in their case to ciprofloxacin) can become well established, the questionable effects of high endemicity in causing an overall increase in the infection rates in patients and the need for nursing homes and their affiliated hospitals to join together in careful communication regarding both the presence of MRSA and its appropriate control. As also emphasized by Strausbaugh and colleagues, nursing homes and their patients are increasingly important reservoirs of MRSA.

John M. Boyce, MD, concludes with a careful review of the current status of, and recommendations regarding, containment efforts in limiting the spread of MRSA. Data reviewed include analysis of responses to a questionnaire sent to all members of the Society for Hospital Epidemiology of America, Inc. (SHEA) (71% of those hospital-based responded) as well as a thorough review of the literature. Almost all of the respondents reported cases of MRSA in their patients or facilities. Most facilities do routinely review microbiology data regarding MRSA activity and advocate the use of private rooms, careful handwashing by personnel, and routine barrier precautions (gloves) when caring for colonized or infected patients. Proven effectiveness for these or more stringent efforts directed at MRSA containment have not been examined in carefully conducted and controlled clinical trials. He suggests that more stringent efforts in containment be limited to special areas of the hospital (such as intensive care or burn units) when MRSA is newly introduced into an institution or when MRSA accounts for more than 10% of nosocomial S *aureus* isolates.

REFERENCE

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