



The Clinical Newsletter
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**Western Maryland Health System
Infection Control Department**

MRSA - Therapeutic Approaches

We have discussed the clinical presentation of *Staphylococcus aureus* and methicillin-resistant *S. aureus* (MRSA) in previous issues of *The Clinical Newsletter*. The recognition of a staphylococcal infection and its treatment can be aided by obtaining proper microbiological specimens for culture. It is generally not possible to clinically differentiate MRSA caused infections from those that are sensitive to the majority of commonly used antimicrobial agents except following therapeutic failure.

The over utilization of broad spectrum antibiotics after sensitivity results are available has been partially responsible for the relative increase in MRSA compared to methicillin-sensitive *S. aureus* (MSSA) isolates in the hospital, community and nursing home settings. With the continued increase in MRSA isolates from both hospital- and community-acquired infections, and the broader degree of drug resistance among these isolates, therapeutic choices become more limited. There are, however, some older drugs that are often not considered.

MRSA comprised 64.5% of all *Staphylococcus aureus* isolates recovered from in-patients at WMHS during calendar year 2004. Rates for community-acquired MRSA were at 48.7% whereas nursing homes had an 85.9% rate of MRSA. The relative rates are to be expected owing to the different selective pressures seen in the various environments. For example, the excessive use of antibiotics in nursing homes, and the closed areas and the closeness of residents to each other, contribute to the spread and maintenance of high MRSA levels.

It is well recognized that multiple antibiotic resistance is the norm among MRSA isolates. This holds true whether the organisms are from in-patients, those from the community, or from nursing homes (Table 1). It is also evident that several therapeutic options are available for both MSSA and MRSA infections.

Table 1. WMHS Sensitivity Data - 2004

| | In-patient | | Out-patient | | Nursing Homes | |
|---------------|------------|------|-------------|------|---------------|------|
| | MRSA | MSSA | MRSA | MSSA | MRSA | MSSA |
| % of isolates | 64.5 | 35.5 | 48.7 | 51.3 | 85.9 | 14.1 |
| Clindamycin | 29 | 80 | 42 | 81 | 16 | 74 |
| Erythromycin | 6 | 64 | 6 | 65 | 7 | 30 |
| Gentamicin | 97 | 99 | 96 | 99 | 94 | 100 |
| Levofloxacin | 6 | 84 | 21 | 87 | 0 | 48 |
| Linezolid | 100 | 100 | 100 | 98 | 100 | 100 |
| Penicillin | 0 | 20 | 0 | 20 | 0 | 22 |
| Rifampin | 100 | 99 | 99 | 98 | 100 | 100 |
| Tetracycline* | 91 | 95 | 100 | 99 | 97 | 95 |
| Trimeth/Sulfa | 97 | 96 | 94 | 98 | 97 | 100 |

* Tetracycline is the "class" drug for minocycline and doxycycline.

Rifampin has been recognized as part of an anti-tuberculosis regimen. It is also effective against some organisms, including the staphylococci. It is very important, however, to recognize that **rifampin should never be used alone** for two reasons. There is a rapid emergence of rifampin-resistant organisms when the drug is used alone. In addition, used alone rifampin has very poor clinical efficacy against staphylococci.

When combined with some other antibiotics that have anti-staphylococcal properties, however, the resulting synergistic combinations may be highly effective. The options that may be considered are rifampin plus vancomycin, trimethoprim/

[TMP/SMX (Bactrim[®])], an aminoglycoside, minocycline or a quinolone. When MRSA isolates are shown to be sensitive *in vitro* to rifampin and one of the other drugs cited there is the possibility that the pair will be more effective than if the "standard" drug is used alone.



There are literature reports indicating that if oral rifampin is given together with vancomycin in serious infections such as bacteremias and organ infections there is at times a higher cure rate than when vancomycin is used alone¹. There are also data supporting the use of rifampin and TMP/SMX^{2,3}, and rifampin plus minocycline⁴ (Doxycycline might be considered). Therefore, the use of rifampin in conjunction with other anti-staphylococcal drugs shown to be sensitive *in vitro* might be considered an MRSA therapy option.

Alternative therapeutic approaches should be considered prior to using the newer agents Daptomycin (Cubicin[®]) and Linezolid (Zyvox[®]). Although they are available they should be reserved for future use in the majority of cases. The spectra of these two drugs, and the availability of the latter in oral form, make them agents to be used very infrequently at the present time, especially at an institution such as ours where the resistance patterns differ from those at larger urban and teaching centers.

The use of older agents such as TMP/SMX and minocycline together with rifampin may help to decrease the rate of MRSA in the hospital, community and nursing homes. In most instances a resistant bacterial strain multiplies less quickly and is at an ecological disadvantage in the absence of antibiotics to which it is resistant. This absence of selective pressure will often decrease the prevalence of resistant strains, thereby giving a “new lease” to old as well as newer antimicrobial agents. Considered and well thought out choices in antibiotic therapy can lead to less resistance, fewer secondary infections, and less overgrowth of normal flora and other pathogens.

References:

¹ Raj, KG.. et al. 1999. Burns. 25:640-644.

² Walsh, TJ. et al. 1993. Antimicrobial Agents and Chemotherapy 16:141-146.

³ Iyer, S., and Jones, DH. 2004. J. Acad. Dermatology 50:854-858.

⁴ Darouiche, R., et al. 1991. Antimicrobial Agents Chemotherapy 35:1612-1615.

This publication is available on the WMHS Web Portal. Contributions of articles and suggestions for future subjects on clinical subjects are welcomed.

