

New, Virulent Strain of MRSA Poses Renewed Antibiotic Resistance Concerns

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The often feared and sometimes deadly infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) are now moving out of hospitals and emerging as an even more virulent strain in community settings and on athletic teams, and raising new concerns about antibiotic resistance.

Right now, the new community-associated strain of MRSA is responsive to more, but sometimes different, antibiotics than its hospital relative, experts say. But those antibiotics will almost certainly lose their effectiveness as they are used more widely, and efforts are under way to combat that issue.

A new study by pharmacy researchers at Oregon State University has identified two antibiotics that appear less likely to cause future antibiotic resistance, and others that if used would allow resistance to emerge more quickly. This analysis, just published in the *International Journal of Antimicrobial Agents*, offers physicians some direction to help deal with this problem until more research can be done, they said.

"The problem with invasive MRSA infections is very real and is now moving from the hospital setting to the community," said George Allen, an assistant professor in the OSU College of Pharmacy. "The community-based strain in some ways is even more apt to cause serious problems than those most often acquired in hospitals, and increasing quite dramatically in prevalence. The good news is that so far the community strain is more treatable, if we can keep it that way," he said.

Staphylococcus aureus, a common bacterium that's often associated with skin infections, was once treated easily by penicillin. But over many years it acquired resistance to that, as well as the penicillin-derivative methicillin and other antibiotics, leaving limited options to address it. Although infections are usually minor, some can spread rapidly, cause pneumonia, tissue necrosis, bloodstream infections, shock and death.

In the new research based on laboratory analysis, scientists identified linezolid and moxifloxacin as two antibiotics that would be effective against, and less apt to induce antibiotic resistance in the new strain of community-associated MRSA. That's of some interest because moxifloxacin, like other antibiotics in its class, has not been traditionally thought of as an appropriate agent for MRSA because resistance to it often develops rapidly.

Antibiotics that are most apt to cause rapid development of resistance against the community-associated strain of MRSA include clindamycin and doxycycline, the research found. The study was supported by the Society of Infectious Diseases Pharmacists.

"We didn't find one perfect choice of a drug that everyone could use and it won't ever develop resistance," Allen said. "That's not surprising, since with constant use every antibiotic breeds resistance to it in various bacteria. Part of the goal here is just to slow down the increase in resistance while we continue to develop new approaches."

More research, animal and clinical trials would still be of value to further explore this issue, Allen said. The issue of antibiotic resistance in general and MRSA resistance in particular is huge and getting worse.

Meanwhile, the general public should be aware that MRSA infections are no longer confined to the hospital, and can be acquired in ordinary community settings, he said. They are often associated with close personal contact, and have been a particular problem with some athletic sports such as wrestling or football when multiple members of a team have been infected.

MRSA usually, but not always shows first as a skin infection, with such symptoms as swelling, pain, pus or fever. Any significant symptoms or evidence of spread of the infection should be seen by a physician, Allen said. Basic first aid – soap, water and a bandage – on cuts and scrapes is a good first line of defense, he said, and some antibacterial ointments are available that have been proven to have enhanced effectiveness against MRSA infections.

Complicating the issue, experts say, is that the new community-associated strain of MRSA is now showing up in

hospitals, as well, and optimal treatment regimens for the two strains may differ.

"Our data suggest that resistance to all of the tested antimicrobials will develop with their continued use," the researchers wrote in their report.