Researchers discover link between use of antibiotics and MRSA

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Researchers tracking a penicillin-type resistant bacterium that leads to infection in some hospital patients have discovered that occurrence falls significantly when prescriptions of a common antibiotic of the fluoroquinolone family also fall. The research team, was led by St George's, University of London, United Kingdom, has published its results in the Journal of Antimicrobial Chemotherapy.

The bacteria tracked by the researchers was methicillin-resistant Staphylococcus aureus, or MRSA, and is also known as multidrug-resistant Staphylococcus aureus as it has developed resistance to beta-lactam antibiotics. This includes antibiotics in the penicillin family which are typically used in hospitals to prevent and treat infection. MRSA can cause serious infections of the skin, blood, lungs and bones; once infected, treatment with standard antibiotics can cause serious complications.

From 1999 to 2009, the researchers tracked MRSA infection at St George's Hospital. They looked at how it has adapted to survive in a hospital environment and at factors affecting its prevalence. What they discovered is that a significant drop in MRSA rates coincided with a reduction in hospital prescriptions of ciprofloxacin, the most commonly prescribed antibiotic of the fluoroquinolone family.

Over a short period during the study, ciprofloxacin prescriptions fell from 70-100 daily doses for every thousand occupied beds to approximately 30 doses. In the same period, the number of patients identified by the laboratory as infected with MRSA fell

by half, from an average of about 120 a month to about 60. Over the last two years of the study, both the drug prescription level and MRSA rates remained at these reduced levels. Symptoms of MRSA infection can range from very mild to severe, but it is not known how many of the cases examined in the study were serious.

The study investigated whether other factors, such as improved infection control measures, may have contributed to this decrease in infection. However, when more stringent infection control policies were introduced, such as improved cleaning and hand washing, and screening patients for MRSA on arrival at hospital, the only major reduction in infection rates coincided with the reduction in ciprofloxacin prescriptions.

Lead author Dr Jodi Lindsay, a reader in microbial pathogenesis at St George's, commented: 'Surprisingly, it wasn't hygiene and hand washing that were the main factors responsible for the decrease in MRSA in the hospital. Rather, it seemed to be a change in the use of a particular group of antibiotics. Hand washing and infection control are important, but they were not enough to cause the decrease in MRSA we saw.'

Dr Lindsay said the study suggested that MRSA relies on ciprofloxacin, and fluoroquinolones in general, to thrive in hospitals, as well as on penicillin-type drugs, which was already assumed. The fluoroquinolone group of antibiotics have a similar enough mechanism of action to assume that the effect would be the same for them all.

She added that the findings suggest the most effective way to control MRSA and other hospital-based superbugs is to continue finding alternative ways to use antibiotics, rather than simply focusing on infection control techniques.

The researchers also identified the strain of MRSA, CC22, which has become dominant. This strain has flourished by developing and maintaining multi-drug resistance, and becoming more fit to survive on hospital surfaces than other strains.

Dr Tim Planche, consultant microbiologist at St George's Healthcare NHS Trust and one of the co-authors of the study explained the importance of the findings: 'The Trust currently has infection rates among the lowest in London, having successfully driven acquisitions down over the past five or six years using a combination of both tough hygiene regimes and careful selective use of antibiotics. These findings, however, provide valuable insight and certainly warrant further investigation, which could lead to the development of even more effective infection control strategies in future.'

Dr Lindsay went on to add that studying the dynamics of how MRSA bacteria strains continue to evolve in hospitals in response to changing practices and interventions, such as infection control and antibiotic prescribing, will be essential in determining which interventions work, which are cost effective, and which are likely to have the

best long-term outcomes. 'But it seems that we now have an excellent opportunity to control superbugs in hospitals by re-examining how we prescribe antibiotics and ensuring we're using them in the most effective way possible.'For more information, please visit:St George's, University of Londonhttp://www.sgul.ac.uk/Journal of Antimicrobial Chemotherapy:http://jac.oxfordjournals.org/

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