

# MODELING THE SPREAD OF METHICILLIN RESISTANT STAPHYLOCOCCUS IN LOW PREVALENCE COUNTRIES.

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*Staphylococcus aureus* is a wide-spread bacteria colonizing the nostrils of 25-50% of the human population. In addition the bacteria can infect soft tissue through wounds and other damages to the skin barrier; if *Staphylococcus* enters the blood stream, it may cause a life-threatening *bacteremia* ("blood poisoning"). Resistance to the preferred types of antimicrobials (methicillin) arose shortly after the first introduction of these penicillins. In these early types of methicillin resistant *staphylococcus aureus* (MRSA) resistance was carried by a large gene-segment which conferred reduced fitness in an antibiotic-free environment and which effectively prohibited vertical ("plasmid") transfer of the resistance gene. Thus MRSA was spread by solely infection processes and in countries with a low consumption of antibiotics, MRSA spread primarily in hospitals. Restricted use of antibiotics combined with quarantine measures have allowed the Scandinavian countries and the Netherlands to keep MRSA-prevalence at around 1% of the total staphylococcus cases. In the rest of the industrialized world MRSA accounts for 30-80% of all staphylococcus infections. In the last decade a new and smaller resistance gene has spread rapidly over the world. It is believed to cause little or no cost of fitness and to spread outside the hospital environment. The new MRSA-type could threaten the current control efforts in the low prevalence countries. Together with Robert Skov at Statens Serum Institut (the Danish center for disease control) a group of mathematicians at Roskilde University have started a project that will investigate a) if the new MRSA does indeed spread outside the hospitals and b) which new control measures could be implemented. I will report on this work and in particular discuss the two modeling approaches which are currently used to describe the situation: detailed simulation type models describing the behavior of health care workers (which are believed to be the primary vector moving MRSA around between patients) and population level models describing the movement of individuals between hospitals and the general population. Our preliminary results suggest that MRSA is still primarily a hospital acquired infection.