



Title of PhD project	What drives antibiotic resistance diversity? Modelling for MRSA control	
Supervisor	Dr Gwenan Knight	LSHTM
Co-Supervisor	Professor Jodi Lindsay	SGUL
Brief description of project	<p>Antibiotic resistance (ABR) is a growing global problem that requires innovative, cross-disciplinary solutions. Mathematical modelling can be used to integrate data from multiple sources to give novel insights and clinically relevant outputs such as the future impact of public health interventions.</p> <p>In this project, clinical and experimental data will be used to parameterise new mechanistic models to explore the reasons for the evolutionary dynamics of ABR from a clinical and potentially One Health framework. Linking changes in antibiotic use with ABR heterogeneity in clinical populations of methicillin resistant <i>Staphylococcus aureus</i> (MRSA), we will design and evaluate new interventions for control, such as the impact of antibiotic stewardship.</p> <p>The outputs generated by the student will have direct translational impact on clinical practice and will inform our understanding of underlying evolutionary changes and how these can be optimally harnessed for ABR control.</p>	
Particular <i>prior</i> educational requirements for a student undertaking this project	This project would suit students with a quantitative background.	
Skills we expect a student to develop/acquire whilst pursuing this project	<p>Training in mathematical modelling of infectious diseases will be provided through courses at LSHTM and the primary supervisor. Specific skills will involve using ordinary differential equations, compartmental and stochastic models, coding (R, python), high performance cluster computing and model fitting (MCMC).</p> <p>During this project, the student will be expected to gain knowledge of basic microbiology laboratory skills. This will either be through interaction with laboratory colleagues at SGUL or there is the opportunity to combine the modelling with bench work if interested. No prior laboratory experience is required.</p> <p>The student would be expected to work across the relevant disciplines and will gain experience in communicating</p>	

	modelling results to a variety of audiences (clinical, public health, modellers etc.).
Key Words	<ul style="list-style-type: none">• Antimicrobial resistance• Mathematical modelling• Clinical data• Microbiology• Evolution• MRSA