

Antibiotics Prescribing Decision-making Process in Secondary Care: a System Dynamics Approach

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Antimicrobial resistance (AMR) became a global threat to public health systems in the world. In the UK, 5-year action plan has been launched by the UK government to set a national ambition to reduce antimicrobial consumption in humans by 15% by 2024. Inappropriate prescribing of antibiotic drugs is one of the major drivers of AMR. Previous research in doctors' prescribing behaviour failed to explain how doctors' decision-making processes were influenced by multiple structural, procedural, and cultural factors across healthcare systems. Therefore, the existing behavioural interventions in promoting optimal prescribing practices have limited effectiveness and sustainability. In this research, we recognised that antibiotic prescribing decision-making processes and management of prescribing practices is a systems issue. Cultural factors are influential, and doctors, like any other decision makers, are subject to bounded rationality. We employed System Dynamics (SD) modelling to simulate doctors' prescribing behaviour when treating patients with bacterial infections in hospitals under various scenarios with the impact from multiple influence factors calculated collectively. This research is a novel approach to examine health behaviour using SD modelling. Further research will be conducted to apply SD to help evaluate organisational and system-level outcomes of healthcare interventions.

Dr. Nina Zhu is a research assistant from the Health Protection and Research Unit (HPRU) in Healthcare Associated Infections (HCAI) and Antimicrobial Resistance (AMR) in Imperial College London, funded by the NHS National Institute for Health Research (NIHR). Before joining HPRU, she worked as a visiting researcher in Harvard T. H. Chan School of Public Health to investigate evidence in health system strengthening and healthcare intervention evaluation in low- and mid- income countries. Her current research focuses on applying SD to inform design, implementation, and evaluation of healthcare interventions in different settings, with a primary focus on AMR. Also, she hopes to establish meta-methodology to help identify and develop the best systems thinking tools to solve real-life problems in system management in general.

Supervision team:

Dr. Raheelah Ahmad is the Health Management Programme Lead within the faculty of Medicine at Imperial College. She has awarded the prestigious NIHR Fellowship in Knowledge Mobilisation where she will lead research to evaluate sustained impact of interventions across the healthcare economy to address AMR. She has expertise in adopting systems thinking approaches, including SD, discrete-event simulation, process mapping combined with behaviour theories and other sociological research methods to examine healthcare, including but not limited to AMR, obesity, and maternal and neonatal health.

Prof. Rifat Atun is a Professor of Global Health Systems at Harvard University, and the Director of Global Health Systems Cluster at Harvard T.H. Chan School of Public Health.

Prof. Alison Holmes is a Professor of Infectious Diseases at Imperial College, and the Director of the NIHR HPRU in HCAI and AMR.