China-UK Antimicrobial Resistance Workshop

Shanghai

21st – 22nd November 2017,

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Background

In December 2015, the Medical Research Council (MRC), the Economic and Social Research Council (ESRC), the Biotechnology and Biological Sciences Research Council (BBSRC), as part of the UK Cross Research Council AMR Initiative, and the NSFC launched the China-UK AMR Partnership Initiative. In 2016, this initiative supported six new research partnerships looking at ways of tackling the rise of antibacterial resistance. These Chinese-UK partnerships brought together leading researchers from both countries, and from multiple research disciplines, to better understand the emergence and spread of resistant bacteria, develop new interventions, and improve health and agricultural systems.

Building on the success of this initiative, in July 2017, the UK Cross Research Council AMR Initiative, under the umbrella of the Newton Fund and the National Natural Science Foundation of China (NSFC) announced an upcoming China-UK AMR Partnership Hubs call to launch in 2018. In preparation for this call, the call sponsors held the China-UK AMR workshop in Shanghai, China, in November 2017 to provide partnering opportunities and scope this present initiative. The workshop brought together Chinese and UK-based researchers to explore field needs, national strengths and areas of potential complementarity.

Agenda

Day 1, Tuesday 21st

Time	Item	Speaker
	Registration	
Welcome and Introductory Talks		
9:00	**Chairs' Welcome**	Co-Chairs: Mark Holmes and Zhou Mi
9:05	**School of Medicine, Shanghai Jiaotong University Welcome**	Chen Hongzhuan
9:10	**NSFC Welcome**	Liu Congqiang
9:15	**Research Councils UK Welcome**	Jonathan Pearce
9:20	**Research Councils UK, China Welcome**	Grace Lang
9:25	**Group photo**	All
9:50	**UK Expert Scene-Setting**	Mark Holmes
10:15	**China Expert Scene-Setting**	Li Min
10:30	**Tea/coffee break**	
10:45	**UK AMR Funding Landscape**	Caroline Culshaw
11:00	**China AMR Funding Landscape**	Fan Yingjie
11:15	**Introduction to UK-China AMR Initiative & the Current Call**	Caroline Harris

Time	Item	Speaker
11:30	**Funding Q & A**	NSFC & Research Councils UK
12:00	**Lunch**	
13:00	**Speed Networking**	Elaine Morley to introduce
14:30	**Tea/coffee break**	
15:00	**Breakout Session 1: Identify existing strengths in AMR research in China and the UK** • In what areas of AMR research are the UK and China particularly strong? • What are the existing AMR partnerships between the UK and China, on which this initiative can build?	Mark Holmes and Li Min to introduce
15:45	**Plenary Feedback for Breakout Session 1**	
16:15	**Breakout Session 2: Identify challenges and gaps in AMR research in China** • Identify any particular challenges to AMR research in China • What research/expertise gaps remain	Mark Holmes and Li Min to introduce
17:00	**Plenary Feedback for Breakout Session 2**	
17:30	**Summary of Day 1 and Close**	Co-Chairs and Funders
	Reception Dinner	

Day 2

Time	Item	Speaker
9:00	**Breakout Session 3: Synergy in UK-China AMR research** • Pick out 2 to 3 research gaps from the list (more if you have time) • Match UK and China strengths to research gaps, consider complementarity between UK and China rather than matching skills across both countries • Consider infrastructure requirements to address the research gap	Mark Holmes and Li Min to introduce

Time	Item	Speaker
9:45	**Plenary Feedback for Breakout Session 3**	
10:15	**Coffee break**	
10:40	**Breakout Session 4: Interdisciplinarity** • How can you engage and integrate the relevant disciplines during the conceptualisation phase? • Who are the stakeholders and how would you capture and include their perspectives in your research plan? • What barriers do you need to overcome? • If anyone has experience of interdisciplinary working, please give examples	Mark Holmes and Li Min to introduce
11:30	**Plenary Feedback for Breakout Session 4**	
12:00	**Lunch**	
13:00	**Breakout Session 5: Describe what a centre partnership could look like** Consider: • The scale of funding available • Research programme • People and knowledge exchange • Management structure/governance • Routes to impact	Jonathan Pearce to introduce
13:45	**Plenary Feedback for Breakout Session 5**	
14:15	**Partnering 1 to 1s**	All
15:00	**Tea/coffee break**	
15:30	**Partnering 1 to 1s**	All
16:30	**Closing Remarks**	Chairs, NSFC, RCUK China, UK RCs
17:15	**Day 2 Close**	

Breakout Session Discussions

Breakout Session 1: Identify existing strengths in AMR research in China and the UK

In what areas of AMR research are the UK and China particularly strong?

UK

Interdisciplinarity and links to policy

- Interdisciplinarity
- Integrated research programmes
- Awareness of importance of interdisciplinarity, communication, and policy (but is in its infancy)
- Public awareness
- Understanding of regulatory processes

Veterinary sciences

- Veterinary sciences, microbiology and medicine
- Best practice in farming

Transmission research

- Environmental microbiology techniques
- Molecular microbiology
- Biofilm research
- Transmission of resistance
- Genomics and epidemiology analysis and evidence
- Identification of new genes and strains
- New infection models

Data analytics

- Surveillance networks
- Data analysis
- Big data analytics
- Health informatics
- Metadata

Social sciences

- Health systems and economics
- Social science
- Behavioural interventions
- Stewardship of antibiotics

Drugs

- Therapeutics (novel)
- Drug discovery and developments
- Structural biology
- Clinical trials and evidence based medicine

CHINA

Diagnostics

- Evaluation of new diagnostics

Veterinary sciences

- Veterinary medicine (40bn animals in China)
- Veterinary microbiome

Basic underpinning sciences

- Technical/technology and material science
- Chemistry and biochemistry
- Clinical and molecular microbiology
- Genetic engineering, genomics and AMR genes
- Novel biomaterials

Macroeconomics and population sciences

- Macroeconomics
- Population sciences

Environmental perspectives

- Environmental resistome and molecular genomic tools
- Environmental geochemistry – interaction with AMR

Data sciences

- Information technology
- Digital linkage
- Bioinformatics

Drug design

- Drug discovery and design, pharmaceutical sciences, synthetic biology, new compounds
- Uses of traditional Chinese medicine and natural products
- Early stage chemistry
- Structural biology
- Biotic biosynthesis

Surveillance

- Surveillance CARRS plus CHINET
- Bacterial clinical surveillance network
- Animal and food surveillance

Clinical trials

- Preclinical evaluation
- Registration plus running clinical trials

Breakout Session 2: Identify challenges and gaps in AMR research in China

Identify any particular challenges to AMR research in China

- Differing terminology between disciplines
- Differing ways of working between disciplines
- Empowering rural China
- Teaching and training fellowships, skills pathway
- Interdisciplinary knowledge sharing and focussed knowledge sharing
- Balance between long term research aims and short term priorities – people are dying now

What research/expertise gaps remain

In context of the pressing ABR needs of China

- Ecology and Economics of AMR; including burden (environmental, animal and human) and economic cost of AMR
- Understanding and predictive modelling of transmission between animals and man, and within and between communities and hospitals
- Drug Discovery, including translation to market
- Vaccines
- Risks, costs and benefits of reducing antibiotic use; understanding current drivers of use, including economic drivers, and challenges to change
    - Diagnostics to help prescribing choices
- Implementation Research – from evidence to policy and impact

Breakout Session 3: Synergy in UK-China AMR research

Match UK and China strengths to research gaps, consider complementarity between UK and China rather than matching skills across both countries, consider infrastructure requirements to address the research gap

Several cross cutting themes were discussed where synergies between the UK and China could lead to significant advances of our understanding of AMR in China.

Systems approaches to understand the selection and transmission of AMR

- Considering community carriage, farming, the environment, etc.

Data – flagged as of critical importance throughout the themes discussed

Modelling – flagged as of critical importance to extrapolate meaningful information from complex data sets

Environment:

- Environmental antibiotic levels – can they be reduced by sequestration?
    - Requirement for longitudinal data
- Measuring environmental impact on the natural and clinical environments
- Measuring the ecological burden of AMR

- The impact of rapid development in China on AMR

Measuring the economic and social drivers of AMR in the community
- Social behaviours around AB use and misuse
- Differences between urban and rural areas
- Culture-specific understanding of practices and the drivers of those practices for tackling AMR
- Understanding the economic drivers of resistance and solutions to them
    - Prescribing: incentivise/disincentivise prescribing practices
    - Diagnostics: promote new/existing diagnostics
- Cost-benefit analyses of interventions to reduce AMR

Antibiotic use in hospitals – can/should antibiotic use be reduced?
- What differences exist between urban and rural hospitals?

Drug discovery
- Incorporating a multi-disciplinary approach to facilitate the marketing of new products

Breakout Session 4: Interdisciplinarity

How can you engage and integrate the relevant disciplines during the conceptualisation phase? Who are the stakeholders and how would you capture and include their perspectives in your research plan?
What barriers do you need to overcome?

Stakeholder engagement: requires a strong engagement plan from the outset. The specific stakeholders depend on the research question being asked.

Possible barriers to interdisciplinary, international research:
- Terminology – English/Chinese and disciplinary
- Interdisciplinarity takes time, strong communication is important
- Data standardisation, comparability and metadata
- Sharing clinical data and biological isolates
- Pressure from REF (UK) and ownership of outcomes
- Intellectual property

Breakout Session 5: Describe what a centre partnership could look like

Consider:

- *The scale of funding available*
- *Research programme*
- *People and knowledge exchange*
- *Management structure/governance*
- *Routes to impact*

Scale of funding: proposals must be focussed to achieve meaningful outcomes in the 3 year timeframe and with the funding available. A single project could involve a single or multiple research organisations in the UK and China, to bring together the required expertise.

Research programme: should consider acquiring the evidence required to answer the research questions. Various tools will need to be acquired or developed to support the research programme.

People and knowledge exchange: Training requirements, data sharing platforms.

Management structure: project manager, steering committee, programme managers, PI's all with clearly defined roles and responsibilities.

Routes to impact: communicate results via frequent meetings with stakeholders and policymakers.

Attendees

UK Attendees

Peter Monk, University of Sheffield
Dov Stekel, University of Nottingham
Tania Dottorini, University of Nottingham
William Hope, University of Liverpool
Jason Weeks, European Medicines Agency
Marcela Hernandez Garcia, University of Southampton
Merlin Wilcox, University of Southampton
Tjeerd-Pieter van Staa, University of Manchester
Gerald Bloom, Institute of Development Studies at the University of Sussex
Helen Lambert, University of Bristol
Anthony Bradley, Diamond Light Institue
Therese Hesketh, University College London
Simon Foster, University of Sheffield
Qingxiu Bu, University of Sussex
Alan McNally, University of Birmingham
Maria Katsikogianni, University of Bradford
Matthew Upton, Plymouth University
Wei Huang, University of Oxford
Tim Sharpe, Glasgow School of Art
Giorgio Volpe, University College London
Ian Gilbert, University of Dundee
Hermine Mkrtchyan, University of East London
Adam Roberts, Liverpol School of Tropical Medicine
Guogang Ren, University of Hertfordshire
Chris Dowson, University of Warwick
Mark Holmes, University of Cambridge
Elizabeth Wellington, University of Warwick
Charles Knapp, Strathclyde University

China Attendees

Yongguan Zhu, Chinese Academy of Sciences
Lefu Lan, Chinese Academy of Sciences
Minggui Wang, Huashan Hospital, Fudan University
Wenhong Zhang, Huashan Hospital, Fudan University
Debin Wang, Anhui Medical University School of Health Service Management
Jiabin Li, Anhui Medical University
Hui Wang, Peking university People's Hospital
Bo Zheng, Peking University First Hospital
Yunsong Yu, Sir Run Run Shaw Hospital of Zhejiang University
Zhiyong Zong, West China Hospital, Sichuan University
Min Li, Renjo Hostitao Shanghai Jiao Tong University
Gucheng Zeng, Zhongshan School of Medicine, Sun Yat-sen University
Baoli Zhu, Institute of Microbiology, CAS
Baolin Sun, Univeristy of Science and Technology of China

Yuging Liu, Institue of Animal Science and Veterinary Medicine, Shangdong Academy of Agricultural Sciences
Xiaoxing Cheng, The 309th Hospital of Chinese People' Liberation Army
Zhihong Ren, Chinese Center for Disease Control and Prevention
Shenghui Cui, National Institutes for Food and Drug Control
Gongli Tang, Shanghai Institute of Organisic Chemistry, CAS
Wei Liu, Peking Unviersity First Hospital
Ling Lu, Nanjing Normal University
Yijun Chen, China Pharmaceutical University
Daijie Chen, Shanghai Institute of Pharmaceutical Industry
Junshi Chen, National Food Safety Risk Assessment Center
Sheng Ye, Institute of Biophysics, CAS
Aidong Han, Xiamei University
Ke Yang, Institute of Metal Research, Chinese Academy of Sciences
Zixin Deng, Shanghai Jiaotong University
Yuhui Sun, Wuhan University
Shijun Ding, Zhongnan University of Economics and Law
Qiang Sun, Shandong University
Xiangmei Zhou, China Agricultural University

Funders

Elaine Morley, AHRC
Caroline Harris, MRC
Jonathan Pearce, MRC
Caroline Culshaw, NERC
Grace Lang, RCUK China
Glen Noble, RCUK China
Yiming Hu, RCUK China
Representatives of NSFC

Concluding Remarks

Following this workshop, the UK Research Councils and NSFC are considering the points raised to shape the up-coming funding initiative to be launched early 2018.

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- Arts & Humanities Research Council (AHRC)
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- Engineering and Physical Sciences Research Council (EPSRC)
- Economic and Social Research Council (ESRC)
- Medical Research Council (MRC)
- Natural Environment Research Council (NERC)
- Science and Technology Facilities Council (STFC)