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UKHSA Presents

Antimicrobial Resistance

Tackling AMR as a whole system approach

Thursday 14 November 2024

#UKHSAPresents

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Welcome

Professor Isabel Oliver

Chief Scientific Officer, UKHSA

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Our speakers today:

Professor Diane Ashiru-Oredope

Lead Pharmacist for healthcare-associated infections and antimicrobial resistance, UKHSA

Dr Colin Brown

Deputy Director, Healthcare Associated Infections and Antimicrobial Resistance Division, UKHSA

Professor Julie Robotham

Head of AMR Modelling and Evaluations, UKHSA

Professor Mark Sutton

Scientific Leader for AMR and Healthcare Biotechnology, Porton Down Team UKHSA

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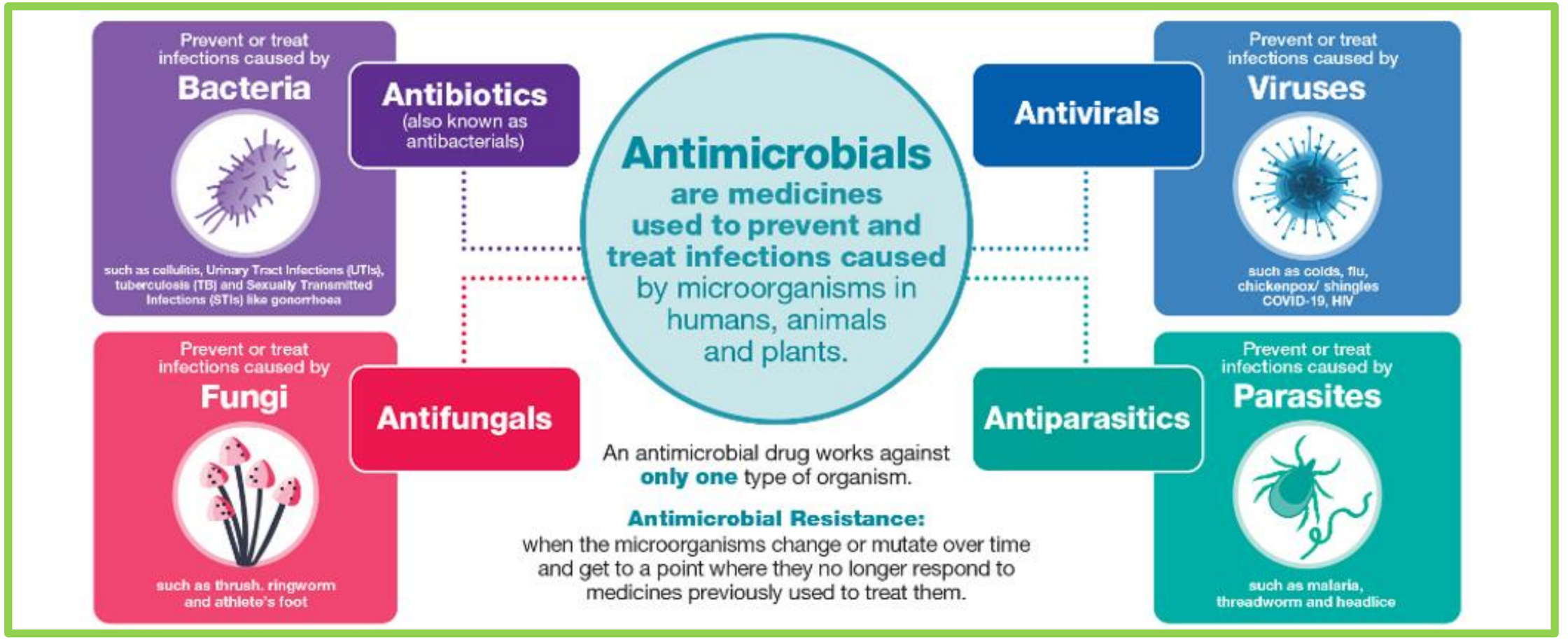
Antimicrobials: a simple overview



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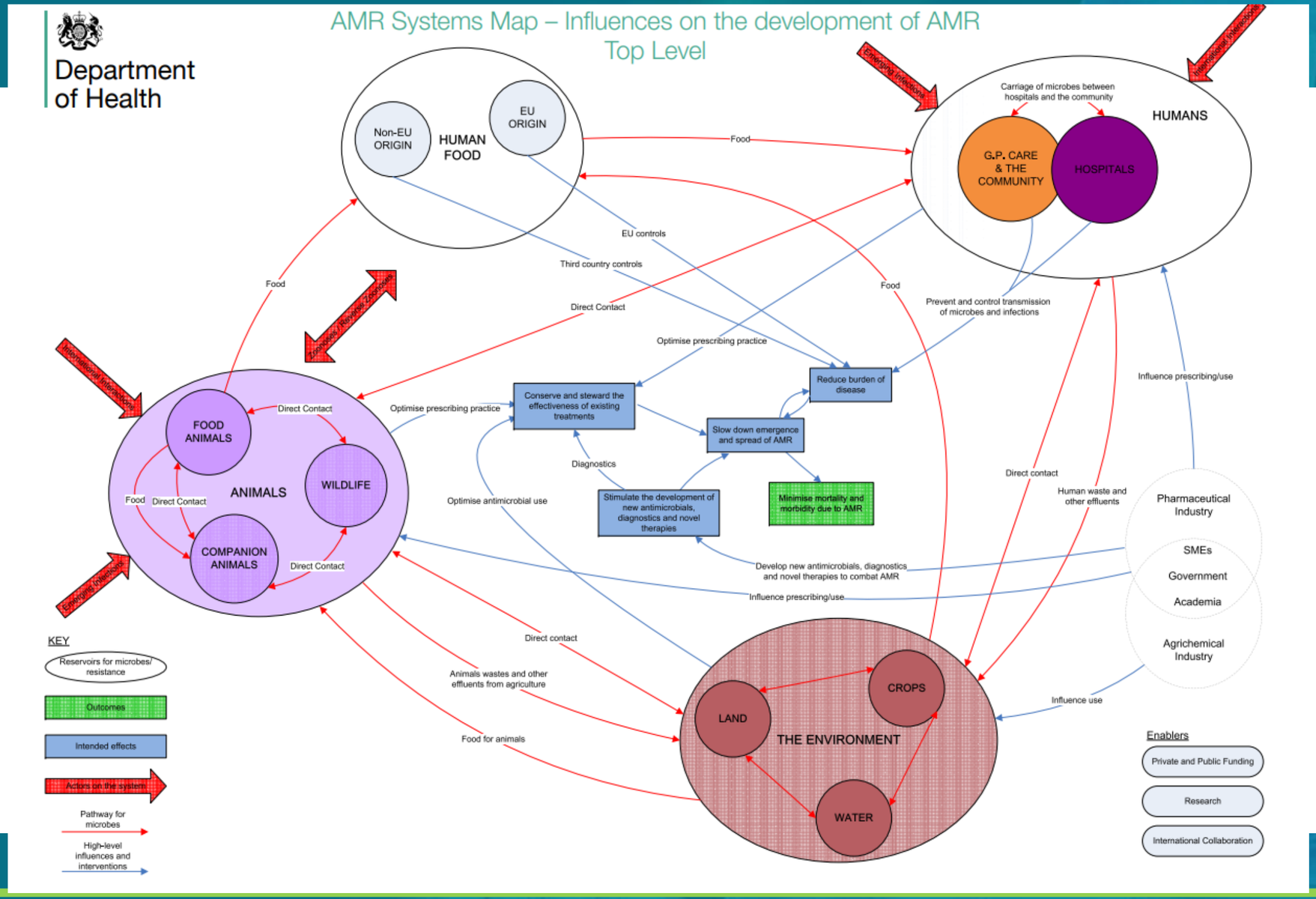
Influences on the development of AMR



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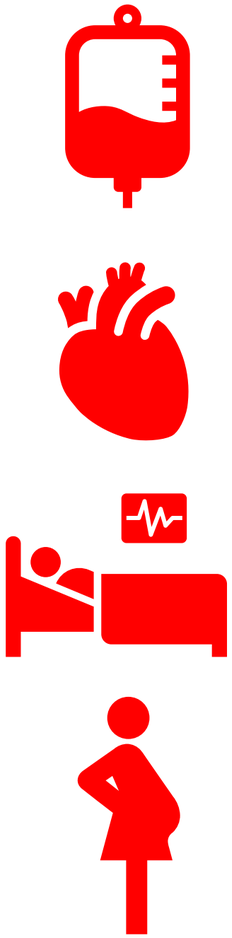
AMR SOS



Ineffective antibiotics increased risk of disease spread, illness, disability and death

In 2021, AMR was directly responsible for 1.14 million global deaths

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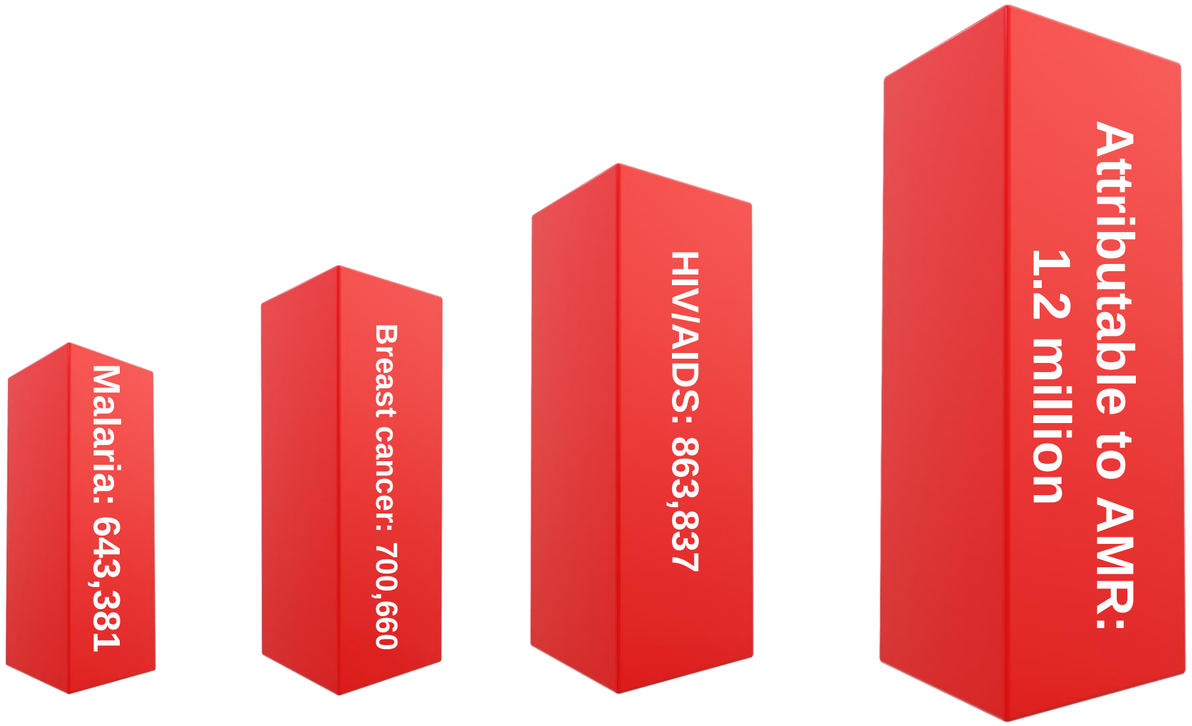
The scale of the problem

Global deaths in 2019



Global deaths in 2021

Source: Global burden of bacterial antimicrobial resistance in 2019, a systematic analysis, *The Lancet*, January 2022

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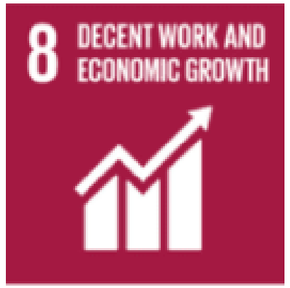
AMR is a threat to progress on the Sustainable Development Goals

AMR hits the poor hardest; treatment of resistant infections is more expensive.

Untreatable infections in animals threatens sustainable food production for growing populations

Antimicrobials are fundamental components of all health systems

Clean water and effective sanitation reduces infections from multiple sources of contaminated water.



Cost of AMR is predicted to be US $100 trillion by 2050, driving and extra 28 million people into poverty.

It is crucial to balance access and conservation of antimicrobials with innovation, to contain AMR.

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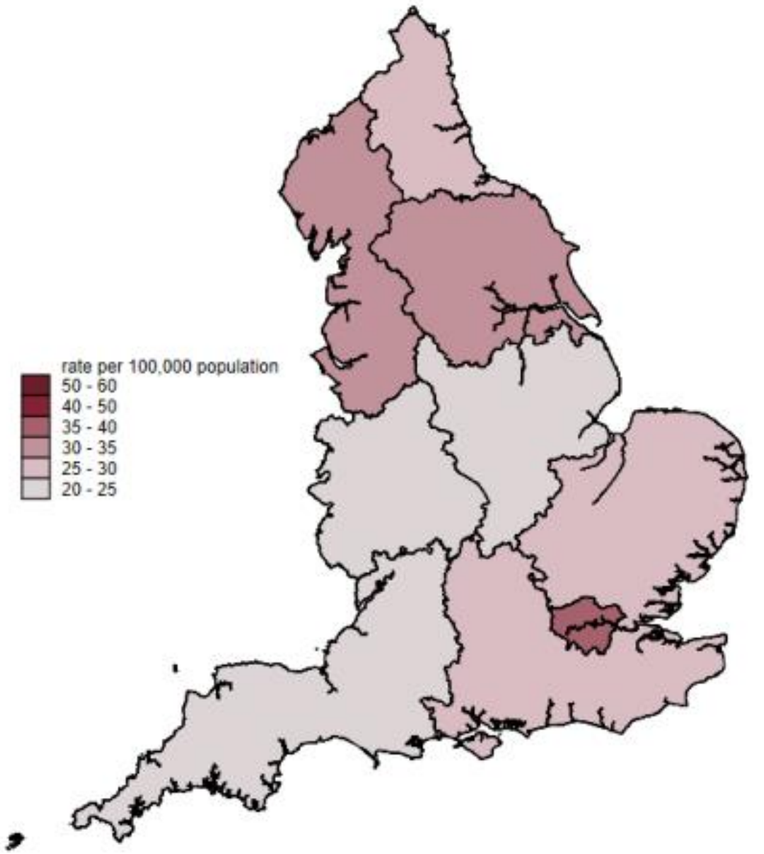
AMR in the UK – the “silent pandemic”

- ✓ Captured on the **National Risk Register**
- ✓ Costs the NHS **£95 million per year**
- ✓ In England, 20 out of 100 people with a key pathogen blood stream infection had a **resistant infection** in 2022 (source: *ESPAUR*)
- ✓ **Resistance** to antimicrobials is **increasing**, creating a new generation of **‘superbugs**’ that cannot be treated with existing medicines.



Regional variation in rate per 100,000 population of the estimated burden of AMR

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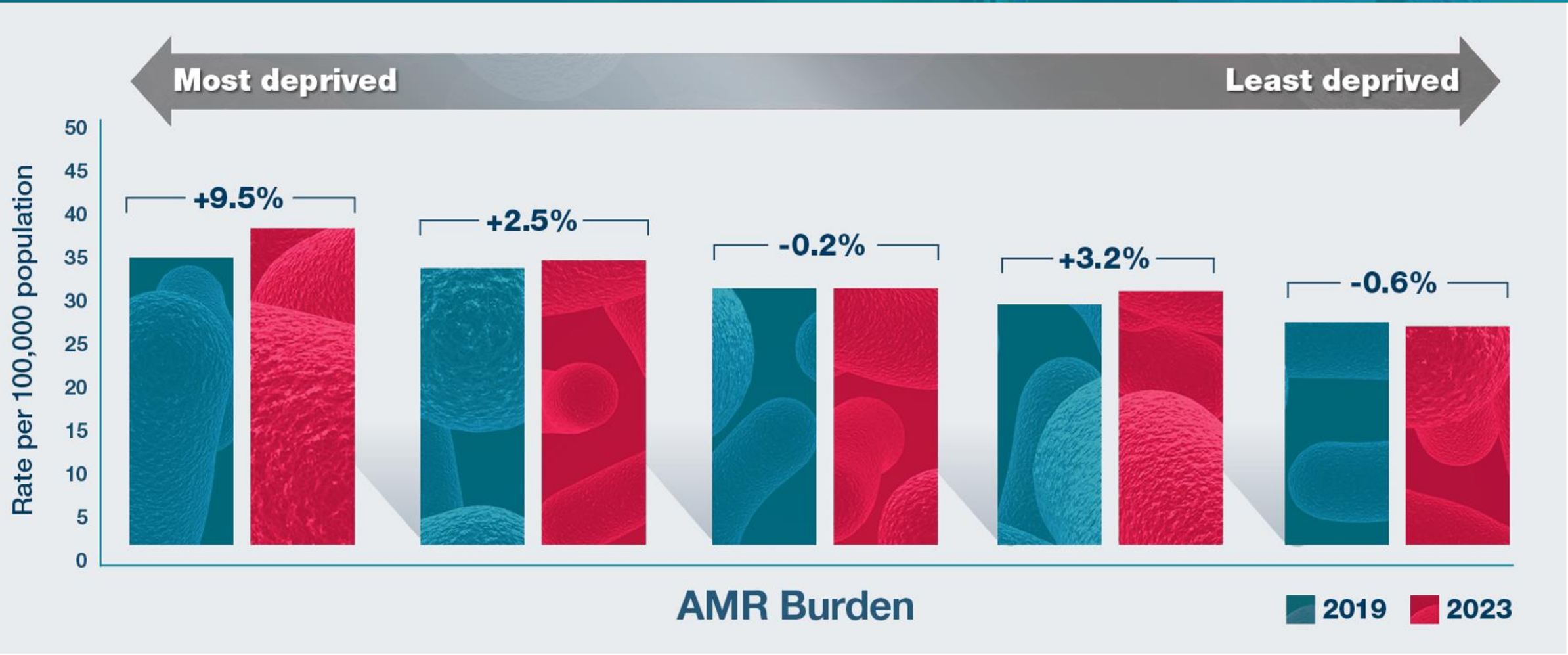
The AMR burden falls disproportionately on more deprived communities in the UK



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UKHSA priorities

- Being ready to respond to **all hazards to health**
- Improve **health outcomes through vaccines**
- Reduce the impact of **infectious diseases and antimicrobial resistance**
- Protect health from **threats in the environment**
- Improve action on **health security through data and insight**

- Develop UKHSA as a **high-performing agency**

The UK AMR National Action Plan 2024-29

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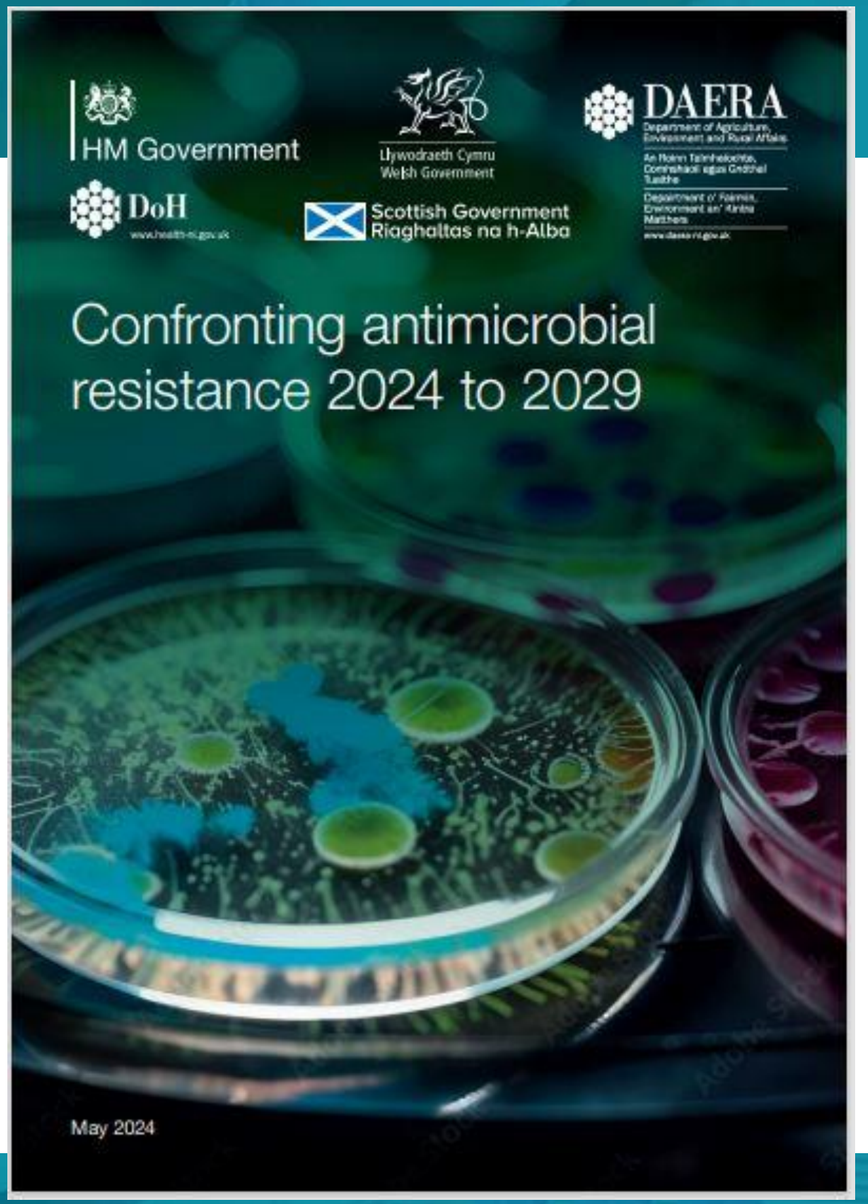
- The **UK Government**, including all four UK nations, owns the UK NAP

- The **Department of Health and Social Care** (DHSC) provides overall coordination

- **UKHSA** plays a crucial role in the development and implementation of the plan. We:
- coordinate the development of UK-wide human health targets
- lead on key outcomes and commitment
- drive and monitor the impact of public health interventions



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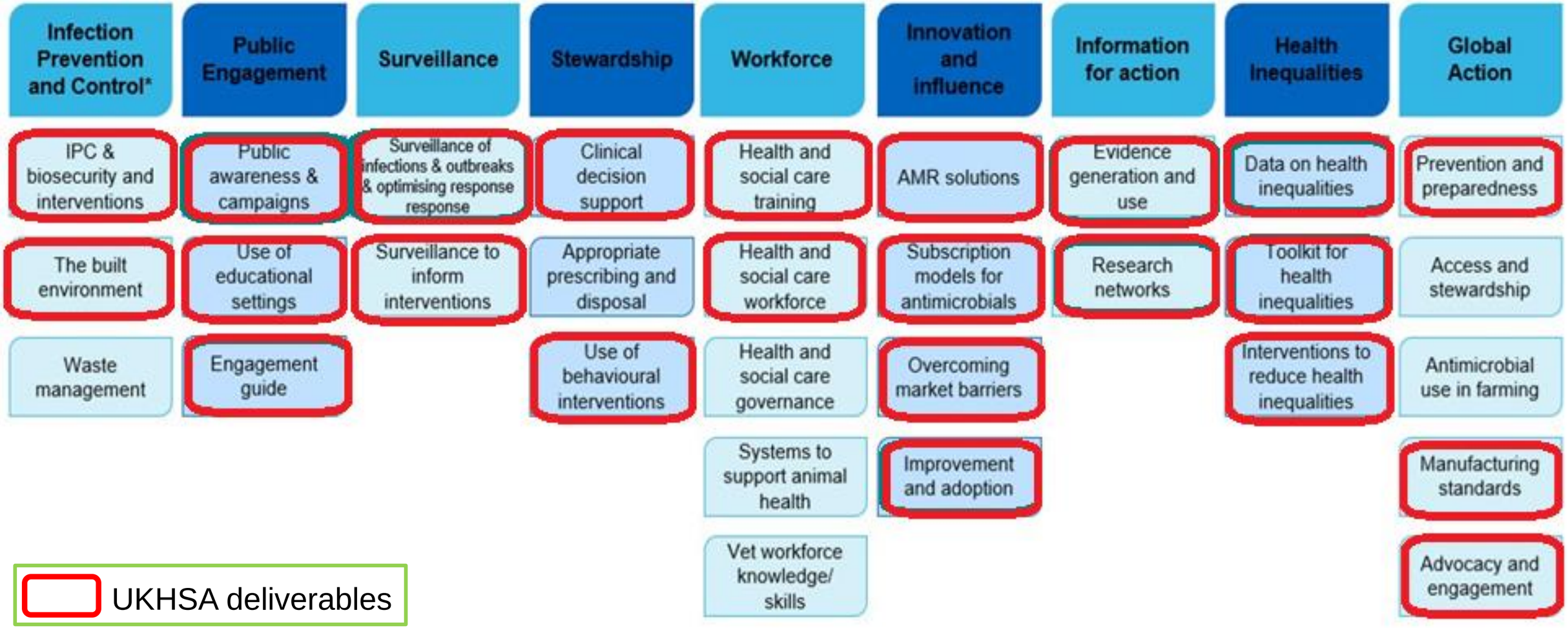
The UK AMR National Action Plan 2024-29



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ESPAUR Report 2023-24

- Antimicrobial resistance
- Antimicrobial consumption
- Point prevalence survey
- Antimicrobial stewardship
- Professional and public education
- Research
- ESPAUR oversight group
- ESPAUR report and feedback
- ESPAUR lay summary
- NHS England improvement and assurance schemes

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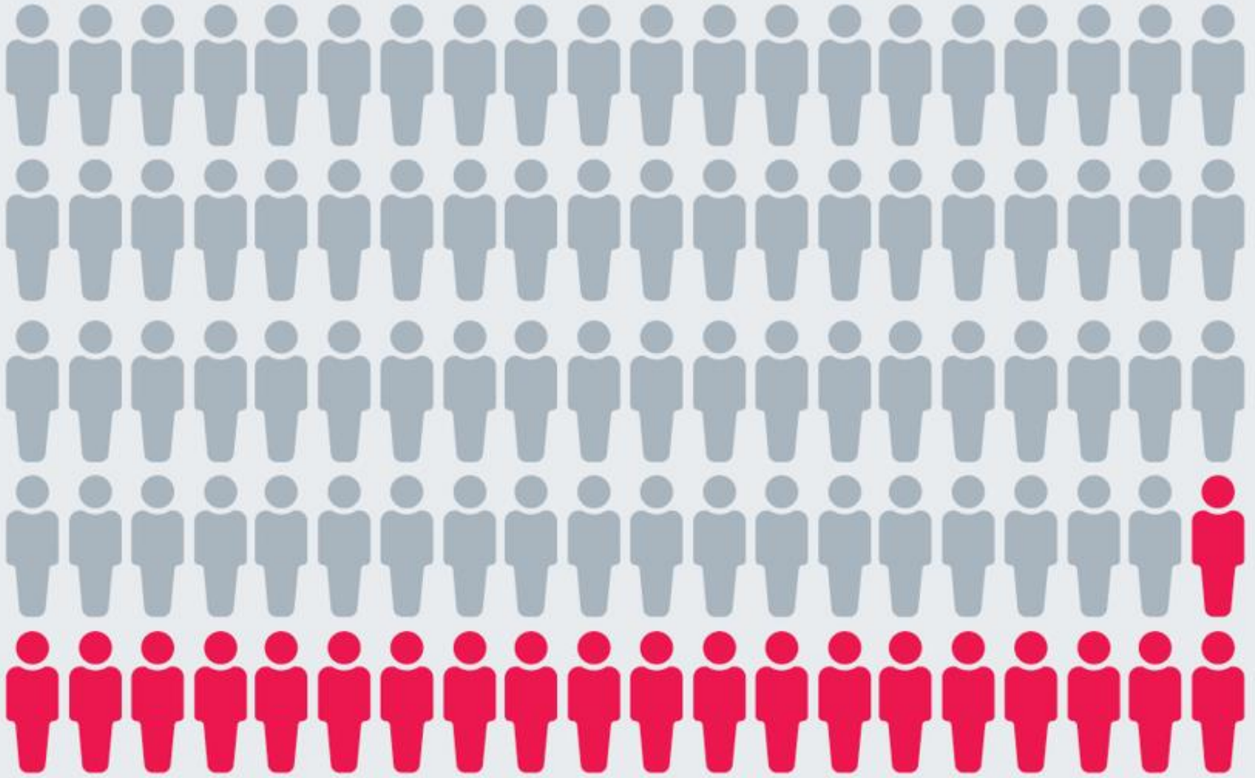
Antibiotic resistant bloodstream infections are on the rise

21 out of **100**
bloodstream infections were antibiotic resistant in England in **2023**



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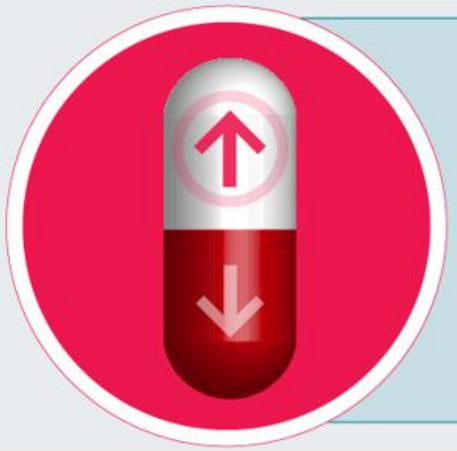
Total antibiotic consumption in Defined Daily Doses (DDDs)

Total antibiotic consumption was 17.6 Defined Daily Doses (DDDs) per 1,000 inhabitants per day (DID) in England in 2023.



This is an increase of 2.4% compared with antibiotic consumption in 2022 but 1.9% below the pre-pandemic 2019 consumption level.

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Antibiotic prescribing patterns across healthcare settings in 2023

Primary care prescribed

80%

of all antibiotics

Secondary care antibiotic use exceeded 2019 levels, with notable increases in:

- Accident & Emergency
- Other specialty services

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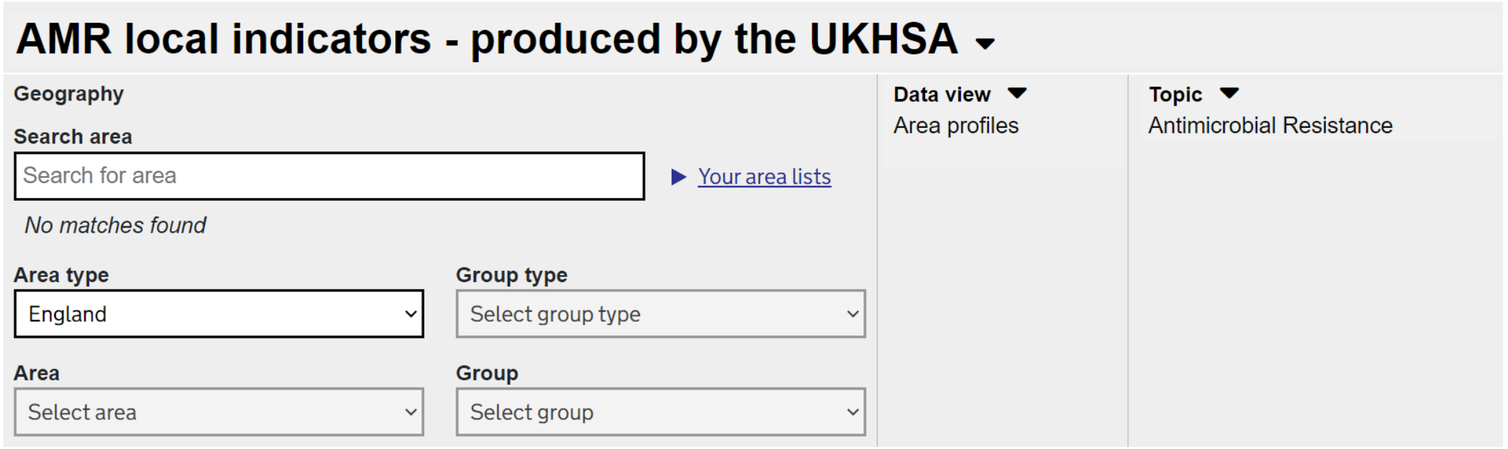
Open access to AMR data: AMR local indicators on Fingertips

UKHSA produces data across six domains:

- ✓ Supporting NHS England Initiatives
- ✓ Antimicrobial Resistance (AMR)
- ✓ Antibiotic Prescribing
- ✓ Healthcare-Associated Infections (HCAI)
- ✓ Infection Prevention and Control (IPC)
- ✓ Antimicrobial stewardship (AMS)



Accessed on the Fingertips website.

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Improving use of data: Modelling

Why are models useful in helping us to tackle AMR?

- ✓ Impact of changes to policy or practice can be **simulated *before* being implemented**.
- ✓ Many more strategies can be **evaluated** than would be feasible in randomized controlled trials
- ✓ We can explore the **cost-effectiveness** of public health options
- ✓ Can look at **counterfactuals** (what would have happened if...)
- ✓ Help us to **interpret data/trends we** see in the data, or understand the underlying mechanisms

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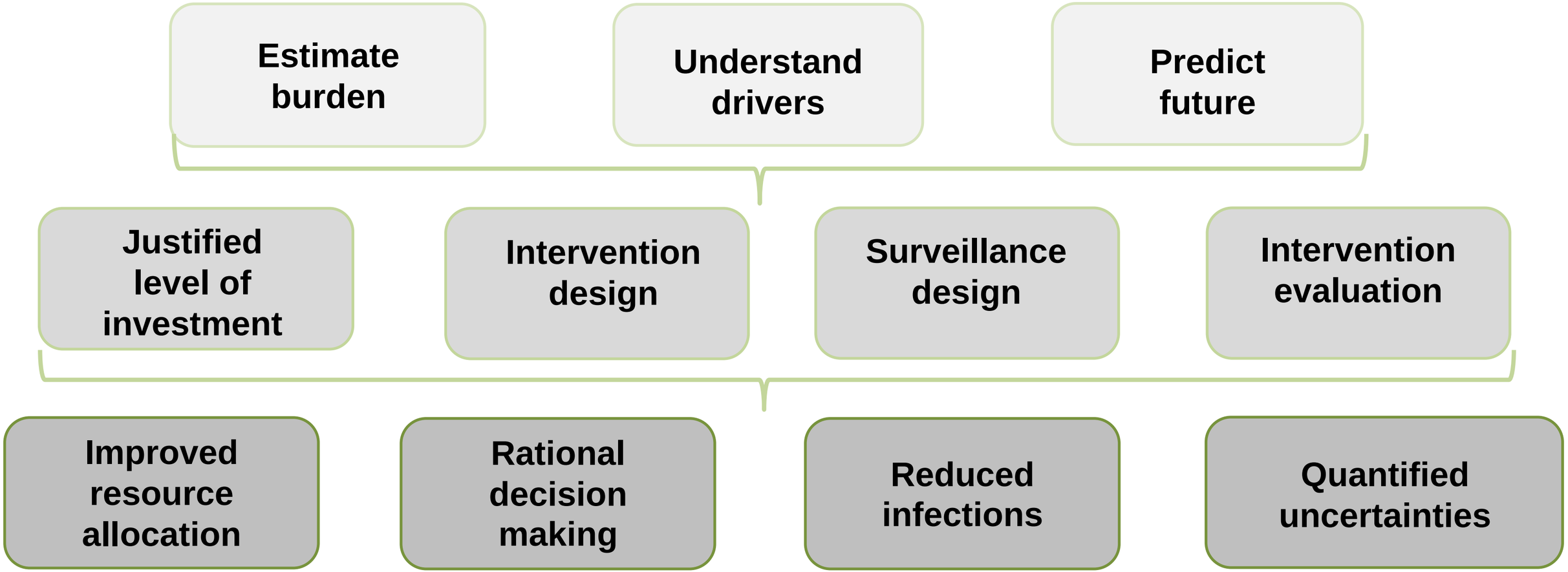
AMR modelling and health economics

Optimal use of surveillance data to…



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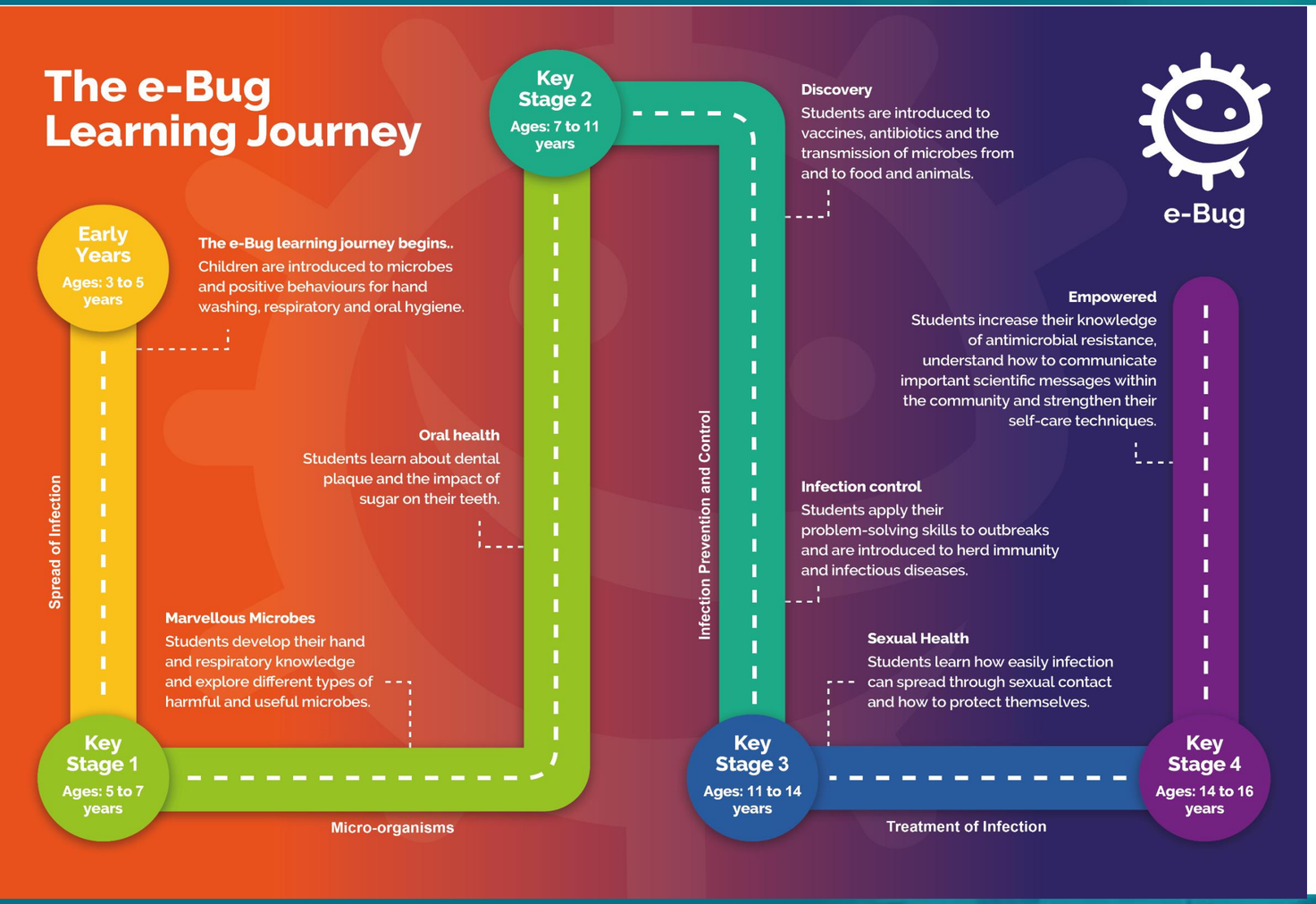
Intervention example: Childhood learning



- ✓ **e-Bug** is a health education programme that aims to promote positive behaviour change among children/young people to support infection prevention and control (IPC) efforts and tackle AMR

- ✓ e-Bug provides free resources for educators, community leaders, parents and caregivers to educate young people, aligned with schools

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Intervention example: TARGET Antibiotics

TARGET

Keep Antibiotics Working

T Treat

A Antibiotics

R Responsibly.

G Guidance,

E Education and

T Tools

TARGET antibiotics provides and champions the use of evidence-based guidance, education and tools for primary healthcare providers to prevent and manage common infections and optimise antibiotic use.

- ✓ Supporting infection prevention and control initiatives,
- ✓ Improving how antimicrobials are used,
- ✓ Empowering patients to manage their own infections, preserving antibiotics for future generations

www.rcgp.org.uk/TARGETantibiotics

Intervention example: Antibiotic Guardian pledge based campaign

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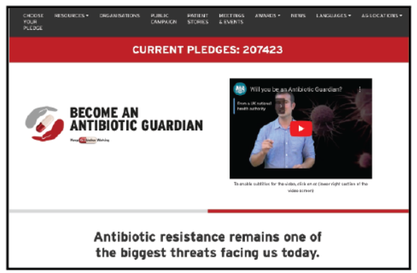
CURRENT PLEDGES: 208664

"If I'm prescribed antibiotics, I will take them exactly as prescribed and never share them with others"
- Public

"I will ensure that guidelines for diagnosis and management of common infections (including Sepsis) are readily and reliably accessed by supporting their design and dissemination"
– Infection Prevention Specialists

"When handing out a prescription that includes antibiotics, I will inform the patients of dose and duration and to take their antibiotics exactly as prescribed and to return any unused antibiotics to a pharmacy for safe disposal"
– Pharmacy Teams

"When I see a patient with dental pain, I will discuss methods of controlling symptoms rather than prescribing antibiotics as a first course of action"
- Dentist



"If I prescribe an antibiotic then I will document indication, duration and review dates on the drug chart in line with Start Smart then Focus AMS guidance"
– Primary/Secondary Care Prescribers

> 200,000 pledges
10 peer review publications
1025 organisation pledges
241 AG school ambassadors
469 entries to AG Awards

2014 AG Launch

2016 Launch of AG Shared Learning Event, Platform and Awards

2017 Rebranding

2019 Launch of AG schools ambassadors

2023 Revision of AG pledges

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Example of collaborative research

HCAI and AMR Health Protection Research Units

- ✓ National Institute for Health Research funded partnerships between universities and UKHSA
- ✓ Forming multi-disciplinary centres of excellence, conducting translational research.
- ✓ Effective mechanism for UKHSA and academia to work together, with demonstrable **impacts for public health policy and practice.**
- ✓ Example: Combined network analysis and mathematical modelling has informed introduction of a novel sentinel-based whole genome sequencing surveillance to deliver efficient, rapid identification of novel *Clostridioides difficile* strains in English hospitals.

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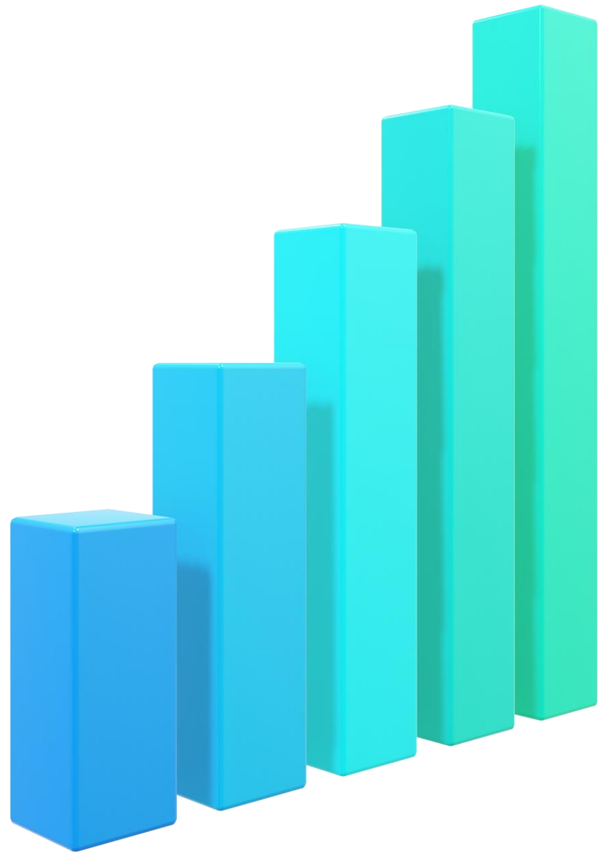
Current HCAI and AMR Health Protection Research Units

Imperial College London

- ✓ Priority Pathogens
- ✓ Precision Prescribing
- ✓ Practice, design and engineering
- ✓ Population health and policy

University of Oxford

- ✓ Populations
- ✓ Interventions
- ✓ Contexts
- ✓ Sequencing



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Therapeutics for difficult to treat infections and AMR

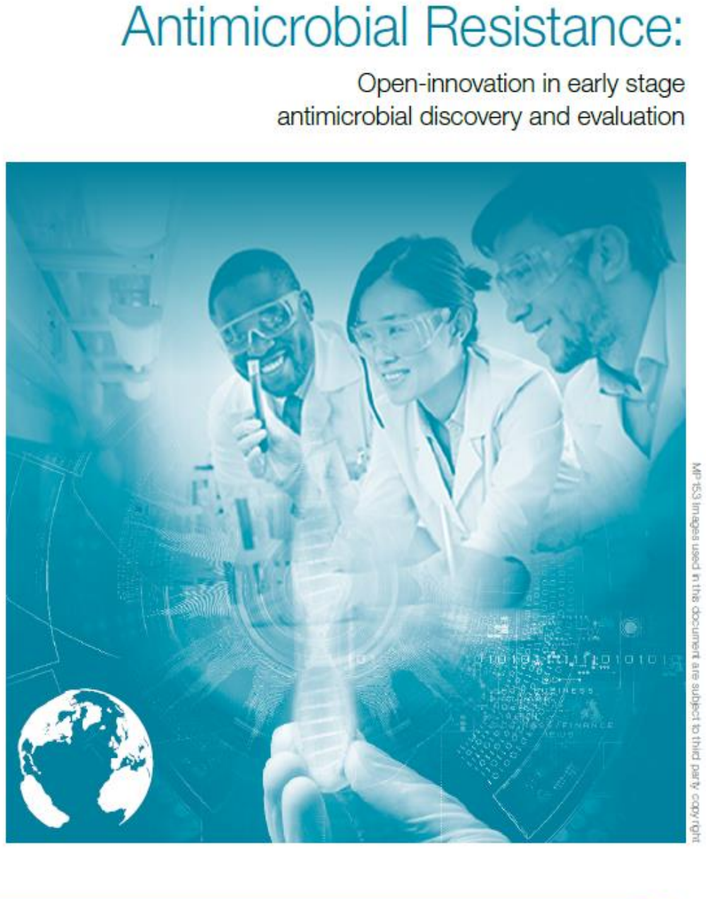
Therapeutic development and evaluation **Open Innovation in AMR platform** partnerships with academia and industry

Delivery partners with **PACE consortium** supporting hit to lead and lead optimisation of novel therapeutics against drug-resistant strain panels **(https://paceamr.org.uk/)**

UKHSA Discovery Partnerships, working with academia and industry to facilitate translation of new antimicrobial assets

Industry-funded project to screen large libraries against TB using an HTS assay developed at UKHSA Porton (80,000 compounds; at CL3).

An **integrated pathway approach to support phage innovation and clinical adoption**, tackling complex infections and addressing future antimicrobial shortages



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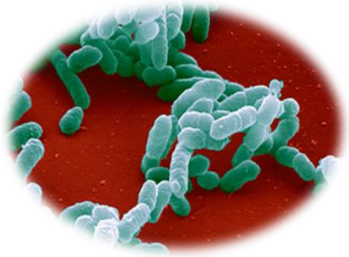
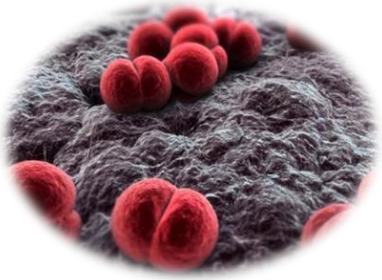
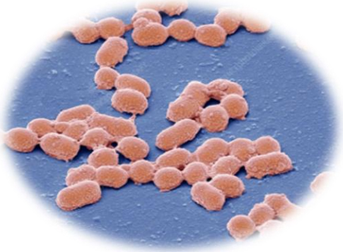
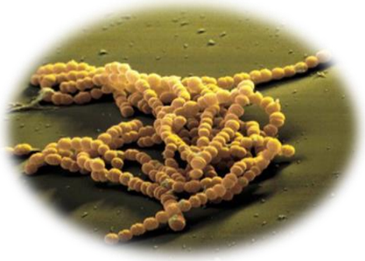
Vaccines and AMR



- ✓ **Vaccine discovery and evaluation in *in vivo* models** – immunological read-outs. CL3/4
- ✓ De-risk the development of vaccines for AMR through the **design and use of functional immune assays**
- ✓ **Evaluate vaccine protection in support of vaccine preclinical/clinical trials** - assay standardisation and inter-lab studies
- ✓ **Immunoassay, cell-based assays**, generation of proteins – toxin neutralisation by antibodies
- ✓ **Discover and evaluate antibiotic-sparing therapies** to target extremely drug resistant pathogens, or pathogens for which antibiotic usage is inappropriate – **C. difficile (in phase II clinical trials). Wellcome-funded**.
- ✓ **Fermentation – biomass for human challenge studies** & challenge stocks (at CL2 & CL3)

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AMR diagnostics and interventions

- ✓ **Development and translation of new detection and susceptibility test technologies** e.g. **https://ifastdiagnostics.com/** and **biomarkers** for complex diseases (e.g. Sepsis)
- ✓ **Diagnostic Accelerator** evaluation of rapid diagnostic tests and approaches e.g. LFD evaluation for Sars-Cov-2. **Pathogen genomics and characterisation**
- ✓ **Investigating the role of the built environment, modular ward facility** to investigate transmission dynamics of antimicrobial resistant bacteria and other emerging pathogens
- ✓ **Understanding and interrupting potential transmission pathways**, including aerosol generating procedures, water
- ✓ **Development and evaluation of novel infection control strategies**, surface modifications/treatments, disinfection strategies, water treatments

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The future of AMR: questions for human health

- ✓ What are the **key drivers** of AMR transmission?
- ✓ Where to place new technologies? What is the role of **big data and AI?**
- ✓ How can we educate the **healthcare workforce**?
- ✓ How can we involve **inclusion health** groups?
- ✓ How can we model the **economic impact**?
- ✓ How can we best engage the public to address **information gaps**?
- ✓ Where best to **target** our action?
- ✓ How can we **evaluate** interventions?

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Our Q&A panel today:

Professor Matt Inada-Kim
National Clinical Director for Infection, Antimicrobial Resistance and Deterioration, NHS England

Professor Philip Howard OBE
Antimicrobial stewardship lead for North East England and Yorkshire

Dr Joanna Bacon
Principal Investigator, AMR Discovery & Founding Chair, Porton Down AMR network UKHSA

Dr Russell Hope
Lead Scientist AMR Division UKHSA

Trish Mannes
Regional Deputy Director, South East, UKHSA

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Thank you