The Review on Antimicrobial Resistance

The global challenge of drug-resistant infections

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@ReviewonAMR

Review on
Antimicrobial
Resistance
Tackling drug-resistant infections globally

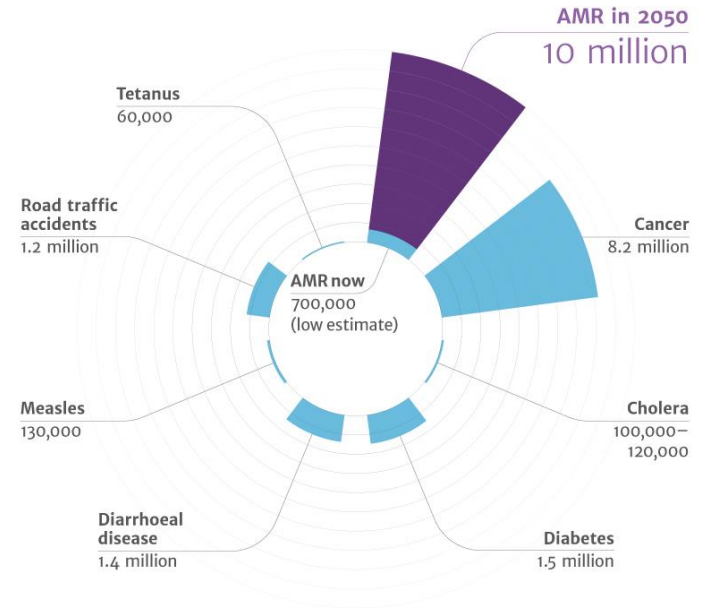# Background to the independent Review on AMR

- Established by UK Prime Minister David Cameron in 2014

- Chaired by Jim O'Neill

- Co-sponsored by the UK Government and Wellcome Trust

- Tasked to:

  - Look globally at the problem rising drug-resistant infections, through the lens of economics and policy-making

  - Help build an international consensus for comprehensive action

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AMR as an economic problem

Key role was to define the future human and economic burdens of AMR to raise the issue's profile with policy-makers.

Our modelling estimated that if no action taken, by 2050:

- 10 million deaths annually
- $100 trillion lost from GDP
- A threat to development and global prosperity

AMR in 2050
10 million

Tetanus
60,000

Road traffic accidents
1.2 million

AMR now
700,000
(low estimate)

Cancer
8.2 million

Measles
130,000

Cholera
100,000–120,000

Diarrhoeal disease
1.4 million

Diabetes
1.5 million

Number of deaths per year today

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A ten-point plan for action

- Eight interim reports over 18 months.

- Final report in May 2016 recommended specific actions on ten fronts.

- Argues for comprehensive, global action to reduce unnecessary demand for antimicrobials, as well as stimulating the supply of new ones.

Public awareness	Sanitation and hygiene
Antibiotics in agriculture and the environment	Vaccines and alternatives
Surveillance	Rapid diagnostics
Human capital	Drugs
Global Innovation Fund	International coalition for action

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Stimulating the discovery and development of new antimicrobials

Which antimicrobials ? What are the priorities?

- Our report said:

Urgent need and current funding structures inadequate	Urgent need but current funding structures largely adequate	Need will arise and require future consideration
· TB treatment regimen	· New malaria treatments	· HIV/AIDS drugs
· Antibiotics		
· Antifungal medicines		

- Urgent work needed to set national and global priorities. Public funding and new commercial incentives should focus on highest needs. This work now started by WHO.
- Our economic modelling focused mostly on antibiotics and TB.

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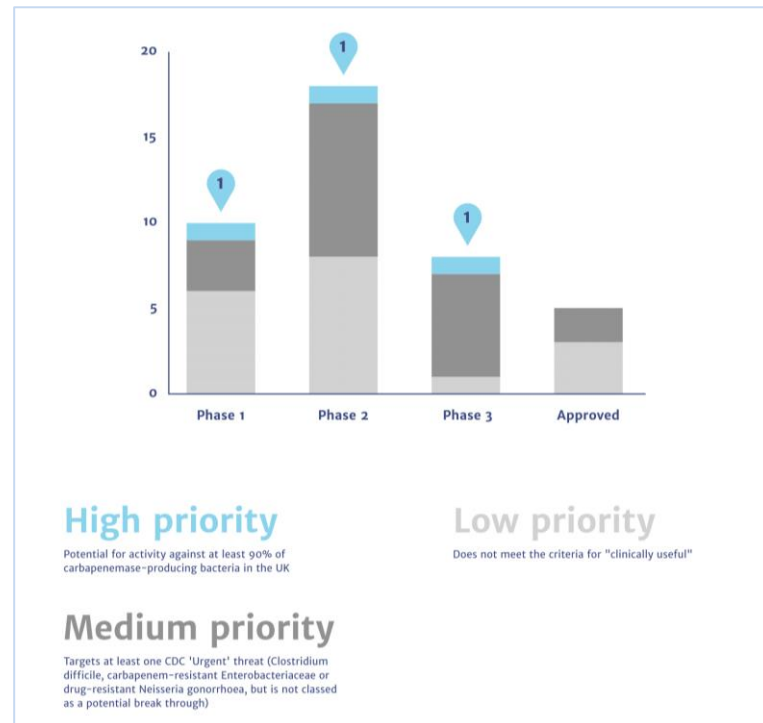*Tackling drug–resistant infections globally*

The antibiotics pipeline remains too weak

The commercial challenges of antibiotic development are by now well documented – and the pipeline of new products is extraordinarily thin.

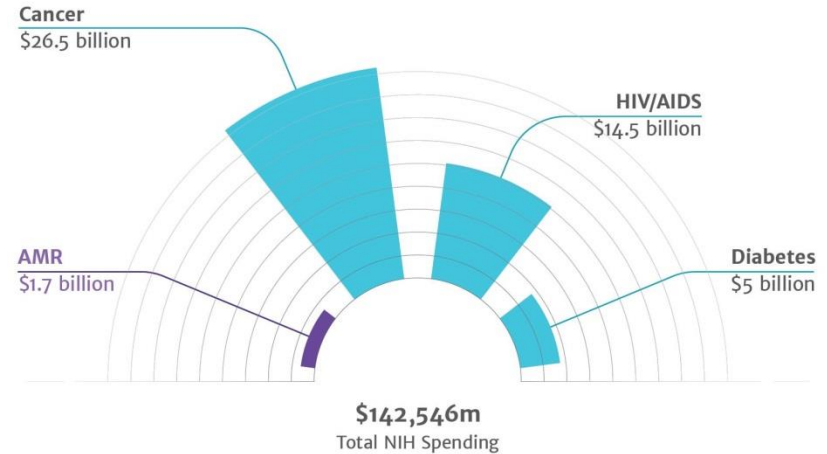Need to 'shift the supply curve' for new antibiotics:

- 'Push' funding to channel more money into early research

- Novel 'pull' funding mechanisms to correct the antibiotics market

High priority
Potential for activity against at least 90% of carbapenemase-producing bacteria in the UK

Low priority
Does not meet the criteria for "clinically useful"

Medium priority
Targets at least one CDC 'Urgent' threat (Clostridium difficile, carbapenem-resistant Enterobacteriaceae or drug-resistant Neisseria gonorrhoea, but is not classed as a potential break through)

Stimulating antibiotic development – 'push'

Improved **global innovation funding** to provide new public funding opportunities for researchers:

- Proposed that we need an extra $2bn over five years

- Governments are already acting on this – more than £600m in new government funding globally announced in past two years, with UK and US leading the way

Cancer
$26.5 billion

HIV/AIDS
$14.5 billion

AMR
$1.7 billion

Diabetes
$5 billion

$142,546m
Total NIH Spending

US National Institutes of Health grant funding for selected disease areas, 2010-14.
Source: NIH

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Stimulating antibiotic development – 'pull'

Also need new funding to ensure a proper market 'pull' for new products – via new market models that 'de-link' the profitability of an antibiotic from the volume sold.

- Globally-administered market entry rewards of $1-1.3bn for antibiotics meeting most urgent unmet needs, pegged to objective criteria of 'value'
- Conditions attached for global access and stewardship
- Supporting 15 new drugs over a decade would cost approx. $16bn.

MARKET ENTRY REWARDS WOULD HAVE A POWERFUL IMPACT ON ANTIBIOTIC R&D

Patented antibiotics form a small percentage of the total $40 billion per year antibiotics market, so $1.6 billion a year would have a material impact.

$**4.7** bn
Patented antibiotics market
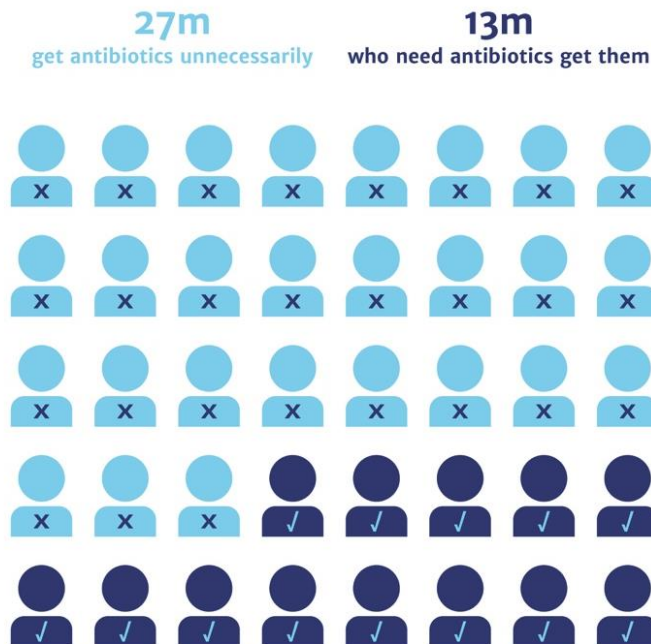
$**1.6** bn
Market entry reward

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Reducing unnecessary demand for antimicrobials

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The potential of new diagnostics

Significant volumes of antibiotics are prescribed unnecessarily.

Rapid diagnostics that could change this are under-used and innovation slowed by a market failure: benefits of better tests accrue to society, not the individual doctor or patient whose preference is often to take an antibiotic 'just in case'.

Out of 40m people who are given antibiotics for respiratory issues, annually in the US:

27m get antibiotics unnecessarily

13m who need antibiotics get them

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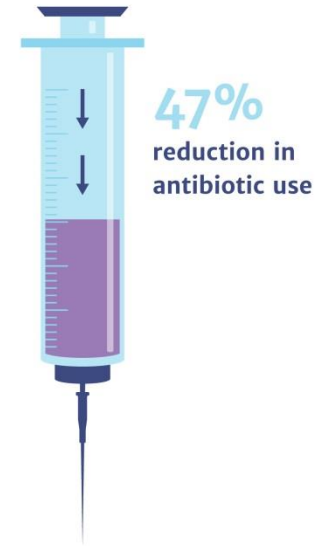*Tackling drug-resistant infections globally*

The role of vaccines

Need greater focus on preventive measures – like vaccines, or improved sanitation – in reducing the development and spread of drug-resistant infections.

Novel and existing vaccines have significant potential to:

- Reduce demand for antibiotics associated with vaccine-preventable bacterial infections (e.g. *S. pneumoniae)*

- Reduce *unnecessary* demand for antibiotics associated with preventable viral infections (e.g. influenza)

INCREASING COVERAGE OF VACCINES CAN REDUCE ANTIBIOTIC USE

Universal coverage by a pneumococcal conjugate vaccine could potentially avert 11.4 million days of antibiotic use per year in children younger than five, roughly a 47% reduction in the amount of antibiotics used for pneumonia cases caused by *S. pneumoniae*.

47% reduction in antibiotic use

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Source: Laxminarayan R, Matsoso P, Pant S, Brower C, Røttingen J, Klugman K, Davies S. Access to effective antimicrobials: a worldwide challenge. Lancet, 2016; 387: p. 168-175.
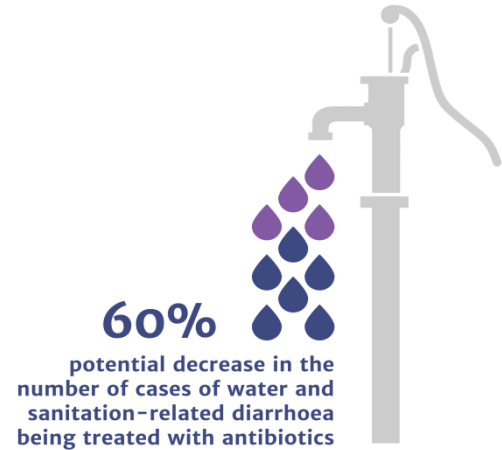
The importance of water and sanitation

Countries cannot sidestep public infrastructure investment and use drugs instead of prevention.

Improved sanitation reduces the development of all infections, including drug-resistant infections, and reduces the need for antimicrobials.

Cost of the global interventions we recommended

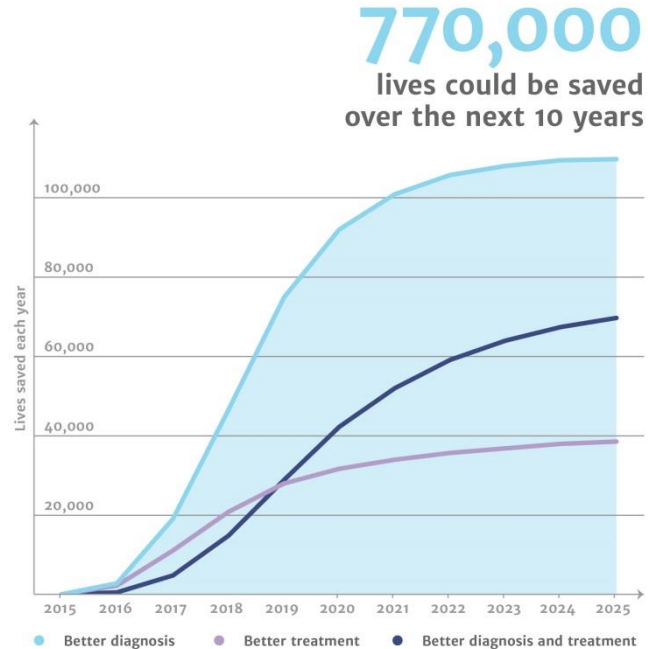| INTERVENTION	COST (USD)	TIME PERIOD
Promote the development of new antimicrobials including making better use of existing ones – includes cost of new antibiotics and TB regimen	16 billion	Over 10 years
Global Innovation Fund supporting basic and non-commercial research in drugs, vaccines, diagnostics	2 billion	Over 5 years
Rolling out existing and new diagnostics and vaccines	1 to 2 billion	Per year
Global public awareness campaign *(depends on size of campaign)	40 to 100 million*	Per year
TOTAL	**UP TO 40 BILLION USD PER DECADE**	

- Cost of up to $4 billion a year investment is affordable at a global level.
- Today AMR costs the US alone $20 billion per year in extra healthcare costs.
- The cost of AMR is hitting and will hit governments – it's a question of when.
- We have proposed four different options for funding:
  - Reallocate from current health, R&D and development aid budgets
  - Antibiotics investment charge levied on pharma industry
  - A tax on antibiotics use
  - Exchangeable 'vouchers' that would reward AMR innovators

Potential impact - the example of TB

Better diagnostics and treatment for TB could save 770,000 lives over the next ten years

BETTER DIAGNOSTICS AND TREATMENTS FOR TB COULD SAVE NUMEROUS LIVES

Better diagnostics and treatment for tuberculosis could together save more lives than either could alone.

770,000 lives could be saved over the next 10 years

Lives saved each year

- Better diagnosis
- Better treatment
- Better diagnosis and treatment

Source: Arinaminpathy N, 2016, Avaliable online on Review website: www.amr-review.org.

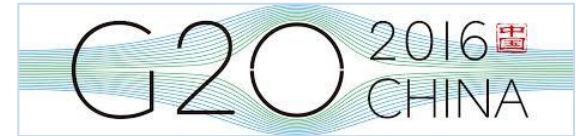Review on Antimicrobial Resistance

Towards implementation

Major steps forward in 2016

Commitment by **G20** leaders in September – now initiating work by the OECD, WHO and others to address market failures (e.g. for antibiotics.)

UN General Assembly High-Level Meeting on AMR saw 193 countries agree to act – and will establish new mechanisms to lead work by WHO and other UN agencies.

Davos Declaration and subsequent industry 'roadmap' provide framework for continued collaboration with private sector – something that must incorporate as broad a range of companies as possible.

The Review is now closing down – but handing over its activities back into Government and Wellcome Trust.

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Thank you

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