Future health challenges – antibiotic resistance

Prof. Mats Ulfendahl
Secretary-General for medicine and health
Swedish Research Council

mats.ulfendahl@vr.se
Future health challenges – antibiotic resistance
Antimicrobial resistance
The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant.

Alexander Fleming, 1945
Antibiotic Resistance threatens to return us to the pre-antibiotic era

- In Tanzania, antibiotic resistance has decreased the rate of survival from neonatal gram-negative infections from 70% to just 20%.

In the EU, **more than 25 000 patients** die from multidrug resistant bacteria annually (EMA/ECDC report)

Extra health-care costs and productivity losses of **at least 1.5 billion EURO per year**
Antibiotic resistance: "One of the Greatest Threats to Public Health"
Joint Programming as an instrument for addressing major societal challenges
Why Joint Programming?

Establishing the ERA – “a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive...” */

Addressing the grand challenges

Structural

Societal

Health

*/ From the Treaty on the Functioning of the European Union
Establishing the European Research Area (ERA)
Improving Europe's research performance to promote growth and job creation

- Europe is facing many grand challenges

From Robert-Jan Smits, Director-General DG Research & Innovation (http://ec.europa.eu/research/era/pdf/era-communication/era-presentation_en.pdf)
The Five Key ERA Priorities

1. More effective national research systems
2. Optimal transnational co-operation and competition
3. An open labour market for researchers
4. Gender equality and gender mainstreaming in research
5. Optimal circulation, access to and transfer of scientific knowledge including via digital ERA

Objective – defining and implementing common research agendas on grand challenges, constructing and effectively running of pan-European research infrastructures

From Robert-Jan Smits, Director-General DG Research & Innovation
(http://ec.europa.eu/research/era/pdf/era-communication/era-presentation_en.pdf)
A reinforced partnership

Action-oriented & Responsibility-based

- Member States
- Research Stakeholder Organisations
  E.g. WHO
- European Commission
- Industry

Joint Programming

Adapted from Robert-Jan Smits, Director-General DG Research & Innovation
(http://ec.europa.eu/research/era/pdf/era-communication/era-presentation_en.pdf)
Why Joint Programming?

Establishing the ERA — “a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive…”

Addressing the grand challenges
Antimicrobial Resistance
Facts:
- Antibiotics used excessively
- Increasing number of resistant strains
- Great societal costs
- Less drugs being produced
- Global problem

A major societal challenge requiring joint and coordinated actions
The Joint Programming Process
The JPIAMR time line

Proposal for a future JPI

Dec. 2009
April 2010 Proposal submitted
2011 Council Recommendations (Oct.) & Council Conclusions (Dec.)
2012 Start of the CSA (September)
2013 Strategic Research Agenda Adopted
Strategic Research Agenda

- Scientific Advisory Board
- National expert panels
- Online consultation
- Stakeholder involvement

http://www.jpiamr.eu/
Priority topics

THERAPEUTICS: Development of novel antibiotics and alternatives for antibiotics – from basic research to the market.

DIAGNOSTICS: Design strategies to improve treatment and prevention of infections by developing new diagnostics.

SURVEILLANCE: Implementation of a publicly funded global antibiotic resistance surveillance program.

TRANSMISSION: Transmission dynamics.

ENVIRONMENT: The role of the environment and sewage as a source for the emergence and spread of antimicrobial resistance.

INTERVENTIONS: Designing and testing interventions to prevent acquisition, transmission and infection caused by antibiotic-resistant bacteria.
Research objectives and activities

**New antibiotics and alternatives to antibiotics**

- Basic and translational research to provide leads, targets, and candidate compounds that can be exploited to develop novel antibiotics and anti-infective strategies (including immunotherapy, vaccines and anti-virulence or anti-colonisation approaches and combinations of different therapeutics).
- Research aimed at re-sensitising resistant bacteria to conventional antibiotics.
- Mechanistic studies into the molecular mechanisms that lead to AMR.
Research objectives and activities

**Improve existing antibiotics**
- Research on *previously discovered, but neglected, drug compounds* with the aim to improve the clinical efficacy and reduce side effects, and to develop them into safe and effective antimicrobial drugs for modern clinical practice.
- Research to *optimise drug use, dosage, and delivery* to improve the antibacterial efficacy of existing antibiotics and to reduce their adverse impact on the normal microbiota.
- Research focusing on the *pharmacokinetic/pharmacodynamic properties* of neglected antibiotics.
Research objectives and activities

Regulatory and economic aspects
• Activities aiming at streamlining regulatory processes and removing economic barriers in order to facilitate the rapid and successful introduction of novel antibiotics and antimicrobials to the market.
JPIAMR - Participating states

Belgium  Romania
Canada  Switzerland
Denmark  Spain
Finland  Sweden
France  Czech Republic
Greece  Turkey
Israel  Germany
Italy  United Kingdom
the Netherlands  Estonia (observer)
Norway  Argentina (observer)
Poland  European Commission

WHO (observer)
Actions!
Implementation
= realizing the Strategic Research Agenda

Challenges...
Prioritization
Commitment
Agreeing on how to do
Globalization

Global challenges need global solutions

“Without a coordinated global response, humanity will not overcome the challenges it faces.“

(Subra Suresh, *Nature* 2012)
Antimicrobial resistance is a truly global problem!

Worldwide spread of the 23F clone of penicillin resistant pneumococci

By courtesy of Dr. Liselotte Diaz Högberg
The *landscape*...

Several ongoing initiatives and actions with impact on internationalisation and cooperation – from national to global
“Creating an effective IPAMR will be a huge undertaking, but the successful global campaign to eradicate smallpox, led by the WHO, demonstrates that a coordinated, international response to a public-health threat can work. The attempt must be made — otherwise, the massive health gains made possible by antimicrobial drugs will be lost.”

An intergovernmental panel on antimicrobial resistance

Drug-resistant microbes are spreading. A coordinated, global effort is needed to keep drugs working and develop alternatives, say Mark Woolhouse and Jeremy Farrar.
Executive Order – Combating Antibiotic-Resistant Bacteria

”...hereby order as follows:

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Sec. 9. International Cooperation.
...shall designate representatives to engage in international action to combat antibiotic-resistant bacteria, including the development of the World Health Organization (WHO) Global Action Plan for Antimicrobial Resistance with the WHO, Member States, and other relevant organizations.

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....identify and pursue opportunities for enhanced prevention, surveillance, research and development, and policy engagement.
...expand existing bilateral and multilateral scientific cooperation and research...”
Focus on the economic issues surrounding antimicrobial resistance, including drugs and drug development.

Final report and recommendations in 2016
AMR’s impact on World GDP in trillions of USD

100 trillion USD in 2050!
While the problem is enormous, it can be solved if we collectively take the right steps soon:

There is an international governance framework with the WHO taking the lead to agree a global action plan to tackle AMR between 194 countries this spring.

Already there is cooperation at the highest level in the European Union, and between the EU and the United States for pushing more collaborative and innovative research for new antibiotics involving academics, clinicians and companies, large and small.”
Draft global action plan on antimicrobial resistance

In May 2014, the WHO was requested to develop a draft global action plan to combat antimicrobial resistance, to be submitted to the World Health Assembly in May 2015.

Antimicrobial resistance. Draft global action plan on antimicrobial resistance (A68/20, March 2015)
The goal of the draft global action plan is to ensure, for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them. It is expected that countries will develop their own national action plans on antimicrobial resistance in line with the global plan.

To achieve this goal, the draft global action plan sets out five strategic objectives:

1. to improve awareness and understanding of antimicrobial resistance;
2. to strengthen knowledge through surveillance and research;
3. to reduce the incidence of infection;
4. to optimize the use of antimicrobial agents; and
5. develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.
Professor Anne Glover
Former Chief Scientific Adviser to the President of the European Commission

Back to square one?

Let's go beyond statements!

ESOF – EuroScience Open Forum
Copenhagen, June 2014
Thank you for your attention!

For more information about JPIAMR please visit http://www.jpiamr.eu/