



Federal Ministry  
of Health



**G7 GERMANY 2015**

# Combating Antimicrobial Resistance

Examples of Best-Practices of the G7 Countries

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## Dear Readers,



Antimicrobial Resistances (AMR) are an urgent public health threat for both developed and developing countries. They lead to prolonged treatment times, higher mortality, high burden on health systems and high economic impact. Tackling AMR requires a multisectoral approach, encompassing all areas—human and animal health as well as agriculture and the environment. It also needs international efforts as AMR do not stop at borders.

The Global Action Plan of the World Health Organization (WHO) that was adopted by the World Health Assembly in May 2015 takes this One Health approach into account and provides the frame for further action.

Combating AMR is a high priority for Germany. Therefore it was taken up as one of the health topics of the G7-summit in Elmau in June 2015. The G7 strongly support the WHO Global Action Plan and agreed to foster the prudent use of antibiotics and to engage in stimulating basic research. The Global Action Plan calls for the development of National Strategies by all countries within the next two years. The G7 will develop or review, operationalize and share their national action plans.

Following this decision the updated German National Resistance Strategy DART 2020 was released in May 2015. In the implementation of the previous strategy Germany started several activities and projects that as a bundle contribute to the reduction of AMR.

These activities include for instance the set-up and expansion of surveillance systems, measures on infection prevention and the responsible use of antibiotics, the support of research and development and measures to strengthen the One Health approach. The other G7 partner countries have also examples of successful initiatives.

Combating AMR also means to learn from each other and to share experience to strengthen our own efforts in the fight against AMR. This brochure compiles best practice models from all G7-Partners, covering multiple areas. It forms a basis for discussing at the G7-Health Ministers conference in October 2015 in Berlin but is also intended to be used afterwards in the context of the implementation of the WHO Global Action Plan.

A handwritten signature in blue ink, appearing to read 'Hermann Gröhe', written in a cursive style.

Hermann Gröhe MdB  
Federal Minister of Health



## Dear Readers,

We can only be successful in combating antibiotic resistance if both human and veterinary medicine work closely together. As Germany's Minister of Agriculture, I am therefore only too happy to make my contribution to the topic of 'antibiotic resistance', which the G7 Health Ministers are placing at the centre of their conference. Our joint effort in the spirit of the 'one-health' approach will thus empower us to fulfil our responsibility for human and animal health.

In the area of veterinary medicine, many states, including Germany, were quick to recognise the writing on the wall and put strategies in place to reduce antibiotic resistance. Since 2002, veterinarians in Germany are no longer allowed to dispense or prescribe antibiotics for treatment periods exceeding seven days. The year 2011 saw the introduction of the requirement that the amounts of antibiotics dispensed by veterinarians must be recorded. One important milestone was the launch, in 2014, of the antibiotics minimisation concept for animal husbandry that was legally established in the 2013 Medicinal Products Act.

The Federal Government has been pursuing the 'one-health' approach for quite some time. In the year 2008, for example, we set up the interministerial German Antibiotic Resistance Strategy (DART) that created the foundation for human medicine, veterinary medicine, agriculture and scientific research to work closely together so as to further reduce the use of antibiotics. We are steering the right course here and we will continue to pursue this course consistently with DART 2020.

However, we do not intend to rest on our laurels. Our goal is to limit the use of antibiotic veterinary medicinal products to the minimum and thus continue reducing the risk to the well-being of human beings and animals that is associated with antibiotic resistance. I wish to extend my sincere gratitude to everyone who is contributing to the fulfilment of this demanding task!

A handwritten signature in blue ink, appearing to read 'Christian Schmidt'.

Christian Schmidt MdB  
Federal Minister of Food and Agriculture

## Dear Readers,



WHO warmly welcomes this G7 joint effort, led by Germany, to combat the rise of antimicrobial resistance. The initiative sets in motion actions recommended in the WHO Global Action Plan on Antimicrobial Resistance, approved by the World Health Assembly in May 2015. It rightly recognizes that combatting antimicrobial resistance must engage society and multiple sectors of government, including veterinary medicine and agriculture, and illustrates how this is being done.

The brochure provides a compendium of best practices in Europe, Canada, Japan, and the USA, and a menu of policy options that can be used by other countries. Options covered include strategies for enhanced surveillance, regulation of the use of antibiotics in veterinary medicine, national campaigns to promote prudent and appropriate use, and initiatives to prevent infections in the first place, especially in intensive care units and surgical wards.

Taking an international approach is imperative. Drug-resistant pathogens are notorious globe-trotters. The growth of medical tourism has accelerated the international spread of hospital-acquired infections that are frequently resistant to multiple drugs.

I cannot overstate the urgency of actions being undertaken by G7 countries. Antimicrobial resistance is now regarded as a major health and medical crisis. Highly resistant “superbugs” haunt emergency rooms and intensive care units around the world. Gonorrhoea is now resistant to multiple classes of drugs. An epidemic of multidrug-resistant typhoid fever is rolling across parts of Asia and Africa. Even with the best of care, only around half of all cases of multidrug-resistant tuberculosis can be cured.

With few new antimicrobials in the pipeline, the world is heading towards a post-antibiotic era when common infections will once again kill. A post-antibiotic era means, in effect, an end to modern medicine as we know it. Some sophisticated interventions, like joint replacements, organ transplantation, cancer chemotherapy, and care of preterm infants, would become far more difficult or even too dangerous to undertake.

A handwritten signature in blue ink that reads "M. Chan".

Dr Margaret Chan  
Director-General of the World Health Organization

# Introduction

When Alexander Fleming won the Nobel Prize for the discovery of penicillin and its curative effect in various infectious diseases in 1945, he was already aware that this powerful medical tool could easily become weak. “Mr. X. has a sore throat. He buys some penicillin and gives himself, not enough to kill the streptococci but enough to educate them to resist penicillin. He then infects his wife. Mrs X gets pneumonia and is treated with penicillin. As the streptococci are now resistant to penicillin the treatment fails. Mrs. X dies,” he explained in his Nobel Lecture. The researcher knew that in the laboratory, it was not difficult to make microbes resistant to penicillin by exposing them to concentrations not sufficient to kill them. “And the same thing has occasionally happened in the body,” he told the audience.

70 years later, antimicrobials still play a crucial role for the current and future success of human and veterinary medicine. However, the number of bacterial pathogens that have become less susceptible or even completely resistant to antibiotics is increasing—essentially due to broad and inappropriate use of antibiotics. Antimicrobial resistance (AMR) has become a major challenge for modern medicine worldwide, affecting humans and animals alike. Each year, hundreds of thousands of people are getting infected with pathogens in connection with inpatient medical treatment worldwide. Too many of them die. Around one third of these infections could be avoided if suitable measures were taken. Resistant pathogens play a particularly important role here, since the treatment options are limited. The current situation shows that the fight against antibiotic resistance is still not being tackled with the necessary urgency worldwide. Awareness of the problem still needs to be improved in various areas.

The Joint Efforts to Combat Antimicrobial Resistance (AMR) formulated in the annex of the Leaders’ Declaration of the G7 Summit in June 2015 summarize the crucial steps to meet this challenge. Among them is the necessity to identify and share best practice examples, providing information on existing programs as well as most successful strategies to prevent avoidable infections and promote the responsible use of antibiotics.

This publication contains best practice examples from G7 countries. It presents some of the existing experience in combating antimicrobial resistance other countries might benefit from. At the World Health Assembly in May 2015 Member States of the WHO committed to develop national action plans on AMR within two years. This best practice brochure aims to contribute to the further development and implementation of the respective national action plans on antimicrobial resistance.

All countries must increase their efforts: They must further develop their concepts and strategies, and expand their measures already in use. The best practice examples presented in this booklet document initial successes for further efforts to build-on. Let us take the opportunity to learn from each other!

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## The best practice examples are categorized by five subsectors:

1

### **Strengthening the One Health approach**

Animals and human beings are often infected by the same pathogens, treated with the same antibiotics and thus have a mutual influence on the problems of resistance. All sectors need to work closely together in order to protect the health of both people and animals and to maintain the effectivity of antibiotics.

2

### **Combating and preventing infections**

by raising awareness of antimicrobial resistance and deepening the knowledge of infection prevention and control—not only among human and animal health professionals but also among the general public.

3

### **Promote the responsible use of antibiotics**

by committing to use them only for therapeutic reasons after individual diagnosis, and under supervision of health professionals in compliance with legislation. Implementation of stewardship programmes for healthcare professionals as well as livestock producers.

4

### **Strengthening the surveillance system**

for existing and emerging patterns of antimicrobial resistance and antibiotic use in medical, veterinary and agricultural settings in order to fill knowledge gaps and develop effective strategies to fight AMR.

5

### **Support of research and development**

by increasing basic research, epidemiological research as well as the development of and access to new antimicrobials, treatment alternatives and rapid diagnostic tools.

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CHAPTER **1**

# Strengthening the One Health approach

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Pages 12, 20, 21



Page 11



Human, animal and environmental health is inextricably linked. The development of antimicrobial resistance can therefore only be tackled with a cross-sectoral approach: the One Health approach. Building a bridge between public health, health care, animal health and the agricultural sector is essential and has to be improved in all fields (politics, economics, and research) and on all levels (international, national, and local). Setting up national action plans on antimicrobial resistance, for example, requires the collaboration of stakeholders from all relevant areas. Furthermore, research associations should bring together scientists of different sectors by investigating antimicrobial resistance in humans, animals, food and the environment. A common, worldwide approach only can bring about a long-lasting change in the situation.

A world map is shown in a light, semi-transparent style. Three callout boxes are overlaid on the map, each pointing to a specific region. The first callout box, located over Germany, contains the text 'Pages 14, 15, 16' and a small German flag. The second callout box, located over the European Union, contains the text 'Pages 17, 19' and a small European Union flag. The third callout box, located over Italy, contains the text 'Page 18' and a small Italian flag.

Pages 14, 15, 16

Pages 17, 19

Page 18

# Federal Framework and Action Plan on AMR



► **The purpose of the Federal Framework is to identify key government of Canada areas of focus and map out a multi-sectoral, coordinated, collaborative approach by federal departments to respond to the threat of AMR. Building on the framework, the Action Plan identifies concrete commitments and activities that will be undertaken by key federal departments.**

In 2013, Government of Canada departments identified the need for better coherence, collaboration and coordination in preventing, limiting and controlling the emergence and spread of AMR in Canada. Specifically, there was a need to bridge between public health, health care, animal health and agri-food sectors for a more integrated approach.

In October 2014, The Government of Canada released Antimicrobial Resistance and Use in Canada: A Federal Framework for Action which takes a One Health approach to antimicrobial use (AMU) and AMR. The Framework maps out surveillance, stewardship and innovation as key areas of focus and identifies the roles and responsibilities of key federal departments in terms of both human and animal health.

The Action Plan released in March 2015 builds on the strategic areas of focus and priority action items outlined in the Framework. It identifies specific actions that will be undertaken by the Public Health Agency of Canada, Health Canada, the Canadian Food Inspection Agency, the Canadian Institutes of Health Research, Agriculture and Agri-Food Canada, the National Research Council, and Industry Canada.

In addition, the Government of Canada is committed to taking a leadership role both nationally and internationally. Leveraging the Federal Framework,

formal governance with provinces and territories, and relationships with human and animal health sectors, it continues to bring together all sectors to take an objective and integrated approach to the development of a pan-Canadian framework on AMR. International efforts include policy discussions with leading countries and partner organizations, and the provision of technical expertise to human and animal health working groups, particularly in the areas of surveillance.

[healthycanadians.gc.ca/antibiotics](http://healthycanadians.gc.ca/antibiotics)

**Timescale:** 2015–2019

## The owners and organisation involved in the project

Public Health Agency of Canada  
Lianne Bellisario  
613-863-1588  
[lianne.bellisario@phac-aspc.gc.ca](mailto:lianne.bellisario@phac-aspc.gc.ca)

# 2011–2016 National Antimicrobial Alert Plan



› The third plan is a continuation of effective, recognised actions existing in the two previous plans. It stresses the need for good patient care. This requires that the professional have the tool to make the right choices, but also that he/she be trained in the specific aspects of bacterial infections, antibiotic use and resistance phenomena.

In 2002, the French Minister of Health launched a national plan to preserve efficacy of antibiotics, which was renewed from 2007 to 2010, the objectives were to increase awareness of Public and health professionals and to promote good antibiotic prescription.

The 2011–2016 “National Antimicrobial Alert Plan” is pursuing actions initiated under previous plans with the addition of some major new initiatives, in particular a target of reducing antimicrobial prescriptions by 25% over a five-year period, to be nearest of the European average of antibiotic consumption. The other goals of this third plan, are in particular to set up a network of dedicated professionals for helping GPs in order to improve the prescription of antibiotics.

In 2015, Minister Touraine installed a group of experts chaired by Jean Carlet to propose recommendations on the preservation of antibiotics. This report outlined 4 areas of action: establish a national coordination to tackle AMR, encourage research and development in the field of AMR, involve the civil society and promote a specific status for antibiotics.

A specific plan known as Ecoantibio 2012–2017 was drawn up for veterinary medicine. It focuses on: good practices for prescribing antibiotics by veterinarians; information and awareness raising

among veterinarians, farmers and owners of animals on the good use for animals; as for human medicine, there is a quantitative objective to decrease the consumption of antibiotics by 25% in five years; there are also qualitative objectives focused on reducing the use of critical antibiotics in veterinary medicine (focussing on fluoroquinolones, cephalosporins 3–4).

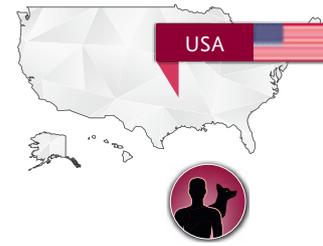
Legislative measures have been taken to reach the goals set in the national plan for veterinary antibiotics, particularly regarding antibiotics of critical importance. When taking all animal species into account, overall exposure to antimicrobials for 2013 fell by 7.3% as compared to 2012.

**Timescale:** 2012–2017

## The owners and organisation involved in the project

- Ministry of Health
- National Drugs Agency
- National health insurance
- ANSES—French Agency for Food, Environmental and Occupational Health & Safety
- Ministry of Agriculture

# National Strategy for Combating Antibiotic-Resistant Bacteria (CARB)



- › To prevent, detect, and control illness and death related to infections caused by antibiotic-resistant bacteria, mitigate the emergence and spread of antibiotic resistance, and ensure the continued availability of therapeutics for the treatment of bacterial infections, through domestic and international whole-of-government and whole-of-society approaches.

In December 2013, President Obama called for an assessment of the current and growing threat of antibiotic resistance and the development of a multi-sectoral plan to combat resistant bacteria. Federal Departments and Agencies worked together with input from outside the government to develop practical, evidence-based ways to enhance antibiotic stewardship, strengthen surveillance for antibiotic resistance and use, advance the development of new diagnostics, antibiotics, and novel therapies, and accelerate research and innovation. On September 18, 2014 President Obama launched a comprehensive set of national measures to combat antibiotic-resistant bacteria. These include Executive Order 13676; the National Strategy on Combating Antibiotic-Resistant Bacteria; a \$20 million prize to facilitate the development of rapid diagnostic tests for healthcare providers; and the President's Council of Advisors on Science and Technology report on Combating Antibiotic Resistance. On March 27, 2015 the Administration released the National Action Plan for Combating Antibiotic-Resistant Bacteria, which outlines steps for implementing the National Strategy and addresses recommendations of the PCAST report. In June 2015 White House convened a Forum on Antibiotic Stewardship at which over 150 major food companies, retailers, and human and animal health stakeholders announced commitments to combat antibiotic resistance.

This national effort is already showing successes in preventing the spread of infections, strengthening one health surveillance efforts, developing regulatory pathways to facilitate innovative diagnostics, and accelerate basic and applied research and development for new antibiotics, other therapeutics, and vaccines. The development of this successful approach required leadership from the White House and wide working level engagement including health, agriculture, policy, economic, defence, foreign relations, and budget experts.

**Timescale:** Three implementation periods of one, three, and five years.

## The owners and organisation involved in the project

- National Strategy for Combating Antibiotic-Resistant Bacteria, Sept. 2014 [https://www.whitehouse.gov/sites/default/files/docs/carb\\_national\\_strategy.pdf](https://www.whitehouse.gov/sites/default/files/docs/carb_national_strategy.pdf)
- National Action Plan for Combating Antibiotic-Resistant Bacteria

# One Health and AMR



- ▶ To slow development and spread of AMR, the UK Government published the 'UK Five Year Antimicrobial Resistance Strategy 2013-2018', in September 2013. The Strategy takes a 'One Health' approach; acknowledging that effective progress can only be achieved by close collaboration between medical, veterinary, food and environment sectors. An update on progress so far and an Implementation Plan setting out activity over the next four years has been published in December 2014. Further progress reports will follow annually.

UK has developed a comprehensive human health surveillance programme (the English surveillance programme for antimicrobial utilisation and resistance or ESPAUR) which tracks prescribing and resistance trends in England. The first report was published in October 2014.

UK veterinary surveillance incorporates antibiotic sensitivity testing of bacteria from healthy animals (since 2014) and from clinical veterinary cases (since 1998), and reports the total quantity of antibiotics sold by veterinary pharmaceutical companies (since 2005). These data have been reported together since 2013 in the annual Veterinary Antibiotic Resistance and Sales Surveillance report, (UK-VARSS). The UK is currently working to establish systems for surveillance of antibiotic consumption in animals.

The UK's One-Health report (<https://www.gov.uk/government/publications/uk-one-health-report-antibiotics-use-in-humans-and-animals>) brings together and compares the most recently available UK data on antibiotic resistance and antibiotic use in both human and veterinary sectors. It was published for the first time in July 2015 and will be updated every two years.

The UK produced guidance by various British Veterinary Associations and by the Responsible Use of Medicines in Agriculture Alliance (RUMA) to inform their members about responsible prescribing.

The UK is working to develop potential projects in the animal health sector involving AMR standards into day-one-competences (essential competences required for vets students to register as a veterinary surgeon (this is in conjunction with the Royal College of Veterinary Surgeons).

**Timescale:** ongoing

## The owners and organisation involved in the project

Department of Health  
 Veterinary Medicines Directorate:  
<https://www.gov.uk/government/organisations/veterinary-medicines-directorate>

# GERMAP



## › GERMAP is a report that provides a summary of data on the consumption of antimicrobials and the extent of resistances against antimicrobials in human and veterinary medicine.

GERMAP is a report that provides a summary of data on the consumption of antimicrobials and every two years the extent of resistances against antimicrobials in human and veterinary medicine. It is compiled by an expert group from human and veterinary medicine and is updated every second year. It is a basis for risk assessment and supports the development of treatment-guidelines for both humans and animals.

Results from the recent report (GERMAP 2012): In human medicine, broad spectrum antimicrobials, especially cephalosporins and fluoroquinolones, still have a large share of the overall consumption of antimicrobials. This applies for ambulatory as well as in-patient treatments. As it is known, both antibiotic classes select for multi-drug resistant bacteria more than most other classes. A reduced use of cephalosporins and fluoroquinolones for therapy in both sectors therefore must be a goal with high priority.

Furthermore the use of antimicrobials can be reduced in prophylaxis, especially when peri-operative prophylaxis continues too long after surgery. In the ambulatory sector the use of antimicrobials against acute respiratory diseases must be reduced. In the veterinary sector reliable data on the sales of antimicrobials in 2011 were available for the first time.

The development of resistances in bacteria pathogenic for animals is characterized by increasing rates of ESBL-producing bacteria and MRSA. The recent

isolation of carbapenemaseproducing bacteria from animals is proof that a transfer of resistant bacteria or resistance genes between humans and animals is possible in both directions.

**Timescale:** since 2008, ongoing

### The owners and organisation involved in the project

- Bundesamt für Verbraucherschutz und Lebensmittelsicherheit  
Dienstsitz Berlin  
Mauerstraße 39–42, 10117 Berlin  
[www.bvl.bund.de](http://www.bvl.bund.de)
- Paul-Ehrlich-Gesellschaft für Chemotherapie e.V.  
Campus Hochschule Bonn-Rhein-Sieg  
Von-Liebig-Straße 20, 53359 Rheinbach  
[www.p-e-g.org](http://www.p-e-g.org)
- Infektiologie Freiburg  
Medizinische Universitätsklinik  
Zentrum Infektiologie und Reisemedizin  
Hugstetter Straße 55, 79106 Freiburg
- <http://www.p-e-g.org/econtext/germap>

# RESET



- › **1. To determine the prevalence of ESBL-producing bacteria in humans (hospital, ambulant, community), animals (livestock, pets), animal food and the environment (wastewater). 2. To identify the respective resistance genes and analyse their transferability between enterobacteriaceae. 3. To compare genetic relationship of bacterial isolates and resistance gene carrying plasmids in different settings (human, animal, environment) to evaluate the transmission pathways of ESBL-resistance.**

The RESET project is funded by the Federal Ministry of Education and Research and its aims are in the scope of the German Antimicrobial Resistance-Strategy DART2020. Ten project partners including public health institutes and universities of human and veterinary medicine as well as hospitals of human medicine and veterinary medicine are involved in the RESET project. In the first period of the project (2011–2013) the project partners conducted different studies to determine the prevalence of fluoroquinolone resistance and cephalosporin resistance (ESBL production) in *Escherichia coli* from humans (hospitalised patients, outpatients, healthy persons), animals (livestock and pets), animal food and environment (wastewater, shed environment). In the second period of the project the genetic relationship of the collected isolates will be compared in detail to evaluate transmission pathways.

Further, special studies e.g. on the risk of infection with ESBL-producing bacteria after previous ESBL-colonization will be conducted. First results showed a high prevalence of ESBL-producing *E. coli* in livestock animals (>50%) and in a certain amount of healthy humans (6%). The vast majority of ESBL-*E. coli* from humans produce CTX-M-15 but in animals this

enzyme type is rare. This indicated a human reservoir and a selection of these resistant bacteria by antibiotic use in human medicine. However, other ESBL-variants, e.g. CTX-M-1 and CTX-M-14, are frequently present in *E. coli* from humans and animals—here a detailed genome-based comparison is in progress to evaluate possible transmission routes between animals, food and humans or to identify potential reservoirs of multidrug-resistant bacteria.

**Timescale:** 2011–2016

## The owners and organisation involved in the project

Institut für Biometrie, Epidemiologie und Informationsverarbeitung  
 Prof. Dr. Lothar Kreienbrock  
 Stiftung Tierärztliche Hochschule Hannover  
 Bünteweg 2  
 30559 Hannover  
[www.reset-verbund.de](http://www.reset-verbund.de)

# MedVet-Staph



- 1. To identify the risk MRSA which emerged in livestock and companion animals pose to humans. 2. To identify the contribution of clinically relevant antibiotic resistance genes contained by staphylococci from animals to antibiotic resistance development in staphylococci of human. 3. To further develop targeted antibiotic resistance surveillance as well as strategies for diagnostics, intervention, and therapy as one health approach.

The MedVetStaph project cluster is funded by the German Ministry of Education and Research and focusses on antibiotic resistance in staphylococci, in particular methicillin resistant *Staphylococcus aureus* (MRSA). The results from this work are translated to the German Antibiotic Resistance Strategy (DART). The cluster consortium consists of 11 partners from human and veterinary medicine in the academia and federal institutions, as well as one company developing tools for rapid diagnostics.

Data from molecular epidemiology based interdisciplinary studies reveal that livestock associated MRSA are able to cause the same kind of infections in humans as *S.aureus* and MRSA in general. They can be introduced to hospitals and cause nosocomial infections there. For this reason screening for MRSA colonization at admittance to hospitals is recommended for farmers and veterinarians with livestock contacts. Although LA-MRSA (> 80%) are multi resistant to several antibiotics there are still sufficient treatment options. Intrahospital dissemination in the absence of sufficient hygiene has only rarely observed for LA-MRSA so far. The proportion of LA-MRSA among all MRSA from nosocomial infections in all Germany is about 3%. This is, however, different in geographical areas with

comparative high density of conventional farms where it amounts up to 10% for MRSA from septicemia and 15% for MRSA from wound infections. This observation should be taken into consideration for future livestock farming and structural planning in rural areas. Comparative genome analysis shows that LA-MRSA have evolved from human adapted methicillin susceptible *S.aureus*, the jump to livestock was obviously associated with several genetic changes. Reversion of them and re-adaptation to humans is currently studied in more detail. It bears a potential health risk and needs tight surveillance and coordinated intervention for which the established network of efficient cooperation is a promising start.

**Timescale:** 2011–2016

## The owners and organisation involved in the project

Institut für Hygiene, Dr. Robin Köck  
 Universitätsklinikum Münster  
 Robert-Koch-Str. 41, 48149 Münster  
[www.medvetstaph.net/](http://www.medvetstaph.net/)

# European Commission Action Plan on AMR



## › Setting out priorities and concrete actions for tackling antimicrobial resistance at EU level, based on a holistic and multi-sectorial approach.

Antimicrobial resistance is a priority for the European Commission with initiatives developed over the past decades in both human and veterinary medicine. To further strengthen its commitment, the Commission launched in November 2011 a 5 year Action Plan against Antimicrobial Resistance, to be implemented in close cooperation with the EU Member States.

The Plan is based on a holistic approach involving all sectors and aspects of antimicrobial resistance (public health, animal health, food safety, consumer safety, research, non-therapeutic use of antimicrobials, etc.). It aims at strengthening the prevention and control of antimicrobial resistance across the sectors and at securing the availability of effective antimicrobial agents. The Action Plan covers seven areas and sets out 12 concrete actions both in the human and veterinary field. Prudent use of antibiotics in human and veterinary medicine, enhanced surveillance systems, development of new antimicrobials and prevention of infections must be pursued in parallel to effectively address AMR. International cooperation is also a key element of the action plan. Collaboration with international organisations such as WHO, FAO and OIE is essential in view of the global nature of AMR.

A progress report on the Action Plan was published in February 2015, showing the state of play of steps taken to address AMR. Moreover, based on the results of an ongoing evaluation of the EC Action Plan, the Commission will decide on possible new or additional policy measures aiming at tackling AMR in the EU and globally in the future.

**Timescale:** multi-annual

### The owners and organisation involved in the project

European Commission,  
DG Health and Food Safety  
[http://ec.europa.eu/health/antimicrobial\\_resistance/policy/index\\_en.htm](http://ec.europa.eu/health/antimicrobial_resistance/policy/index_en.htm)

# The Italian National Health System: a longstanding One Health experience



► Coordinated actions among the three levels of the Italian National Health System, the National Health Institute, the national laboratories Network and a specialized Health Police Corp are conducted on the basis of an annual control Plan on the use of antimicrobials in the veterinary and food Sector, aimed to tackle AMR.

The use of antimicrobials in the veterinary and food sector in Italy is monitored by a 3-level system: national (ItMoH, ISS, NAS Command), regional (21 Regions and Autonomous Province) and local (ASLs).

The System adopts annual Plan where Sectors and Matrix to be investigated are identified, on the basis of scientific developments, requests coming from EU Commission and Reference Laboratory, Police investigations etc. The annual Plan takes into account the distinctive production features in the Italian Regions, anyway in a global vision driven by the data collected in the previous years. Tests are conducted by the IZS Network.

The main driving force of this system is the One Health approach. Veterinary, food safety and human health Authorities are represented and work together at the 3 Level of the NHS. So, any issue is faced in a coordinated and integrated way. Since the establishment of MoH (1958) and of the NHS (1978), veterinarians, prevention and public health experts, scientists and doctors are represented in the different bodies (ItMoH, ISS, Regions, ASLs' Departm. of health).

Controls are made on animals (bovine, swine, birds, etc.) and on their products or derivatives (meats, milk, honey, etc...).

The results are collected through web system at the ItMoH, analysed by ISS and published yearly. Starting from them, the Authorities adopt decisions on interventions in the veterinary, food and/or human field, working together in a Coordination table at the Directorate General for food safety/ItMoH.

The efficacy of this One Health approach is confirmed by the number of tests per year, exceeding the legal obligation (more than 11000 per year), and by the very small number of non conformities (0.037%).

**Timescale:** 2006—ongoing

## The owners and organisations involved in the project

- Ministry of Health (ItMoH)
- Regional Health Authorities
- Local Health Authorities (Asl)
- Istituto Superiore di Sanità (ISS)
- Istituti Zooprofilattici Sperimentali (IZS)
- Health Police Corp (NAS)

# EU support to One-Health research



- › Support research on AMR that follows a holistic One-Health approach, addressing AMR in human health, animal health as well as in the environment.

The European Commission is strengthening research that follows a holistic One-Health approach and addresses AMR in human health, animal health as well as in the environment. The supported research includes the EvoTAR project that has already characterized a large number of resistance genes and has provided more insight into the dynamics of resistance within hosts as well as between different reservoirs of resistance (human, animal, and environment). Furthermore, the EFFORT project aims to provide scientific evidence to inform decision makers, the scientific community and other stakeholders about the consequences of AMR in the food chain. The project is studying the relationship between farming practises, antimicrobial usage, animal health and resistance and reaches out to policy makers world-wide via webinars.

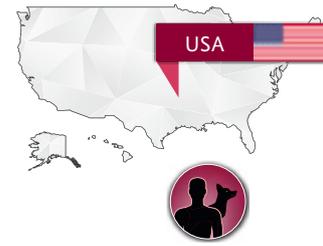
Early 2016, the Joint Programming Initiative on Anti-microbial Resistance (JPIAMR) will launch a transnational research call that will be co-funded by the European Commission via an ERA-net, welcoming proposals focussing on the dynamics of AMR at genetic, bacterial, animal, human, societal and environmental levels, in order to design and evaluate preventive and intervention measures for controlling resistance.

**Timescale:** multi-annual

## The owners and organisation involved in the project

European Commission,  
DG Research & Innovation  
e.g. <http://www.evotar.eu/>;  
<http://www.effort-against-amr.eu/>;  
[www.jpiamr.eu](http://www.jpiamr.eu)

# Get Smart: Know When Antibiotics Work



› Antibiotic resistance is a growing problem and the main cause of this problem is misuse of antibiotics. CDC's Get Smart: Know When Antibiotics Work program works to make sure antibiotics are prescribed only when they are needed and used as they should. The Get Smart program focuses on common illnesses that account for most of the antibiotic prescriptions written for children and adults in doctors' offices and other outpatient settings.

The Get Smart: Know When Antibiotics Work program focuses on educating healthcare providers and patients on the appropriate use of antibiotics in the outpatient setting and promoting outpatient antibiotic stewardship programs and interventions. Outpatient stewardship refers to coordinated efforts to promote appropriate prescribing of antibiotics for non-hospitalized patients in clinics, offices, and emergency rooms.

Programs can range in size and scope and can be implemented by a variety of stakeholders. Regardless of the clinical setting, the overarching goal is to promote adherence to clinical practice guidelines to provide the best standard of care and to minimize the spread of antibiotic-resistant bacteria. The program works closely with partners to reach this goal.

Additionally, the program coordinates Get Smart About Antibiotics Week, an annual observance to raise awareness of the threat of antibiotic resistance and the importance of using antibiotics appropriately. The observance is a key component of CDC's efforts to improve antibiotic stewardship in communities, in healthcare facilities, and on the farm in collaboration with state-based programs, nonprofit partners, and for-profit partners.

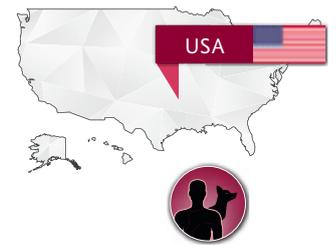
The observance is an international collaboration, coinciding with many other countries and organizations activities during the week.

**Timescale:** ongoing

## The owners and organisation involved in the project

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# FDA Approach to Judicious Antibiotic Use in Animals



- Working through public-private partnerships, to promote judicious antibiotic use in food animals, the U.S. Food and Drug Administration (FDA) developed a collaborative approach to help ensure medically important antimicrobial drugs in food producing animals are limited to uses necessary for assuring animal health and include veterinary oversight.**

Working through public-private partnerships, the U.S. Food and Drug Administration (FDA) developed a collaborative approach to help ensure medically important antimicrobial drugs in food-producing animals are limited to uses necessary for assuring animal health and include veterinary oversight. This voluntary effort represents a significant change in how these products have been used for decades and has proved to be considerably faster to implement than a mandatory approach.

A mandatory withdrawal of individual approved drugs can involve protracted legal proceedings and is subject to challenge. In contrast, FDA sought broad public input over a number of years on plans to work with pharmaceutical companies to voluntarily withdraw production uses and require veterinary oversight of remaining therapeutic uses of medically important antimicrobials approved for use in feed or water of food producing animals. All 25 pharmaceutical companies with affected products agreed to fully adopt the FDA's judicious use approach, withdrew 30 drugs from the market, and began implementing some of the recommended changes prior to the 3 year target.

The value of this approach was confirmed at a June 2015 White House Antibiotic Stewardship Forum where participants highlighted voluntary commit-

ments to stewardship. In addition to aligning their products with FDA's guidance, pharmaceutical companies are investing in vaccines, on-farm hygiene, and innovations to benefit animal health. Food producers are voluntarily setting standards to phase out affected products, providing responsible use guidelines to meat suppliers, and funding research for antibiotic alternatives. Feed industry organizations and farmers are educating producers about the FDA changes. Veterinary and agriculture associations are developing stewardship guidelines and conducting regional workshops on the new policies. Non-government organizations are developing standards and verification programs.

**Timescale:** ongoing

## The owners and organisation involved in the project

U.S. Food and Drug Administration  
<http://www.fda.gov/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/ucm216939.htm>

CHAPTER **2**

# Combating and preventing infections

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Human Health



Animal Health



Human and Animal Health



There is a whole range of interventions that help prevent and control infections and the spread of antimicrobial resistant bacteria. Hand hygiene, for example, is particularly important. Measures like these need to be accompanied by the development and implementation of guidelines and training for healthcare-professionals. The establishment of networks including hospitals, ambulatory care, nursing homes, laboratories and public health institutions contributes to the implementation of interventions across all health sectors. With the help of quality indicators assessing the performance of healthcare-providers, infection prevention and control efforts can be compared among hospitals. Apart from that, developing and implementation of novel antimicrobial drugs or alternatives for humans and animals could help reduce antibiotic use and thus also influence the emergence of antimicrobial resistance.

A world map is shown in a light blue and white color scheme. Three callout boxes are overlaid on the map, each pointing to a specific country. The first callout box, located over Germany, is blue and contains the text 'Page 26' and a small German flag. The second callout box, located over Japan, is blue and contains the text 'Pages 28, 35' and a small Japanese flag. The third callout box, located over Italy, is blue and contains the text 'Pages 30, 31, 32, 33' and a small Italian flag.

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Pages 30, 31, 32, 33

# National Action Plan to Prevent Healthcare-Associated Infections (PROPIAS)



› The national plan on HAI is in line with the national plan on antibiotics 2011–2016, the national programme on patient safety 2013–2017 and the national health strategy. It is clearly prevention-focused and patient-centred, as it aims to impact the daily practice of health professionals in the patient management.

Prevention and control of healthcare-associated infections—the 2015 National Action Plan to Prevent Healthcare-Associated Infections (Propias) aims to

1. Enhance the prevention of HAI across the continuum of settings in which health care is delivered (acute care and long-term facilities, out-patient treatment),
2. Reinforce control of antibiotic resistance, and
3. Reduce the risks of HAI with regard to invasive procedures.

A target is drafted for each action and the source of measurement defined. Propias is available at: <http://www.sante.gouv.fr/programme-national-d-actions-de-prevention-des-infections-associees-aux-soins-propias.html>

**Timescale:** 2015–2020

## The owners and organisations involved in the project

- Ministry of Health
- Regional Health Agencies
- National Drugs Agency
- Social Security
- French Institute for Public Health Surveillance

# Improvements in combating infections



- › The UK continues to support quality improvement standards for IPC at a national level to reduce the risk of harm from healthcare-associated infections for patients, staff and visitors; and to reduce the costs associated with preventable infection.

The UK is developing an integrated indicator (to come into effect from April 2016) which will assess the performance of acute care facilities on infection prevention and control. The indicator will provide a more comprehensive picture of prescribing and resistance trends set out against each healthcare provider. This information will be in addition to current surveillance provisions covering rates of bloodstream infections: MRSA; E. coli; MSSA and C. difficile infections.

The UK has strengthened the Code of Practice on the prevention and control of infection and related guidance (The Code), linked to the Health and Social Care Act 2008. The changes strengthen the infection prevention and control requirements and antimicrobial stewardship framework for healthcare providers. We have also engaged with the Care Quality Commission to explore how infection prevention and control and antimicrobial stewardship aspects can be built into the key lines of enquiry used in their inspections of healthcare providers.

The National Institute for Health and Care Excellence (NICE) published guidance on medicines optimisation in March 2015 and on antimicrobial stewardship in August 2015 to drive best practice across the health-care system. Other guidance related to AMR and IPC is included on the NICE work programme including a suite of short infection syndrome guidelines.

Public Health England is working with the Department of Health Advisory Committee on Antimicrobial Resistance and Healthcare-Associated Infections to develop an overarching national framework to optimise prescribing by end of 2016/17. The framework will address diversity in prescribing and monitoring of its effect on patient outcomes enabling the safe delivery of year on year reductions in infections.

Scotland has a National Infection Prevention and Control Manual adopted by all NHS Boards and considered best practice in all non-National Health Service settings.

**Timescale:** ongoing

## The owners and organisation involved in the project

Department of Health/NHS England/  
Public Health England

# “Aktion Saubere Hände” (Clean Hands)



- › Hand hygiene is of particular importance for infection prevention. “Aktion Saubere Hände” (Clean Hands) is a national campaign for improvement of compliance to hand disinfection in German healthcare facilities based on the WHO campaign “Clean Care is Safer Care” that started in 2005. It supports implementation of multimodal infection control interventions.

The Clean Hands project “Aktion Saubere Hände” (ASH) supports implementation of multimodal infection control interventions in healthcare institutions (HCI), for example by providing training material and video tutorials for health care workers. The contents of the campaign were adapted to the different medical situations and the modular structure allows application not only to hospitals, but also to residential and nursing homes and outpatient treatment. In addition information for patients and relatives are available for improvement of patient safety. On a voluntary basis 1900 health care institutions are participating, including almost 50% of the approximately 2000 German hospitals (June 2015).

Another core objective of ASH is to collect data from healthcare institutions to monitor the effectiveness of interventions over the campaign period. Since 2008 the evaluation of alcohol-based hand rub consumption data was established as a surrogate parameter for hand hygiene performance. The latest data records further progress as, over a period of eight years, the hospital-wide hand rub consumption increased by 84%.

In 2015 ASH presented for the first time the compliance data collected by direct observation of Health Care Workers for benchmark analysis in Germany.

The overall mean for hand hygiene compliance is 72%. The reference data reports the current state and the distribution of hand hygiene compliance and stimulates further improvements for patient safety.

**Timescale:** 2008—ongoing

## The owners and organisation involved in the project

- German National Reference Center for Surveillance of Nosocomial Infections: <http://www.nrz-hygiene.de/>
- Coalition for Patient Safety: <http://www.aktionsbuendnis-patientensicherheit.de/>

# Infection Prevention and Control Guideline Series



- This project provides healthcare professionals with infection prevention and control guidance for health care settings. The series includes two foundation documents: hand hygiene practices in health care settings (2012) and routine practices and additional precautions for preventing the transmission of infection in healthcare settings (2013), along with more concise guidance targeting specific organisms such as *Clostridium difficile*.

Developing and implementing effective infection prevention and control measures reduces the risk of transmission of pathogens by interrupting the epidemiological chain of infection (altering host, organism, environment, transmission route/risk) in both healthcare and community settings.

To help reduce, minimize or prevent the occurrence of infection, the Public Health Agency of Canada (the Agency) produces a series of infection prevention and control guidelines for healthcare professionals in the healthcare setting.

The Agency works with a group of external technical experts to draft evidence-informed guidance and collaborates with stakeholders, professional associations and organizations, and provinces and territories to share information and identify best practices.

The Agency's guidance informs practitioners of essential infection prevention and control practices. In addition, Routine Practices and Additional Precautions Assessment and Educational Tools includes a summary of the elements of routine practice, an algorithm for a point of care risk assessment for personal protective equipment, and case scenarios.

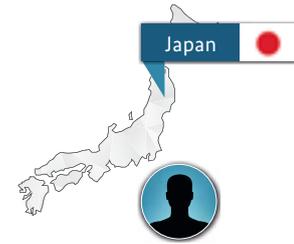
These tools may assist other jurisdictions that have not yet developed similar guidance. The external advisory approach may also be a model that could be used to leverage expertise not available within governments.

**Timescale:** ongoing

## The owners and organisation involved in the project

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<http://www.phac-aspc.gc.ca/nois-sinp/guide/pubs-eng.php>

# Area network for infection control



› **Area network for infection control involves not only advanced hospitals but also small hospitals, clinics and nursing care facilities. They share their best practices and educate each other through mutual site visits to promote infection control.**

In Japan's healthcare system, tertiary hospitals are considered to be a "hub" of the area network for infection control. Within the networks, tertiary hospitals and other facilities including secondary hospitals, nursing homes and clinics learn their best practices and educate each other through mutual site visits to promote infection control.

Hospitals receive additional reimbursement from insurers to hospitals, if they meet the criteria, such as designating full time certified infection control nurse or infection control doctor, holding medical area meetings four times per year or more, and promote the prudent use of broad-spectrum antibiotics and anti-MRSA drugs. Through the area networks, hospitals share surveillance data on antimicrobial resistance (AMR) rates and incidence of infections.

Addressing the infection control by a single healthcare facility alone is not enough, because a patient may often receive health care at multiple facilities including nursing homes. In addition, the number of infection control specialists is still not enough to cover all health care facilities. Therefore, shared awareness of issues and collective activities within the area are necessary to tackle AMR. Education provision is also an important role of the network, such as hand hygiene, surveillance method and epidemiological data of the local infections. The networks contribute to enhancing preparedness to AMR in the area building "herd immunity" to AMR.

The area networks also contribute to outbreak response. When a nosocomial infection outbreak occurs, each hospital takes the primary responsibility to contain it in compliance with the law. However, if the hospital fails to control, it asks the network for support. Response to outbreaks includes active surveillance, environmental screening, re-education of healthcare workers, special sterilization (i.e. vapor hydrogen peroxide) and special testing (i.e. pulsed-field gel electrophoresis, gene tests).

**Timescale:** The governmental support on nosocomial infection control area network project started in 2004. Reimbursement from insurers started in 2012.

## The owners and organisation involved in the project

Ministry of Health, Labour and Welfare

# NHSN Antimicrobial Use and Resistance Module



- › The National Healthcare Safety Network (NHSN) Antimicrobial Use and Resistance (AUR) Module enables hospitals to report, track, and respond to antimicrobial use and antimicrobial resistance data and enables CDC to use the data for national benchmarks and analyses. As a result, the AUR data can be used to measure and improve the use of antimicrobials in U.S. hospitals and lessen the burden of antibiotic resistant infections.

CDC's National Healthcare Safety Network (NHSN) is the most widely used healthcare-associated infection (HAI) tracking system within the U.S. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate healthcare-associated infections. The goal of the NHSN AUR Module is to provide a mechanism for facilities to report and analyze antimicrobial use and/or resistance as part of local or regional efforts to reduce AR infections through antimicrobial stewardship efforts or interruption of transmission of resistant pathogens at their facility. The AUR Module only allows for electronic reporting, with microbiology and pharmacy data captured and reported electronically from Electronic Medication Administration Record (eMAR) or Bar Coding Medication Administration (BCMA) systems in hospitals.

The AU reporting option provides a mechanism for facilities to report and analyze antimicrobial usage as part of antimicrobial stewardship efforts at their facility. CDC has developed a measure based on this data to help facilities compare antimicrobial use that the hospitals report with expected antimicrobial use based on national data. The measure is comprised of a discrete set of ratios, Standardized Anti-

microbial Administration Ratios (SAARs) that summarize observed-to-predicted antimicrobial use based on the antibiotic and patient location. The SAARs are designed to serve as indicators for antimicrobial stewardship programs (ASPs), revealing possible overuse, underuse, or inappropriate use of antimicrobials; track improvements to antimicrobial prescribing; and evaluate impact of antimicrobial stewardship programs. The AR reporting option facilitates the evaluation of AR data using a standardized approach while providing facilities with an improved awareness of AR issues within their hospital to aid in clinical decision making and prioritize prevention efforts.

**Timescale:** ongoing

## The owners and organisation involved in the project

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# Risk analysis for the control of HAI in Intensive care and Surgery



- To perform a risk analysis for the control of HAI in Intensive care and Surgery Units, identifying the main preventable risk factors. To evaluate the effectiveness of the prevention measures identified, their implementation and related compliance level. To describe the epidemiology of some alert pathogens, defining an effectiveness assessment of PH interventions. To develop an educational programme and a set of indicators. To estimate the costs of surveillance and preventive interventions.

HAIs are considered to be the most frequent adverse event in healthcare, and their impact has become a Public Health priority. HAIs are a focus point for the development and spread of AMR.

There is a need to identify the risk factors related to these infections in order to define specific interventions reducing subsequent risks. Epidemiological surveillance represents an important instrument of hospitals' quality management.

**Timescale:** November 2012–May 2015

## The owners and organisations involved in the project

- University of Milan
- University of Marche
- University of Sassari
- University of Catania
- University of Udine
- University of Bari
- University of Parma
- University of Verona

# Proposal of a risk analysis model for HAI in Intensive Care Units (ICU)



- To perform risk analysis for HAIs in intensive care units. To identify and apply effective practices and guidelines. To assess the effectiveness of the actions carried out.

HAIs are considered an important Public Health issue due to related morbidity and mortality and the associated AMR infections. In Intensive Care Units patients are exposed to greater HAI risks due to their clinical conditions, invasive procedures, undergoing multiple strong antimicrobial therapies.

In particular, as supported by scientific literature, the antimicrobial resistance rate in ICUs is significantly higher than in other units. Even if these considerations highlight the importance of AMR surveillance in ICUs, a more integrated approach is needed to obtain better results.

**Timescale:** October 2012 to April 2014 extended April 2015

## The owners and organisations involved in the project

- University of Cagliari
- Brotzu Hospital, Cagliari
- Giovanni Paolo II Hospital, Olbia
- San Raffaele Hospital, Milan
- Verona Polyclinic
- Padua Hospital

# Integrated approach for SSI prevention in joint replacement surgery



- › Assessment of adherence to the recommendations on procedures for antibiotic prophylaxis and the level of microbiological contamination of the air during clean hip and knee operations, as well as evaluating the cost effectiveness and the impact on health outcomes that different ventilation systems have on SSI related to joint replacement, taking into account a previous evaluation of anti-microbial prophylaxis and the characteristics of operating rooms.

Joint replacement surgery in Italy is characterised by a volume of more than 120,000 interventions per year, entailing considerable costs for our National Health System. Surgical site infections are common avoidable complications of this surgery. Antibiotic prophylaxis, a better ventilation system in operating rooms and the application of international guidelines have improved the complication rate in recent years.

Many studies highlight the role played by ventilation systems, prophylaxis and guideline adherence to obtain a microbiological environmental quality improvement. Integration of different actors (surgeons, public health medical doctors, biomedical engineers, infectivologists) involved in infection surveillance and the different procedures focused on avoiding SSI represents the strategic key of the project.

**Timescale:** March 2010 to May 2012

## The owners and organisations involved in the project

- University of Milan
- University of Parma
- University of Sassari
- University of Catania
- University of Rome “La Sapienza”

# MDR pathogens colonization assessment in Residential Health Care



- To describe the circulation of AMR pathogens of public health concern among the elderly population in nursing home care. To evaluate the prevalence of AMR strains of E. Coli, K. pneumonia, MRSA, Clostridium difficile, with particular regard to Enterobacteriaceae-producing carbapenemases. To perform data analysis to identify the main risk factors related to the colonisation of specific AMR pathogens.

There are more than 13,000 nursing homes in Italy providing assistance to more than 400,000 patients, 75% of whom are elderly. Infections represent a major cause of mortality among this population.

In these settings, outbreaks represent a possible risk with high costs for the health system, and the same assistance setting can be considered a reservoir for AMR infections given the frequent hospitalisation of the guest population.

A nationwide analysis of MR enterobacterias, MRSA, MR Clostridium difficile strains in the context of Nursing Home Care represents a priority in the field of Public Health.

**Timescale:** February 2014 to December 2016

## The owners and organisation involved in the project

- ISS
- Emilia Romagna Regional Social and Health Agency
- Papa Giovanni XXIII Hospital, Bergamo
- Campo di Marte Hospital, Lucca
- Spirito Santo Hospital, Pescara
- Agostino-Estense-Baggiovara Hospital, Modena