

## Executive summary

### Introduction

Antimicrobial resistance is today one of the most important public health issues in both human and veterinary medicine and is bound to become one of the major health challenges of the coming decades. The growing incidence of infections caused by multi-resistant microorganisms (MDROs) causes an increase in morbidity, mortality and costs associated with healthcare. In our country the problem of antimicrobial resistance (AMR) is made very complex by the convergence of several factors, in particular the high consumption of antibiotics in human and veterinary medicine and low adherence to the hands hygiene. These factors have led to a spread, among the higher in Europe, of many critical microorganisms such as carbapenemase-producing *Enterobacteriaceae* (CPE), methicillin-resistant *Staphylococcus aureus* (MRSA) or multiresistant (MDR) or pan-resistant (XDR) *Acinetobacter baumannii* and *Pseudomonas aeruginosa*. To manage this critical situation, the Ministry of Health published a National Program to Fight Antimicrobial Resistance (Piano Nazionale di Contrasto dell'Antimicrobico-Resistenza - PNCAR), which addresses the issue according to the One Health Strategy, focussing both on human and veterinary medicine.

This multi-society and multi-association project aims to address the antibiotic resistance problem by implementing strategies in line with PNCAR and the WHO Global Microbial Resistance Action Plan.

### Aims

The MuSICARe project aims to involve and engage Italian Scientific Societies and Citizens Associations on the issue of AMR in Italy through the organization of a large working group that will enable the construction of a network on the subject, able to provide support to the activities envisaged by PNCAR. In particular, the project aims to reduce the spread of AMR in our country, in support of PNCAR, following these 20 points.

1. Antimicrobial resistance in Italy is today a critical issue closely related to several factors including high consumption of human and veterinary antibiotics, with very high prescriptive inappropriateness, and low adherence to hand hygiene in the health-care setting.
2. To effectively tackle this problem, AMR has to be identified as a national health emergency and dedicated funding is needed to implement or improve activities such as staff training and information to citizens, surveillance systems, and modernization of microbiological diagnostics.
3. The most important epidemiological issues in the field of AMR in Italy today is the spread of multi-resistance among gram-negative and, to a lesser extent, gram-positive bacteria, with resistance ratios at least twice as high as the European average.
4. AMR and antimicrobial consumption monitoring strategies need to be improved in Italy. Interventions both at hospital and regional levels should take place in order to: a) share specific laboratory-based surveillance protocols; b) implement a continuous and systematic laboratory-based data collection; c) organize networks of regional public laboratories and identify reference laboratories; d) share laboratory-based surveillance protocols in the veterinary framework in order to integrate surveillance data of veterinary and human laboratories; e) favour the analytical and continuous publication of national, regional and local data on antibiotic consumption in humans, both in the community and hospital settings; f) favour the analytical and continuous publication of national, regional and local of antibiotic consumption data also in the veterinary field, implementing surveillance strategies aimed at the analysis of both the various zootechnical productions areas and pets.
5. To improve the use of antibiotics, it is essential to improve the diagnostic strategies in the community and in the hospital. Fast microbiology, selective reporting, and improving the appropriateness of microbiological examinations can make an important contribution to the appropriate use of antibiotics.
6. In the community context, strategies are needed to promote the good use of antimicrobials and to reduce the selection of MDRO. Among strategies that need to be implemented are: a) reduction of inappropriate use of antibiotics in viral infections; b) optimization of the use of microbiology; c) training of doctors and of all health care professionals; d) reduction of left-over antibiotics at the end of treatment.
7. Antimicrobial stewardship programs should be organized in the hospital setting. Each and every hospital should have an Antimicrobial stewardship group for the good use of antimicrobials, whose action is closely interconnected with the activities of the Infection Control Committee (CIO), and that should formally monitor the timing of meetings and of programmed actions.
8. The general principles of antimicrobial stewardship as outlined above are also applicable within the hospital departments of rehabilitation and outpatient rehabilitation facilities and, albeit to a different extent, in long-term care facilities interfering as little as possible with the patients' rehabilitation programs.
9. Strategies to control the spread of MDRO in the hospital setting, can be grouped into three types of action: a) organization of surveillance systems; b) prevention of MDRO spread; c) rapid identification of possible outbreaks, investigations and control.
10. In the rehabilitation and long-term care facilities, taking into account the peculiarities of the context, surveillance and prevention of MDRO diffusion must be adopted.
11. The implementation of strategies to improve the use of antibiotics in the veterinary field is a priority, as globally about two-thirds of antibiotics are used in this setting. Interventions aimed at rationalizing the use of antimicrobials in this area are necessary and should focus on prescription, surveillance and organization.

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12. From the diagnostic point of view, strategies for identifying and typing multi-resistant microorganisms should be implemented. Networks of public laboratories will have to define standards for microbiological investigations and criteria for using different tests.
13. The development of research on AMR must be strongly promoted, in many areas, including epidemiology and treatment.
14. Staff training on antimicrobial therapy and infection control (IC) must be compulsory and reorganized at all educational and professional levels. All staff, both health-care worker and non health-care workers that have direct contact with the patient.
15. Vaccination is a valuable preventive intervention to reduce the inappropriate and excessive antibiotic prescription.
16. Measures for the control of AMR in health-care facilities are part of the more general framework for the prevention and control of health-care associated infections (HAI).
17. The involvement of the Scientific Societies and the Citizens Associations plays a central role in the fight against antimicrobial resistance, in parallel with the actions of the National and Regional Institutions and to support them.
18. Associations and civil society must play a role in controlling AMR and fully participate in the definition, design, implementation and evaluation of public policies, as set out in the WHO Health 2020 goals, as well as the European Charter of Patient's the Rights.
19. The organization of a multidisciplinary working group identifying critical intervention areas where the available resources are channeled, facilitating collaboration with existing surveillance systems and allowing the collection of data of interest, involving also organizations protecting citizens' rights. Data will have to be disseminated as soon as available and on a regular basis.
20. The definition of a common set of data of interest to be collected that will facilitate collaboration with existing surveillance systems represents a second operational part of the project and will be a task of the multidisciplinary working group, based, in the citizens' interest, on information transparency and usability.

The road map of the MuSICARe project involves the publication of the document on the web site and/or the journals of the participating Societies and Associations by September 2018 and will be sent to the relevant national institutions. Periodically, every 1-2 years, critical intervention areas will be identified on which the interventions will focus. The document will be reviewed by 2022.

ACRONIMI					
<b>AMR</b>	Resistenza Antimicrobica (Antimicrobial resistance)	<b>Hib</b>	Haemophilus influenzae tipo b	<b>PCV</b>	Vaccino anti-pneumococcico (Pneumococcal conjugate vaccine)
<b>CAP</b>	Polmonite acquisita in comunità (Community-acquired pneumonia)	<b>ICA</b>	Infezioni correlate all'assistenza	<b>PD</b>	Farmacodinamica (Pharmacodynamic)
<b>CCM</b>	Centro Nazionale per la Prevenzione e il Controllo delle Malattie	<b>IOS</b>	Infezioni nelle organizzazioni sanitarie	<b>PDR</b>	Panresistenza (Pan Drug Resistance)
<b>CIA</b>	Antibiotici di importanza critica (Critically Important Antibiotics)	<b>IPD</b>	Malattia invasiva da pneumococco (Invasive pneumococcal disease)	<b>PK</b>	Farmacocinetica (Pharmacokinetic)
<b>CIO</b>	Comitato per le Infezioni Ospedaliere	<b>KPC</b>	Klebsiella pneumoniae produttrice di carbapenemasi (Klebsiella pneumoniae carbapenemase)	<b>PNCAR</b>	Piano Nazionale di Contrasto dell'Antimicrobico Resistenza
<b>CoSA</b>	Comitato di Studio per gli Antimicrobici	<b>LG</b>	Linee guida	<b>PNPV</b>	Piano Nazionale Prevenzione Vaccinale
<b>CPE</b>	Enterobacteriaceae produttrici di carbapenemasi (carbapenemase-producing Enterobacteriaceae)	<b>LTCF</b>	Strutture di riabilitazione e di lungodegenza (Long Term Care Facilities)	<b>RT-PCR</b>	Reazione a catena polimerasica con trascrizione inversa (Real-time Polymerase Chain Reaction)
<b>DDD</b>	Dose definita giornaliera (Defined Daily Dose)	<b>MALDI-TOF</b>	Spettrometria di massa a tempo di volo (Matrix assisted laser desorption ionization-time of flight mass spectrometry)	<b>SSN</b>	Servizio Sanitario Nazionale
<b>DH</b>	Day hospital	<b>MDR</b>	Multi-antimicrobico resistente – Multiresistente (Multi-Drug Resistant)	<b>TB-MDR</b>	Tubercolosi multi-farmaco resistente (Multidrug-resistant tuberculosis)
<b>EARS-Net</b>	European Antimicrobial Resistance Surveillance Network	<b>MDRO</b>	Microrganismi multi-resistenti (Multi-Drug Resistant Organisms)	<b>TB-XDR</b>	Tubercolosi estensivamente resistente ai farmaci (Extensively drug-resistant tuberculosis)
<b>ECDC</b>	European Centre for Disease Prevention and Control	<b>MIC</b>	Minima Concentrazione Inibente (Minimal inhibitory concentration)	<b>UNESCO</b>	Organizzazione delle Nazioni Unite per l'Educazione, la Scienza e la Cultura (United Nations Organization for Education, Science and Culture)
<b>EFSA</b>	European Food Safety Agency	<b>MRSA</b>	Staphylococcus aureus meticillino resistente (Methicillin-resistant Staphylococcus aureus)	<b>UTI</b>	Unità di terapia intensiva
<b>EMA</b>	European Medicine Agency	<b>OMS</b>	Organizzazione Mondiale della Sanità	<b>VRE</b>	Enterococchi resistenti alla vancomicina (Vancomycin-resistant Enterococci)
<b>ESBL</b>	Beta-lattamasi a spettro allargato (extended-spectrum Beta-lactamases)			<b>XDR</b>	Resistenza estensiva agli antimicrobici (Extensive drug resistance)
<b>Euro-GASP</b>	European Gonococcal Antimicrobial Surveillance Programme				
<b>HTA</b>	Health Technology Assessment				