Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

4.3
Update Report on Integration plan

WP4 | Integration into national policies and sustainability

Leader acronym | MoH-FR

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LIST OF ACRONYMS

AC: Advisory Committee

AMR: Antimicrobial Resistance

AMS: Antimicrobial stewardship

CED: Council of European Dentists

CPME: Standing Committee of European Doctors

DX.X: Deliverable produced by the WP

EAHP: European Association of Hospital Pharmacists

ECDC: European Centre for Disease Prevention and Control

EFSA: European Food Safety Authority

EMA: European Medicines Agency

EPHA: European Public Health Alliance

EPRUMA: European Platform for the Responsible Use of Medicines in Animals

ESCMID: European Society of Clinical Microbiology and Infectious Diseases

ESNO: European Specialist Nurse Organisation

EU: European Union

EUSJA: European Union of Science Journalists' Associations

FAO: Food and Agriculture Organisation

FEMS: Federation of European Microbiological Societies

FVE: Federation of Veterinarians of Europe

GARDP: Global Antibiotic Research and Development Partnership

HCAI: Healthcare-Associated Infections

HOPE: European Hospital and Healthcare Federation

IMI: Innovative Medicines Initiative

IPC: Infection Prevention and Control

JA: Joint Action

JAMRAI: Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections

JPI AMR: Joint Programming Initiative on Antimicrobial Resistance

JPI AMR VRI: Joint Programming Initiative on Antimicrobial Resistance Virtual Research Institute

MoH-FR: French Ministry of Solidarity and Health

MS: Members States

MS*X.X*: Milestone produced by the WP

MedTech EU: European trade association for the medical technology industry including diagnostics, medical devices and digital health

NAP: National Action Plan

OECD: Organisation for Economic Cooperation and Development

One Health EJP: One Health European Joint Programme

PGEU: Pharmaceutical Group of the European Union

SH: Stakeholders

WHO Europe: World Health Organization Regional Office for Europe

WP: Work Package

1. CONTEXT AND OBJECTIVES

Context

The overall aim of the European Joint Action (JA) on antimicrobial resistance and healthcare-associated infections (EU-JAMRAI) is to support EU Member States develop and implement effective One Health action plans against antimicrobial resistance (AMR) and healthcare-associated infections (HCAI).

The overarching task of EU-JAMRAI work package (WP) 4 is to foster the integration into national policies of evidence-based policy initiatives and key recommendations issued by the consortium and encourage healthcare workers, policy makers as well as other key actors to expand and maintain their implementation in their respective countries when and where needed.

Definition of "integration"

"Integration" refers to the strategy for uptake and integration of relevant EU-JAMRAI outputs into member states (MS) national health policy. A needs assessment of each MS was performed as a first step and the EU-JAMRAI deliverables that matched these needs, based on their expected benefit, were then selected.

Objectives

This document is an updated report (D4.3 updates D4.2), which proposes a set of concrete measures to be implemented into MS' national action plans (NAPs) based on the EU-JAMRAI deliverables, according to the methodology described in D4.1. These measures aim at facilitating and assessing integration.

Summary: Overview of the selected integration measures

This document highlights the measures selected for the integration of relevant EU-JAMRAI outputs into member states (MS) national health policy. They are organised along two pillars: integration facilitation and integration assessment.

As far as the first pillar is concerned, two measures aim at facilitating integration in national action plans:

- Making key documents and resources produced by the JAMRAI widely accessible on relevant websites,
- Actively raising awareness and engaging key stakeholders.

The integration assessment pillar is based on a questionnaire survey sent to the advisory committee (AC) (i.e. MS representatives) to evaluate the integration of the JAMRAI's outcomes in NAPs and to assess the satisfaction of the MS.

2. INTEGRATION FACILITATION: SPECIFIC MEASURES TO FACILITATE INTEGRATION IN NATIONAL ACTION PLANS

Measure 1: Making key documents and resources produced by the EU-JAMRAI widely accessible on relevant websites

Scope: Human health and Animal health

During the 3-year duration of the EU-JAMRAI, WPs produced a large number of key documents on various topics relevant to AMR and HCAI. In addition to the milestones and deliverables mentioned in the Description of Action, seven policy briefs were also produced (in four languages : English, French, German and Spanish) and a final one is planned. All these documents are currently hosted on the EU-JAMRAI website. Although this website will be maintained for a few years after the end of the joint action (JA) by the Spanish partner AEMPS, it has been suggested that EU-JAMRAI key documents could also be hosted on some of the JA stakeholders' websites, to reach out to a larger audience.

Description of the work performed

Aiming at promoting awareness and supporting the development of national action plans on AMR, here are the key documents and resources identified by WPs' leaders (details available in Annex 1):

- **Dissemination report (Tasks 2.1 & 2.5)**

A report that includes a visual summary of all the dissemination tools and activities developed to give visibility to the progress and the results of the Joint Action.

- **A toolkit for awareness raising and behaviour change communication on AMR (D8.3)**

This is a technical guide presenting tips for optimal communication and awareness activities (including social media), based on the WP8 outputs.

- **AMR/HCAI webinar for journalists with a One Health approach (D8.3)**

Released on March 26th 2019, this is an online training opportunity for general media and health-specialized journalists.

- **Online game app for school and high school students (Micro-Combat) (D8.3)**

Given the complexity of introducing antimicrobial resistance in the curricular program of schools and high schools, the EU-JAMRAI decided to develop an online game app to facilitate the treatment of the subject by teachers and students during school hours with accurate information and in a fun way. EU-JAMRAI launched the Micro-combat game App in December 2020.

- **Antibiotic resistance symbol (D8.2)**

A contest was launched to create the symbol that best represents the fight against antibiotic resistance. The winning symbol was announced on the 10th of November 2020. Chosen by the jury – including EU-JAMRAI's partners, stakeholders, scientists, regulatory bodies and patients organizations - among 600 applications, this symbol aims at raising awareness about this rising health threat. It is something tangible, that anyone, anywhere, can make at home and wear with pride; like the AIDS red ribbon. The winner, David Ljungberg, a Swedish product designer and art director, designed two simple hearts that, when connected, make an X-shape made of two antibiotic pills. "*The capsules set the theme, the hearts tell us we need to care, and the X-shape in the shape of band-aids tells us there is something that we need to fix*".

- **Self-assessment tool: questions in preparation of country-to-country assessments**

A self-assessment tool was developed. The questionnaire focuses on progress made within countries, and therefore consists of open-ended questions that can help to highlight and trigger issues for discussion during country-to-country assessments.

- **Country-to-country assessments (D5.2)**

The country-to-country pilot assessments were performed by a multidisciplinary team of one or more representatives of the WP5 participating countries. These assessments allowed an evaluation of each other's national action plans and One Health strategies, reflected about policy options and provided recommendations to support countries on the development and implementation of the NAP and the measures taken. The summary of country-to-country assessments could serve as an example for setting up future country-to-country assessments.

- **Report of implementation of guidelines for HCAI prevention using an implementation model (D6.4)**

The document reports results and experiences of structured quality improvement work to prevent catheter-associated urinary tract infections (CAUTI), in hospital wards, using an evidence-based model for improvement.

- **Report on JAMRAI tool on antibiotic use and resistance in humans (D7.4)**

A pilot study was performed with the objective to gather near real-time data on antibiotic use and resistance in human health. The document presents the outcomes of the study.

- **Repository of guidelines, tools and implementation methods for antibiotic stewardship (Task 7.1)**

This is a structured collection of existing materials on antibiotic stewardship in human health for different levels of health care: hospital, long-term care facility and community setting.

- **Report on the workshop on implementation of antimicrobial stewardship (D7.2)**

A workshop including 22 participants was organised with the aim of exchanging experiences, discussing and identifying important factors for successful antimicrobial

stewardship implementation. The report presents the participants' recommendations for future steps regarding antimicrobial stewardship in human health.

- **Qualitative evaluation of antimicrobial stewardship implementation (D7.3)**

A qualitative study was conducted on attitudes towards core elements of antimicrobial stewardship programmes, and identification of success stories and barriers of stewardship implementation at different levels of healthcare in different European countries. The study could be helpful in reviewing national efforts, improving organization, knowledge and implementation of antimicrobial stewardship and could lead to increased national awareness about this topic.

- **Implementation of antibiotic stewardship programmes in animal health (Task 7.3)**

An electronic questionnaire was disseminated amongst partners and stakeholders of the EU-JAMRAI. The aim of this activity was to identify the core components needed for implementation that can be used by member states when planning their own stewardship programmes.

In order to bridge the gap between surveillance and stewardship in humans and animals, within a collaboration between EU-JAMRAI and JPIAMR, Rodolphe Mader (WP7) integrated the JPIAMR ARCH network which aims to bridge the gap between human and animal surveillance data, antibiotic policy, and stewardship.

In order to bridge the gap between human and animals surveillance and stewardship, and within the collaborations between EU-JAMRAI and JPIAMR, Rodolphe Mader from WP7, integrated the JPIAMR ARCH network which aims to bridge the gap between human and animal surveillance data, antibiotic policy, and stewardship. From this collaboration, a white Paper was published as a result of this collaboration : "Bridging the gap between surveillance data and antimicrobial stewardship in the animal sector - practical guidance from the JPIAMR ARCH and COMBACTE-MAGNET EPI-Net networks".

- **Report on design, roadmap and feasibility of an integrated surveillance network of antimicrobial resistance in bacteria from diseased animals in Europe (D7.5)**

This report identified gaps in the current European strategy for AMR surveillance in the animal sector, especially in veterinary medicine (i.e. in diseased animals). To improve the current state of play, an initiative was launched to develop an European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet), as a network of national surveillance systems.

A publication "Time to build the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-VET)" was recently published in Eurosurveillance and describes the vision and objectives of this network.

EU-JAMRAI achievements on the development of EARS-Vet were also presented at a joint JPIAMR-JAMRAI virtual workshop on AMR surveillance held on February 23rd 2021, as well as a One Healh EJP ARDIG project (Antibiotic Resistance Dynamics: the influence of geographic origin and management systems on resistance gene flows within humans, animals and the environment) virtual workshop held on March 1st and 2nd 2021.

- **Gap analysis of research priorities at EU level (D9.1)**

Research priorities of seven European countries were collected, analyzed and compared with existing European research agendas to identify gaps. Two key documents were produced:

A report "Gathering of national research priorities from at least five countries and gap identification" (MS9.1)
This report explains how the national research priorities of seven European countries were collected and analysed to highlight research areas not sufficiently present in European research programmes and not developed enough in European research agendas. Four research gaps were identified through this work.

A scientific paper entitled "Infection prevention and control research priorities to combat antimicrobial resistance and healthcare-associated infections"
This manuscript, published in August 2020, is based on a mapping exercise (MS9.1) and aims at filling one of the identified research gaps in Europe. By formulating 16 research priorities, validated by experts from the field, the EU-JAMRAI expects to raise awareness on the most urgent needs in the infection prevention and control field.

- **Tools and resources to boost innovation and ensure availability of existing antibiotics (D9.2)**

Three publications will contribute to set a concrete strategy for implementing multicountry incentives in a European context to stimulate antimicrobial and diagnostic innovation and access. This strategy will be aligned with ongoing non-European efforts to implement incentives:
First publication: "Financing pull mechanisms for antibiotic-related innovation: Opportunities for Europe" (publication in *Clinical Infectious Diseases*)
This publication discusses potential mechanisms to finance pull incentives in Europe.

Second publication: "Supply chain transparency needed to enable sustainable and continuous supply of essential medicines" (accepted in the Bulletin of the World Health Organization). This comment calls for greater transparency in supply chains to limit antibiotics and other drugs' shortages. This work is based on WP9 country visits where several countries called for more transparency in supply chains.
Third publication, in a scientific journal, on the main findings of the country visits
A manuscript will be submitted for publication to communicate on the main findings of the WP9 country visits.

- **Guidelines to assist with evidence-based policymaking (D9.3)**

This work helps the development of guidelines for incorporating evidence into AMR- and HCAI-related national policies, guidelines, and other tools:

Publication planned in a scientific journal describing how European countries set their guidelines based on available evidence

Case studies on how European countries set their national guidelines in comparison with the EVIPNET recommendations. This article will highlight weaknesses in how countries use scientific evidence to build their guidelines and provide them opportunities to improve their processes.

As mentioned above, a JPIAMR-EU-JAMRAI virtual workshop on AMR surveillance, was held on February, 23rd. The aim of this workshop was to present some of the latest AMR surveillance research findings, followed by an open dialogue about how these results may inform national policies. The programme included representatives of the ECDC, WHO GLASS, IMI COMPARE/VEO, the EARS-Vet project, and JPIAMR Surveillance Research Networks.

- **POLICY BRIEF – The need for a reinforced One Health network (Annex II-1)**

This policy brief calls for an extension and strenghtening of the AMR One Health Network mandate, to address all the components of this trans-sectoral and integrated approach and obtain a full impact of the EU action plan.

- **POLICY BRIEF - The need to develop core elements at the European level on antimicrobial stewardship (AMS) and infection prevention and control (IPC) Annex II-2)**

This policy brief discusses the need to develop core elements on AMS and IPC, implementable at national and facility levels, both in human and animal health.

- **POLICY BRIEF - The need to develop indicators and targets for AMR action plans in the EU (Annex II-3)**

This policy brief discusses the need to establish indicators and targets to monitor the progress of the EU Action Plan against AMR and to support Member States with the monitoring of their national action plans, with a One Health perspective.

- **POLICY BRIEF – European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet) (Annex II-4)**

A policy brief was produced: it calls on MS and the EC to provide political support to launch EARS-Vet, an integrated and sustainable surveillance network of antimicrobial resistance in bacteria from diseased animals in Europe.

- **POLICY BRIEF - Appropriate use of antibiotics in a One Health perspective- A holistic approach including targeted implementation strategies and time appropriate surveillance in human and animal health (Annex II-5)**

A policy brief was produced: it presents a summary of WP7 activities, providing important knowledge and efficient tools to already identified gaps in implementation of antimicrobial stewardship and surveillance of AMR/antimicrobial use in both human and animal health. The aim of the policy brief is to encourage policymakers to prioritize antimicrobial stewardship and surveillance of AMR/antimicrobial use in a One Health perspective.

- **POLICY BRIEF – The urgent need to foster research on infection prevention and control to improve health security (Annex II-6)**

Summary of the findings of the scientific article "Infection prevention and control research priorities to combat antimicrobial resistance and healthcare associated infections". Its aim is to convince policymakers to invest more on research within the infection prevention and control field.

- **POLICY BRIEF – Incentivizing antibiotic access and innovation (Annex II-7)**

A policy brief was developed in collaboration with the Global AMR R&D Hub with the result of in-depth interviews with 13 countries pointing to a clear need for specific and detailed incentives.

- **POLICY BRIEF – Evidence-informed antibiotic prescribing guidelines (will be available soon)**

This policy brief will provide tools for policymakers to incorporate evidence into their policies.

All policy briefs are available here.

- **Summary of EU-JAMRAI achievements as of October 2020: Handing over the beginning rather than the end**

Report summarizing the concrete results and impacts of the JA after 18 months of the project. An updated summary will be presented in the Joint Action Layman report that will be available in April 2021.

How was the measure 1 "Making key documents and resources produced by the EU-JAMRAI widely accessible on relevant websites" performed?

After consultation with WPs, the most relevant documents and tools were identified as "key documents". Some documents were milestones or deliverables, while others have been specifically developed by WP leaders to meet the integration facilitation objective. Key stakeholders were selected from the list of the EU-JAMRAI stakeholders (SH) and contacted to know if they would be willing to host the relevant documents on their website. The documents could then be hosted on different SH' websites. The annex I details the key documents and a short summary including the SH who have already decided to host these documents. Due to the current COVID-19 situation, some documents and deliverables were finalized quite recently and the stakeholders are still discussing internally to select the relevant documents.
The selected documents are expected to be valid for at least 3 years according to WP leaders' opinion. The SH may delete the documents once outdated.

Stakeholders that have been contacted

One health: AMR Hub, EMA, JPI AMR, One Health EJP.
Human health: CED, EAHP, ECDC, EPHA, ESCMID, ESNO, HOPE, GARDP, WHOEurope.
Animal health: EFSA, EPRUMA, FAO, FVE.

Monitoring and Evaluation Indicator

Since the aim of these measures is to disseminate the EU-JAMRAI's key documents as widely as possible in order to foster the integration of the EU-JAMRAI's outcomes, it will be monitored according to the number of SH who have agreed to host and disseminate these documents.

Out of 21 contacted stakeholders, 18 declared they were interested in hosting or disseminating EU-JAMRAI's key documents. 12 SH further confirmed their wish to host or disseminate the documents (pdf format or links) and 3 stakeholders have already selected the relevant documents that they will host (Annex I).

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2.2. Measure 2: Actively raising awareness and engaging key stakeholders

In order to conduct an active promotion of the EU-JAMRAI's tools and results, specific key stakeholders have been contacted to promote the use of the JAMRAI's outputs. The main objective of this measure is to extend the impact and use of the JA's productions. This has included:

- **Promoting the antibiotic resistance symbol**

Scope: One Health

Description of the work performed

A contest was launched to create the symbol that best represents the fight against antibiotic resistance. The symbol thus created will be recognized as the symbol of the global threat of antibiotic resistance.

Stakeholders who have been contacted

ECDC and its EAAD TAC (European Antibiotic Awareness Day Technical Advisory Committee) that includes representatives from all EEA (EU Economic Area) countries as well as representatives from several European professional and students' associations

WHO WAAW (World Health Organization World Antibiotic Awareness Week) team.
EFSA, EJP One Health, JPI AMR, AMR Hub, OECD, EPHA, EPRUMA, ESCMID, FEMS, HOPE, IFMSA, UEMO, MedTech EU, EUSJA.

How was the measure implemented?

With the aim of raising awareness in society, the EU-JAMRAI presented on November 10th 2020 the first global symbol representing the fight against antibiotic resistance. The Antibiotic Resistance Symbol was selected among more than 600 applications from 44 countries received for the graphic design contest launched by EU-JAMRAI during 2019 ECDC's European Antibiotic Awareness Day (EAAD) celebration in Stockholm. The competition encouraged participants from all over the world to send in their proposals under these premises: it should be something tangible, that anyone, anywhere, could make at home and wear with pride. The call reached 600,000 people in social media. The winner was David Ljungberg (Sweden), a product designer and art director working in the fields of medtech, energy, and circular economy.

The communication toolkit and samples of the already crafted symbol with an advocacy document were shared, requesting the SH to wear the symbol in all the public events related to AMR and HCAI. They were advised to promote, to craft and wear the antibiotic resistance symbol among the civil society by, for example, launching several challenges on their social media channels for young people.

Another big part of the dissemination of the symbol was done on social media. The social media strategy to promote the Antibiotic Resistance Symbol has been based on two pillars: organic and paid. Organic social refers to those posts made without paying for them, so the engagement and reach is considerably lower than with paid social.
The following are the metrics for the **paid campaign**, from the 10th November up to the 12th of January 2021:

Social Media platform	Impressions	Reach	Video visualisations	Interactions	Cost (€) (NO VAT)
Facebook and Instagram	2.158.576	1.283.563	238.727	57.943	3.401,71
Twitter	991.182	493.159	293.949	20.736	1.384,41
Total	3.149.758	1.776.722	532.676	78.679	4.786,12

- Impressions: how many times a post shows up in someone's timeline
- Reach: potential unique viewers a post could have
- Video visualisations: in the case of those posts with video, how many times it has been visualized
- Interactions: "likes," comments, and social sharing by EU-JAMRAI followers.

The **organic campaign** metrics would sum around a 5% more, so that the final figures would be as follows:

Social Media platform	Impressions	Reach	Video visualizations	Interactions
Facebook and Instagram	2.266.505	1.347.741	250.663	60.840
Twitter	1.040.741	517.817	308.646	21.773
Total	3.307.246	1.865.558	559.310	82.613

The campaign being still in progress, these metrics will be updated in a final report, that will be published here.

- **Sharing gap analysis at EU level, to influence the research strategic agenda and future research activities**

Scope: Human health and animal health

Description of the work performed
WP9 output includes a policy brief of research priorities identified as gaps from existing European research agendas as compared to priorities of JAMRAI's members.

Stakeholders who have been contacted
Human health: CPME, ECDC, GARDP.
One health: AMR Hub, Directorate-General for Research and Innovation (EC), Horizon Europe, JPI AMR, OECD, One Health EJP, AMR One Health Network. MS representatives.

How was the measure implemented?
JPI AMR has closely worked with WP9 on the identification of IPC research gaps and is expected to put more emphasis on IPC within its next Strategic Research and Innovation Agenda. A policy brief called "The urgent need to foster research on infection prevention and control to improve health security" was produced and included in the D9.1 deliverable "Publication of research priorities identified as gaps" (Annex II-6). The stakeholders mentioned above may help to disseminate the policy brief.

- **Boosting innovation**

Scope: Human health and animal health

Description of the work performed
WP9 output includes a policy brief "Incentivizing antibiotic access and innovation" (Annex II-7) on its findings in order to present policymakers opportunities to incentivise innovation. It presents a concrete strategy for implementing multi-country incentives in a European context to stimulate antimicrobial and diagnostic innovation and access; this strategy will be aligned with ongoing non-European efforts to implement incentives.

Stakeholders who have been contacted
Member states and EC.
GARDP, AMR Hub, CPME, EMA, ESCMID, JPI AMR, OECD.

How was the measure implemented?
AMR Hub, EJP One Health, EMA, WHO, BEAM alliance, EFPIA and MedTech Europe were regularly contacted and updated along the course of the JA by WP9 to incentivize public and private research and innovation on new antibiotics, alternatives, diagnostics, and strategies to combat AMR and HCAI. A policy brief called "Incentivizing antibiotic access and innovation" has been produced based on the results of in-depth interviews with 13 countries pointing to a clear need for specific and detailed incentives (Annex II-7): the stakeholders mentioned above agreed to disseminate the policy brief. In addition, two

publications “Financing pull mechanisms for antibiotic-related innovation: Opportunities for Europe” (publication in Clinical Infectious Diseases) and “Supply chain transparency needed to enable sustainable and continuous supply of essential medicines” (not published yet) have been integrated in the documents to disseminate.

3. INTEGRATION ASSESSMENT: A SURVEY TO ASSESS INTEGRATION IN NATIONAL ACTION PLANS

A survey was sent in November 2020 to the Advisory Committee in order to consult member states (MS). The survey's main goal was to identify whether or not MS had already implemented some of the EU-JAMRAI outputs in their NAPs, and if they did not, whether or not they were aware of their existence and were planning to implement them (see Annex IV).

Methodology of the survey

Participants

The member states representatives were invited to participate in the survey that was sent through the Advisory Committee (AC).

Development and description of the questionnaire

The questionnaire (Annex IV) was in English. It included eight sections in order to evaluate the integration within the National Action Plans of the key outcomes of the EU-JAMRAI. The questionnaire was first drafted by the WP4 and then reviewed by the Executive Board.

The first section was designed to assess to what extend the EU-JAMRAI might have helped MS improving their national strategy and actions. Then the following sections were dedicated to the use (now or in the future) of specific outcomes of the JAMRAI, mainly the Micro-Combat app, the antibiotic resistance symbol, the IPC framework. Then, a section focused on the implementation of AMS programmes, the research strategic agenda and strategies to boost innovation. The last section used a Likert scale (from 1 to 4, strongly disagree to strongly agree) in order to evaluate if the JAMRAI met the expectations of the MS.

Due to the delayed release of some deliverables (due to the COVID-19 crisis), the survey was sent to the AC members on November 17th 2020, with two reminders: one sent on December 7th 2020 and the second one sent on December 17th 2020. The initial deadline was set for December 24th 2020, but due to a low response rate, it was extended until January 8th 2021. Unfortunately, despite a low response rate, as this deliverable D4.3 had to be published in February 2021, the deadline could not be extended further.

Response rate

Among AC members, 32% (8/25) participated in the survey : Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands and Sweden. The survey results are therefore only indicative, as they do not represent the opinion of all EU MS.

Results

They are detailed in the Table below. The vast majority of the participating MS are planning to improve their national strategy and actions by including some of the EU-JAMRAI's outputs.

Regarding communication, while 86% of the respondents consider that the symbol will help them raise awareness on antibiotic resistance, only half of the participating MS are planning to implement the Micro-Combat App. It must however be noted that the app was officially launched on the 28th of December 2020, while the survey was almost closed. Thus it might be expected to have a higher uptake of the app as a communication tool in the future. The implementation of EARS-Vet is relevant for all respondents.

MS perceived there was room for improvement regarding the dissemination/communication of the EU-JAMRAI activities and outputs. With a score of 2.4 out of 4 (scale from 1 disagree - 2 partially disagree - 3 partially agree - 4 agree), the EU-JAMRAI seems to have partially reached the objective of helping countries improve their national strategy and actions on AMR and healthcare-associated infections. It is important to note that due to the COVID-19 situation, some JAMRAI outputs have been delayed; this might explain why they are not implemented within MS'NAPs yet.

These results were communicated to the Advisory Committee members at the end of January 2021.

Questions	n/N (%)
1-Do you have a national action plan (NAP)/strategy/position paper on AMR?	
☐ Human health	0
☐ Animal health	0
☐ One Health	7/8 (87.5)
☐ Under preparation	0
☐ No	1/8 (12.5)
2-If yes, have you included/used some of the EU-JAMRAI outputs in your national strategy/actions?	
☐ Yes	1/8 (12.5)
☐ No	2/8 (25)
☐ No, but we are planning to	4/8 (50)
☐ To be determined	1/8 (12.5)
3-If no, has the EU-JAMRAI helped you plan for designing such a national action plan?	
☐ Yes	2/7 (29)
☐ No	5/7 (71)
4-Are you considering hosting some of the EU-JAMRAI's documents on your national Antimicrobial Resistance (AMR) website?	
☐ Yes, we have done so	2/8 (25)
☐ Yes, we are planning to do so	2/8 (25)
☐ Not applicable (no national AMR website)	4/8 (50)
☐ No	0
5-Do you plan to use Micro-Combat app as one of the communication tools used nationally to raise awareness on AMR?	
☐ Yes	2/7 (29)
☐ No	4/7 (57)
☐ To be determined	1/7 (14)
6-Do you think this app could be part of your national strategy towards younger generations?	
☐ Yes	3/7 (43)
☐ No	3/7 (43)
☐ To be determined	1/7 (14)
7-Will this symbol help you raise awareness on this topic? (e.g. during the European Antibiotic Awareness Day (EAAD)/ World Antibiotic Awareness Week (WAAW))	
☐ Yes	7/8 (87.5)
☐ No	1/8 (12.5)

8-The EU-JAMRAI developed a Universal Infection Control Framework: could this framework help you update/improve your IPC national policy? ☐ Yes ☐ No ☐ To be determined	 3/8 (37.5) 4/8 (50) 1/8 (12.5)
9-Are you planning to use the EU-JAMRAI's Universal Infection Prevention and Control (IPC) framework at national level? ☐ Yes ☐ No ☐ To be determined	 1/8 (12.5) 5/8 (62.5) 2/8 (25)
10-Do you find the EU-JAMRAI inventory of tools and guidelines on AMS helpful to guide you designing and improving your national actions in human health and animal health? ☐ Yes ☐ No	 7/8 (87.5) 1/8 (12.5)
11-Do you find the concept of a Surveillance network on AMR for diseased animals (EARS-Vet) relevant for your country? ☐ Yes ☐ No	 6/6 (100) 0
12-Do you think that being involved in the EU-JAMRAI has helped you improve your own surveillance system on AMR in human health and animal health? ☐ Yes ☐ No	 3/7 (43) 4/7 (71)
13-According to these highlighted research gaps, do you intend to update your national strategic research agenda to address the identified unmet needs? ☐ Yes ☐ No	 3/6 (50) 3/6 (50)
14-The EU-JAMRAI, trough the publication of a scientific article, highlighted different ways to finance innovation for antibiotics. **Are you aware of this document?** ☐ Yes ☐ No	 5/8 (62.5) 3/8 (37.5)
15-Has this document been useful to inform your national innovation strategy? ☐ Yes ☐ No	 5/7 (71) 2/7 (29)
16-Do you agree that the EU-JAMRAI's objective to raise awareness in Europe on AMR, healthcare-associated infections, AMS and IPC was achieved? (scale from 1 disagree - 2 partially disagree - 3 partially agree - 4 agree)	2.8
17-Do you agree that the EU-JAMRAI helped to create a closer collaboration, understanding and trust between the animal health and human health sector in a One Health perspective?	2.8
18-Do you agree that the dissemination/communication of the EU-JAMRAI activities and outputs was sufficient?	2.8
19-Overall, do you agree that the EU-JAMRAI project helped your country improve its national strategy/actions on AMR and healthcare-associated infections?	2.4

Annex I: Key documents

As mentioned previously, the EU-JAMRAI WP leaders selected the main documents produced on various topics relevant to AMR and HCAI in order to disseminate them and reach a large audience. These documents are currently hosted on the EU-JAMRAI website (https://eu-jamrai.eu/). This website will only be maintained for a few years after the end of the joint action (JA). To reach out to a larger audience, it has been suggested that EU-JAMRAI key documents could also be hosted on some of the JA stakeholders' websites.

18 stakeholders expressed interest in hosting or disseminating EU-JAMRAI key documents. In February 2021, 12 SH confirmed that they could host or disseminate the key documents (or their links) and some SH have already selected the relevant documents, disseminated them among their members and/or uploaded them on their websites.

Key document	Brief description	One health scope and Target audience	Weblink	Stakeholders that might host this document (pdf or link) on their website
Dissemination report	A report that includes a visual summary of all the dissemination tools and activities developed to give visibility to the progress and the results of the Joint Action.	**One Health** European Commission Member states Stakeholders	Draft available here Final version will be available here Pdf: 5 021 Ko	- EPHA - Could be advertised by ECDC in their newsletter and among their national focal points
POLICY BRIEF – The need to develop indicators and targets for AMR action plans in the EU	Policy brief discussing the need to establish indicators and targets to monitor the progress of the EU Action Plan against AMR and to support Member States with the monitoring of their national action plans, with a One Health perspective.	**One Health** European Commission Policy makers Relevant stakeholders	Available here Pdf : 571 Ko	- EPHA - Could be advertised by ECDC in their newsletter and among their national focal points - The following stakeholders informed us that they will disseminate the document among : o CED members o JPI AMR members o OECD's network on the economics public health o PGEU members

POLICY BRIEF -The need to develop core elements at the European level on antimicrobial stewardship (AMS) and infection prevention and control (IPC)	Policy brief discussing the need to develop core elements on AMS and IPC, implementable at national and facility levels, both in human and animal health	**One Health** European Commission Policy makers Relevant stakeholders	Available here Pdf : 227 Ko	- CPME - EPHA - Could be advertised by ECDC in their newsletter and among their national focal points - The following stakeholders informed us that they will disseminate the document among : o CED members o JPI AMR members o OECD's network on the economics public health o PGEU members
POLICY BRIEF – The need for a reinforced One Health network	This policy brief calls for an extension and strenghtening of the AMR One Health Network mandate, to address all the components of this trans-sectoral and integrated approach and obtain a full impact of the EU action plan.	**One Health** European Commission Policy makers Relevant stakeholders	Available here Pdf 335 Ko	- Available on CED website, here - The following stakeholders informed us that they will disseminate the document among : o CED members o JPI AMR members o OECD's network on the economics public health o PGEU members
Self-assessment tool: questions in preparation of country-to-country assessments	The document presents the self-assessment tool that aims to provide information to be used for the country-to-country assessment.	**Human health** Member states	Available here Pdf: 225 Ko	- Could be hosted on the ECDC webpage
Country-to-country assessments	The document presents the performance of the country-to country assessments. These assessments allow representative of one or several WP5 participating countries to evaluate each other's national action plans and One Health strategies, reflect about policy options and provide recommendations to support countries on the development and implementation of the NAP and the measures taken.	**One Health** Member states	Available here Pdf: 106Ko	- Could be hosted on the ECDC webpage - CPME

Report of implementation of guidelines for HAI prevention using an implementation model	Results and experiences of structured quality improvement work to prevent CAUTI, in hospital wards, using an evidence based model for improvement with a bottom up approach.	**Human Health** Relevant stakeholders European Commission	Available here Pdf : 2130Ko	- Could be hosted on the ECDC webpage
Report on JAMRAI tool on antibiotic use and resistance in humans	A pilot study was performed along the course of the joint action with the objective to gather near real-time data on antimicrobial use and resistance. There were selected a series of indicators based on PIRASOA (an Institutional Program for the prevention and control of Healthcare Associated Infections and Appropriate Use of Antimicrobials in Andalusia, Spain). 17 partners from 11 countries participated in the study reinforcing their surveillance systems by providing data in a quarterly basis, from hospitals and/or primary care at a local, regional or national scope.	**Human health**	Soon to be available	- Could be advertised by ECDC in their newsletter and among their national focal points
Repository of guidelines, tools and implementation methods for antibiotic stewardship	This is a structured collection of existing materials on antibiotic stewardship in human health for different levels of health care: hospital, long-term care facility and community setting. This repository of information can help professionals on this topic to develop their projects and share experiences.	**Human health** Healthcare professionals	Available here Multiple documents	- CPME - ECDC - EPHA
Report on the workshop on implementation of antimicrobial stewardship	A workshop including 22 participants was organised with the aim of exchanging experiences and discussing and identifying important factors for successful antimicrobial stewardship implementation. The report presents the participants' recommendations for future steps regarding antimicrobial stewardship in human health.	**Human health** Healthcare professionals	Available here 9254 Ko	- ECDC - CPME
Qualitative evaluation of antimicrobial stewardship	A qualitative study was conducted on attitudes towards core elements of antimicrobial stewardship programs, and identification of success stories and barriers	**Human health** Healthcare professionals	Under development	- Depending on the content, ECDC might wish to disseminate it through its newsletter or host it on their webpage - CPME

implementation	of stewardship implementation at different levels of healthcare in eight different European countries. The study could be helpful in reviewing national efforts, improving organization, knowledge and implementation of antimicrobial stewardship and could lead to increased national awareness about this topic. The final report is based on the results from the participating countries and will give insight about differences and similarities in antimicrobial stewardship implementation based in qualitative data.			
Assessment of the level of implementation and acceptance of stewardship programmes in veterinarian health	An electronic questionnaire was disseminated through partners and stakeholders of the European Joint Action EU-JAMRAI. The aim of this activity was to identify the core components needed for implementation, that can be used by member states when planning their own stewardship programmes.	**Animal health** Member states and European Commission policy makers	Available here	- Could be advertised by ECDC in their newsletter and among their national focal points
Report on design, roadmap and feasibility of an integrated surveillance network of antimicrobial resistance in bacteria from diseased animals in Europe	This report identified gaps in the current European strategy for AMR surveillance in the animal sector, especially in veterinary medicine (i.e. in diseased animals). To improve the current state of play, an initiative was launched to develop a European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet), as a network of national surveillance systems. In a bottom-up and One Health approach, existing AMR surveillance systems in diseased animals were reviewed, described and analysed. Based on this information, expert consensus meetings led to the development of an EARSVet surveillance framework and the	**Animal health** Member states and European Commission Policy makers	Soon to be available	- Could be advertised by ECDC in their newsletter and among their national focal points

	building of a preliminary network of national surveillance systems in Europe.			
POLICY BRIEF – European Antimicrobial Resistance Surveilance network in Veterinary medicine (EARS-Vet)	Policy brief that calls on MS and EC to provide political support to launch EARS-Vet, an integrated and sustainable surveillance network of antimicrobial resistance in bacteria from diseased animals in Europe.	**Animal health** European Commission	Available here	- Could be advertised by ECDC in their newsletter and among their national focal points - The following stakeholders informed us that they will disseminate the document among : o JPI AMR members o OECD's network on the economics public health o PGEU members
Publication in Eurosurveillance entitled "Time to build the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet)"	Scientific article describing the vision and objectives of the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet)	**Animal health** European Commission Member states Policy makers Relevant stakeholders	Available here	
Scientific article entitled 'OASIS evaluation of the French surveillance network for antimicrobial resistance in diseased animals (RESAPATH): success factors at the basis of a well-performing volunteer system'	Scientific article presenting the results of the evaluation of the French system for AMR surveillance in animal pathogens (RESAPATH)	**Animal health** Member states Relevant stakeholders	Soon to be available	
Scientific article entitled 'Defining the scope of the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet): a bottom-up	Scientific article describing the EARS-Vet scope, i.e. the combinations of animal species – bacteria – antimicrobials of interest to be retained in EARS-Vet	**Animal health** European Commission Member states Policy makers Relevant stakeholders	In preparation	

and One Health approach'				
Scientific article entitled 'Review, description and analysis of national surveillance systems of AMR in bacterial pathogens of animals in Europe: a basis for the design of the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet)'	Scientific article describing and evaluating existing systems for AMR surveillance in animal pathogens in Europe	**Animal health** European Commission Member states Policy makers Relevant stakeholders	In preparation	
Scientific article in Journal of Antimicrobial Chemotherapy entitled 'White Paper: Bridging the gap between surveillance data and antimicrobial stewardship in the animal sector - practical guidance from the JPIAMR-ARCH and COMBACTE-MAGNET EPI-Net Networks'	This article summarizes the results of a collaboration between JAMRAI WP7, JPIAMR-ARCH and COMBACTE-MAGNET EPI-Net Networks that joined forces for the shared goal of implementing a framework of actions to facilitate antimicrobial stewardship interventions and foster use of surveillance data on AMR and AMU and implementation of AMS activities in animal health.	**Animal health** European Commission Member states Policy makers Relevant stakeholders	Available here	
POLICY BRIEF - Appropriate use of antibiotics in a One Health perspective - A holistic approach including targeted implementation strategies and time appropriate surveillance	This policy brief presents a summary of the activities of WP7, providing important knowledge and efficient tools to already identified gaps in implementation of antimicrobial stewardship and surveillance of AMR/antimicrobial use in both human and animal health. The aim of the policy brief is to encourage policymakers to prioritize antimicrobial stewardship and surveillance	**One Health** European Commission Policymakers Relevant stakeholders	Available here 148 Ko	- CPME - EPHA - Available on CED website here and disseminated among members - Could be advertised by ECDC in their newsletter and among their national focal points - The following stakeholders informed us that they will disseminate the document among :

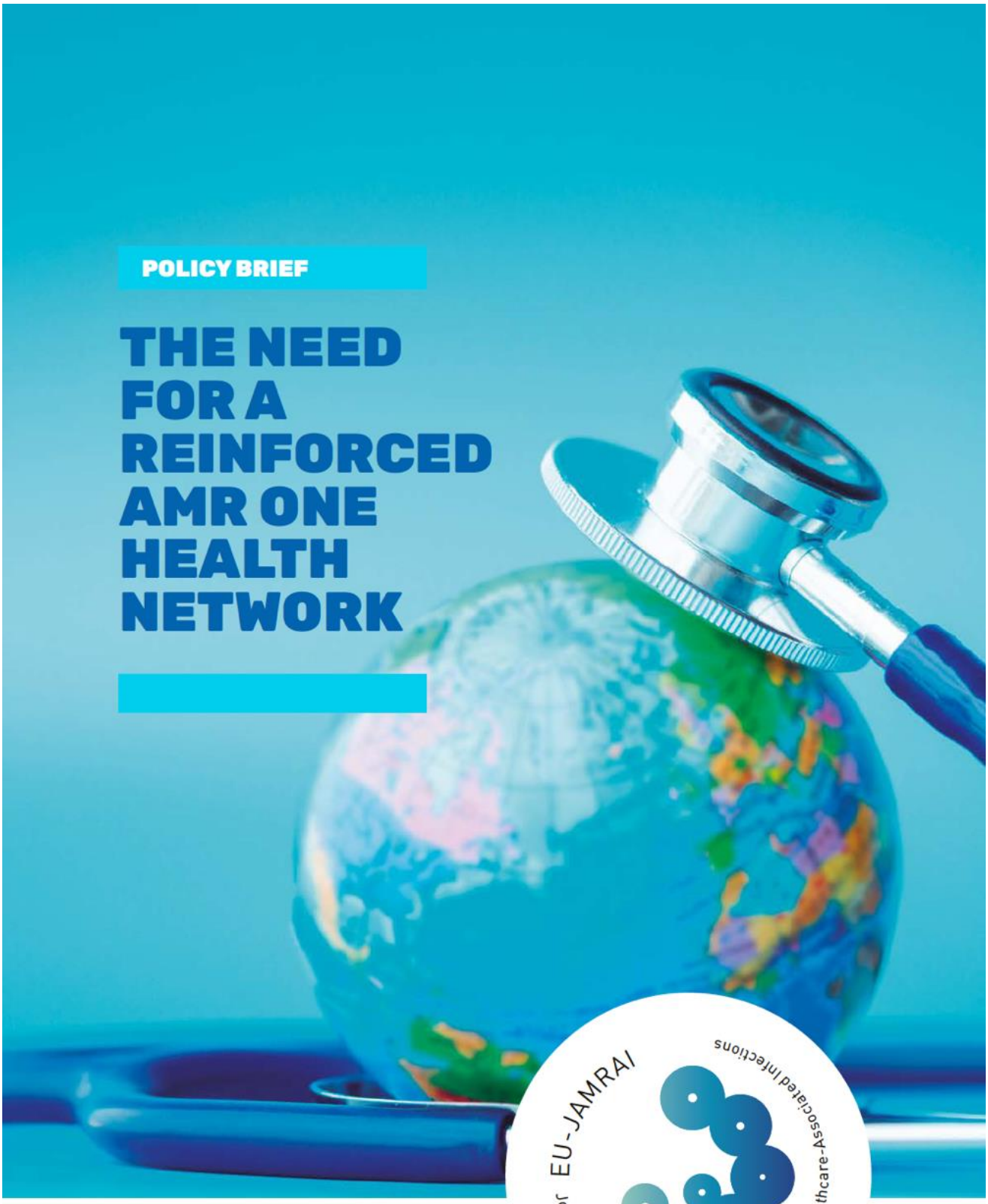
in human and animal health	of AMR/antimicrobial use in a One Health perspective.			○ PGEU members ○ JPI AMR members ○ OECD's network on the economics public health
A toolkit for awareness raising and behaviour change communication on AMR	Technical guide presenting tips for optimal Communication and Awareness activities (including social media), based on the WP8 outputs. The main objective of this guide is to summarize for EU-JAMRAI partners, stakeholders and EU Member States the results of the communication key activities developed during the JA including learnt lessons and recommendations. With this practical road map, all interested parts will be able to scale up, replicate and adapt to their local needs the activities tested by EU-JAMRAI during its 3 years of implementation.	**One Health** EU-JAMRAI partners EU-JAMRAI stakeholders EU Member States	Will be available in March here	- CPME - EPHA - Could be hosted on EAAD website
AMR/HCAI webinar for journalists with a One Health approach	An online training opportunity for general media and health-specialized journalists with clear and accurate scientific information from senior experts with long experience in the fight against Antimicrobial Resistance (AMR) and Healthcare-Associated Infections (HCAI) and up-to-date information on the ways in which Europe is facing this important global health challenge. The speakers, representatives from EU-JAMRAI, ECDC and FAO, covered the following topics: • The global challenge of AMR and HCAI: Major drivers. • Roadmap against AMR: International initiatives. • Best practices: Human health. • Best practices: Animal health. • Awareness raising and behaviour change	**One Health** General media Health-specialized journalists Communication departments of health authorities	Available here	
Online game app for school and high school students:	Given the complexity of introducing antibiotic resistance in the curricular program of schools and high schools, EU-	**One Health** Primary target audiences:	Micro-Combat App https://eu-jamrai.eu/micro-combat/	- Could be hosted on EAAD website

Micro-Combat	JAMRAI decided to develop an online game app to facilitate that the subject is treated by teachers and students during school hours with accurate information and in a fun way. Enhancing the importance of the appropriate use of antibiotics promotes individual behaviour change among the youngest audiences. Players become familiar with different types of pathogens (bacteria, viruses, fungi and protozoa), multiple routes of transmission, different infectious diseases, the specificity of drugs to combat them and the phenomenon of pathogen resistance to these drugs. This app, available in 16 languages, will also be used to advocate for the inclusion of the antimicrobial resistance subject in science educational curricula to achieve social transformation through individual behaviour change.	School and high school students and teachers. Secondary target audiences: EU level and national level education authorities.		
Antibiotic resistance symbol	A contest was launched to create the symbol that best represents the fight against antibiotic resistance. The symbol thus created will be recognized as the symbol of the global threat of antibiotic resistance.	**One Health** Global general audience Healthcare professionals for the human and animal sectors	Description of the contest: https://eu-jamrai.eu/symbolcontest/ Winning symbol and promotional materials: here Report available here Updated report will be available here	- CPME - EPHA - Could be hosted on EAAD website - Available on JPI AMR website, here
Publication in a scientific journal entitled "Infection prevention and control research priorities to combat	This publication follows the previous mapping exercise (MS9.1) and aims at filling one of the existing research gaps in Europe. By formulating 16 research priorities, validated by experts from the field, the EU-JAMRAI expects to raise awareness on the	**Human health** Scientific audience	Available here 969 Ko	- CPME - Available on Global AMR R&D Hub website, here

antimicrobial resistance and health care associated infections"	most urgent needs in the infection prevention/control field.			
"Gathering of national research priorities from at least five countries and gap identification"	This report explains how the national research priorities of seven European countries were collected and analysed to highlight research areas not sufficiently present in European research programmes and not developed enough in European research agendas. Four research gaps were identified through this work.	**Human health** Policymakers Funders Researchers Relevant stakeholder (JPI AMR, AMR-Hub)	Available here 1974 Ko	- Available on Global AMR R&D Hub website, here
Publication in Clinical Infectious Diseases entitled "Financing pull mechanisms for antibiotic-related innovation: Opportunities for Europe"	This publication discusses potential mechanisms to finance pull incentives in Europe.	**Human health** Scientific audience	Available here	- CPME - Available on Global AMR R&D Hub website, here
Publication in a scientific journal entitled "Supply chain transparency needed to enable sustainable and continuous supply of essential medicines"	This comment calls for greater transparency in supply chain to limits antibiotics and other drugs shortages. This work is based on WP9 country visits where several countries called for more transparency in supply chains.	Scientific audience	Available here	- CPME
Publication in a scientific journal on the main findings of the country visits	Publication to communicate on the main findings of the WP9 country visits.	**Human health** Scientific audience	Under development	- CPME - Could be advertised by ECDC in their newsletter and among their national focal points
Publication in a scientific journal on how European countries set their guidelines from available evidence	Case studies on how European countries set their national guidelines in comparison with the EVIPNET recommendations. This article will highlight weaknesses in how countries use scientific evidence to build their	**Human health** Scientific audience Policymakers Relevant stakeholders	Under development	- CPME - Could be advertised by ECDC in their newsletter and among their national focal points

	guidelines and provide them opportunities to improve their processes.			
POLICY BRIEF – The urgent need to foster research on infection prevention and control to improve health security	Summary of the findings of the scientific article "Infection prevention and control research priorities to combat antimicrobial resistance and healthcare-associated infections". Its aim is to convince policymakers to invest more on research within the infection prevention and control field.	**Human health** European Commission Policymakers Funders Relevant Stakeholders	Available here Pdf : 103 Ko	- CPME - EAPH - Could be advertised by ECDC in their newsletter and among their national focal points - The following stakeholders informed us that they will disseminate the document among : o CED members o JPI AMR members o OECD's network on the economics public health o PGEU members
POLICY BRIEF – Incentivizing antibiotic access and innovation	A policy brief developed in collaboration with the Global AMR R&D Hub with the result of in-depth interviews with 13 countries pointing to a clear need for specific and detailed incentives.	**Human health** EC Policymakers Funders Relevant stakeholders	Available here Pdf: 166 Ko	- CPME - EAPH - Could be advertised by ECDC in their newsletter and among their national focal points - Available on AMR Hub website here - The following stakeholders informed us that they will disseminate the document among : o CED members o JPI AMR members o OECD's network on the economics public health o PGEU members
POLICY BRIEF – Evidence-informed antibiotic prescribing guidelines	This policy brief will provide tools for policymakers to incorporate evidence into their policies.	**Human health** EC Policymakers	Under development	
Summary of EU-JAMRAI achievements as of October 2020: Handing	Report summarizing the concrete results and impact of the JA after 18 months of the project. This summary will be updated with	**One Health** EC	Available here	- CPME

over the beginning rather than the end	the Joint Action Layman report that will be available in April 2021.	Policymakers Relevant stakeholders		


POLICY BRIEF
THE NEED FOR A REINFORCED AMR ONE HEALTH NETWORK
EU-JAMRAI
Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections
Co-funded by the Health Programme of the European Union
EU-JAMRAI | Policy brief: The need for a reinforced AMR One Health Network
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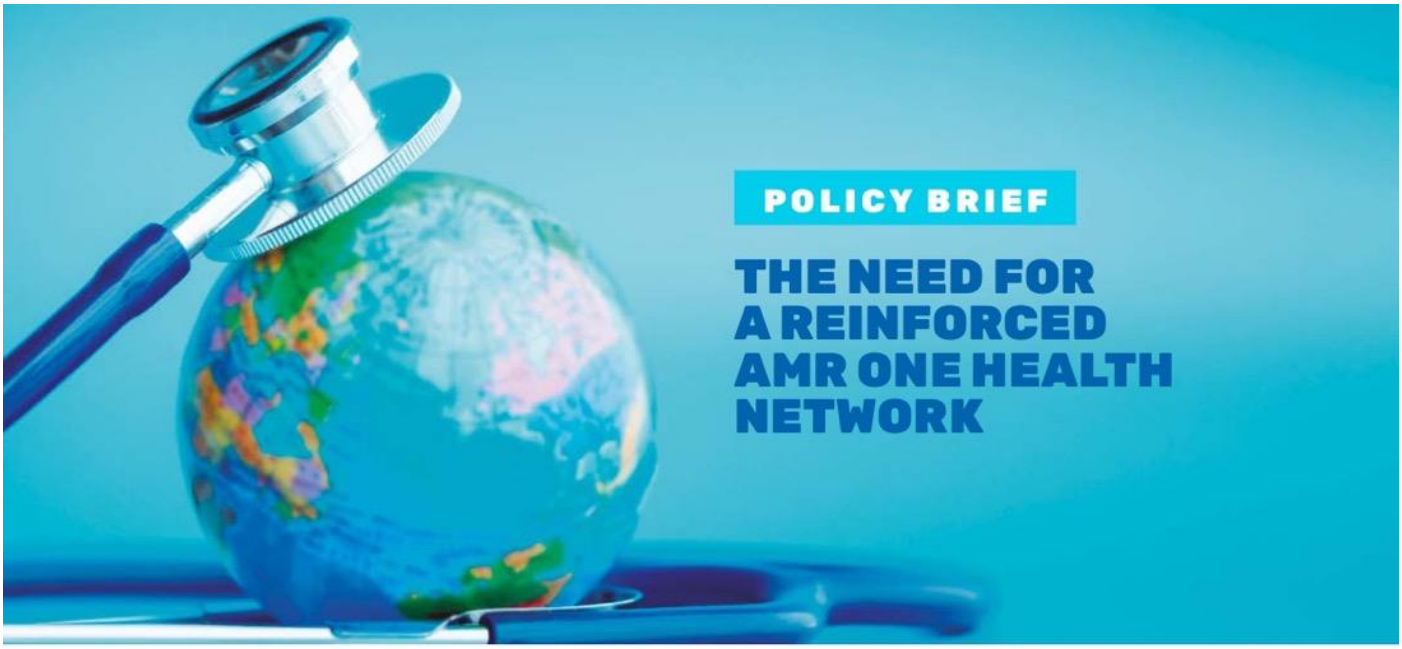

POLICY BRIEF

THE NEED FOR A REINFORCED AMR ONE HEALTH NETWORK

Antimicrobial resistance (AMR), known as the ability of microorganisms to resist antimicrobials, is a global and major issue that threatens human and animal health as well as the environment. These three sectors are all interrelated, as microorganisms can spread in all sectors. The issue of AMR thus requires a holistic and trans-sectoral approach, known as the One Health approach.

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Following the 2016 and 2019 Council Conclusions on AMR, the EU-JAMRAI calls for an extension and strengthening of the mandate of the AMR One Health Network (OHN), to wholly address all components of the One Health trans-sectoral and integrated approach required to obtain a full impact of the EU action plan against AMR.

THE GLOBAL THREAT OF AMR

At the international level, AMR is recognized by the World Health Organization (WHO) as being one of the major global threats and is listed as a top priority for action on the global health agenda. The figures published by the WHO and the OECD are alarming:

- 33.000 patients die annually in the European Union as a result of infections caused by multi-resistant bacteria[i].
- Antibiotic use and infection prevention and control practices vary a lot between countries. By 2050, Southern Europe will be the most strongly impacted by AMR: Italy, Greece and Portugal are forecasted to be the countries with the highest mortality rates[iii] from AMR by the OECD

Concerning the animal sector, in the EU / EEA, about two thirds of total antimicrobial use is for food producing animals[iii]. Globally, if no effective action is put in place, antimicrobial use in food-producing animals will rise by 67% between 2010 and 2030[iii].

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THE EU AMR ONE HEALTH NETWORK

In 2016, the Council Conclusions on the next steps under a One Health approach to combat AMR[iv] recognised the importance of cooperation between Member States and called on the European Commission to create an EU AMR One Health Network (OHN).

The main purpose of the OHN created in 2017 was to facilitate and enhance regular discussions between Member States on AMR policy options, exchange information and sharing of best practices and keep each other updated on the progress made on the implementation of NAP and the implementation of the EU Action Plan.

It is composed of government experts from the human health and animal health sectors, as well as EU agencies representatives (ECDC, EMA, and EFSA)[v].

The 2019 Council Conclusions on the next steps towards making the EU a best practice region in combatting antimicrobial resistance[v] underlined the importance of the regular meetings of the OHN. They called for a reinforced cooperation, through the OHN, to address AMR by implementing bilateral and multilateral sharing of best practices in order to provide support to Member States in the establishment of the National action plans (NAPs) and the national strategies on Antimicrobial stewardship (AMS) and Infection prevention and control (IPC).

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A PRESSING NEED TO EXTEND AND STRENGTHEN THE MANDATE OF THE AMR ONE HEALTH NETWORK IDENTIFIED BY THE EU-JAMRAI

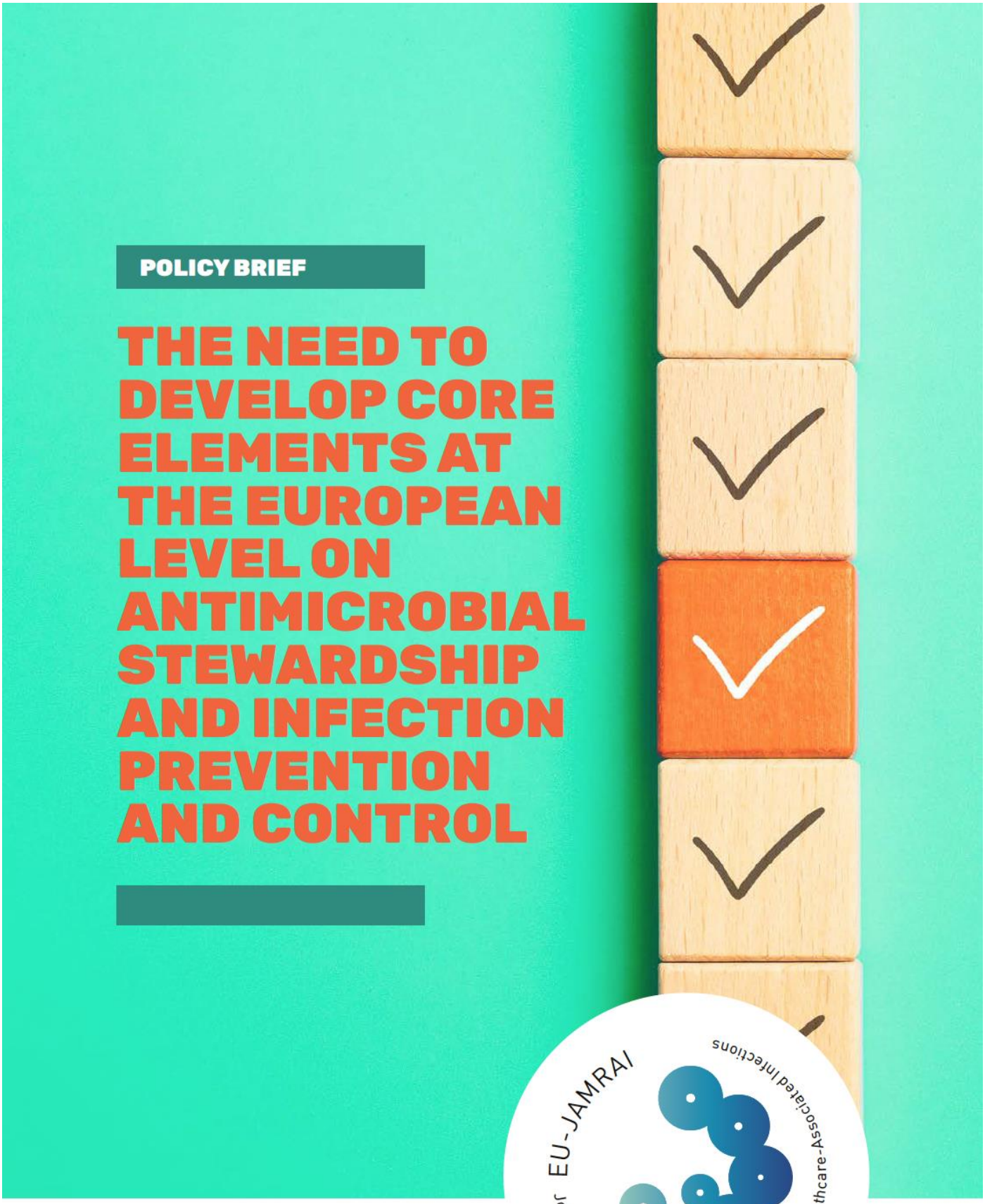
Using regular meetings such as the OHN and sectorial discussions at the EU level has also been identified by the EU-JAMRAI stakeholders and Member States as a priority and the most important element to sustain the fruitful cooperation in the fight against AMR. Indeed, during the three-year duration of the project, one of the main objectives of the EU-JAMRAI has been to strengthen a network of all the actors involved in the fight against AMR (general objective 2). Particularly, the Work Package 5 worked on sharing of best practices between MS, for example using country-to-country visits. The WP5 has also set up a network of supervisory bodies responsible for controlling activities related to AMR (e.g. control of the level of implementation of national policies, the level of compliance with legislation or adherence to guidelines or recommendations).

The EU-JAMRAI underlined how essential networking is to continue improving and sustaining this EU-wide collaboration between MS. Strengthening the role of the OHN would build further on the work done during the Joint Action

Acknowledging the importance of communication and coordination between European Member States to tackle the urgent issue of AMR, the EU-JAMRAI calls for the extension and the strengthening of the mandate of the EU AMR One Health Network by:

- Focussing also on the environmental sector: including inviting environmental sector representatives to join the AMR One Health Network. The work achieved within the EU-JAMRAI, and lately the impact of the COVID-19 pandemic, have highlighted the need to consider the AMR issue within a large One Health perspective.
- Preparing the agenda of the meetings with the EU Presidency in order to reflect Member States' priorities and issues to be discussed.
- Developing dedicated IT tools (or extend functionalities of existing ones) that will allow participants to share information during and between the meetings, to drive improvement of national activities. A password-protected web-based dynamic platform accessible to all MS representatives could be put in place, with interactive functionalities such as: repository of tools and documents, allowing sharing of success stories regarding AMR/HCAI-related interventions, contact list, forum of discussion. This platform would allow discussing common problems, sharing experiences information and best practices. This would allow more interactions between the MS representatives, ultimately leading to greater engagement and collaboration during the bi-annual meetings.
- Extending the duration of the bi-annual meetings of the OHN to two full days, so as to foster networking, give MS the possibility to contribute to the agenda, and allow more in-depth discussions around complex issues related to AMR at the European level.

[i] Cassini A. et al (2019). Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis. The Lancet, 19:1.
[ii] European Court of auditors (2019). Addressing antimicrobial resistance: progress in the animal sector, but this health threat remains a challenge for the EU. Luxembourg: Publications Office of the European Union.
[iii] Van Boeckel, T. et al. (2015). "Global trends in antimicrobial use in food animals", Proceedings of the National Academy of Sciences. Vol. 112/18, pp. 5649-5654.
[iv] ECDC, OECD (2019). AMR tackling the burden in the European Union. Briefing note for EU/EEA countries. Paris.
[v] Council of the European Union (2019). Conclusions on the next steps towards making the EU a best practice region in combatting antimicrobial resistance n°36.37.
[vi] Council of the European Union (2019). Conclusions on the next steps towards making the EU a best practice region in combatting antimicrobial resistance. 9765/19. n°35. 56. 57.
[vii] EU-JAMRAI WP4 (2019). Survey of Members States and Stakeholders' priorities.



POLICY BRIEF

THE NEED TO DEVELOP CORE ELEMENTS AT THE EUROPEAN LEVEL ON ANTIMICROBIAL STEWARDSHIP AND INFECTION PREVENTION AND CONTROL

Co-funded by
the Health Programme
of the European Union

EU-JAMRAI | Policy brief: The need to develop core elements at the European level on antimicrobial stewardship (AMS) and infection prevention and control (IPC)

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POLICY BRIEF

THE NEED TO DEVELOP CORE ELEMENTS AT THE EUROPEAN LEVEL ON ANTIMICROBIAL STEWARDSHIP AND INFECTION PREVENTION AND CONTROL

AN UNMET NEED

Joint Action
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Antimicrobial resistance (AMR), known as the ability of microorganisms to resist the action of antimicrobials, is a global and major issue that threatens human and animal health as well as the environment, which are all interrelated, as microorganisms can spread in all sectors. The issue of AMR requires a holistic and multi-sectoral approach, known as the One Health approach.

Excessive and inappropriate use of antimicrobial drugs as well as poor infection prevention and control (IPC) practices are the two main drivers of AMR. If AMR continues to increase, we would revert to a world where infectious diseases are no longer treatable, leading to prolonged illnesses, disabilities, mortality, and at the same time increasing the cost of healthcare[1].

International organisations act for the prevention of antimicrobial resistance: OIE, WHO and FAO, in relation with UNEP, are engaged in a Tripartite plus alliance to coordinate the strategies to combat AMR. WHO published the Global Action Plan to combat AMR in 2015 while the European Union adopted an updated European One Health action plan against AMR in 2017. According to the European Commission guidelines[2], the control of AMR can only be achieved by combining strong IPC measures (including those targeting healthcare associated infections), and programmes promoting prudent use of antimicrobials known as antimicrobial stewardship (AMS) programmes. From an economic perspective, the OECD demonstrated that the implementation of AMS and IPC programmes is cost-saving[3].

However, despite these plans and guidelines, EU member states do not reach the same level of achievements concerning health policies on AMS and IPC. This represents a barrier to the effective implementation of AMS and IPC programmes at the European level.

To overcome this obstacle, the EU-JAMRAI strongly invites the Member States and the European Commission to mandate the relevant EU Agencies with the support of European medical societies to develop core elements on AMS and IPC. They should be implementable at national and facility levels, both in human and animal health, that are relevant to the EU, in order to create the minimum framework to be used by all EU Member States.

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THE GLOBAL THREAT OF AMR

At the international level, AMR is recognized by the WHO as being one of the major global threats and is listed as a top priority for action on the global health agenda. Indeed, the figures published by the ECDC and the OECD[3] are alarming:

- 33.000 patients die annually in the EU/EEA as a direct consequence of infections caused by multidrug-resistant bacteria[4].
- Antibiotic use and infection prevention and control practices vary a lot between countries. By 2050, Southern Europe will be the most strongly impacted by AMR: Italy, Greece and Portugal are forecasted to be the countries with the highest mortality rates[4] from AMR.

Concerning the animal sector, in the EU / EEA, about two thirds of total antimicrobial use is for food producing animals[5]. Globally, if no effective action is put in place, antimicrobial use in food-producing animals will rise by 67% between 2010 and 2030[6]. Across the EU, between 2011 and 2016, it has been estimated that sales of veterinary antimicrobials were reduced by 20 %[5], but use still remains too high.

AMR also has a significant impact on the cost of healthcare in EU/EEA countries. In 2019, the OECD and the ECDC estimated that, due to extra healthcare costs induced by AMR, 1.1 billion euros are expected to be spent yearly across EU/EEA countries between 2015 and 2050[7].

If no effective public health action is put in place in the coming years, AMR rates and its impact will grow further.

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WHAT CAN BE DONE?

As the European One Health Action Plan against AMR[1] is urging to make the EU a best practice region and to shape the global agenda, establishing harmonized core elements guiding AMS and IPC programmes in the EU is necessary.

Without a common framework, effective AMS and IPC programmes that have the ability to reduce the burden of AMR at the European, national and facility level cannot be implemented properly.

The 2019 Conclusions of the EU Council urged for the development of common guidelines on IPC and AMS based on best practices and for supporting their implementation.

The European Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI) found that the Member States and stakeholders interviewed consider that having standards at the European level was a priority for effective implementation of AMS and IPC programmes.

Some core elements have already been developed at international level, but several gaps need to be addressed in order to have such core elements fully implemented in the EU (see Table below).

Furthermore, in animal and environmental health, we are not aware of existing core elements at international level.

	Infection Prevention and Control (IPC)	Antimicrobial Stewardship (AMS)
	Human health	Human health
Existing core elements at national and facility (hospital) level	■ The 2016 WHO guidelines[10] ■ The 2019 WHO Minimum Requirements[11]	■ The 2019 WHO Antimicrobial stewardship toolkit[12]
➡ **Gaps to address**	➡ Adapted to the EU? ➡ Develop core competencies at national and facility level for animal health?	
Existing core elements at facility (hospital) level only	■ A 2015 literature review and expert consensus with a European perspective[13]	■ The 2015 TATFAR common structure and process indicators[14]
➡ **Gaps to address**	➡ Need to be updated? ➡ Focus only on hospitals, need to be developed for nursing homes and primary care	

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WHAT CAN BE DONE?

The EU-JAMRAI therefore urges the European Commission, together with EU Member States but also key stakeholders such as professional organisations, to address these gaps. These core elements on AMS and IPC programmes, both at national and facility/setting level (e.g. hospital/nursing homes/primary care), for human and animal health, could be developed on the basis of the examples described above. A solid methodology is advisable, for example:

- Review of the existing published and grey literature and existing guidance / recommendations;
- Followed by a structured consensus procedure involving all EU Member States representatives.
- These core elements must be complemented by a standard structure/process/outcome evaluation framework, with relevant indicators, that could be used both at national and European level if accompanied with quantified achievable targets. This can follow the same process as the Transatlantic Taskforce on Antimicrobial Resistance (TATFAR) work[15].

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Healthcare-Associated Infections

REFE-RENCES

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POLICY BRIEF

THE NEED TO DEVELOP INDICATORS AND TARGETS FOR AMR ACTION PLANS IN THE EU

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POLICY BRIEF

THE NEED TO DEVELOP INDICATORS AND TARGETS FOR AMR ACTION PLANS IN THE EU

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AN UNMET NEED

Antimicrobial resistance (AMR), known as the ability of microorganisms to resist the action of antimicrobials, is a global and major issue that threatens human and animal health as well as the environment, which are all interrelated, as microorganisms can spread in all sectors. The issue of AMR requires a holistic and multi-sectoral approach, known as the One Health approach.

Excessive and inappropriate use of antimicrobial drugs as well as poor infection prevention and control (IPC) practices are the two main drivers of AMR. If AMR continues to increase, we would revert to a world where infectious diseases are no longer treatable, leading to prolonged illnesses, disabilities, mortality, and at the same time increasing the cost of healthcare[1].

International organisations act for the prevention of antimicrobial resistance: OIE, WHO and FAO, in relation with UNEP, are engaged in a Tripartite plus alliance to coordinate the strategies to combat AMR. WHO published the Global Action Plan to combat AMR in 2015 while the European Union adopted an updated European One Health action plan against AMR in 2017. According to the European Commission guidelines[2], the control of AMR can only be achieved by combining strong IPC (including those targeting healthcare-associated infections), and programmes promoting prudent use of antimicrobials known as antimicrobial stewardship (AMS) programmes. From an economic perspective, the OECD demonstrated that the implementation of AMS and IPC programmes is cost-saving[3].

However, despite these plans and guidelines, EU Member States do not reach the same level of achievements concerning their AMR national action plans. There is a need to support Member States and to monitor the European One Health action plan with indicators and targets.

The EU-JAMRAI is urging the European Commission to establish indicators and targets to monitor the progress of the EU Action Plans, with a One Health perspective. The establishment of these indicators and targets should be mandated to European health Agencies (i.e. ECDC, EMA and EFSA) with the support of European medical societies.

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THE GLOBAL THREAT OF AMR

At the international level, AMR is recognized by the WHO as being one of the major global threats and is listed as a top priority for action on the global health agenda. The numbers published by the ECDC and the OECD[3] are alarming:

- 33.000 patients die annually in the EU/EEA as a direct consequence of infections caused by multi-resistant bacteria[4].
- Antibiotic use and infection prevention and control practices vary a lot between countries. By 2050, Southern Europe will be the most strongly impacted by AMR: Italy, Greece and Portugal are forecasted to be the countries with the highest mortality rates[4] from AMR by the OECD.

Concerning the animal sector, in the EU / EEA, about two thirds of total antimicrobial use is for food producing animals[5]. Globally, if no effective action is put in place, antimicrobial use in food-producing animals will rise by 67% between 2010 and 2030[6]. Across the EU, between 2011 and 2016, it has been estimated that sales of veterinary antimicrobials were reduced by 20 %[5], but use still remains too high.

AMR also has a significant impact on the cost of healthcare in EU/EEA countries. In 2019, the OECD and ECDC estimated that, due to extra healthcare costs induced by AMR, 1.1 billion euros are expected to be spent yearly across EU/EEA countries between 2015 and 2050.

If no effective public health action is put in place in the coming years, AMR rates and its impacts will grow further.

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WHAT CAN BE DONE?

As the European One Health Action plan against AMR[1] is urging to make the EU a best practice region and to shape the global agenda, having a set of indicators and targets to monitor progress across Europe is necessary.

The 2019 Council Conclusions on AMR encourage Member States and the Commission to "strengthen and widen the scope of surveillance of AMR and healthcare-associated infections rates and consumption of antimicrobials, both in the human and the animal health sectors", in establishing, for Member States, "national measurable targets (...) and monitor progress towards reducing the spread of AMR, taking into account to the appropriate extent the indicators developed by EFSA, EMA and ECDC" . The European Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI) highlighted that Member States and stakeholders consider indicators for human and animal health as the key to secure concrete outcomes. Moreover, the European guidelines for the prudent use of antimicrobial in human health and the guidelines for the prudent use of antimicrobials in veterinary medicine also recommend developing indicators on AMS.

The European Commission requested that ECDC, EMA and EFSA produce a scientific opinion on outcome indicators for AMR One Health Action that could use existing surveillance data. These agencies published in 2017 a Joint Scientific Opinion with a list of general outcome indicators on AMR in humans and food-producing animals[12]. However, the last report of the European Court of Auditors highlighted that these indicators were not used enough by Member States or by the European Commission, to monitor progress[5].

EU-JAMRAI highlighted that Member States and stakeholders consider indicators for human and animal health as the key to secure concrete outcomes.

Moreover, no target / objective to reach was defined for each of these indicators, which makes it difficult to assess the room for improvement.

A cross-sectional survey conducted in 2016 by the ESCMID Study Group for Antimicrobial stewardship (ESGAP) found that only 29% of the European participating countries had national indicators on antibiotic use in human health with both clear targets and incentives[13]. A survey conducted in 2019 by the Transatlantic Taskforce on Antimicrobial Resistance (TAFTAR) highlighted that only nine countries out of 30 responding countries had implemented targets for the reduction of antibiotic use in humans and 17 countries were working to establish such targets[14]. Some examples of indicators and targets are provided below.

Indicators	Targets
Number of antibiotic prescriptions for 1000 inhabitants per year in primary care	<250
Proportion of children treated with third-generation cephalosporins over the year, out of children receiving antibiotics in primary care	<3%

WHAT CAN BE DONE?

Concerning the animal sector, EMA recommended in 2016 that "over the course of the next three to four years, all Member States should reduce the use of colistin in animals at least to a target level of 5 mg colistin/population correction unit. [...] Member States are also encouraged to set stricter national targets, ideally below 1 mg colistin/PCU as a desirable level".[15]

Establishing a set of key structure/process/outcome indicators (e.g. quality indicators, proxy indicators, quantity metrics, on antibiotic use and resistance, AMS and IPC) and targets should be a priority, with a One Health perspective. The EU-JAMRAI therefore urges the European Commission to initiate such a work, in relation with the relevant EU agencies and EU Member States. These indicators and targets, on the basis of the examples described above, might be developed using the following methodology:

- Review of the existing published and grey literature and existing guidance / recommendations;
- EU agencies (EMA, ECDC, EFSA) to provide advice on possible target values;
- Followed by a structured consensus procedure involving all EU Member States representatives.

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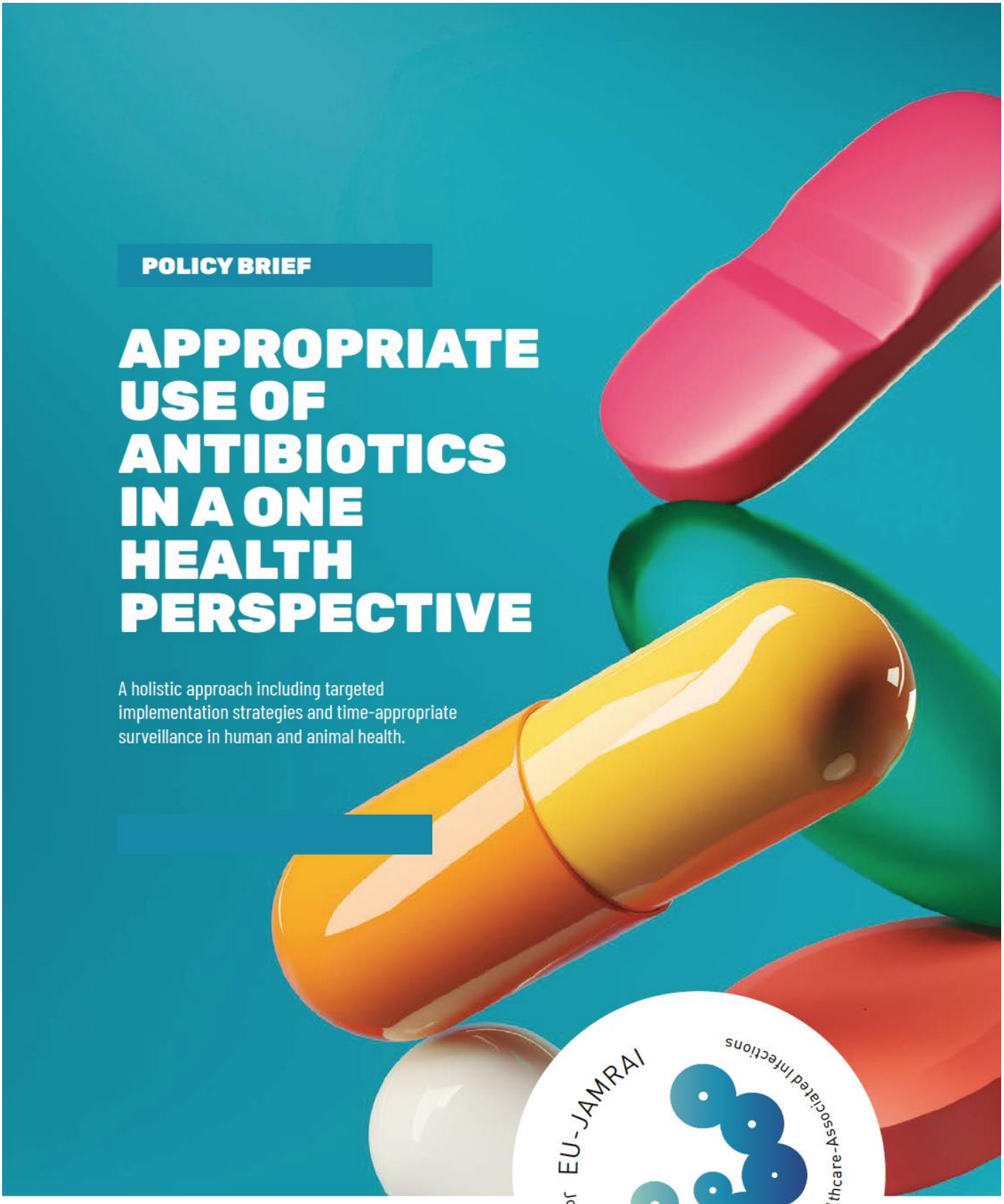
POLICY BRIEF

APPROPRIATE USE OF ANTIBIOTICS IN A ONE HEALTH PERSPECTIVE

A holistic approach including targeted implementation strategies and time-appropriate surveillance in human and animal health.



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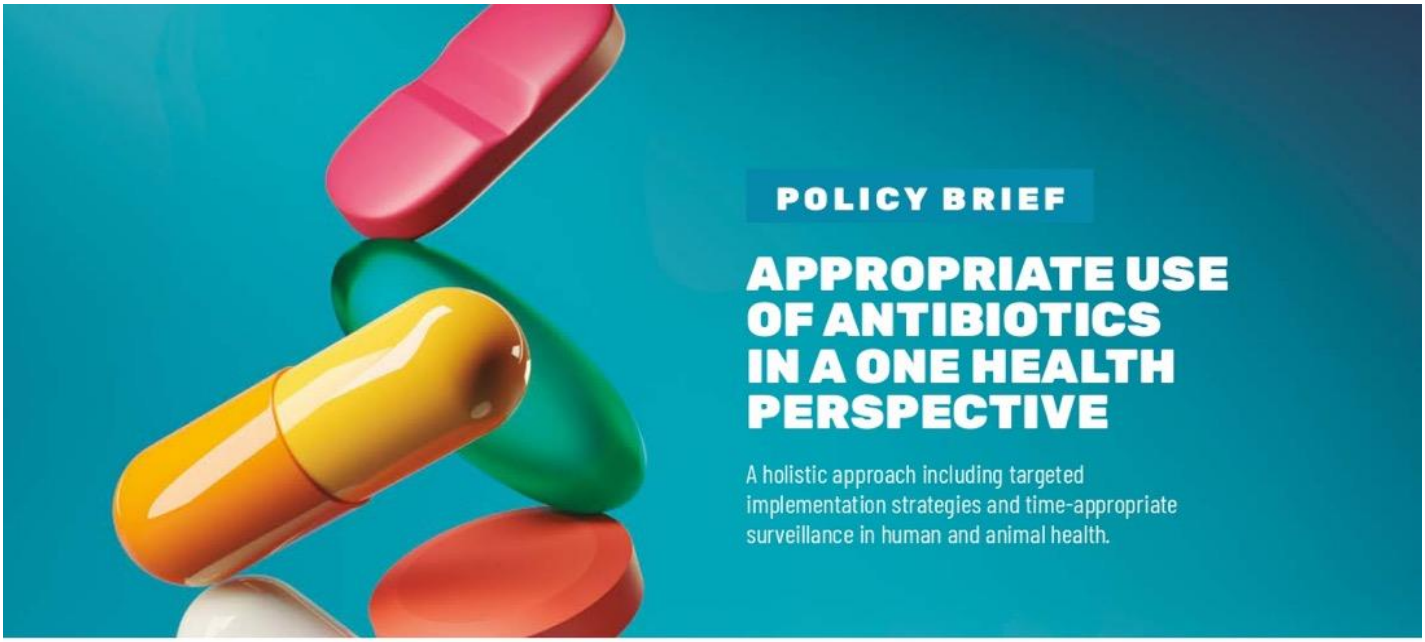

POLICY BRIEF

APPROPRIATE USE OF ANTIBIOTICS IN A ONE HEALTH PERSPECTIVE

A holistic approach including targeted implementation strategies and time-appropriate surveillance in human and animal health.

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BACK-GROUND

Antimicrobial resistance (AMR) poses a serious challenge; in the European Union (EU) alone it is estimated that AMR costs approximately EUR 1.5 billion annually in healthcare costs and productivity losses. Three of the most important areas with the highest added value for action are promoting the prudent use of antimicrobials, enhancing cross-sectorial work, and surveillance of AMR and antimicrobial consumption.

Antimicrobial stewardship is defined as "a coherent set of actions which promote using antimicrobials responsibly"[1] and is one of the core strategies to combat AMR. European guidelines for the prudent use of antimicrobials in both human and animal health[2,3], were developed with the purpose of providing practical guidance on the development and implementation of strategies to promote appropriate use of antimicrobials. European countries vary in their focus and level of implementation of antimicrobial stewardship actions.

Better surveillance is part of the key objectives of the European One Health Action Plan against AMR with the aim of making the EU a best practice region. Surveillance of AMR and antimicrobial consumption (AMC) is paramount in monitoring progress of AMR National Action Plans (NAPs), and specifically of antimicrobial stewardship programmes. A One Health AMR surveillance system is essential to understand the magnitude of the problem, identify trends, determine how AMC and AMR are linked, evaluate policies and set priorities. Although in the EU gaps in surveillance remain and one of these gaps is a Europe-wide surveillance system for AMR in sick animals.

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WHAT EU-JAMRAI ADDS TO THE SITUATION

Antimicrobial stewardship in human medicine

- The EU-JAMRAI identified a lack of efficient and easily accessible tools to facilitate the implementation of antimicrobial stewardship at both country and healthcare level.
- Existing guidelines, tools and implementation methods stratified by level-of-care (hospital, long-term care facility (LTCF) and community setting) were identified and reviewed and a repository was made. This repository has been well received and already used, among others, by the ARCH Network[4].
- Results from a one-day workshop with participants from 22 different European countries, showed that hospitals currently have more actions in place than community settings. Whilst there has been a lot of recent action for family doctors, experience with long-term care facilities (LTCF) is lagging behind. Although there were different success factors and problems specific to individual countries, there was also a lot of common ground (e.g. good leadership and clear lines of accountability and well-functioning IT) which meant countries could benefit directly from findings in other member states.
- A qualitative study was conducted in seven different European countries to assess attitudes towards core elements of antimicrobial stewardship at national, hospital, LTCF and primary care levels, focusing on success stories and barriers to stewardship implementation. The results are already being used to inform the content and action points of upcoming NAPs.

The results of a qualitative study of antimicrobial stewardship implementation are already being used to inform upcoming NAPs.

Antimicrobial stewardship in veterinary medicine

- To assess the level of implementation and acceptance of antimicrobial stewardship programmes (ASP), an electronic questionnaire was disseminated through partners and stakeholders of the EU-JAMRAI.
- Core components needed for implementation were identified which can be used by member states when planning their own stewardship programmes. In animals this is broader than in humans, due to the variety of production systems and animal species.
- The results of the questionnaire are already being used to propose a stewardship program suitable for adaptation and use in both companion and production animal, structured around different strategic and specific actions.
- When developing an ASP, it is important to define objectives, identify all actors that need to be involved, and periodically assess the progress and success, in order to constantly improve and address the need to review the strategy.

[4] Aim to bridge the gap between humAn and animal suRveillance data, antibiotic poliCy, and stewardsHip

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WHAT EU-JAMRAI ADDS TO THE SITUATION

Surveillance of AMR and antimicrobial consumption in human health

- In order to shorten the current time gap between AMR and AMC data collection and assessment, a near-real time surveillance system has been piloted within the EU-JAMRAI, during a 2.5 year period, collecting 41 indicators each trimester: 19 AMC indicators for hospital care (HC); 10 AMC indicators for primary care (PC); 7 AMR indicators for HC; and 5 AMR indicators for PC.
- 17 partners from 11 countries enrolled the study, reinforcing their surveillance systems by providing data on a quarterly basis, from hospitals and/or primary care at a local, regional or national scope. This approach would complement the current surveillance on AMR and AMC data in the EU/EEA Member States, which are informed to the ECDC and assessed on a yearly basis.
- In addition to the innovative quarterly based surveillance, this pilot system introduced new indicators to increase the knowledge of AMR and AMC status from healthcare centres level up to the regional or national level, allowing each healthcare centre to monitor their own AMR and AMC data evolution over time, in order to carry out local, regional or national interventions on a more timely manner:
  - A new AMC indicator for hospitals to monitor consumption in DDD per 1000 bed-days, complementing the current EU/EEA AMC surveillance data for HC that are expressed as DDD per 1000 inhabitants
  - A new AMR indicator to monitor the incidence density of resistant isolates from all clinical samples per 1000 bed-days in hospitals and per 1000 inhabitants in primary care, complementing the current EU/EEA AMR surveillance data that are expressed as resistance percentage from invasive (blood and cerebrospinal fluid) isolates

A near-real time surveillance system has been piloted by 17 partners from 11 countries.

Surveillance of AMR in animals[5]

- AMR surveillance efforts in the animal sector in Europe produce useful data on the possible spread of AMR to humans through the food chain, but they are of little help to inform antimicrobial treatment guidelines and support antimicrobial stewardship in the veterinary sector.
- As part of the EU-JAMRAI, a broad consultation of experts from 14 countries and from European stakeholder organizations (incl. ECDC, EFSA, EMA, EURL-AR and FVE) led to the conclusion that time had come to build a European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet), in order to fill the current surveillance gap in diseased animals in Europe and complement the existing EFSA and EARS-Net monitoring.
- National AMR experts were consulted during 12 country visits about their expectations from EARS-Vet and under which conditions they would be ready to participate. Of note, 11 countries already have a national surveillance system in place. These were described and analysed to define, via a pragmatic bottom-up approach, the EARS-Vet objectives, scope (i.e. AMR hazards of interest) and standards (i.e. microbiological techniques and interpretation criteria).
- Among others, EARS-Vet would help i) to support the development of evidence-based guidelines for antimicrobial stewardship in veterinary medicine, ii) to better characterize links between AMC and AMR in animals and iii) to support risk assessment of AMR transmission from animals to humans via non foodborne related routes. Overall, EARS-Vet would contribute to a much stronger One health strategy for AMR surveillance in Europe.

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CALL FOR ACTION

Antimicrobial stewardship in humans

- We encourage Member States to use the repository and the reports as tools for improvement and more successful implementation of antimicrobial stewardship at different levels of human healthcare, which will be an added value to the implementation of the national and EU action plans.
- The EU should prioritize further efforts on antimicrobial stewardship by developing European core elements for antibiotic stewardship programmes at national level, as well as all levels of healthcare. The qualitative evaluation conducted in EU-JAMRAI can contribute with valuable information about the most appropriate core elements of antimicrobial stewardship programmes and the most significant enablers and barriers for successful implementation.

The EU should prioritize further efforts on antimicrobial stewardship by developing European core elements for antibiotic stewardship programmes at national level.

Antimicrobial stewardship in veterinary medicine

- We encourage Member States for further consensus procedure involving the key stakeholders in animal health to be able to publish a white book on the implementation of antimicrobial stewardship in animal health, including definition of a common structure, description of the core elements, the roles of each core professional and indicators to assess the progress.

Surveillance of AMR and antimicrobial consumption in human health

- We encourage policymakers to consider improving AMR and AMC surveillance in the EU by supporting real-time or near-real-time surveillance systems in addition to the existing surveillance systems.

Surveillance of AMR in animals[5]

- We encourage policymakers to build on Member States strong interest in monitoring AMR in diseased animals at a European level, with a number of countries already having national surveillance in place.
- The EU regulation 2016/429 (Animal Health Law) opens for the possibility to regulate AMR surveillance in diseased animals in Europe; EFSA was requested to provide, by March 2022, "a scientific opinion for the listing and categorisation of transmissible animal diseases caused by bacteria resistant to antimicrobials".
- EU-JAMRAI built a preliminary network of 13 countries and set the technical basis for EARS-Vet (scope, objectives, standards). The next step will consist in launching a pilot phase where participating countries start sharing data and produce a first EARS-Vet report, thereby delivering a proof-of-concept for a European AMR surveillance in diseased animals.
- We strongly encourage European decision-makers to consider EARS-Vet as a possible resource for future implementation if, AMR surveillance in diseased animals becomes mandatory in Europe.

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POLICY BRIEF

EUROPEAN ANTIMICROBIAL RESISTANCE SURVEILLANCE NETWORK IN VETERINARY MEDICINE (EARS-VET)

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POLICY BRIEF

EUROPEAN ANTIMICROBIAL RESISTANCE SURVEILLANCE NETWORK IN VETERINARY MEDICINE (EARS-VET)

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CONTEXT AND RATIONALE BEHIND EARS-VET

Antimicrobial resistance (AMR) should be tackled through a One Health approach, as stated in the EU One Health Action Plan.

In the human sector, the ECDC monitors AMR in invasive bacteria from hospitalised patients (European Antimicrobial Resistance Surveillance Network, EARS-Net) and in Salmonella spp. and Campylobacter spp. (European Food- and Waterborne Diseases and Zoonoses Network, FWD-Net). In the animal sector, the EFSA coordinates an active monitoring of AMR in commensal and zoonotic bacteria from healthy food-producing animals at slaughter and food thereof, according to Directive 2003/99/CE of the European Parliament and the Council and the Commission Implementing the Decision 2013/652/EU. Since 2011, EU agencies deliver their findings in joint inter-agency antimicrobial consumption and resistance analysis (JIACRA) reports. The JIACRA II report concluded that monitoring of AMR should also include animal pathogens.

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CONTEXT AND RATIONALE BEHIND EARS-VET

While the EFSA monitoring provides valuable insights into the potential for AMR spread to humans through the food chain, it also has limitations: i) it does not inform on AMR occurrence in specific animal pathogens; this information is needed to rationalize antimicrobial use and improve antimicrobial stewardship in the veterinary sector, ii) it focuses exclusively on foodborne AMR transmission, while AMR transmission from animals to humans can occur via multiple other routes and iii) it targets healthy animals that have either never been treated with an antimicrobial, or been treated a long time before sampling for AMR testing, thereby limiting the sensitivity of the surveillance system, i.e. its ability to detect AMR, and the possibility to study direct associations between AMR and antimicrobial consumption. **Hence, an important gap that remains is a European coordinated programme on surveillance of AMR in bacterial pathogens of animals, i.e. in diseased animals.**

There is currently no EU regulation on AMR surveillance in bacterial pathogens of animals. However, the EU Regulation 2016/429 (Animal Health Law) opens for the possibility to regulate AMR surveillance in veterinary medicine. As a first step in this direction, EFSA received a mandate from the European Commission to provide, by March 2022, "a scientific opinion for the listing and categorisation of transmissible animal diseases caused by bacteria resistant to antimicrobials" (excluding those already covered by Directive 2003/99/CE). However, the way surveillance should be implemented is not part of this mandate.

Of note, a number of EU countries (at least 11) already have a national surveillance system of AMR in bacterial pathogens of animals. However, these systems are fragmented, do not all monitor the same animal species, bacterial species and antimicrobials, and do not all use the same methodologies and interpretative criteria. In addition, other countries are currently developing their surveillance system, without European guidance. **There is an urgent need for a harmonized and coordinated approach for AMR surveillance in bacterial pathogens of animals across Europe.**

Hence, time has come to build the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-Vet), which should be set up and designed so that it can complement and integrate with existing ECDC and EFSA monitoring systems. EARS-Vet would represent a major step towards a stronger and truly One-Health strategy for surveillance of AMR, interlinked with the monitoring of antimicrobial consumption in Europe.

This conclusion, as well as the following technical information, results from a collective agreement within a multidisciplinary group of 30 experts from 14 European countries in consultation with relevant EU bodies (ECDC, EFSA, EMA), built as part of the EU Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI) 2018-2021 co-funded by the EU Health Programme.

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EARS-VET OBJECTIVES

EARS-Vet would be in charge of reporting on the current AMR situation, following AMR trends and detecting emerging AMR in bacterial pathogens of animals in Europe in order to:

i. Inform on AMR occurrence in specific animal pathogens;

ii. Contribute to the development of evidence-based guidelines for antimicrobial prescription in animals, thereby supporting antimicrobial stewardship in the veterinary sector;

iii. Investigate direct links between antimicrobial consumption and AMR in both animals and humans, by providing AMR data collected close to animal point-of-care; as such, EARS-Vet could complement the current pool of data covered by the JIACRA reports;

iv. Support risk assessment of human exposure to AMR from animal reservoirs via non-food related routes (e.g. direct contact with companion or food animals);

v. Provide timely information for policy makers and allow exploring the benefits of interventions at European level;

vi. Provide relevant information that could be of use to medicines agencies in the evaluation or revision of marketing authorisations;

vii. Contribute to estimate the burden of AMR in the animal sector.

EARS-VET DESIGN AND STANDARDS

EARS-Vet would operate as a network of national surveillance systems of AMR in diseased animals, similarly to EARS-Net in the human sector. All these national surveillance systems perform passive data collection, although a few countries complement their passive scheme with an active sampling. Using a bottom-up approach that takes into account what national surveillance systems currently monitor, as well as what EFSA and ECDC already cover, EU-JAMRAI partner countries agreed on a tentative EARS-Vet scope including 220 combinations of animal species - sample types - bacterial species - antimicrobials of interest and EARS-Vet standards for antimicrobials susceptibility testing.

EARS-Vet would operate as a network of national surveillance systems of AMR in diseased animals, similarly to EARS-Net in the human sector.

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FUTURE STEPS TO BUILD EARS-VET

Building on EU-JAMRAI achievements, the next steps will consist in launching an EARS-Vet pilot phase where participating countries will start to share and jointly analyse their data, and finally produce a first EARS-Vet surveillance report. The level of representativeness and comparability of AMR data across national surveillance systems will also be assessed. Future EARS-Vet developments also include the integration of molecular (WGS) data for AMR bacterial clones and genes surveillance, as well as the inclusion of other AMR hazards of interest, such as those to be identified as priorities in the EFSA scientific opinion on the listing and categorisation of transmissible animal diseases caused by bacteria resistant to antimicrobials.

To achieve these next steps, and more generally to ensure the sustainability of EARS-Vet, strong political commitment from EU and national decision makers is needed. On the short term, we urge them i) to provide financial support to EARS-Vet, e.g. by funding an EARS-Vet pilot phase and ii) to provide political support to EARS-Vet, by encouraging Member States to promote surveillance of AMR in bacterial pathogens of animals in their country and to invite relevant national contact points to join the EARS-Vet initiative.

To achieve these next steps, and more generally to ensure the sustainability of EARS-Vet, strong political commitment from EU and national decision makers is needed.

On the long-term, EARS-Vet could potentially be taken over by EU bodies (e.g. EFSA), should they receive the mandate to coordinate AMR surveillance in bacterial pathogens of animals (e.g. under the umbrella of the Animal Health Law). This would ensure the integration of EARS-Vet within the European landscape of AMR surveillance and related initiatives, and contribute to achieving a stronger One-Health surveillance of AMR in Europe.

Reference: This policy brief is based on the following publication: Mader Rodolphe et al. Building the European Antimicrobial Resistance Surveillance network in veterinary medicine (EARS-Vet). Euro Surveill. 2021;26(4):pii=2001359. https://doi.org/10.2807/1560-7917.ES.2021.26.4.2001359

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EU-JAMRAI | Policy brief: The urgent need to foster research on infection prevention and control to improve health security.

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POLICY BRIEF

THE URGENT NEED TO FOSTER RESEARCH ON INFECTION PREVENTION AND CONTROL TO IMPROVE HEALTH SECURITY

Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

THE PROBLEM

Effective Infection Prevention and Control (IPC) measures are necessary to control the spread of infections, like COVID-19, as well as minimise everyday healthcare-associated infections. Fewer infections in hospitals result in lower consumption of antibiotics, thereby reducing antibiotic resistance. Yet, despite the critical importance of IPC measures, its research needs are often neglected

As COVID-19 has demonstrated to the world, the only steps that can be taken to control the spread of a novel virus with pandemic potential are effective Infection Prevention and Control (IPC) measures, like handwashing, social distancing, and even isolation. In non-pandemic times IPC measures are also critical to stop the spread of infections. Every year more than 2.5 million healthcare-associated infections occur in the European Union and European Economic Area, causing millions of extra days of hospital stays.1 Fewer infections in hospitals result in lower consumption of antibiotics, thereby reducing antibiotic resistance.

Effective IPC measures go well beyond handwashing. Ideally IPC should be designed into any new healthcare facility. For instance, purchases of sinks, showers, or bathtubs in healthcare institutions should include an analysis of the evidence of how easily they can be disinfected. Placement and design of hand sanitisers should be based upon evidence of where healthcare personnel are most likely to use them. Avoidance of ventilator-associated infections should be based on evidence for sterilising both the equipment and insertion site. IPC evidence is crucial, but scarce. When IPC research projects compete for funding against other thematic areas, like breakthrough technologies to combat climate change, big data against social inequities, or potential new cancer treatments, they are often perceived as dull, receiving low innovation marks.

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[1] Cassini A, Plachouras D, Eckmanns T, et al. Burden of six healthcare-associated infections on European population health: estimating incidence-based disability-adjusted life years through a population prevalence-based modelling study. PLoS medicine 2016; 13(10).

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THE PROBLEM

This neglect is apparent in the evidence available. Many IPC guidelines are based upon weak scientific evidence.[2,3] The research priorities of IPC are often neglected in important international research agendas. Many countries do not identify IPC research as important in hindering the spread of antibiotic resistance.[4] In this regards, many countries implement a bundle of IPC interventions without knowing which ones are the most cost-effective for their particular context.

Many IPC guidelines are based upon weak scientific evidence.

THE RECOMMENDATION

With European IPC experts the EU-JAMRAI has developed a list of IPC research priorities. Financing these research priorities is critical to strengthening infection prevention and control.

The lack of IPC research may be due to a global lack of awareness of the most urgent IPC needs and knowledge gaps. To address this issue, the European Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI) has developed a list of IPC research priorities, based upon existing scientific literature and validated by European IPC experts.[5] **The most urgent priorities are in bold text.** We urge policymakers, research funders, academics, and industry to adopt and prioritise these research needs. Investment will have wide-ranging benefits, including lowering the number of hospitalised patients, hindering antibiotic resistance, and strengthening global health preparedness for the next pandemic.

Patient environment (facilities and staffing)

1. **Insufficient data are available on the impact of infrastructural changes at the facility level on the reduction of infections and resistance. This includes the accessibility to specific equipment, density of hand washing points, availability of single occupancy rooms, and more.**

2. **Research is needed to explore the impact of patient-to-bed ratio on the spread of infections and resistance, including instances of overcrowding. This should include analyses of staff workload, available staffing (including presence of IPC professionals), bed occupancy, and visitor frequency.**

3. **Research is needed to study the interaction between the human and hospital microbiome.**

[2] Berrios-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for disease control and prevention guideline for the prevention of surgical site infection, 2017. JAMA surgery 2017; 152(8): 784-91.
[3] O'Grady NP, Alexander M, Burns LA, et al. Guidelines for the prevention of intravascular catheter-related infections. Clinical infectious diseases 2011; 52(9): e162-e93.
[4] European Union Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI). Gathering of national research priorities from at least five European countries and gap identification, 2019.
[5] Lacotte Y, Ärdal C, Ploy M-C. Infection prevention and control research priorities to combat antimicrobial resistance and healthcare-associated infections. (under consideration) 2020.

THE RECOMMENDATION

Behavioural science

4. **Studies are needed to assess the demographic, organizational, economic, sociological, and behavioural factors facilitating success but also the barriers and challenges to implement effective IPC programmes.**

5. Patients and their families are key elements in the chain of transmission in healthcare facilities. Studies addressing the impact of patient and family-oriented education and communication campaigns (involving patients associations) on the rate of hospital-acquired infections are needed.

Interventions

6. There is a need for high-quality studies addressing the effectiveness of hospital-based IPC programmes, including their impact, cost-effectiveness, and ideal composition.

Guidelines

7. Many best practice IPC recommendations are based upon weak evidence. For example, the World Health Organization identified, in its Global Guidelines for the Prevention of Surgical Site Infection, 20 recommendations with a "low" quality of evidence. The evidence base supporting IPC guidelines needs to be strengthened.

8. Situational analyses in different settings (high, medium or low-incomes countries) but also different healthcare settings (intensive care units, short or long stay, medico-social facilities) are needed to better understand potential adaptations of IPC guidelines.

9. A better understanding of the different patient screening strategies is needed for risk management. This includes who should be screened, when (including start and stop of screening), and how movement between healthcare institutions should trigger screening. Research should include both clinical impact and cost-effectiveness.

Training

10. Additional tools are needed to evaluate IPC training programmes and implement them.

11. New innovative ways of training should be evaluated such as e-learning, simulation, self-directed training modules or mentorship for IPC education. There is a lack of study on the impact of these innovative training tools on the practice change and infection rate in healthcare facilities.

12. Minimal standard requirements for the recruitment and training of IPC professionals should be investigated.

THE RECOMMENDATION

Surveillance and monitoring

13. Research is needed to assess and validate the reliability of surveillance based on available patient clinical information (syndromic-based surveillance) rather than microbiological data or prescription databases, i.e., data gathered for other primary purposes.

14. There is a lack of published standards to monitor IPC practices beyond hand hygiene. Evidence-based standardised audit protocols need to be created addressing, for example, catheter-related bloodstream/urinary tract infections and ventilator-associated pneumonia.

15. There are a number of innovative, new methods to monitor compliance to IPC practices, including electronic and infrared approaches. These need to be tested in multiple settings to assess their value for IPC programmes.

One Health

16. Research is needed to assess the impact of IPC measures in different operational contexts including small farms, industrial farms, feedlots, slaughterhouses, fish farms, and more. IPC measures may include the density of the animal populations, vaccinations and antibiotic use in animals, as well as the infection control measures of the workers.


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EU-JAMRAI & Global AMR R&D Hub | Policy brief: Incentivizing
antibiotic access and innovation
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POLICY BRIEF

INCENTIVIZING ANTIBIOTIC ACCESS AND INNOVATION

Joint Action Antimicrobial Resistance and Healthcare-Associated Infections

GLOBAL AMR R&D HUB

PREDICTABLE ACCESS TO LIFE-SAVING ANTIBIOTICS IS UNDER THREAT

Antibiotic resistance imperils global health, with multi-drug resistant bacterial infections accounting for over 33,000 deaths in Europe alone in 2015. The number of annual global deaths is unknown but predicted to be large. Yet contrary to the public health need, antibiotic innovators and manufacturers are struggling.

New antibiotics are unable to generate revenues large enough to sustain the interest of multinational players and even small developers are failing to cover their costs, resulting in bankruptcies of small antibiotic innovators. Melinta, an American antibiotic innovator went bankrupt in December 2019, after receiving regulatory approval in the United States and Europe for an antibiotic judged as "innovative" against a "critical" priority pathogen by the World Health Organization. Physicians use new antibiotics as a last resort in order to preserve their efficacy. Whereas this is sound stewardship, it dis-incentivizes innovation since unit sales determine revenues.

Simultaneously, shortages of older antibiotics are increasing. Due to antibiotic resistance patterns and prescribing habits, the markets of some essential antibiotics are small, including those for children. Tendering processes based solely on price and automatic price reductions for generic medicines reduce profitability, leading to a consolidation of supply. The dependency on sole manufacturers may come as a surprise, when there is suddenly no medicine available. For example, in 2017 a fire at a raw material factory in China resulted in a global shortage of piperacillin/tazobactam. During the COVID-19 pandemic, supply chains have been unable to meet demand as well as challenged by supply disruptions due to lockdowns and border closures.

Several prominent reports have assessed the challenges to antibiotic access and innovation and have made recommendations, including calls for "pull" incentives, aiming to increase revenues for marketed, innovative antibiotics. We set out to understand countries' perceptions of these recommendations, through frank and anonymous dialogue. As a part of the EU Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI) we performed in-depth interviews with policymakers and AMR experts in ten European countries.[1] These insights were made more globally representative with support of the Global AMR R&D Hub who supported the inclusion of a further three countries from other continents.[2] The aim of the interviews was to understand the barriers and facilitators for implementing incentives that promote antibiotic access and innovation.

[1] European countries interviewed were: Belgium, Denmark, France, Germany, Luxembourg, the Netherlands, Norway, Romania, Spain, and Sweden. We interviewed policymakers from Ministries of Agriculture and Research in nine of these countries.

[2] Supplementary pool included interviews with the Ministries of Health and other AMR experts in Canada and South Africa, and an interview with an AMR expert in Japan.

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PREDICTABLE ACCESS TO LIFE-SAVING ANTIBIOTICS IS UNDER THREAT

EUROPEAN "PULL" MECHANISMS

The Pharmaceutical Strategy for Europe (2020) states that the EU will pilot a pull incentive in 2021. Three countries are already underway:

England will pay an annual fixed payment determined through a health technology assessment (including both patient and societal value) for the supply of a new antibiotic. The payment is not dependent upon sales volumes. The pilot has selected two antibiotics. Target implementation date is Spring 2022.

Germany has revised the way it assesses new "reserve" antibiotics, allowing for higher unit prices in line with the value of the new antibiotic.

Sweden has signed agreements with suppliers of five new antibiotics for an annual revenue guarantee. Swedish hospitals continue to purchase as normal with the funding from the pilot study paying the difference between the guarantee and actual sales. The agreements started July 15, 2020 and will continue for two years.

ELEVEN COUNTRIES EXPRESSED GENERAL SUPPORT FOR ANTIBIOTIC INCENTIVES

Interviewees expressed support for antibiotic incentives in 11 of 13 countries. Yet, it was clear from the interviews that policymakers' support is high-level and general. Almost all countries are uncertain which incentive is appropriate for their country, how to implement an incentive, and how much it will cost. They prefer to wait for evidence from Germany, Sweden, and the United Kingdom (see box). Nine of the 10 European countries interviewed would prefer a common, European or multinational incentive, as long as it is independent from national health technology assessment, medicine pricing, and reimbursement.

Policymakers were clear that incentives should only apply to antibiotics that meet public health needs and that the public health value must be demonstrated through showing benefit in clinical situations against multi-drug resistant infections (see quote).

Whereas policymakers expressed concerns about the lack of antibiotic innovation, this was not the principal driver for support for new incentives. Rather, countries (9 of 11) indicate a preference for a model that ensures access to both old and new antibiotics, with the highest priority for older antibiotics.

"Antibiotics are being approved for indications where there is no intention that they will be used. This sends the wrong signal...would prefer that antibiotics are tested against drug-resistance instead. If the trials need to be done in [high-resistance countries] and they are performed according to existing standards, this is preferable."

EU-JAMRAI & Global AMR R&D Hub | Policy brief: Incentivizing antibiotic access and innovation

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COUNTRIES DO NOT HAVE PREDICTABLE ACCESS TO LIFE-SAVING ANTIBIOTICS

Predictable access to life-saving antibiotics is a common global challenge. Twelve of 13 countries indicated that shortages of existing antibiotics is a serious problem. Eight out of 13 indicated that this resulted in greater use of broad-spectrum antibiotics and thereby potentially increasing antibiotic resistance. As important antibiotics continue to be unavailable, doctors change prescribing habits, potentially away from evidence-informed prescribing guidelines. Interestingly, we also interviewed veterinary counterparts in European countries, who stated that there was no indication of shortages of veterinary antibiotics, despite often being comprised of the same active pharmaceutical ingredients.

National medicines agencies and procurers lack the tools to work proactively to avoid antibiotic shortages. They know which factories produce the raw materials and finished medicines for only their own marketed medicines, but do not have access to data about the global market for a specific medicine. Factory information is generally considered a business secret and cannot be made publicly available. When countries are notified of a supply disruption, it is too late to find a solution if all companies are dependent upon the same raw material supplier. This is a common problem since the world supply of active pharmaceutical ingredients is highly concentrated in a few countries. A lockdown in one geographic region can have significant implications for the world's medicine supply. Transparency is needed to understand supply chain resilience. New Zealand has already taken steps, openly publishing the name and location of raw material and finished product factories for all its marketed medicines.

Unpredictable access is not only a challenge for older antibiotics but also for new ones. New antibiotics are not widely available. For example, the new antibiotic combination meropenem/vaborbactam, judged as "innovative" by the World Health Organization against "critical" priority pathogens, was approved by the European Medicines Agency in 2018 but is currently marketed in only five EU countries.

A lockdown in one geographic region can have significant implications for the world's medicine supply.

SPECIFIC, DETAILED INCENTIVES MUST BE COMMUNICATED TO FACILITATE IMPLEMENTATION

The results of these interviews point to a clear need for specific, detailed incentives that national policymakers can assess, tailor, and implement. These incentives must be designed with the aim of ensuring national access to important antibiotics that meet public health need. EU-JAMRAI aims to publish a recommendation in early 2021.

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ABOUT EU-JAMRAI

EU-JAMRAI is a European Union Joint Action on Antimicrobial Resistance (AMR) and Healthcare-Associated Infections (HCAI) that brings together 44 partners and more than 40 stakeholders. Our mission is to foster synergies among EU Member States by developing and implementing effective One Health policies to fight the rising threat of AMR and to reduce HCAI. EU-JAMRAI started in September 2017 and will finish in February 2021.

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Annex III: Survey to assess integration in National Action Plans

The aim of this short survey (19 questions) is to assess to what extent the European Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI) outputs have been useful for National Action Plans (NAP) and policies, and if the EU-JAMRAI has met the Member States' (MS) expectations.
As a Member State representative (member of the Advisory Committee), please reply for both the human health and animal health sectors (one single coordinated reply per country).

Country you represent: xx
Contact details of the national representative submitting the questionnaire:

LIST OF ACRONYMS
AMR: Antimicrobial Resistance
AMS: Antimicrobial stewardship
EU: European Union
IPC: Infection Prevention and Control
EU-JAMRAI: European Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections

Assessing how the EU-JAMRAI has helped Member States improve their national strategy and actions

Do you have a national action plan (NAP)/strategy/position paper on AMR?
☐Human health
☐Animal health
☐One Health
☐Under preparation
☐No

Comments:

If yes, have you included/used some of the EU-JAMRAI outputs in your national strategy/actions?
☐Yes (please give some examples)
☐No
☐No, but we are planning to (please give some examples)

Comments:

If no, has the EU-JAMRAI helped you plan for designing such a national action plan?
☐Yes
☐No

Comments:

Are you considering hosting some of the EU-JAMRAI's documents on your national Antimicrobial Resistance (AMR) website?
☐Yes, we have done so (please provide the weblink)
☐Yes, we are planning to do so
☐No
☐Not applicable (no national AMR website)

Comments:

We will now focus on some key outputs of the EU-JAMRAI.

Assessing the use of the online app for school and high school students (Micro-Combat)

The online game app (available in 16 languages) will be shared with all EU-JAMRAI partners and advisory committee members very soon.
Do you plan to use the online game app as one of the communication tools used nationally to raise awareness on AMR?
☐Yes
☐No

Comments:

One of the objectives of the app Micro-Combat is to help teachers to introduce AMR to students with accurate information and in a fun way. Do you think this app could be part of your national strategy towards younger generations?

☐Yes

☐No

Comments:

Assessing the use of the antibiotic resistance symbol

The EU-JAMRAI has developed a symbol for Antibiotic Resistance. The winner of the 'Antibiotic Resistance Symbol Contest' was revealed on November 10th. The EU-JAMRAI shared the communication toolkit with all its partners and advisory committee members on November 11th.

Will this symbol help you raise awareness on this topic? (e.g. during the European Antibiotic Awareness Day (EAAD)/ World Antibiotic Awareness Week (WAAW))

☐Yes (please describe briefly how you intend to use the symbol in the coming year)

☐No

Comments:

Assessing the adoption of an IPC framework

The EU-JAMRAI developed a Universal Infection Control Framework: could this framework help you update/improve your IPC national policy?

☐Yes

☐No

Comments:

Are you planning to use the EU-JAMRAI's Universal Infection Prevention and Control (IPC) framework at national level?

☐Yes (please give some examples)

☐No

Comments:

Facilitating the implementation of antimicrobial stewardship (AMS) programmes

Do you find the EU-JAMRAI inventory of tools and guidelines on AMS helpful to guide you designing and improving your national actions in human health and animal health?

☐Yes

☐No

Comments:

Do you find the concept of a Surveillance network on AMR for diseased animals (EARS-Vet) relevant for your country?

☐Yes

☐No

Comments:

Do you think that being involved in the EU-JAMRAI has helped you improve your own surveillance system on AMR in human health and animal health?

☐Yes

☐No

Comments:

Assessing the influence of the gap analysis at EU level on the research strategic agenda and future research

The EU-JAMRAI identified many research gaps on AMS and IPC by comparing every national research strategic agenda and the European Strategic Research Agendas of European initiatives.

According to these highlighted research gaps, do you intend to update your national strategic research agenda to address the identified unmet needs?

☐Yes

☐No

Comments:

Assessing the implementation of strategies to boost innovation

The EU-JAMRAI, trough the publication of a scientific article, highlighted different ways to finance innovation for antibiotics.

Are you aware of this document?

☐Yes

☐No

Comments:

Has this document been useful to inform your national innovation strategy?

☐Yes

☐No

Comments:

Your expectations

For the following questions please reply using a scale from 1 to 4 *(1=disagree, 2=partially agree, 3=mostly agree, 4=totally agree)*.

Do you agree that the EU-JAMRAI's objective to raise awareness in Europe on AMR, healthcare-associated infections, AMS and IPC was achieved?

☐1(disagree) ☐2 ☐3 ☐4(totally agree)

Comments:

Do you agree that the EU-JAMRAI helped to create a closer collaboration, understanding and trust between the animal health and human health sector in a One Health perspective?

☐1(disagree) ☐2 ☐3 ☐4(totally agree)

Comments:

Do you agree that the dissemination/communication of the EU-JAMRAI activities and outputs was sufficient?

☐1(disagree) ☐2 ☐3 ☐4(totally agree)

Comments:

Overall, do you agree that the EU-JAMRAI project helped your country improve its national strategy/actions on AMR and healthcare-associated infections?

☐1(disagree) ☐2 ☐3 ☐4(to

Comments:

EU-JAMRAI

Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections

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