



**D6.1 Protocol for a
systematic review on
environmental factors
influencing the prevalence of
antibiotic resistance in the
environment**

Workpackage 6

Responsible Partner: UOS

Contributing partners: AGES- INSA-PHE



GENERAL INFORMATION

European Joint Programme full title	Promoting One Health in Europe through joint actions on foodborne zoonoses, antimicrobial resistance and emerging microbiological hazards
European Joint Programme acronym	One Health EJP
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DOCUMENT MANAGEMENT

Title OHEJP deliverable	Protocol for a systematic review on environmental factors influencing the prevalence of antibiotic resistance in the environment		
WP and task	<p>WP6: Probabilistic and mechanistic models of the links between antimicrobial usage in animals, AMR in the environment, and the risks for public health</p> <p>T6.1: Build a probabilistic mathematical model of the emergence of AMR in target bacteria and the relative contribution of transformation and conjugation to ARG acquisition</p>		
Leader	Giovanni Lo Iacono		
Other contributors	Brian Gardner; Mark Chambers. Also, other members of the One Health EJP, colleagues from PHE and UoS have been invited and agreed to contribute to the systematic review.		
Due month of the deliverable	M30		
Actual submission month	M38		
Type <i>R: Document, report DEC: Websites, patent filings, videos, etc.; OTHER</i>	R: Documents; DEC: Website (GitLab); Other Save date: 7-Jul-21		
Dissemination level <i>PU: Public (default) CO: confidential, only for members of the consortium (including the Commission Services).</i>	CO <i>See updated Grant Agreement</i>		
Dissemination <i>Author's suggestion to inform the following possible interested parties.</i>	OHEJP WP 1 <input type="checkbox"/> OHEJP WP 4 <input type="checkbox"/> OHEJP WP 7 <input type="checkbox"/> Communication Team <input checked="" type="checkbox"/> National Stakeholders/Program Owners Committee <input type="checkbox"/>	OHEJP WP 2 <input type="checkbox"/> OHEJP WP 5 <input type="checkbox"/> Project Management Team <input checked="" type="checkbox"/> Scientific Steering Board <input type="checkbox"/>	OHEJP WP 3 <input checked="" type="checkbox"/> OHEJP WP 6 <input type="checkbox"/>



	<p>EFSA <input type="checkbox"/> ECDC <input type="checkbox"/> EEA <input type="checkbox"/> EMA <input type="checkbox"/> FAO <input type="checkbox"/> WHO <input type="checkbox"/> OIE <input type="checkbox"/></p> <p>Other international stakeholder(s):</p> <p>Social Media:</p> <p><u>Other recipient(s):</u></p>
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D-JRP15-FED-AMR-WP6.1: Protocol for a systematic review on environmental factors influencing the prevalence of antibiotic resistance in the environment

D-JRP17-FED-AMR-WP6.1 is led by task leader Dr Giovanni Lo Iacono (23-UoS). On this task, PDRA Dr Brian Gardner (23-UoS) has outlined the protocol for a systematic review regarding the impact of environment factors on the prevalence of antimicrobial resistance (AMR) in the environment. This is a collaborative effort: involving several other members of FED-AMR, UoS and Public Health England (PHE). The intention is to use the data gathered from this systematic review as the input for a machine learning approach .

Preliminary Remarks

This deliverable D-JRP17-FED-AMR-WP6.1 was originally described as "Main code for the mathematical modelling made available in public repository (e.g. GitHub) with associated documentation (which can be used as "Material and Method" section of the forthcoming publications)". However, due to certain challenges in obtaining the data required for setting up a machine learning model (in part related to COVID-19 restrictions), the workflow of WP6.1 was since changed to initially carry out a systematic review of the literature regarding environmental factors of AMR prevalence. The idea is that the data extracted as part of this systematic review will be used to inform the design of a future machine learning model. This revised deliverable provides the protocol for such a systematic review. The protocol has been shared with members of FED-AMR, who were also invited to join as co-authors for this review (and some have agreed).

Description of action

This work package has been delayed due to the late recruitment of PDRA Brian Gardner. Hence, the milestones of this WP, including this deliverable WP6.1, have been delayed by two months. Work commenced at the start of May 2020, and initial steps involved establishing interest from FED-AMR partners and others in the idea of designing a systematic review for data gathering purposes. Subsequently, a mini-scoping review was conducted to establish the novelty of this topic, resulting in the following set of research questions:

- How is the prevalence or abundances of antibiotic resistance factors, specifically ARB and ARGs, in the environment associated with the local level of exposure to suspected causes / indicators of antibiotic resistance?
- What prominent mechanisms of HGT are involved in the spread of antibiotic resistance: specifically, in relation to the environmental conditions from which samples are obtained?

Accordingly, the protocol for a systematic review was devised to address these questions, and feedback gained from collaborators involved with related FED-AMR projects, as well as from UoS and PHE. This protocol specifies the steps needed to conduct the systematic review, including the expected format of data extracted from the literature for future modelling, satisfying the description of WP6.1.

Description of deliverable

As explained above, D-JRP17-FED-AMR-WP6.1 has been changed to "Protocol for a systematic review on environmental factors influencing the prevalence of antibiotic resistance in the environment". This



deliverable provides this protocol documentation on the UoS GitLab website at the following link: <https://gitlab.eps.surrey.ac.uk/bg0013/systematic-review-protocol-amr>. This is a private repository, and will remain confidential until publication of the systematic review or registration of the protocol. The protocol can be shared with all members of the FED-AMR or other One-Health EJP members and they can access to the GIT repository if requested.

This deliverable documents the research objectives of this task, including a detailed methodological approach to conducting the systematic review. As described in the protocol, study eligibility for inclusion in this systematic review include those describing factors which indicate the emergence of AMR in the natural, non-built-up environment. For the purposes of modelling using machine learning, data regarding the prevalence of antibiotic resistance factors and antibiotic resistance genes will be extracted from included studies. In-line with the goal of this WP6.1, a key outcome is to identify the relative importance of HGT mechanisms associated with the spread of antibiotic resistance, i.e. transformation vs. conjugation. The searched databases, specific search strategy, plans for data management and categories of extracted data types are specified in the linked protocol.

Confidentiality of the documents

This protocol for the systematic review will remain confidential, except for FED-AMR members or other One-Health EJP members, until publication or registration of the protocol.