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ARTICLE

A tribute to the foot soldiers: European health agencies in the fight against antimicrobial resistance

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Abstract

The prevention of antimicrobial resistance (AMR) has been a flagship of the EU's health policy since the early 2000s, leading the European Commission to mandate three European agencies to cooperate in the fight against AMR: EMA (the European Medicines Agency), ECDC (European Centre for Disease Prevention and Control) and EFSA (the European Food Safety Agency). This article is at the intersection of EU health policy and the burgeoning scholarship on bureaucratic reputation. Little is known on the role played by reputational incentives on inter-agency cooperation. This empirical work supports the claim that cooperation creates incentives for agencies to protect their reputational uniqueness *vis-à-vis* each other. However, rather than threatening their cooperation, it amounts to a process of sense-making of their respective roles in the integrated fight against AMR. Evidence is generated through the agencies' textual sources, as well as in-depth interviews and analysed through a narrative analysis. From the early days of inter-agency cooperation, to recent legislative work, this paper offers in-depth insights on the EU's governance against AMR.

Key words: Antimicrobial resistance; European agencies; European Union; Future of health policy; Reputation

1. Introduction

The European Commission is a precursor in the fight against antimicrobial resistance (AMR), preceding even the World Health Organization (WHO). From the early 2000s, the Commission, with the support of the European Food Safety Authority (EFSA), restricted via Regulation the use of antibiotics for promoting growth in animals (European Union, 2003a). Due to the baroque legal framework that characterises health policy in the European Union (EU), animal health remains the area of competence where the EU is the most capable to legislate. In 2018, a new Regulation (European Union, 2003b, 2019) extended the restrictions to prophylactic use of antibiotics in groups of animals, as well as metaphylactic use of antimicrobials in animals and restricted the use of certain antimicrobials to human use only. However, the legislative outputs, with their focus on animal health, only tell a partial story of the EU's actions in the fight against AMR. A more comprehensive picture is drawn in the Commission's action plans against AMR (2011 and 2016). Following the 'One Health' approach, the European Commission has developed an integrated strategy that approaches both human and animal health as two sides of the same coin (Cassidy, 2017). The scope of the problem, and the accepted integrated approach (human and animal health), has led to the consolidation of an original multifaceted, sophisticated organisation which involves three agencies: EFSA, the European Medicines Agency (EMA) and the European Centre for Disease Prevention and Control (ECDC). Ultimately, the three agencies cooperate closely in co-producing scientific expertise and advice.

However, what are the roles of these agencies in this joint approach? In its first action plan (European Commission, 2011), the Commission largely referred to agencies' joint publications and their scientific input in defining the problem of AMR. It also mandated the agencies to further their work on antimicrobial consumption and resistance which resulted among other things in two influential joint reports (the Joint Inter-Agency Antimicrobial Consumption and Resistance Analysis 'JIACRA' reports), as well as joint scientific opinions. Considering the limited competences at the disposal of the EU regarding health issues, these coordinated efforts seem to be a credible and sophisticated solution to tackle AMR. It mobilises the resources of three independent agencies, a practice that conventional wisdom in the regulation literature (Majone, 2002; Busuioc *et al.*, 2011) would interpret as signalling that credible commitments are taken. But past the scientific input, distinct roles seem to take shape for each agency. Indeed, the second action plan (European Commission, 2017) of the Commission portrays the agencies in more diverse and operational roles. Joint actions remain important: the Commission mandated the trio to research the link between antimicrobial agents and resistance, as well as to define key outcome indicators to monitor member states' progress in the fight against AMR. But agencies are also mandated with specific missions: the harmonisation of rules for surveillance (EFSA), support in the implementation of the One Health approach (ECDC), review the use of antimicrobial agents (EMA).

The aim of this paper is twofold: first as a tribute to the 'foot soldiers', it details the scientific cooperation of agencies which defined the action taken at EU level to fight AMR. Second, this paper addresses the following question: how are tasks and roles ultimately assigned in inter-agency cooperation on AMR? I use a reputational approach to explore the determinants of the agencies' roles. The literature on reputation has so far only discussed implications regarding cooperation between agencies in a limited way (Busuioc, 2016). Yet, a reputational approach can also inform our understanding of the regulatory arrangements of public health governance at EU level. Crucially, it can answer pressing questions regarding the lack of clarity on the allocation of authority in the EU's public health policy (Adolph *et al.*, 2012; Clemens *et al.*, 2017; Ferreira and Staerk, 2017).

Reputation assigns organisations' statuses of expertise and allows them "to define basic terms of debate" (Carpenter, 2010, 33). Institutional autonomy, resources and ultimately survival depend on the ability to cultivate a strong reputation of 'uniqueness' among one's audiences (Carpenter, 2000). Uniqueness is crucial for agencies, as they must demonstrate they are able to create solutions and provide a type of information found nowhere else in the polity (Busuioc *et al.*, 2011; Busuioc and Lodge, 2015). Agencies are expected to cultivate a reputation of 'uniqueness' (Carpenter, 2001; Maor and Sulitzeanu-Kenan, 2016). Threats to uniqueness are incentives to adopt reputation-seeking strategies in order to maintain, enhance or even correct a given reputation (Maor *et al.*, 2013). Agencies are thus deemed to claim a unique contribution to the public good (Maor *et al.*, 2013, 583) different from other organisations. The claim defended here is that agencies' reputational strategies offer explanatory leverage as to why they adopt specific roles in the integrated fight against AMR. While the cooperation between agencies reflects the credibility of commitments taken to address AMR, cooperative settings represent threats to an agency's uniqueness. As a joint form of institutional expression, cooperation between agencies is bound to be shaped by strategic choices (Lodge, 2008, 284), motivated by reputational concerns. In sum, this paper seeks answers to the following question: what is the role of reputational incentives in explaining the respective roles taken on by health agencies in the integrated approach adopted to fight AMR?

2. 'Uniqueness' and agencies' behaviour

Reputation builds on the idea that agencies' ability to perform regulatory tasks depends on a unique reputation (Majone, 1997). This key insight has a significant importance regarding the behaviour of agencies. Cooperation between agencies may incentivise them to adopt strategies

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to preserve their uniqueness. To confront this claim, the concept of uniqueness ought to be operationalised. 'Uniqueness' emphasises the distinctive characteristics of an agency that differentiates it from similar organisations. The exclusive character of an agency depends on its functions and actions being widely acknowledged on the basis of its distinct performance (Carpenter, 2010; Carpenter and Krause, 2011) as well as the capability of the agency to deliver outputs that cannot be provided by another organisation (Carpenter, 2001; Maor and Sulitzeanu-Kenan, 2016). It thus logically follows that an agency cannot thrive or survive in an environment in which conditions prevent the sustainability of a reputation of uniqueness. As Wilson notes "an organisation is like a fish in a coral reef: To survive, it needs to find a supportive ecological niche" (Wilson, 1989, 188). The case of inter-agency cooperation brings empirical depth to the concept of uniqueness by making it distinguishable from the broader concept of reputation. It also makes comparative observations possible bringing three different agencies under scrutiny as they work and produce knowledge in the same field and in a cooperative fashion. In the unusual setting that is the cooperation between EFSA, EMA and ECDC, uniqueness is a relevant issue that, at face value, indicates that agencies are incentivised to mark their differences and thrive for clarity *vis-à-vis* their roles and functions. However, the cooperation between the three agencies is characterised at times by intensive forms of cooperation while evolving towards more distinct roles. To refine the research expectations on uniqueness, the literature on regulatory cooperation and agencies' behaviour provides some additional leverage.

Busuioc (2016) analyses how reputation strategies are turf sensitive especially in cases of cooperation between European agencies and their national counterparts: "the benefits cooperation efforts can bring in terms of the unique reputation the agency maintains and cultivates towards its key audience(s) are expected to considerably shape cooperation outcomes" (Busuioc, 2016, 43). In a multi-level setting, Busuioc shows evidence that threats to reputational uniqueness trigger turf-protecting tendencies which in turn undermined proper cooperation. In this context, cooperation is treated as another instance of bureaucratic behaviour, one that leads to turf-protecting behaviours. Turf is understood as an agency's distinctive "jurisdiction/mission" (Wilson, 1989, 182) or "regulatory dominion" (Maor 2010, 136). This delimited 'turf' and the need for an agency to protect it leads to specific bureaucratic behaviour already pinpointed by Wilson (1989, 189–190), as the efforts "to seek out tasks that are not performed by others", "to fight organisations that try to perform your tasks", and therefore, "to be wary of joint or cooperative ventures". The concept of turf thus underlines that cooperation can be deemed risky, lead to rivalry and ultimately put at risk an agency's uniqueness. Turf-protecting behaviours are thus ultimately deemed to create situations referred to as 'cooperation' in name only.

However, in the case of inter-agency cooperation between EFSA, EMA and ECDC, scope conditions are different. Agencies do not compete for the ability to regulate in a multi-level system (Busuioc, 2016), rather they engage in a consensual, joint venture with different areas of scientific competence and a common goal. Research expectations must be updated. Turf-protecting behaviour is posited to be inherent to agencies, but they do not have to automatically lead to stalemate. In the case under scrutiny, turf-protective behaviours are expected to set off a process in which agencies reflect, make sense and eventually collectively clarify and define their respective roles. The joint venture between EFSA, EMA and ECDC ought to be explained in the light of the development of their cooperation. Each agency first makes sense of its turf and perceived reputational incentives and threats. Then, to build on Wilson's analogy of the ecological niche, rather than engaging in turf 'wars', the three agencies eventually develop an ecological equilibrium in which turf is now clearly delimited and understood: roles are assigned, and each unique expertise is reinforced. This virtuous effect of turf tendencies allows them to cooperate, make sense of their turf and cultivate a reputation of uniqueness.

In light of these updated research expectations, two observations are necessary to complete the picture. EFSA and EMA are both considered quasi-regulators meaning that they systematically shape the regulation of the EU market in their respective areas of competences (Busuioc,

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2013). The ECDC operates in an area of coordinating competences with no capacity to regulate the market. EFSA's turf is limited to livestock and other animals while the ECDC and EMA's respective mandates revolve more explicitly on human health. Because of their respective regulatory natures and areas of expertise, efforts to make sense and clarify roles in the fight against AMR are expected to be more important in the relationship between EMA and ECDC than between EFSA and the other two agencies. While EFSA has a clearly defined quasi-regulatory role to take on animal health, task-sharing between EMA and ECDC is bound to be less explicitly defined and likely to trigger more distinct turf-sensitive behaviours.

3. Narrating reputational incentives

To unveil agencies' behavioural strategies and sense-making efforts, the logic of inquiry must encapsulate socially constructed realities. Research expectations are thus probed through a qualitative narrative analysis. The research question guiding this inquiry is explanatory in nature and underpins the following causal argument: cooperation produces reputational incentives for agencies which shape their strategic choices. The answer to this question offers explanatory leverage on the institutional expression of inter-agency cooperation. A narrative analysis allows for a robust understanding of how cooperation is perceived by the three agencies, and how it informs the rationale of their respective behaviours. A narrative policy analysis consists of studying narratives as the basic tool of sense-making of organisational and policy change. Narratives have been represented as analogous to 'stories': sequences of events, actions and sometimes lessons, with a plot tying together different parts into a meaningful whole (Riessman, 1993). 'Storytellers' illustrate their version of the action, exclude, emphasise and ultimately provide an interpretation or a commentary and reflect a particular understanding of public policy making (Feldman, 2004). Narrative analysis is also an effective way to draw possible scenarios for the future as narratives are in nature reflexive, including reflecting on the next steps to be taken (Bold, 2011).

The narrative analysis in this paper is based on data collected from interviews and internal textual sources from the afore-mentioned agencies. Nine in-depth expert interviews were conducted: three with former staff and collaborators of the ECDC, two with current staff from EFSA, two with current staff from EMA and two with current staff from DG Santé in the Commission. A pillar of interpretive social science, in-depth interviews are more conversational than structured ones and offer flexibility (Soss, 2006, 136). They are open-ended and centred on dialectical and discursive conversations with informants. After summarizing the research project, each informant was invited to tell 'their' story, from the beginning of their involvement in AMR, up to the present day. Interviewees were pressed for clarifications, and elaborations, building on the knowledge gathered in the textual sources. Crucially, interviewees were also asked to comment not only on the behaviour of their own organisation but also to comment on the way they explained other agencies' behaviour. Interviews were transcribed for the purpose of the analysis.

Textual sources included internal documents from the agencies, such as director's reports, and corporate and scientific publications related to AMR, but most of the textual data were generated from minutes of the governing bodies of the agencies. This includes a management board for EMA, ECDC and EFSA as well as an advisory forum for ECDC, these governing bodies hold accountable the directors and staff of their specific agency. As such, discussions and debates that take place in those settings carry meaning conveyed by the explanations of the directors and staff to national representatives and/or experts who hold them accountable. Forty-four documents were analysed with a breakdown of the documents in Table 1. These textual sources were supplemented by joint publications produced by the agencies and documents from the European Commission. Relevant extracts of minutes were selected where appropriate. Transcripts and extracts were analysed following the same method.

Two distinct approaches are commonly accepted in narrative analysis (Polkinghorne, 1995). The first one, characterised by a quasi-ethnographic approach is concerned with the collection

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Table 1. Textual sources for narrative analysis

Sources	*N*
ECDC	13
EMA	8
EFSA	9
Joint publications	9
European Commission	5

of stories as data, and results in descriptions of themes across the stories. The second one collects descriptions of events and happenings and synthesises them by means of a plot. For the purpose of this analysis, it would be in the first case articulating the analysis in the function of narrators and in the second case making sense of them in functions of the events they discuss. The chosen method of analysis is to reconstruct narratives and synthesise them by means of a plot. Two reasons motivate that choice: first, it allows for a presentation of the results which is explicit in describing the joint actions carried out by the agencies and the development of their cooperation over time. Second, by tying-in the subjective point of view of agencies, the analysis is more efficient in contrasting the reputational incentives agencies perceive. This approach risks eschewing the subjectivity of the sources and thus requires some precautions (Roe, 1989, 1994; Bedsworth *et al.*, 2004). The collective protagonists and narrators are the three agencies, while the researcher is an observer who reports those narratives. To probe research expectations, stories are reconstructed from different textual elements in a systematic way. In order to avoid imprinting the researcher's subjectivity and emphasise narrators' and protagonists' points of view, the analysis is based on Bold's three fundamental criteria for causal stories (2011): temporality (a sequence of events in a specific time frame), causation (one event causes another) and human interest (or in this case the 'organisational' interest of each agency).

In the first analytical step, data were coded with these three criteria. In a second analytical step, narratives were reconstructed using different textual and interview sources from the three agencies according to the sequence of events described (temporality) and the causation of these events. These form the plot of the narratives and allow for a trustworthy and reliable description. Narratives were also supplemented with public health publications to enhance trustworthiness ($N = 7$). Unlike temporality and causation, the criterion of organisational interest is relevant as it harbours the subjective experience agencies have of their cooperation. The last analytical step thus consisted of contrasting these different experiences. Ultimately reputational incentives perceived by the agencies and their turf-sensitive behaviours are inferred from this analytical step.

Three self-contained, collective, narratives emerge from this analysis:

- A first narrative running from the late 1990s to 2011 (first Commission action plan) in which cooperation becomes possible following the resolution of an epistemic feud on AMR.
- A second narrative (starting in the late 2000s to the present, starting with the preparation of the first action plan) focuses on the agencies seizing the technical gains of their cooperation to increase surveillance capacity regarding AMR.
- A third narrative, which runs in parallel to the tail-end of the second narrative, starts in 2014 to the present. This narrative is concerned with the way agencies refocus on their area of competence to carry out a coordinated fight against AMR.

The validity of interpretations described below was cross-checked through member checking. Four informants accepted to participate in member checking with two of them giving a feedback on the analysis (Interview 8, 20).

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4. Analysis: narratives of the fight against AMR in Europe

4.1 Assigning blame, obfuscating roles

This first narrative depicts the growing interest in AMR from the early 2000s up to the infancy of the cooperation between agencies and the first action plan of the Commission in 2011. In this temporality, the role of the Commission in fostering inter-agency cooperation is of paramount importance. But this is only one side of 'causation'. This period is also characterised by a path towards the resolution of a feud between two epistemic communities referred to by informants as the 'veterinary side' and the 'human side'. Regarding 'organisational interest', the end of the feud did not lead to a perfectly smooth cooperation yet but nevertheless indicates how agencies initially perceived potential threats to uniqueness.

4.1.1 Overcoming blame games

In 2001, the European Commission launched an EU strategy to combat AMR which covered a range of actions such as data collection, surveillance, research and awareness-raising. Around that time, the Commission was set on the fact that AMR relates to the animal sector (Interview 8, 2019). EFSA was instrumental in the implementation of the legislation on the prudent use of antimicrobial agents with specific attention to zoonoses (disease transmitted from animals to humans) and specifically the ban of antibiotics used for growth promotion in animal feed, effective from January 2006 (European Union, 2003a, b). Some of the informants recount how, at the time, the problem of AMR and who should act on it was unclear and difficult to tackle (Interview 13, 20, 2019). This uncertainty stimulated a blame game between professionals of the animal sector and human health sector. An informant (Interview 3, 2019) underlines that some of the questions asked by the Commission to agencies were often addressed differently to one agency from another, which might have led to disagreements not only regarding their 'turf' but also regarding the positionality of their expert input.

This blame game did not affect agencies' attitudes in the same ways: EFSA, in the mid-2000s, was particularly keen on developing relationships with partners in the EU, making specific references to ECDC and EMA (EFSA, 2007). The situation in ECDC was more complex. The ECDC Director showed a willingness to cooperate: "EFSA has agreed to have joint interpretation of data. The ECDC scientific panel needs to be coordinated with the EFSA scientific panel. Further discussions will take place with EFSA" (ECDC, 2005a, 10). But members of the advisory forum of the ECDC still saw AMR as a problem that revolved around the veterinary field and did not want the ECDC to be as involved with AMR issues. Despite an ambitious 2005 proposal by the ECDC Director which included coordinating relevant surveillance activities, a website, information to the public, country visits and developing a self-assessment tool for countries to apply to their AMR, the project was rejected in favour of the development of a scientific panel (ECDC, 2005b). However, on EMA's side, textual sources did not show any evidence that the agency had any interest in cooperating with EFSA and/or the ECDC on the topic of AMR. Often the fight against AMR is recalled as an important objective, but without mention of the sister agencies.

The end of the blame game faded at the turn of 2007–2008 which marks the European Commission embracing the One Health approach as a rationale for its second EU-Health Programme (Interview 20, 10, 13, 2019). At that point, evidence of the ECDC's interest for AMR is overwhelming (ECDC Advisory Forum, May, 2008a); as demonstrated in the editorial 'Turning the tide of antimicrobial resistance' (Monnet and Kristinsson, 2008) in Eurosurveillance, the flagship publication of the agency. ECDC's textual sources also provide insightful commentaries on the relationship between ECDC and EFSA. During a visit of a member of EFSA staff to a meeting of the ECDC's Management Board, the warm relations between the two agencies were clear and cooperation was seen as an opportunity: "the collaboration between ECDC and EFSA had now reached a new level, fostering further exchange, mutual understanding

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and intensified collaboration. He reported that EFSA's Director came away very impressed after her visit to ECDC" (ECDC June, 2008b, 9). A new avenue of cooperation was established between ECDC and EMA with the publication of the September 2009 joint report 'The Bacterial Challenge: Time to React' (ECDC, EMA, 2009), with frequent visits from EMA staff to the ECDC (ECDC, 2006). Later textual sources from the EMA emphasise the importance of the European Commission and Council of Ministers willingness to take-up the issue as what sets the agency on the path of cooperation (EMA, 2012, 5).

The formal cooperation between the trio of agencies started with a request from the European Commission for a "common short report on antimicrobial resistance (AMR) focussed on zoonotic infections based on the information currently available" (ECDC, 2009b, 14). This report becomes the first joint scientific opinion and provides the scientific input that is used to develop the Commission's first action plan (2011). It is then followed by the joint scientific opinion (EMA, EFSA, ECDC, 2009) on AMR focused on zoonotic infections. In 2011, the prospect of cooperation was well underway and confirmed in the Commission's action plan. The formalisation of cooperation had been enacted via bilateral memoranda of understanding (except in the case of the ECDC – EMA – a working arrangement). The temporality of these formal agreements mirrors the development of cooperation accounted for in this narrative: EFSA – ECDC in 2008 (EFSA, ECDC April, 2008), EMA – ECDC in 2010 (EMA, ECDC, 2010), EFSA – EMA in 2012 (EFSA, EMA, 2012). All texts mention AMR but do not define any specific distribution of roles or tasks.

4.1.2 Threats and opportunities of inter-agency cooperation

The 'organisational' interest of the three agencies show three gradients of trust *vis-à-vis* the cooperation. EFSA has shown a rather enthusiastic approach to cooperation as documented in the previous paragraphs. However, ECDC and EMA show more resistance towards a tri-partite cooperation with different expressions of turf-sensitive behaviours.

Early discussions in the governing organs of the ECDC show concerns regarding the 'uniqueness' of the organisation *vis-à-vis* its two sister agencies. The ECDC is the youngest agency and in the mid-2000s, it was still making sense of its own turf, with members of the management board citing overlapping nominations and work between EFSA and ECDC (ECDC, 2005a, 12). However, the ECDC approached this question as a way to define its role in the larger picture of health governance (Interview 17, 2019). This process of muddling through the definition of its tasks started as soon as they cooperated with EFSA on zoonoses: "[ECDC] should (a) encourage collaboration starting with one area, (b) consider asking DG SANCO [the Commission] to invigorate the collaboration with the veterinary sector (ideally to establish a standing collaboration committee), and (c) work on the clarification of mandates of ECDC and EFSA regarding any potential overlap in the zoonoses paper" (ECDC, 2008c, 6). Textual sources offer candid comments from the ECDC on its relationship with EMA. While complementarity between the agencies was underlined: "the combination of EMA's more restricted view with its focus on individual medicines with ECDC's broader epidemiological and public-health view was beneficial" (ECDC, 2010c, 9), questions arose on potential overlaps between the ECDC and EMA: "And how do ECDC and EMA differ in their approaches as advisers to the Member States; how can we distinguish their different roles and responsibilities?" (ECDC, 2010c, 17).

A similar, yet more protective of its turf attitude was identified in EMA's textual sources. EMA's board members showed concerns over the attribution of a mandate for the vigilance of cells and tissues to ECDC: "Although the Commission confirmed that the decision had already been taken, the Board called for further debate on this matter" (EMA, 2010, 6). A year later, a whole section of the Management Board meeting was actually devoted to the relationship with the ECDC (EMA, 2011a) which led to the 'Working Arrangement' between the two agencies previously discussed. Yet, the 'Working Arrangement' only clarified the situation in a limited way. The following Management Board meeting discussed the "continued work to clarify the tasks of

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the EMA and ECDC in the area of substances of human origin" (EMA, 2011a, 7), a situation settled a year after the 'Working Arrangement', in favour of EMA's preferences "the ECDC will have an advisory role within their areas of competence" (EMA, 2011b, 9).

In terms of assigning roles, the ECDC emerged rapidly as the agency which coordinates outreach to the public and health practitioners. From 2007 onwards, the ECDC took charge of the organisation of the European Antibiotic Awareness Day (EAAD), a yearly event to promote awareness *vis-à-vis* AMR which first took place on 18 November 2008. The yearly EEAD was an important marker of the role taken by the ECDC not only in the time frame of this narrative but to present day (ECDC, 2009a, b, 2010a, b, 2012, 2016). This outreach role was described as one of the fundamental roles of the ECDC (Interview 2, 2019) even though the field of AMR is where this role was really pioneered (Interview 15, 2009). The fact that the EDCD is not a quasi-regulator is a plausible explanation of the agency seizing the opportunity to take on a unique role. Nevertheless, it also is important to note the strong support for this endeavour in the scientific networks that participate in the work of the ECDC (Interview 10, 2009).

This narrative shows that EFSA and ECDC, through the patronage of the Commission and their own efforts, already had rather distinct roles before the first action plan of the Commission (2011). The EFSA already had an established role, while the ECDC used cooperation to define its own role on the matter of prevention and outreach. However, at the end of the temporality, the question of the unique contribution of EMA is still pending.

4.2 Seizing the rewards of scientific synergy

This second narrative runs from the first action plan to the present and describes the foot soldiers' technical work as they cooperate. In terms of 'causation', all agencies are fully committed in the development of integrated surveillance, which leads to the sophistication of scientific cooperation. The 'organisational interest' shows that agencies are primarily interested in pooling resources at a technical level in order to develop a common message through reliable data. In the development of surveillance, the three agencies shone through unique contributions and their meticulous cooperation.

In the early days of the time period under scrutiny, ECDC and EFSA collaborated more closely together than with EMA: "EFSA and ECDC issued two joint scientific advices and EFSA delivered an urgent scientific report and advice on STEC in vegetables, which are all published on EFSA's website" (EFSA, 2012, 4). The yearly 'EU summary report on antimicrobial resistance' done by ECDC and EFSA was of crucial importance in surveillance (EFSA, 2013, 2014), but only focused on resistance indicators. A key challenge for the three agencies was to establish a link between the consumption of antimicrobial agents and resistance. As all the data at the disposal of the agencies were actually produced by member states, the first step in scientific cooperation was thus to progressively coordinate the way data were retrieved by member states.

The efforts to harmonise data were vastly different from one agency to another. EFSA had already done considerable work in this sense through the Scientific Network for Zoonosis Monitoring Data, due to the importance of those indicators for the food market and the 2003 regulation. The ECDC had recently inherited the European Antimicrobial Resistance Surveillance System (EARSS) (now EARS-Net) and the European Surveillance of Antimicrobial Consumption Network (ESAC-Net). Finally, the Commission mandated EMA to create the European Surveillance for Veterinary Antimicrobial Consumption network (ESVAC), with the project starting in April 2010. In terms of data, each agency has different access: ECDC harbours data on human consumption of antimicrobials and AMR in bacteria, EMA monitors animal consumption of antimicrobials, and EFSA monitors AMR in bacteria found in food-producing animals.

Using each agency's specific resources in terms of data means that while the outputs are inherently collective, each agency brings to the table a unique and irreplaceable contribution. However,

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this unique contribution is not *per se* the result of agencies making sense of their turf in reaction to reputational incentives. Rather, turf is inherited by the agencies through the networks they inherit. EFSA's scientific network is inherited from the mandate it was given through the 2003 Regulation on Zoonoses. In the case of the ECDC and EMA, it is interesting that ECDC is the sole agency in charge of data related to humans. The reason for this surprising outcome is that the network in charge of this surveillance, ESAC-net, was created independently of European agencies. From its creation, the ECDC has been integrating a series of different disease-specific networks into its structure. Indeed, AMR was listed in the European Commission Decision (No 2119/98/EC) on the communicable diseases to be progressively covered by the Community network which preceded the ECDC. This was not the result of a turf dispute but rather the result of a form of path dependence as the ECDC carried over the work of the 'Community network'.

The tasks of data collection and harmonisation were a complex and Dantean process. The surveillance systems were not ready from the get-go to produce sustained data (Interviewee 13, 2019). Member states' data were sometimes non-existent or inferred from completely different methodologies (Interview 20, 2019). In this respect, a core achievement was the 2013 decision on the harmonised monitoring of AMR (European Commission, 2013b), which led to the implementation of a harmonised monitoring system fostering comparability between Member States (European Commission, 2013a). The first output of this operation was the publication of the 2015 JIACRA report (ECDC/EFSA/EMA, 2015) by the trio of agencies which underlined that the use of certain antimicrobials in animals and humans was associated with the occurrence of resistance to these antimicrobials. The technical cooperation between agencies, while not reported to be sensitive by informants, was described as complex and long. Each agency mandated a committee working on the document. All committees worked together but each committee also had to report to their own agency (Interview 20, 2019).

Following the first JIACRA report, cooperation has become increasingly smoother according to the experts interviewed (Interview 13, 10, 2019). Cooperation used to solely be a result of the Commission's requests; 10 years later and with a third JIACRA report on its way for 2020 ('Progress Report New AMR Action Plan' 2018) cooperation has become more natural, with agencies working together without requests from the Commission. JIACRA reports are now recognised as a crucial contribution of the agencies to public health, with important value (Interview 8, 17, 20, 2019). The second JIACRA report 2017 (ECDC/EFSA/EMA, 2017) established that a clear correlation was found between the level of manufacturing standards and the quality of the treatment via medicated feed, which gave sufficient grounds for the Commission to propose the latest regulation on veterinary feeds (European Commision, 2018) (Interview 10, 2019). The legislation also included the obligation for the EU Member States to collect data on the sale and use of antimicrobials in animals (Anderson *et al.*, 2019), which is expected to have a positive effect on the quality of data in future surveillance reports. With the cooperation between EFSA, EMA and ECDC reaching maturity in terms of surveillance, the fight against AMR had gained credibility in Europe and beyond (Interview 20, 17, 2019). The three agencies have been part of the US-led Transatlantic Taskforce on Antimicrobial Resistance (TAFTAR) which started to publish progress report and share good practices in 2014 (CDC, 2014). This move was particularly supported by EMA "The need for a strengthened global action is emerging, along with nationally strengthened surveillance and prudent use of antibiotics, as well as the implementation of the One Health approach" (EMA, 2012, 7). This global dimension is also reflected in the relationship between the three agencies and the WHO, notably through pooling scientific resources within the WHO (Interview 8, 9, 2019).

With regards to the organisational interest, the coordination of surveillance between agencies showed their commitment to cooperation. While the cooperation in terms of publication remained more important between the ECDC and EFSA than with EMA, an informant underlined that this is due to their joint mandate regarding the yearly 'EU summary report on

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antimicrobial resistance'. The same informant (Interview 20) cited for instance the sheer volume of weekly meetings between experts of the three agencies. This narrative shows that each agency brought a unique contribution to surveillance. Task-sharing in this case is not the result of reputational incentives and turf-sensitive behaviours. The agencies did not need to make-sense of their turfs, as their role fell into place due to the links between them and existing scientific communities. The unique contribution of each agency is thus the result of choices made by the Commission to organise the cooperation between agencies (EMA), or inadvertently because of previous organisational choices (EFSA and ECDC).

4.3 Carrying the fight through specialised avenues

In this last narrative, the role of agencies is analysed in terms of the functions they take on, as surveillance has become more routinised, more concrete actions were taken in the fight against AMR. The time frame runs parallel to the tail-end of the previous narrative. The first JIACRA report was very much anticipated by the scientific community (Interview 20, 2019), and the topic was along with vaccines (in the area of public health) a top priority of the Juncker Commission (Interview 5, 2009). In terms of causation, the renewed interest of the Junker Commission on the topic of AMR from 2014 onward set agencies on more operational and specialised roles. Agencies' unique contributions became less concerned with potential threats and more with the development of capacities related to their specific strengths. The 2016 Action Plan by the Commission described the respective roles of agencies with more details: support implementation of national action plans (ECDC), further surveillance (EFSA), review antimicrobial agents (EMA). As expected, the regulatory capacity of the agencies shaped their activities: ECDC became more active in terms of outreach. EMA and EFSA became increasingly active in shaping the regulation of animal consumption, but in their distinct turfs related to their areas of competence. The separation between human and animal health observed in surveillance activities is still important: to this day, the ECDC contributes more actively on the human side while EFSA and EMA are more proactive on the animal side.

4.3.1 Furthering outreach activities on the human side: ECDC

Beyond the organisation of the EEAD, the ECDC engaged in further outreach efforts through a series of country visits which were primarily concerned with human health. Except for an early visit to Latvia on 26–30 September 2011 which focused on reviewing legislation, all visits occurred after 2016. At that point, the consumption and resistance data from the second JIACRA report were publicly available. The accumulation of reliable and comparable data was a useful tool in benchmarking and assessing the situation in specific countries, as underlined by the public health literature (Watier *et al.*, 2017). To this day, there are important variations across the continent in terms of AMR preparedness, with European countries at very different stages of development of national plans for AMR (60% completed, 25% in process, 9% with no plan) (Castro-Sánchez *et al.*, 2018). Moreover, these plans are structured around very different strategies. Without resorting to harmonisation, the ECDC has played a role in some national preparedness plans. The ECDC has visited a total of nine countries: Spain (15–19 February 2016), Italy (9–13 January 2017), Romania (6–10 March 2017), Luxembourg (29 May–2 June 2017), Malta (3–7 July 2017), Belgium (20–24 November 2017), Norway (12–16 March 2018), Bulgaria (15–19 October 2018), Estonia (25–29 March 2019) (ECDC 'Country Visits Reports', 2018). The output of the visits included observation-based and evidence-based assessments of the threat that AMR poses to the country, as well as a comparative review of consumption in hospitals, and assistance in the implementation of national strategies. These short visits were always done with officials of the Commission. One informant (Interview 21, 2019) highlighted that visits were always done through member states' invitation: as a result, national authorities were even

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more receptive to the evaluations made by the ECDC and the recommendations formulated by the ECDC had a profound impact on national action plans.

4.3.2 On the animal side: task-sharing between EMA and EFSA

The previous narratives have demonstrated that EMA was less engaged than its counterparts. The focus on the animal side, effective through the process of sharing tasks in surveillance, brought up change and marks a new impetus for EMA. In April 2014, the Commission requested scientific advice from EMA on the impact of using antibiotics in animals on public health and animal health. EMA formed the Antimicrobial Advice Ad Hoc Expert Group (AMEG) composed of representatives and experts from the three agencies. However, EMA has been leading the project which aims to achieve a categorisation of antimicrobials based on their risk following use in animals. Categorisation has a significant impact on veterinarians' selection and use of antimicrobials (Interview 20, 2019). Another categorisation, set-up by WHO, exists but the difference is that this categorisation also considers animal health and not only human health. With a precise turf and agenda, EMA engaged in reputation seeking strategies with their principals on the basis of their work on AMR: "A delegation from the ENVI committee, led by MEP Matthias Groote, the new contact point for the EMA, visited the agency on 16–18 February. The MEPs were extremely positive on the work and interested in the future plans of the agency, particularly on adaptive pathways and antimicrobial resistance" (EMA, 2015, 3). This new turf was developed following a question from the Commission; however, it is important to underline the proactive and cooperative way in which EMA has engaged through the formation of AMEG.

The previous narratives showed that EFSA has been comparatively the most inclined to further cooperation. This is mostly explained by the explicitness of its role and mandate. Textual sources from EFSA in the time frame under scrutiny continue to emphasise the agency's collaborative approach (EFSA, 2015). However, while in the first narrative, the relationship between ECDC and EFSA was central to the cooperation, there was an observable shift. Technical collaboration between EFSA and EMA has increased, notably because of their common mandate on the animal side of surveillance. Together, and with a focus on antimicrobial use, they have produced a seminal report: the 2017 Joint Scientific Opinion on measures to reduce the need to use antimicrobial agents in animal husbandry in the EU, and the resulting impacts on food safety (RONAFA) (EMA and EFSA, 2017). This report, while receiving little publicity in more political spheres was described by informants as a 'bible' for antimicrobial use in the food industry (Interview 13, 21, 2019). It formulates seminal guidance notably on the use of prophylactic and metaphylactic antimicrobial agents in animals, which paved the way for the regulation of those substances in the 2018 Regulation on medicated feeds. The legislation restricts the use of prophylactic and metaphylactic antimicrobial agents for animals as supported by the RONAFA report but also by the findings of the JIACRA reports and corroborated by the work done by AMEG. Limits of antimicrobial agents' use are defined by the Commission in consultation with EFSA in the usual quasi-regulatory configuration. Quite similarly to the context described in the early days of the EU's interest in AMR, EFSA's role is mostly defined by the continuous work in surveillance and the development of regulatory tasks. Informants in EFSA, the one agency that has been the most continuously involved in the fight against AMR, have held a privileged seat witnessing how much the scientific cooperation has brought to the table (Interview 10, 13, 2019).

5. Discussion: the 'physiology' of cooperation

Through field work, the metaphor of an eco-system in which agencies adjust to each other was positively received, with two informants (unsurprisingly) using a more medical metaphor with the term 'physiological'. Following expectations, inter-agency cooperation did not translate into adverse consequences in the fight against AMR. Early turf issues could have had more profound externalities. The lack of clarity regarding roles and tasks could have jeopardised the cooperation

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if it were not for the proactive behaviour displayed by the trio of agencies, albeit across different time frames. Nevertheless, all agencies participated in making sense of the cooperation and eventually avoided the 'traps' of turf wars.

The three narratives have probed the claim that reputational incentives regarding agencies' uniqueness are important to understand inter-agency cooperation. The first narrative presented the salience of turf issues between the three agencies. In this specific time frame, one agency in particular, the ECDC, relied on turf-sensitive issues to make sense of its own role and emerge with a unique contribution. The second narrative demonstrates that neither behaviour sensitive to the threat of losing turf nor the incentive to uphold uniqueness is sufficient to explain the different roles taken on by the agencies. The role of the Commission in attributing mandates, especially regarding surveillance, has had an important effect on the roles taken on by agencies in the development of their cooperation. Indeed task-sharing between human and animal sides is the result of network dynamics set-up by the Commission, more so than reputational incentives. The last narrative completes the overview of the multiple causes for task-sharing: upholding uniqueness is a strong motivator, especially in the case of EMA, but this process occurs in a context where turf issues have been put behind the agencies. Overall, the agencies have been less concerned with defending their turf than with the opportunity of defining it for themselves, which had a positive impact on their cooperation. Moreover, the way agencies assumed roles throughout their cooperation shows the reputational strategies they adopted had positive consequences on the EU's credibility of commitments in AMR with crucial contributions to the legislative process and sharing good practices beyond the EU's borders.

The three agencies displayed contrasting behaviours in the process of task-sharing. The ECDC, as the youngest agency, defined its own role in contrast with its sister agencies. The notion of turf plays a part in this process, but not in the sense that the ECDC engaged in protective behaviour. Rather, the ECDC learnt the delimitation of its own turf in a process of feedback from the other agencies. As the ECDC was 'muddling through' what could be its role, evidence shows that the organisation took the lead on the matter of outreach and engagement. At the other end of the spectrum, EMA was the agency that was most likely to perceive cooperation as potential threats to its uniqueness. In the early years of cooperation, EMA demonstrated some turf-defensive behaviour regarding ECDC, but then engaged more proactively with EFSA on the animal side, and evidence points out that turf-sensitive behaviours have dissipated. Finally, EFSA is the least probing case, due to a well-defined quasi-regulatory role from the beginning of the time periods under scrutiny.

This research comes with limitations regarding its generalisability: some of the effects observed here are contextual. Health policy in the EU is a peculiar policy area where competences are scarce and where the organisational environment is dense. Two contextual elements are crucial: unlike previous studies, the case under scrutiny does not account for multi-level relationships, and the agencies do not hold similar powers which are elements that also explain the low level of conflict. Second, EU agencies are very much affected by new mandates the European Commission entrust them to fulfil, adding ambiguity to their turf. Further research expectations must thus be established as the yardstick of two dimensions: on the one side hierarchical relationships and on the other the level of ambiguity of agencies' turf.

In the case of inter-agency cooperation on AMR, those two dimensions have evolved throughout the period of scrutiny. Agencies have now more defined turf and informants have underlined that agencies are now more prone to joining forces without the patronage of the Commission, as demonstrated with AMEG. Looking ahead, this inclusive approach to governance has the potential to spill-over in all aspects of health policy. The One Health approach has been instrumental in bringing together agencies on AMR. As an overarching approach, the principles of One Health could be applied to other areas in which the trio of agencies would have relevance. Most likely, the future of health governance will include more articulate inter-agency ventures. The cooperation between EFSA, EMA and the ECDC does not have to be exclusive: the European Agency for

Safety and Health at Work (EU-OSHA) or the European Environment Agency (EEA) is also relevant institutions who can cooperate in the fight against AMR with the caveat that cooperation is a double process of collective and self-learning about organisational roles.

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