Survey on activities to alleviate the threat of antimicrobial resistance in G20-countries

PD Dr. Roswitha Merle, Dr. Céline Simoneit, Institute for Veterinary Epidemiology and Biostatistics, Freie Universität Berlin

The G20 commit to strengthen the One Health approach, while fully respecting the specific mandates of the WHO, OIE and FAO. They will support and facilitate the regular exchange of evidence and science-based knowledge in the field of human and animal health, agriculture and the environment. In preparation of the first expert meeting on antimicrobial resistance (AMR) of public health and veterinary public health experts of the G20 in Germany in September 2017, a survey on activities to alleviate the threat of antimicrobial resistance in G-20-countries was conducted.

This survey was carried out by the Institute for Veterinary Epidemiology and Biostatistics of the Freie Universität Berlin on behalf of the Federal Ministry of Food and Agriculture as well as the Federal Ministry of Health. The survey covered all important aspects concerning antimicrobial use and antimicrobial resistance in a one health approach. Questions from the common WHO, OIE and FAO questionnaire from 2016 (Global monitoring of country progress on antimicrobial resistance (AMR): Country self-assessment questionnaire) as well as a OIE questionnaire from the beginning of 2017 (Global action to alleviate the treat of antimicrobial resistance: Progress and opportunities for future activities under the 'One Health' initiative) were adapted for this survey.

The questionnaire used for this survey was structured in six main objectives:

- Multi-sectoral approach
- Improving awareness and understanding of AMR through effective communication, education and training
- Strengthen the knowledge and evidence base through surveillance and research
- Reducing the incidence of infection through effective sanitation, hygiene and infection prevention measures
- Measures taken to optimize the use of antimicrobial products in human and animal health
- Regulation and promotion of prudent use of antimicrobial agents in agriculture and veterinary medicine

26 countries were invited to take part at the survey (19 G20 (EU being the 20th G20 member), 7 non G20 countries), 15 countries sent complete answers (10 G20, 5 non G20 countries). 7 countries were from Europe, 2 from Africa, 2 from the Americas and 4 from the Asia Oceania region.

Multi-sectoral approach

Almost all countries included human health, terrestrial animal health and the food sector in a one health approach, while the environmental sector was included in 11 countries and crop production in

8 countries. 12 countries have already implemented a multisectoral approach addressing AMR, the remaining 3 countries will implement it in 2017. A national action plan is also already developed in 4 countries and under progress in the remaining 6 countries (Figure 1).

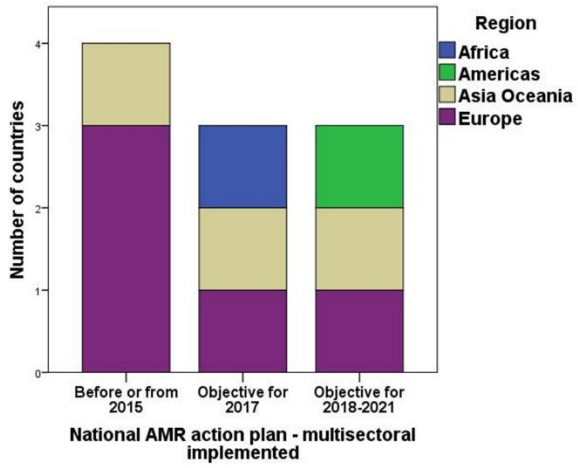

Figure 1: development of national action plan on AMR.

Regarding data collection, data on antimicrobial usage and antimicrobial resistance (AMR) are collected for human health and terrestrial food producing animals in most of the countries, while data often lack regarding crop production, the food sector and the environmental sector. Most countries already have a national plan on incidence, prevalence and geographical patterns (10 countries) in order to consolidate data in a one health approach. 8 countries have a national reporting system incl. exchange of information, but an automated reporting system is only implemented in 2 of these countries. 6 countries have a reporting system based on epidemiological, AMR, genetic and phenotypical information on pathogens, 3 countries plan to do that.

Improving awareness and understanding of AMR through effective communication, education and training

Awareness raising activities are provided by most of the countries. In human health, 9 countries reported some activities, ranging from nationwide campaigns to the general public (9 countries) to national activities to change behavior (4 countries). 3 countries even monitor awareness and behavior change. 5 of the 15 countries plan to improve their activities in the future which displays the importance of that topic. In the animal health and food production sector, activities are comparable, although the monitoring of awareness has to be implemented.

Training on AMR in the human sector is systematically incorporated in core education only in 3 countries, but will be implemented in 8 countries until 2021. In the veterinary sector, training on AMR is already implemented in 8 countries and objective for 2018 – 2021 in 4 countries (Figure 2).

All countries reported some communication or working groups with stakeholders in the field of animal health. 3 countries additionally plan to start coordinated activities of combatting antimicrobial resistance.

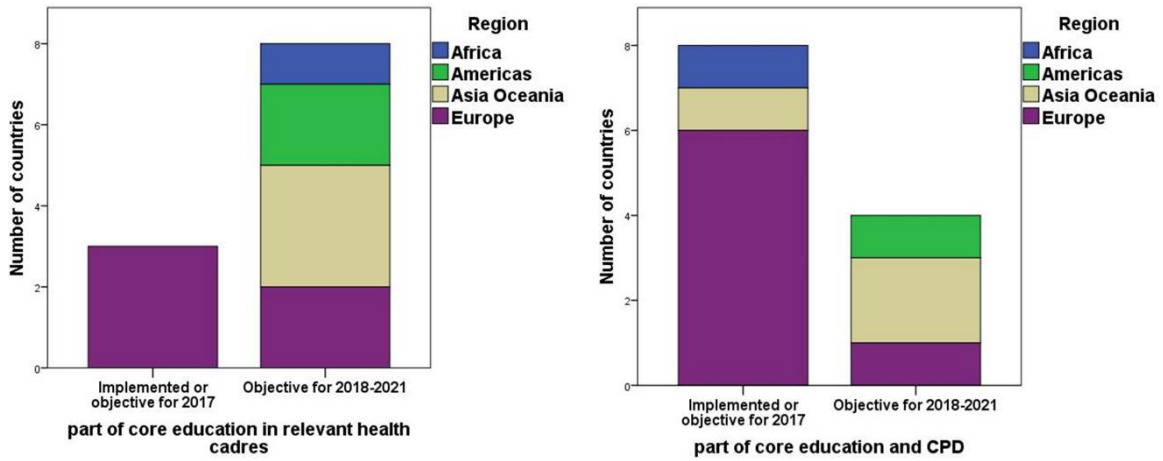

Figure 2: Training on AMR in core education in human and veterinary health sector

Strengthen the knowledge and evidence base through surveillance and research

Monitoring of consumption and use of antimicrobials as well as surveillance of AMR was one of the key aspects in the survey.

All 11 countries answering this question already monitor total sales, and 10 of them also monitor prescribing practices in a sample of healthcare settings. Sales or consumption data are monitored regularly in 10 countries, but prescribing and appropriate use in public and private health facilities is monitored only in 7 countries, planned in 4 countries. Five countries have regular reports of sales and usage data in human health. Ten countries have implemented monitoring in either sales or usage, while it is the objective for 2018 – 2021 regarding the other topic.

In animal health, 10 countries already monitor total sales, 2 countries will start in 2017. 12 countries already collect data on a regular basis, 5 countries plan to enhance activities in future, e.g. monitoring of the appropriate use of antimicrobials and/or antimicrobial sales or consumption for crop production. 10 countries participate in OIE data collection on sales or usage data by species, class and type of use. 8 of them also reported regular monitoring of sales data in humans. Six countries either have implemented or plan to have regular reports for sales and usage from human and animal health.

Regarding surveillance of AMR in humans most countries have surveillance activities for common bacterial pathogens and national reference laboratories with quality assurance. They also produce national reports on resistance level. Animal health is included in 5, agriculture in 3 countries. Contribution to the Global AMR Surveillance System GLASS is only reported in 3 countries, 9 countries plan to contribute in the future. Figure 3 shows that the implementation of GLASS is a task that is currently worked on in many countries.

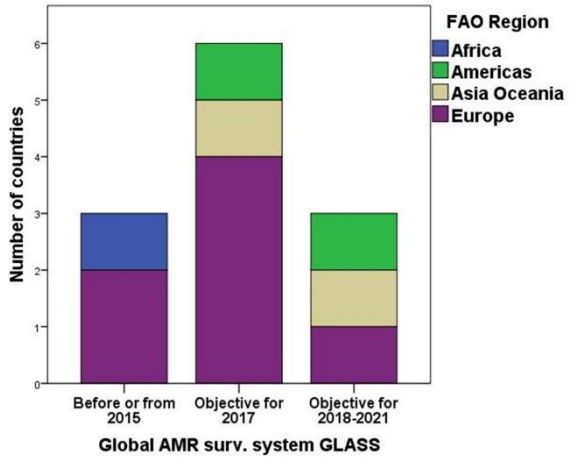

Figure 3: Global AMR surveillance system (GLASS)

In the animal and food sector, 12 countries collect data only locally or for priority pathogens and have additionally study data. 5 countries plan to implement a national surveillance system for relevant animal pathogens, 7 countries already have installed it. 8 countries (5 from Europe) have a complete regular surveillance system, 6 countries plan to implement it (Figure 4).

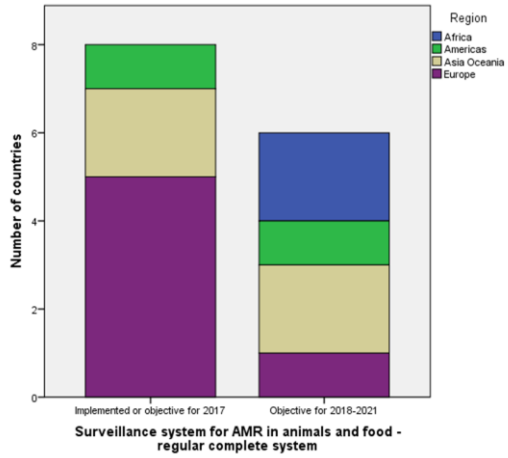

Figure 4: regular collection and report on AMR in relevant pathogens for animals and in food

Many countries have a surveillance system for control of the most important bacteria. Surveillance activities in the human sector cover more bacterial species, while the veterinary sector focuses on relevant zoonotic bacteria such as *Escherichia coli*, *Campylobacter* spp. and *Salmonella* spp. (Table 1).

Table 1: Bacteria assumed to play an important role with regard to AMR

Bacteria	Number of countries (of 15)	Surveillance system in human sector established (in preparation)	Surveillance system in veterinary sector established (in preparation)
Acinetobacter baumannii	11	8 (1)	0 (1)
Escherichia coli	14	12 (1)	8 (1)
Campylobacter spp.	10	3 (1)	7 (0)
Clostridium difficile	10	6 (2)	0 (0)
Klebsiella pneumonia	13	9 (2)	2 (1)
Neisseria gonorrhoeae	9	7 (1)	0 (1)
Staphylococcus aureus	13	10 (1)	5 (1)
Streptococcus pneumonia	6	4 (1)	0 (1)
Salmonella species	13	9 (1)	7 (1)
Shigella species	5	4 (0)	0 (0)
Mycobacterium tuberculosis	12	8 (1)	1 (1)

Reducing incidence of infection through effective sanitation, hygiene and infection prevention measures

8 countries have implemented all relevant infection control measures in all health facilities, while 3 countries still have no national policy regarding infection prevention and control or have implemented national SOPs only in some health care facilities. The veterinary sector includes good animal health and management practices as well as good hygiene in food production. Only one country has implemented a monitoring system in animals, veterinary practices and the food chain, while 2 countries monitor one or two of the items, and 6 countries plan to introduce a monitoring in the future. Enhancement in the veterinary sector would be valuable in the context of one health.

Antimicrobial stewardship activities take place in most of the countries in human as well as in animal health. In the human sector, respective regulations are enforced and monitoring results are used to improve the situation in 11 countries. The program is implemented in health care facilities and in community only in 5 countries, but planned in 4 countries. Regarding animal health, the use of growth promotors is prohibited in 8 countries, 2 plan to ban them. 12 countries reported to comply with Codex Alimentarius standards. But regarding regulations to prevent contamination of the environment with antimicrobials, regulatory compliance systems including antimicrobial residues are effective only in 4 countries, and planned in 1 country. The integration of the environmental sector still lacks in many countries, but is important to complete the one health approach.

Measures taken to optimize the use of antimicrobial products in human and animal health

In order to control the indications for using antimicrobials related to AMR, differences between veterinary and human medicine are rather small. While advertising is limited exclusively to professionals in 13 or 9 countries (human / veterinary sector, resp.), positive lists that account or WHO list of CIAs or OIE list of Antimicrobial Agents of Veterinary Importance are available only in 6 or 8 countries, respectively. Also the surveillance of quality of medicinal products and

pharmacovigilance does not differ largely between the sectors. Almost all countries reported to have respective systems in both sectors.

The level of advancement regarding the implementation of international standards is similar in both, human and veterinary sector. In many countries companies operate in compliance with international standards (10 / 12 countries in human / veterinary sector, resp.). Collection of antibiotics usage data as well as AMR surveillance in based on WHO or OIE standards in 6 and 9 countries, while the recommendations in the respective WHO or OIE lists are implemented in only 5 or 6 countries.

Conclusions

In general, the veterinary sector seems to have larger differences between the countries. Some countries operate on a rather high level and are in some topics even more advanced than in human sector, but other countries have larger differences to human sector.

In training and awareness raising, the human sector is currently a bit behind the veterinary sector, but a lot of countries have reported to plan implementation in the core education in the human sector (Figure 5). With regards to monitoring and surveillance, both sectors are quite active. Some countries have implemented systems already in human sector as well as in veterinary sector. In veterinary medicine, the data collection on AMU and AMR on species level has to be implemented in many countries. In human medicine, multisectoral and global approaches in terms of GLASS are tasks for the future.

In human medicine, most countries have a policy of hygiene and infection prevention, but that is not yet implemented in health care facilities in all countries. In veterinary medicine, regulation and implementation is an objective for the future in many countries.

Regulations of optimized use and implementation of appropriate use is quite well developed in human and veterinary sector, but the environment sector needs to be improved.

In conclusion the one health approach is widely accepted in the countries, although there is still some work to link the sectors with each other and e.g. to integrate the environment. Also the cooperation with the local health care facilities and veterinary sectors should be improved.

	Human sector	Veterinary sector
Training and awareness raising	o	+
Monitoring and surveillance	+	(+)
Hygiene and infection prevention	+	o
Optimized use	+	+

Figure 5: Concluding the general situation in human and veterinary sector