WHO-EM/CSR/064/E

Report on the

Consultative meeting on antimicrobial resistance for countries in the Eastern Mediterranean Region: from policies to action

Sharm El Sheikh, Egypt
12–14 November 2013

World Health Organization
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1. INTRODUCTION

A consultative meeting on antimicrobial resistance for countries in the Eastern Mediterranean Region: from policies to action, was held in Sharm el Sheikh, Egypt, from 12 to 14 November 2013. It was organized by the World Health Organization (WHO) Regional Office for the Eastern Mediterranean and the objectives of the meeting were to: outline strategic directions to control antimicrobial resistance (AMR) based on the policies to tackle AMR issued on World Health Day 2011 and inform strategies and a framework for relevant authorities and decision-makers in the countries of the Region; discuss and identify a prioritized framework for interventions and options for action for AMR containment at the national level in the Region; and develop an outline for a regional operational workplan. For the Programme see Annex 1.

The meeting was attended by participants from selected countries of the Region, the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), the U.S. Naval Medical Research Unit No.3 (NAMRU-3), and staff from relevant programmes in WHO headquarters and the Regional Office. For the List of Participants see Annex 2.

Dr Ala Alwan, WHO Regional Director for the Eastern Mediterranean, in his opening message, expressed his gratitude to WHO's partners in the programme in the Region, as well as the AMR team and other colleagues at WHO headquarters for their participation at the meeting and ongoing support. AMR had been on the radar of WHO since the early 1990s, he noted, and the World Health Assembly had passed a number of resolutions that directly or indirectly supported the fight against it. Resolutions had included those on the rational use of drugs, on new, emerging and re-emerging infectious diseases, on AMR, on global health security, on WHO medicines strategy, and on improving the containment of AMR.

In 1998, the then Director-General of WHO,[1] in his report to the 51st World Health Assembly, indicated several factors in the emergence of AMR. This included: the use of antimicrobials for any condition, real or feared, in humans, animals and in agriculture, in any dosage and over any period of time that adds to the selective pressure on microorganisms to adapt or die; the unjustified faith of people and some health workers in the healing power of antimicrobials; the failure of patients to comply properly with prescriptions; and low quality antibiotics. WHO had also published in 2001 a series of standards and guidelines for addressing AMR that were still valid today, Dr Alwan said.

The Regional Director noted that, in the context of globalization and growing international travel and trade, AMR now threatened global health security and needed to be addressed as a priority before it caused a new pandemic. In 2011, under the theme "Combat Drug Resistance", WHO had called for urgent and concerted action by governments, health professionals, industry, civil society and patients to slow down the spread of drug resistance,

[1] Dr H. Nakajima (term of office: 1988–1998).

limit its impact in the present and preserve medical advances for future generations. In the same year WHO published a six-policy package to combat AMR. WHO and its partners had also developed a number of guidelines and policy documents to assist Member States in their planning and monitoring of AMR.

Dr Alwan concluded by saying that the problem of AMR and the risk it poses to public health had been recognized and was now on the list of the WHO's priorities in the Region. This consultative meeting would draw on the expertise of the participants, in their different fields, to help develop a clear roadmap for the implementation of policy measures for curtailing of AMR in the Region.

2. TECHNICAL PRESENTATIONS: EXAMPLES OF CURRENT EXPERIENCE

2.1 AMR issues worldwide and the WHO approach to combat it

Carmen Lucia Pessoa-Silva, WHO headquarters

The world has seen significant decreases in mortality since the introduction of antibiotics. For example, penicillin reduced death rates among patients with pneumonia and bacteremia from approximately 90% to 10%. Since their availability in the 1940s, antimicrobial drugs have had a clear impact on mortality.

However, these gains are increasingly being threatened by the development of AMR, including carbapenemase-producing *Enterobacteriaceae* (CPE), multidrug-resistant tuberculosis, artemisinin-resistant malaria and resistance to antiretroviral drugs used to treat HIV. Many other pathogens are developing resistance to multiple drugs, some to nearly all. Hospitals have become hotbeds for highly-resistant pathogens, like methicillin-resistant *Staphylococcus aureus* (MRSA), extended spectrum beta-lactamase (ESBL)-producing bacteria, and CPE, increasing the risk that hospitalization kills instead of cures.

Among the world's 12 million cases of tuberculosis in 2010, WHO estimates that 650 000 involved multidrug-resistant tuberculosis strains. Treatment of multidrug-resistant tuberculosis is extremely complicated, typically requiring two years of medication with toxic and expensive medicines, some of which are in constant short supply. Even with the best of care, only slightly more than 50% of these patients will be cured. It is of concern that 3.7% of new cases, without previous treatment, are multidrug-resistant tuberculosis. Increases in drug-resistant HIV and malaria are further threatening the attainment of the Millennium Development Goals. A post-antibiotic era means, in effect, an end to modern medicine as we know it. Some sophisticated interventions, like hip replacements, organ transplants, cancer chemotherapy, and care of preterm infants, would become far more difficult or even too dangerous to undertake.

AMR is already claiming thousands of lives worldwide: around 80 000 Chinese, 30 000 Thai, 25 000 Europeans and 23 000 Americans die every year from antibiotic-resistant infections. AMR has a significant impact on consumer income, employment, national savings, investment spending and health care delivery. The excess direct medical costs represent less

that 25% of the total (direct plus indirect) costs and losses to GDP have been estimated at 0.4% to 1.6 %.

We need to preserve our capacity to treat infections in humans and animals. WHO is aware of these challenges and is addressing them with strategies for combating AMR. WHO's response has included global and regional resolutions, the development of a still valid Global Strategy for the Containment of Antimicrobial Resistance in 2001, and the 2011 World Health Day "Combat Drug Resistance" campaign and six-point policy package. In 2012, "The evolving threat of AMR: options for action" was published as an electronic document, and an ongoing country situation analysis has been taking place since then to assess the situation of the six policy areas in Member States with results to be published in a WHO AMR global report due in 2014.

The six-point policy package to combat AMR launched in April 2011 highlights the essential elements of a multifaceted approach to combat AMR. This includes: committing to comprehensive and financed national plans with accountability and civil society engagement; strengthening surveillance and laboratory capacity; ensuring uninterrupted access to medicines of assured quality; regulating and promoting the rational use of medicines, including in animal husbandry, and ensuring proper patient care; enhancing infection prevention and control; and fostering innovations and research and development for new tools.

However, there is lack of data in many areas to guide and support strategies, including precise estimates on the prevalence of AMR globally and the burden of disease, and information on the impact on society and development. Where data do exist (such as data published in journals), they do not always feed into policy-making.

Many low-and middle-income countries lack capacity, including laboratory, diagnostic, quality assurance, regulatory, research and development, and surveillance capacity, and control over how antimicrobials are obtained and used. For example, anti-malaria pills are sold individually at the local marketplace, and counterfeit and substandard antibiotics abound. In many countries, the pharmaceutical industry is the principal source of prescribing information for doctors. There is also often poor coordination between the animal and human health sectors.

Good public health practices are undermined by poverty. Poverty-driven practices such as self-medication (e.g. medication-sharing, the use of "leftover" antibiotics) and the purchase of substandard drugs are likely contributing to AMR.

Global action is required and the WHO Strategic and Technical Advisory Group on AMR has provided advice on the development of a global action plan. National AMR action plans and coordinating mechanisms are needed and a multisectoral approach is required that involves the animal husbandry and food production sectors, and that addresses the societal and economic factors involved in AMR.

2.2 AMR: From policies to action

Ali R Mafi, WHO Regional Office for the Eastern Mediterranean

The WHO Eastern Mediterranean Region is a very diverse one with large variations in country population, Gross Domestic Product, human development index ranking and health systems. Many countries are experiencing complex emergencies and there are large numbers of refugees (50% of the global total). This diversity dictates employment of special approaches for containment of AMR in the Region as “one size does not fit all”.

The growing problem of AMR has gained the focus of attention at the regional level since 2001 when the WHO Regional Committee in its 49th session passed a resolution on AMR (resolution EM/RC49/R.10). Since that time many pressing emergencies have hampered implementation of the resolution, but in recent years tackling AMR has regained its position among the priorities of the Region. The 60th session of the Regional Committee passed a resolution (resolution EM/RC60/R.1) that urged Member States to establish a robust national AMR surveillance system, including clinical and laboratory surveillance, and to ensure enforcement of rules and regulations for rational use of antimicrobials at all levels.

As part of the global activities for curtailing AMR, the WHO Regional Office has conducted an in-depth country assessment in two countries of the Region. An online rapid country situation analysis survey was also recently done by the Regional Office. It is still undergoing validation to complete missing data and improve accuracy, but some tentative conclusions are that there is low awareness of AMR in those countries that responded (11), especially among the mass media, the public, veterinarians, the agricultural sector and politicians. Very few (2/11) countries reported a national policy and none had a national AMR action plan or regular progress reports. Two countries have reported a coordinating mechanism or focal point for AMR and one country has limited laboratory-based surveillance for AMR. Use of antimicrobials in humans and in animal husbandry has only been monitored and reported in two countries. Moreover four countries reported the existence of public education campaigns on antimicrobial use in the last two years.

Currently, AMR does not appear to be a high priority in the countries that responded and efforts to control it are limited. Where efforts are ongoing, they tend to focus on localized laboratory-based surveillance and infection prevention and control programmes. While there has been little reporting of AMR in countries, data from 2012 indicated that 26.5% of regional tuberculosis cases are multidrug-resistant tuberculosis and drug resistance has also been reported for HIV and malaria.

Four relevant WHO Collaborating Centres exist in the Region (for emerging and re-emerging infectious diseases in Egypt, for pharmacovigilence in Morocco, for infection prevention and control in Saudi Arabia, and for drug registration and regulation in Tunisia) as well as one for HIV/AIDS in Kuwait that can test for antiretroviral resistance. However, existing regional competencies are not used for establishing a comprehensive national programme for tackling AMR. Those include experts and researchers in AMR and well established central public health laboratories in countries.

Challenges in the Region include a lack of data, a lack of coordination across sectors, low capacity (including laboratory capacity) and low understanding of the burden and risks of AMR in many countries. In addition, some health systems are underdeveloped or not functioning well, especially given the existing emergencies and competing priorities within the Region.

2.3 Antimicrobial resistance programmes in FAO

Patrick Otto and Markos Tibbo, FAO Regional Office for the Near East and North Africa

FAO's activities on AMR are undertaken by the Animal Production and Health Division, Plant Production and Protection Division, Food Safety and Nutrition Division, and the Fisheries and Aquaculture Department, as well as through its contribution to the work of the Codex Alimentarius Commission. All these activities are undertaken within the context of the FAO mandate: to improve nutrition, increase agricultural productivity, raise the standard of living in rural populations and contribute to global economic growth. FAO also plays an important role in fighting poverty and supporting the livelihoods of people, many of them dependant on livestock.

The world's population is growing at an exponential rate and will exceed seven billion by 2015. Most of the growth will be in developing (less developed) countries. Since 2007, more people live in urban areas compared to rural areas. Rising income and improved access to a greater variety of food in urban areas has brought in changes in food consumption patterns, mainly of foods of animal origin. There has been an increase in meat production, especially in East and South-East Asia and Latin America, as well as in milk and egg production. This is reflected in the increase in the per capita consumption of animal-based foods. Accelerating world population growth will drive increased demand for protein-based foods. Antimicrobial use will grow in tandem (both appropriate and inappropriate use).

FAO believes that AMR is an important and emerging issue of global public health concern that has an impact on livelihoods and global trade. Antimicrobial drugs are important resources for both human and animal health. Animal health is critical for household nutrition and food security, household income (especially for livestock dependant communities), economic growth and global food security. The emergence and spread of AMR is therefore a threat to both human and animal health and to trade. Prudent and responsible use of antimicrobials is critical for food security, incomes and economic development.

The measures required to combat AMR will include intersectoral/multidisciplinary collaboration, political commitment, good governance and capacities to implement international standards, effective disease prevention and control tools, laboratory capacity, and integrated surveillance and monitoring of antimicrobial use and AMR.

Capacity development has an important role to play in safeguarding the availability and efficacy of antimicrobials so they can continue to support animal production. FAO's AMR capacity development strategy involves four pillars: policies that create an enabling environment for AMR prevention and control and promote prudent use of antimicrobials;

support for institutional capacity development such as with laboratories for generation of AMR data, for AMR surveillance and antimicrobial usage monitoring, and for data sharing between sectors; support for technical capacity development in AMR detection, surveillance and antimicrobial use monitoring; and support and advice to value chain operators and stakeholders on good animal husbandry and health practices, and good hygienic practices.

FAO capacity-building activities on AMR include joint FAO/WHO AMR missions to countries, laboratory capacity development initiatives, regional laboratory and epidemiology networks, a continuing professional development initiative, support for implementation of Codex guidelines and standards, and FAO/OIE/WHO tripartite initiatives.

A coordinated multisectoral approach is needed to combat AMR. At the 19th Tripartite Executive Coordinating meeting between FAO, OIE and WHO on 6–7 February 2013, in Rome, AMR was one of the five priority issues discussed. There was agreement on the development of a joint action plan on AMR, collaboration and implementation of joint capacity development initiatives, and the need to publicize the critical issue of AMR with the development of common messages on the subject.

FAO/OIE/WHO have together recognized that antimicrobial agents are essential to treat human and animal diseases, that some bacteria have demonstrated full or partial resistance to different antimicrobial agents that undermines their efficacy and availability, and that AMR is an increasing issue of concern for both public and animal health. They have also recognized the need to consider antimicrobial agents as a public good, maintain the efficacy and availability of antimicrobial agents to protect animal and human health, and to speak with one voice and take collective action through a coordinated approach with shared responsibilities to tackle AMR worldwide.

2.4 Update on OIE activities on AMR (September 2013)

Elizabeth Erlacher-Vindel and Ghazi Yehia, World Organisation for Animal Health

OIE is an intergovernmental organization, founded in 1924. It has 178 Member Countries (June 2012), with headquarters in Paris, France, and a regional office in Beirut, Lebanon. Its mandate is to improve animal health and welfare worldwide and to ensure food safety from the animal production phase. This is supported by a network of 284 reference laboratories and collaborating centres.

Antimicrobial agents are essential to ensure human health, animal health and welfare, and food security. AMR challenges control of infectious diseases, increases care costs, compromises health security and damages economies. It is estimated that 70% of human disease is from animals. The human, animal and plant sectors have a shared responsibility to prevent or minimize the development of AMR by both human and non-human pathogens. However, there is a lack of coherent global approaches to prevention and containment.

There is currently no control of antimicrobial circulation in more than 100 countries and falsified products make up a majority of circulating antimicrobials. In many developed countries there is unrestricted access to antimicrobials by farmers without veterinary

oversight. The OIE strategy to fight against AMR is based on complementary approaches: the development and updating of international standards and guidelines; support to veterinary services and laboratories; modernization or updating of national legislation; collaboration with international organizations; and communication and capacity-building.

AMR is included in OIE guidelines on animal health in the section on veterinary public health. OIE has a revised list (2013) of Veterinary Critically Important Antimicrobial Agents, which includes some that are also considered of critical importance for human health. To take into account these concerns, recommendations have been adopted that these are not to be used as preventive treatment in feed or water, or in absence of clinical signs, not to be used as first line treatment, unless justified and bacteriologically tested, and are extra label/off label limited and reserved for instances when no alternatives are available.

Stronger collaboration and shared responsibility is needed between FAO, OIE and WHO to coordinate global activities to address health risks at the animal–human–ecosystems interface. A tripartite strategy has identified AMR as one of the priority topics for tripartite action between FAO, OIE and WHO, along with rabies and zoonotic influenza. To this end, the three organizations hold contact point meetings on collaborative activities on AMR.

OIE actions to tackle AMR include capacity-building for veterinary services and legislation, training of national focal points, supporting quality veterinary medicines, supporting veterinary education and competences, and strengthening veterinary statutory bodies and veterinary oversight of the use of antimicrobials.

In 2012, OIE sent a questionnaire to gather information on the current practices employed by OIE Member Countries to monitor the quantities of antimicrobial agents used in animals. A total of 152 questionnaires were received from 178 OIE Member Countries (i.e. 85% replied). Only 27% reported an official system for collecting data.

The OIE Global Conference on the Prudent Use of Antimicrobial Agents for Animals recommended that OIE: strengthen cooperation with FAO and WHO; continue to organize regional training seminars for OIE national focal points for veterinary products and to invite FAO, WHO and other stakeholders to participate; assist Member Countries to conduct surveillance on AMR for animal and human pathogens; and collect harmonized quantitative data on the use of antimicrobial agents in animals with the view to establishing a global database.

In conclusion, there is a need for more cooperation between international organizations, more awareness raising, support for developing countries to implement good governance, good quality veterinary services, including the private sector, and laboratories, the involvement of all stakeholders, more risk assessment and banning of non-priority practices in animals, and more research and public-private partnerships. Animal health and welfare must be sustained and food security and food safety ensured. International solidarity is crucial in a globalized world. The practices at risk need to be carefully evaluated (including growth promotion). While there is no universal optimal solution for the delivery of antimicrobials at farm level worldwide, the well-qualified veterinarian is the key actor.

2.5 The challenge of hospital-acquired infection and AMR surveillance in Egypt

Maha Talaat and Mona El-Shokry, NAMRU-3

Hospital-acquired infections and AMR are emerging as important public health problems throughout the world and they constitute a significant burden for patients and health systems, leading to increased morbidity and mortality, high costs of health care due to prolonged length of hospital stay, cost of antibiotics and additional laboratory investigations. However, limited data on the extent of antimicrobial use and resistance are available from Egypt and other developing countries.

In response to this situation, a prevalence survey of antibiotic use in Egypt was conducted to understand antimicrobial prescribing practices in hospitals and measure surgical antimicrobial prophylaxis. The prevalence survey was conducted in 18 hospitals and all inpatients evaluated on the systemic use of antimicrobial therapy. The methods were adapted from the European Surveillance of Antimicrobial Consumption (ESAC) 2009 protocol. The use of antimicrobials for surgical prophylaxis was also evaluated in five hospitals with 745 surgeries assessed.

The prevalence survey found that of the 3408 inpatients evaluated: 2017 (59.2%) were on antibiotics (32%–92%); 11 (0.3%) were on antifungals; and 4 (0.1%) were on antivirals. Use of antibiotics was greater in patients under 12 years (76.3% versus 55.8% for those aged 12 and above). In terms of optimal timing of first dose of antibiotics for surgical prophylaxis, the survey found a range of 0–88.4% of surgeries adopting the optimal timing of the first dose and only 0–7.6% implementing the optimal duration of surgical prophylaxis.

A surveillance programme of hospital-acquired infections and AMR is currently being implemented in 29 hospitals including about 1000 intensive care unit beds. The objectives are to estimate hospital-acquired infection incidence in order to develop benchmarks for surveillance of infections in Egypt, describe the microbiological profile and resistance pattern of pathogens causing hospital-acquired infections, and implement targeted prevention measures to reduce hospital-acquired infections. Hospital eligibility criteria include presence of infection control team in hospitals, basic hospital microbiology laboratory capacity, data entry capacity, presence of intensive care units, presence of infection control link nurses in intensive care units and political support. Isolates are sent to NAMRU-3 laboratories for pathogen identification and susceptibility testing. The survey process also includes capacity-building for participating hospitals.

Of infected patients identified, 58% of infections were community-acquired, 16% were hospital-acquired and 26% acquired in intensive care units. Of hospital-acquired infections, 45% had pneumonia, 33% blood stream infection and 18% urinary tract infection. The proportion of device-associated infections was almost all for blood stream and urinary tract infections (97.8%) and 79.2% for pneumonia. A total of 1372 pathogens isolated from the three types of hospital-acquired infection (blood stream infection, urinary tract infection and pneumonia) were retrieved at the NAMRU-3 laboratory for identification and susceptibility testing. Almost 63% were Gram-negative pathogens (n = 860) and 20% Gram-positive (n = 271). *Klebsiella* spp.was the most prevalent pathogen in pneumonia and blood stream

infection (25.3% and 28%, respectively), while *Candida* was the most prevalent in urinary tract infections (32%). Almost 89% of *Staphylococcus aureus* were resistant to methicillin (MRSA) and 22% of *Enterococci* were resistant to vancomycin. *Klebsiella* spp. and *Escherichia coli* showed resistance of up to 89% to third generation cephalosporins (ceftazidime and ceftriaxone), which are used intensively to treat hospital-acquired infections in Egypt. Meanwhile, imipenem resistance is still rising in these two genera (12% and 38%, respectively), which provides the possibility of emerging carbapenem resistance.

An integral part of the laboratory capacity-building strategy was generating an antibiogram that gives the clinicians appropriate empirical therapy choices to curb the spread and emergence of AMR. However, many challenges prevented this and need to be identified and addressed. These included: limited laboratory capacity in many hospitals, lack of standardization of laboratory techniques and procedures (no guidelines or standard operating procedures), lack of awareness of common and newly-emerged antibiotic resistance, and lack of trust between clinicians and laboratory staff.

Other challenges in surveillance for hospital-acquired infections include the complex case definitions for hospital-acquired infections, limitations in requesting laboratory investigations, medical records being not well maintained, its labour intensive nature, and a lack of hospital epidemiologists. In addition, intensive care physicians have limited awareness on the diagnosis and treatment of hospital-acquired infections and are not motivated to participate in surveillance. There is also no transparency for reporting infections, no trust in hospital laboratory results and limited awareness of the burden of AMR. The politics and culture of hospitals, which often do not want to acknowledge hospital-acquired infections, as well as issues related to the confidentiality of data, pose other challenges for surveillance. Furthermore, any surveillance system needs to be sustainable.

Future plans include the scaling up of surveillance for hospital-acquired infections and AMR to all eligible hospitals in Egypt, the development of national guidelines for surveillance of hospital-acquired infections and AMR, legislation, hospital-acquired infection and AMR prevention programmes and the development of a web-based national reporting system for hospital-acquired infections and AMR, with all hospitals reporting to the Ministry of Health and Population.

2.6 Lebanon

George F Araj, American University of Beirut

Lebanon lacks national capacity in AMR surveillance. A national committee for antibiotic control was set up by ministerial decree but has not been very active. Regulations on the use of antimicrobials exist but are not being implemented. There exists both the problem of bad medicines and misuse of antimicrobials. Surveillance and infection prevention and control standards exist at the level of individual hospitals. The private health sector is stronger than the public sector and the American University of Beirut Medical Center acts as a reference laboratory for the Ministry of Health in cases of epidemics, tuberculosis and so on.

A study of AMR at the Medical Center from 2000/2001 to 2010/2011 found that AMR levels are increasing (ESBL *E. coli* at 30% in 2011 and ESBL *Klebsiella pneumoniae* at 28%) and MRSA levels have fallen but still accounted for around 20% in 2010/2011. Most infections were found in Iraqi patients attending the hospital. The study has been published in a medical journal article (Araj GF et al. A reflection on bacterial resistance to antimicrobial agents at a major tertiary care center in Lebanon over a decade. *Lebanese Medical Journal*, 2012, 60:125–35).

A leaflet on antimicrobial susceptibility patterns of bacterial isolates is produced annually by the American University of Beirut Medical Center and is being replicated in other hospitals. Hospital-acquired infections have been monitored at the Medical Center using international benchmarks for infection prevention and control. In addition, instructions and guidelines for specimens and tests in clinical microbiology have been produced to provide basic information for clinicians to follow to help ensure the quality of specimens being sent.

2.7 United Arab Emirates

Jens Thomsen, Abu Dhabi Health Authority

There is no national plan for AMR in the United Arab Emirates but a strategy to monitor, prevent and control AMR has existed in Abu Dhabi Emirate since 2010. There is likewise no national surveillance of AMR, but it has existed in Abu Dhabi Emirate since 2010. In 2011, one of the first reports on increasing AMR in the country was published showing rising bacterial resistance and decreasing susceptibility to common antibiotics in Al Ain (1999–2008).

In terms of surveillance laboratory capacity, there are only hospital and research laboratories, but no AMR reference laboratory.There is a need to establish and finance a hospital-independent reference laboratory for advanced tests and for typing, not financed by hospitals, patients or insurance companies, but from governmental public health resources.

Since 2011, the monitoring and reporting of AMR data has been mandatory in Abu Dhabi Emirate. The Abu Dhabi AMR Surveillance Programme (AD ARS) was set up to establish a hospital laboratory-based AMR surveillance programme for Abu Dhabi Emirate with 17 organisms under surveillance to create baseline data and monitor local AMR trends. BacLink/WHONET 5.6 is being used and has been found to be very helpful. AD ARS/WHONET allows comparison and benchmarking of local data to other regions and countries. It can assess the prevalence and trends of AMR in different organisms and can help to identify clusters and outbreaks of multidrug-resistant organisms, for instance in specific hospitals.

Preliminary results demonstrate: unacceptably high AMR levels for some pathogens/antimicrobial agents; increasing trends of resistance, e.g. for fluoroquinolones; high prevalence of multidrug-resistant organisms; and emerging new threats (CPE and pan-resistant pathogens).The AD ARS database is highly representative for the Emirate and results are collated in an annual report.

Other activities of the programme include education and awareness activities, monitoring physician prescription antibiotic patterns and the development of standard treatment guidelines. Identifying physicians with high rates of antimicrobial prescribing allows educational interventions to take place to try to find out why this is happening and to educate on AMR. Infection prevention and control standards exist, mostly at the level of individual hospitals, but more work needs to be done in this area.

Most essential antimicrobials are available in the country, but no national regulation of their rational use exists. Federal and regional regulations regarding prescription-only policies for drugs, including antimicrobials, exist, but need to be more strictly implemented and enforced. A 2005 study found that 68% of antibiotic sales occurred illegally (without prescription) over the counter. Patient demand is high and awareness levels about AMR are low. This is an issue that needs to be addressed. Regulation of the use of antimicrobials in animals is in place and their use as growth promoters is banned in the country.

Several working groups on AMR have been established in Abu Dhabi Emirate. Incentives and political commitment are required. Further action on all levels is needed to reverse increasing AMR trends. To address this, the Health Authority of Abu Dhabi has adopted a comprehensive strategy to control AMR development and spread.

3. POLICY MEASURES

This section of the report summarizes the discussions on required strategic actions and how to address the challenges in curtailing AMR in the context of the Region.

3.1 Surveillance including laboratory capacity

Surveillance involves the systematic collection and analysis of health-related data, and reporting the findings to those who will use them in decision-making and response to public health issues. It also includes the gathering of information to guide and/or evaluate interventions. Data generation depends on both laboratory and epidemiological capacities.

There is a lack of robust AMR surveillance systems in the Region according to the available information and a pressing need to build surveillance capacities. Competent laboratories are an integral part of AMR surveillance. Sentinel sites, focused on priority public health issues (e.g. AMR among certain bacteria, and evaluation of morbidity and mortality due to AMR), are needed in each country to track AMR trends, the introduction of new resistant bacteria and the burden of disease. Surveillance capacities in countries should therefore be further assessed.

The quality and reliability of AMR surveillance data needs to be improved. The development of guidelines and standards, improving epidemiological capacities and laboratory management systems, and dissemination of information for informed policy decisions and action are all essential. Agreed common methodologies are needed, but national differences should be taken into account.

There is a need to link AMR data with action. Identifying which data to collect should be based on the purpose of the surveillance. Targets for surveillance include informing treatment, informing estimates on the burden of disease (morbidity, mortality and costs), identifying trends and providing early warning of problems. Prioritization should be done of the most urgent issues such as AMR (CPE) in clinical settings and pilot studies are needed.

A 2012 global technical consultation in Geneva has led to a roadmap to foster surveillance globally and a global report is being developed, including data from the Region that will provide further evidence of existence of AMR in the Region. Models can be adapted from other regions.

HIV, malaria and tuberculosis AMR surveillance activities are developed in many countries and the data produced could be integrated into national surveillance systems. Meanwhile existing multidrug-resistant tuberculosis surveillance programmes can provide valuable lessons for antibacterial resistance surveillance in the corresponding country context.

Integrated surveillance that follows disease spread from animals to humans, as in Denmark, leading to interventions in farming practices, is also required. Coordination across sectors (animal, food and health), including ministries of agriculture and health, will be important for this. Mechanisms for AMR surveillance in emergency situations and among refugees/displaced persons should also be considered.

3.2 Access to essential medicines of assured quality

Access to antimicrobials of assured quality is crucial for the appropriate treatment of patients and to contain the spread of AMR. There is a prevalent culture of antimicrobial misuse in the Region, with both overuse and courses of treatment not being completed. There is also a lack of legislation and its enforcement in the Region. Where regulation exists, it is not always appropriately enforced. Essential medicine lists exist in most countries but their implementation status is unclear. There is a need to map the regulatory landscape in the Region.

Over the counter availability of medicines, including antibiotics, without prescription, exists in many countries. This is because buying medicines over the counter is cheaper and quicker than seeing a physician and more convenient than relying on insurance coverage for reimbursement. This should be regulated through legislation and its enforcement. Ensuring access to universal health care coverage will help prevent these problems. The utilization of health technology assessment and other pharmacoeconomics evaluation tools will help insurance decision-makers to select the best antibiotics to be covered by insurance. This will in turn make the reimbursement process less cumbersome and reduce the pressure on prescribers.

A conflict of interest issues exists with pharmaceutical companies and distributors who want to increase sales. Regulation of the private sector is therefore required and

pharmaceutical companies could be incentivized to meet standards, using existing examples from the Region.[2]

Counterfeit medicine is also a challenge. In some countries of the Region, laboratory testing for medicines is done before products are released into the market. A WHO prequalification programme exists that sets standards for quality of medicines and assists the industry and regulatory authorities to implement such standards. National quality mechanisms are required, especially for generic drugs. Bioequivalence studies should be mandatory for registration of medicines and Good Manufacturing Practice inspections should be an established function in national medicines regulatory authorities.

There is a need for the education of the public, physicians, and veterinary and agricultural sectors, on AMR. Social mobilization and awareness campaigns should be carried out to achieve the desired behaviour change, using “champions” and “ambassadors” as advocates and utilizing the mass media. The European Antibiotic Awareness Day is celebrated on 18 November, and some countries outside Europe have joined the celebration and there could be a regional campaign built around it.

The social mobilization component could be financed through funds collected from fees that the pharmaceutical industry pays to register their promotional materials. The industry cannot function without such materials and hence it would be a sustainable source, firstly by increasing the fees and, secondly, by ear-marking the increase to be pooled in a fund for social mobilization activities.

Countries could build upon existing systems rather than create a new vertical programme. In line with the One World One Health concept, coordination across sectors is essential. Successful examples exist in the Region, such as the four-way linking committees used for addressing A/H5N1 (see Annex 3) that can be used by countries.

3.3 Responsible use of medicines in humans

Optimal use of antimicrobials is important to minimize the emergence and spread of AMR and also prolongs their useful lifespan. Types of irrational use/misuse of medicines include using the wrong route, dose, administration, duration and timing.

The Region has high rates of irrational prescribing (95% in one study), including the use of antibiotics for ailments that do not need them. Participants felt that there exists a strong belief in the healing power of antibiotics by patients and physicians in the Region. This creates pressure from patients on doctors to prescribe antibiotics. Short consultation times of 2–3 minutes also exacerbate the problem. The availability of antibiotics over the counter from

[2] Pricing incentives or pre-determined order quotas set as preferential treatment for companies that achieve international quality standards.

pharmacies is another important factor. Limited diagnostic capacities also lead to the irrational prescribing of antibiotics.

There is a lack of effective regulation of antimicrobials or enforcement of laws. The absence of evidence-based peer reviewed treatment guidelines and training in the Region (modified to the local situation and patterns of AMR), exacerbates the problem. There are also not enough infectious disease specialists and clinical pharmacists in countries. National guideline development committees are needed that involve senior experts from key institutions to create ownership, but whose members must declare no conflict of interest (e.g. business interests in drug companies).

There is a need to de-link prescribing from the potential payment of prescribers and dispensers to stop the financial drivers of irrational medicine use. Pharmaceutical companies promote irrational use through providing various types of incentive to doctors and pharmacists. There is a need to incentivize optimal use through encouraging adherence to standard treatment guidelines and ensuring medicines covered by insurance are available in pharmacies.

The education of policy-makers, prescribers, dispensers and the public is important in order to change attitudes and behaviour, including through medical education, mass media campaigns and social mobilization. The Region can draw on existing models from elsewhere such as the European Union media campaign on antibiotic resistance and the Alliance for Prudent Use of Antibiotics in the United States of America.

Reliable data on antimicrobial use or consumption is needed in the Region to support advocacy, identify problem areas, assess cost impacts and help prioritize the targeting of interventions. Priorities might include high-prescribers, paediatrics, hospital settings, surgical prophylaxis, infectious diseases and outpatients with acute respiratory infections. The use of electronic payment systems could enable the monitoring of prescribing practices.

3.4 Rational use of medicines in animal husbandry

Antimicrobials are used for growth promotion in animal feed (as well as hormones in some countries) and by veterinarians for the treatment and prevention of zoonotic diseases. Increases in the need and demand for food, with the resulting intensification of food production, have led to increased (and poorly monitored) use of antimicrobials.

Antimicrobials are used to increase food production and for intensive production. Overuse for treatment may occur due to limitations in diagnostics with animals. Animals (in particular poultry) are also often treated en masse.

There is a human public health threat due to increased AMR resulting from the massive use of antimicrobials in animal food, in addition to the risks associated with residues in food (milk, eggs, poultry and meat) and the misuse of antimicrobials in treatment and prevention of disease. The increasing movement of people, animals and commodities are compounding this problem.

However, animals and agriculture are key sources of income and poverty alleviation. While there is diversity of agricultural sectors within the Region, trade in food is an important issue for all countries. Farmers in poor countries often have low awareness of AMR and limited choices. Poultry, in particular, is often important for protein intake and food security. Viable alternatives (such as organic approaches) and economically-sustainable solutions are therefore required. There is a need to balance food security and public health.

Regulation or a ban on the use of antimicrobials for growth promotion in animal feed needs to be considered. This has been done without economic impact in some countries (with technical fixes), for instance in the European Union. Pilot studies are needed on bans of antimicrobials used in growth promotion. Farmers will need time to adjust and find alternatives. Such studies could serve as regional models.

Food safety authorities have a role to play and regulation can take place in the market place (point of sale) not just on farms. It is important to take a whole food chain approach. One issue is that veterinary authorities are not responsible for the control of antimicrobials in many countries and drug control authorities do not focus on their use in animals. There is also a lack of trained personnel in relevant sectors to address the issue. In addition, pharmaceutical companies promote uncontrolled antimicrobials to veterinarians.

Regulations and guidelines should be developed involving professional bodies, experts and ministries. Some regulations and guidelines exist, such as on food safety and animal welfare (from OIE) but they need implementation. Veterinarians will play a key role in implementing any regulation in animal health sector. Coordination between sectors will be needed. There is also a need for research and surveillance in the Region to monitor AMR in animals and its implications for human health; the current knowledge base is fragmented. A situation analysis is therefore needed for the Region.

3.5 Enhanced infection prevention and control

Strong infection prevention and control programmes are essential for preventing the spread of drug-resistant infections and reducing the amount of antibiotics used. There is an urgent need to address emerging AMR in hospitals. CPE is a particular issue, with hospitals as the epicentre, which must be addressed through infection prevention and control. However, infection prevention and control should be viewed as being bigger than a single issue.

A resolution on infection prevention and control was passed at the 57th session of the WHO Regional Committee in 2010 (resolution EM/RC57/R6.). Infection prevention and control is also one of the core capacities required for implementation of the International Health Regulations (IHR [2005]). In addition, WHO guidelines are currently being developed on strategies to prevent and control the emergence and spread of AMR in health care settings. This work is supported by the WHO Global Infection Prevention and Control Network.

Countries should have both national infection prevention and control initiatives and local hospital-based programmes including all core components. In the Region, there currently seem to be three categories of infection prevention and control programme: good,

deficient and none, but this evaluation is based on scarce and fragmented data. A situation analysis based on a formal structured assessment is needed to better understand the current situation with infection prevention and control in the Region and to develop implementation plans. A WHO infection prevention and control core components assessment tool (including an electronic version) is available for countries from the Regional Office. There is a need to identify barriers to implementation of infection prevention and control, any gaps and the resources needed to address them. Quality epidemiological data is also needed, including data on hospital-acquired infection morbidity and mortality attributable to AMR, through monitoring systems and point prevalence studies.

Countries can adopt a horizontal approach of basic infection prevention and control measures (including improved hand hygiene and other standard precautions) or a vertical pathogen-specific approach based on active (targeted or universal) screening. While a mixture of both approaches is probably needed, it should be noted that the vertical measures are costly and limited to high-income countries, and reductions in transmission of resistant organisms via horizontal measures alone have been well documented. Countries should build on existing systems where possible rather than creating a new vertical programme. Infection prevention and control is a cross-cutting issue and specific targeted actions must be on a common basis.

Advocacy, political commitment and leadership on infection prevention and control are also needed, and responsibility for infection prevention and control identified at national level. High-level committees could coordinate action, including at the hospital-level. There is a need to raise awareness of the urgency of issue and its link to AMR. A package of advocacy messages should be developed. The cost benefits of infection prevention and control should be communicated to policy-makers, backed by a financial evidence-base, to secure political commitment and resources.

There is a lack of expertise and trained human resources on infection prevention and control in the Region. The creation of a nucleus of specialists would be helpful. Some national training programmes do exist and there are infection prevention and control curricula and training programmes available from the WHO collaborating centres in the Region.

It is important to ensure that responsibility for infection prevention and control does not fall on nurses alone who do not have the ability to address the issue effectively with physicians. Better cooperation from health care staff is needed. Hospitals may be reluctant to report infections for legal/business reasons and there may be a need for legislation in this area. Targeted priority interventions in high-risk settings can provide an entry point for the issue. This may be tertiary care settings, but selection criteria will vary according to country context. Pilot projects in countries (in a variety of settings and country situations) would be useful, to provide models for adaption by countries.

3.6 Research and development for new tools

Innovation is required in all areas for the development of new approaches, tools and drugs to contain the emergence and spread of AMR. The Region is weak in research and development on new antimicrobials, tools and diagnostics and it needs to be encouraged.

There is a need to create a regional research and development agenda. This should arise out of a regional situation analysis and the identification and prioritization of research areas. WHO could help foster this process.

A range of typologies of research is needed in the Region including both qualitative and quantitative research, behavioural and operational research, research and development on new diagnostic, therapeutic and monitoring tools, prevalence surveys, and evaluations of the socioeconomic burden of AMR. PhD candidates or other categories of researcher could be induced to focus on AMR; this will result in baseline data collection in different settings at high quality and low cost.

Improved knowledge of study design is also needed in the Region; the development of guidelines and standard study protocols would facilitate this and ensure the compatibility of collected data. There is therefore a need to standardize methodologies and develop protocols for piloting in countries. Training, guidelines and information sharing are needed. This could happen through interactive platforms or country meetings. Collaboration can help, for instance with research institutions in Europe.

Research is also needed on the extent of antibiotic use, including prevalence surveys, and qualitative research on attitudes to their use, as well as studies on the impact of AMR, including the economic/financial impact (useful for advocacy with decision-makers). Surveillance technologies are also needed, but existing tools such as WHONet and other open source packages can be used. Operational research is needed to improve the use of existing tools.

New technology is expensive but can have a big impact and save resources, for example on diagnostics at point of care, for rapid data generation and for susceptibility testing. Such technology could be focused on reference laboratories. There is a need to define the profile of products needed. Areas that need research and development include the quality of specimens and the ability to differentiate between viral and bacterial infections, as well as new drugs requiring collaboration between governments, WHO and the pharmaceutical industry.

There is a need to de-link research and development from being driven by pharmaceutical company business models. New approaches are required, such as through academic institutions, and could include innovative funding methods such as from ear-marked levies (as has been done with financial transactions and airline tickets).

3.7 Comprehensive country level national planning and accountable implementation

A national action plan developed and implemented by an executive body comprised of key stakeholders and covering all areas is necessary to enable AMR to be tackled effectively. Political commitment and allocation of adequate resources are critical. National AMR strategic and action plans could be merged with existing plans, but AMR should be recognized as an important and urgent issue and appropriate resources identified. A generic action plan from WHO could provide a useful template. The WHO rapid country assessment

tool and WHO country missions will provide necessary evidence for informed decision-making and planning.

It is important to identify the roles and responsibilities of participating stakeholders for implementation of the plan. A national coordinating mechanism is needed that could include WHO staff, staff from ministries of health and agriculture, and specialists. A national AMR focal point is also needed. Countries can build on existing structures without creating a vertical arrangement and alliances or task forces can be created rather than new programmes. A political analysis of stakeholders is important to ensure the engagement of influential partners in the planning and implementation process.

Political commitment, leadership and the allocation of resources are crucial. It is important to open a policy dialogue to convince decision-makers and raise awareness of the urgency of the problem. WHO Regional Committee resolutions on AMR will help in this process. Plans should be evidence-based and driven by country needs, capacities and structures. Evidence is important for encouraging collaboration and bringing sectors together. Evidence of financial benefit (such as from pilot studies) will also be helpful for advocacy.

A multidisciplinary approach is required to bring stakeholders together. National coordinating mechanisms are needed to ensure a multisectoral approach. This has happened with avian influenza (H5N1), in Egypt for example, when an FAO/OIE/WHO task force was set up, which included two ministries, to share information and help with joint intersectoral collaboration (the four way collaboration – see Annex 3). Similar task forces are needed for AMR, zoonotic diseases and foodborne diseases.

4. WORKING TOGETHER

This section of the report summarizes the discussions on some key aspects of working together to address the challenges involved in curtailing AMR in the context of the Region.

4.1 Stakeholder engagement and coordination

Broad stakeholder involvement is critical to sound AMR containment. A stakeholder is any individual, group or institution that has a vested interest in the results of AMR activities or will potentially be affected by AMR plans and outcomes. Stakeholders have something to gain or lose if conditions change or stay the same. Their involvement requires wide consultation across all sectors involved in AMR to formulate the goals, values and the overall policy directions that will guide policy setting, strategy building, planning and decision-making. Stakeholder education on the issue of AMR and its impact may be needed to help secure their cooperation. “Champions” can play an important role in advocacy efforts.

Regional and national stakeholder mapping and analysis is therefore needed. There is first a need to identify stakeholders. They may include: physicians, pharmacists and veterinarians, and their respective professional associations/bodies; laboratories, basic scientists, statisticians and researchers; policy-makers, health administrators, ministries of health and regional health authorities; the private health sector (including health insurance

companies and private hospitals, centres and clinics); ministries of finance, ministries of agriculture, and regulatory agencies (including food safety); drug companies and animal feed companies; farmers and the food industry; consumers, patient groups, civil society and religious leaders; and the mass media.

Stakeholders can be usefully categorized according to their power, influence and interest. This categorization can help with the prioritizing of activities towards stakeholder engagement and the different strategies employed for different stakeholders. It is important to remember that it is a dynamic process and the situation may change. Try to identify what you want, what different stakeholders can offer and what you can offer them. It is also important to identify and consider those who can slow down or block implementation of the programmes. This might include pharmaceutical companies and agribusiness. Their views are important for informing the development of strategies, but due attention should be given to possible conflicts of interest in order not to hamper the overarching public health goals. However, they could also become part of the solution if incentivized apart from their moral and social responsibilities; for instance, pharmaceutical companies have an interest in preventing counterfeit drugs.

A clear framework for action, at regional and country-level, is also important. In WHO's South-East Asia Region, ministers of health have agreed an outline framework for the Region, known as the Jaipur Declaration on Antimicrobial Resistance, which includes non-health sector involvement. The framework has been adapted at country level.

4.2 Advocacy and communication

Advocacy is central to sound policies, strategies and plans for tackling AMR. Building awareness of AMR and a sense of shared responsibility to combat it among decision-makers is therefore vital. Different countries require different tailored approaches appropriate to the national decision-making processes and patterns of stakeholder involvement. The development of advocacy materials and the identification of key audiences is needed. The levels of awareness of AMR among different stakeholders could be usefully mapped in order to help prioritize advocacy efforts. A focus on high-level decision-makers and forums would be important at this stage to obtain political commitment.

The use of identified "champions" is helpful. Professional groups, celebrities and religious leaders could also be utilized as AMR ambassadors. Potential advocates would benefit from training in advocacy and communication skills. Social media and telephone texting could also be employed. Evidence and data to support the advocacy is crucial and could be packaged in advocacy materials, such as policy briefs and fact sheets. These could be adapted from outside the Region and could include summaries of lessons learnt elsewhere. This includes celebration of antibiotic days or weeks during which basic messages will reach the target audience through appropriate channels in countries.

5. RECOMMENDATIONS

To Member States

1. Establish or revise inclusive intra- and intersectoral coordination mechanisms/focal points for AMR containment, consisting of the human health, animal health, food and agriculture sectors, in order to plan and monitor implementation of comprehensive national plans.
2. Map institutions that are performing AMR surveillance at the country level for the initiation of a regional collaborative platform.
3. Identify competent hospitals for providing surveillance information on AMR and hospital-acquired infection.
4. Map stakeholders in AMR containment at the country level and develop a management plan for engagement of stakeholders.
5. Map existing laws and regulations on the use of antimicrobials and the status of their enforcement.
6. Organize social mobilization and information campaigns on high priority areas for the appropriate use of antimicrobials, such as with upper respiratory infections.
7. Optimize existing programmes and capacities to expand or initiate AMR containment activities.

To FAO/OIE/WHO

8. Establish a regional multisectoral AMR coordination mechanism for steering AMR activities at the regional level, including the definition of priority areas for action.
9. Pursue policy dialogue with countries for in-depth analysis to foster AMR containment activities.
10. Establish a mechanism to strengthen capacities for collecting and sharing surveillance data at regional level.
11. Coordinate on the development of standardized protocols for use by countries for mapping the situation of AMR.
12. Develop an AMR research agenda for the Region and map regional research capacities on AMR.
13. Support pilot studies in the Region to assess the impact of the withdrawal of certain antimicrobial molecules used as growth promoters on animal production.
14. Develop tools for social mobilization and information campaigns.
15. WHO should identify partners in humanitarian assistance and ensure the alignment of AMR activities with regional plans.
16. Support countries in the assessment of regulatory practices in the Region to inform the development of a comprehensive regulatory framework to foster the optimal use of antimicrobials in humans, animals and agriculture.

Annex 1

PROGRAMME

Tuesday, 12 November 2013

08:30–09:00	Registration	
09:00–09:30	Opening session Welcome note Objectives of the meeting Introduction	*Dr A. Mafi*
Part I: Current experiences		
09:30–10:00	Global perspective	*Dr C. Pessoa-Silva*
10:00–10:20	Regional overview	*Dr A. Mafi*
10:20–11:10	Anti-microbial resistance programmes in FAO	*Dr M. Tibbo*
11:10–11:30	Anti-microbial resistance programmes in OIE	*Dr G. Yehia*
11:30–13:30	Country experiences: Egypt, Lebanon, UAE	*NAMRU-3/Country representatives*
Part II: Policy measures		
13:30–15:00	Strengthened surveillance and laboratory capacity	*Panel discussion*
15:00–17:00	Access to essential medicines of assured quality	*Panel discussion*

Wednesday, 13 November 2013

08:30–09:30	Rational use of medicines in humans	*Panel discussion*
09:30–11:00	Rational use of medicines in animal husbandry	*Panel discussion*
11:00–12:15	Enhanced infection prevention and control	*Panel discussion*
12:15–14:15	Research and development for new tools	*Panel discussion*
14:15–15:35	Comprehensive country level national planning and accountable implementation	*Panel discussion*
Part III: Working together		
15:35–17:00	Stakeholder engagement and coordination	*Panel discussion*

Thursday, 14 November 2013

Part III: Working together (continued)		
08:30–09:30	Advocacy and communication	*Panel discussion*
Part IV: The way forward		
09:30–11:00	Areas for action and priorities	*Panel discussion*
11:00–13:30	Areas for action and priorities (cont.)	*Panel discussion*
13:30–15:30	Road map and next steps	*Panel discussion*
15:30	Closing session	

Annex 2

LIST OF PARTICIPANTS

Dr Jameela Mohammed Al-Salman
Chairperson of the Medical Department
Antibiotic Management Team
Ministry of Health
Isa Town
BAHRAIN

Professor Ossama Rasslan Mohammad
Professor of Medical Microbiology and Immunology
Infectious Disease Research and Infection Control Unit
Faculty of Medicine
Ain Shams University
Cairo
EGYPT

Dr Aktham Jeries Haddadin
Director
Laboratory Directorate
Ministry of Health
Amman
JORDAN

Professor Jaouad Berrada
Professor of Veterinary Microbiology and Infectious Diseases
Veterinary School
Hassan II Institut Agronomique et Vétérinaire
Rabat
MOROCCO

Professor Mohamed El Idrissi Benbachir
Laboratory of Microbiology
Faculty of Medicine
Casablanca
MOROCCO

Dr Sulaiman Al Busaidi
Director, Central Public Health Laboratories
Ministry of Health
Muscat
OMAN

Dr George Araj
Professor and Director of Clinical Microbiology
Dept Pathology and Laboratory Medicine
American University of Beirut Medical Center
Beirut
LEBANON

Dr Saida Ben Rejeb
Laboratory of Microbiology
Faculty of Medicine
Tunis
TUNISIA

Dr Jens Thomsen
Head
Occupational and Environmental Health
Community Health and Surveillance Department
Health Authority
Abu Dhabi
UNITED ARAB EMIRATES

OTHER ORGANIZATIONS

Food and Agriculture Organization of the United Nations
Dr Markos Tibbo Dambi
Livestock Officer/Animal Production and Health Officer, a.i.
Regional Office for the Near East and North Africa
Cairo
EGYPT

U.S. Naval Medical Research Unit No. 3 (NAMRU-3)
Dr Maha Talaat
Director, Infection Control Unit/Deputy Director for Disease Prevention
Global Disease Detection and Response Programme
Cairo
EGYPT

Dr Mona El Shokry
Infection control Microbiologist
Infection control Unit
Global Disease Detection and Response Programme
Cairo
EGYPT

World Organisation for Animal Health
Dr Ghazi Yehia
OIE Regional Representative for the Middle East
Beirut
LEBANON

WHO SECRETARIAT

Dr Carmen Lucia Pessoa-Silva, Medical Officer, Antimicrobial/Drug Resistance, WHO headquarters
Dr Alireza Mafi, Medical Officer, Pandemic and Epidemic Diseases, WHO Regional Office for the Eastern Mediterranean
Dr Sergey Eremin, Medical Officer, Infection Prevention and Control in Health Care, WHO headquarters
Dr Soren Madsen, Technical Officer, Food and Chemical Safety, Centre for Environmental Health Action (CEHA)
Mr Mohamed Atef Farag, National Professional Officer, Essential Medicines and Pharmaceutical Policies, WHO Regional Office for the Eastern Mediterranean
Ms Heidi Rizk, Team Assistant, Department of Communicable Disease Prevention and Control, WHO Regional Office for the Eastern Mediterranean
Mr Kevin Eisenstadt, (APW holder), Rapporteur

ANNEX 3

LESSONS FROM FOUR-WAY LINKING OF INSTITUTIONS IN TACKLING A/H5N1 IN EGYPT

Background/rationale

In Egypt, FAO in collaboration OIE and OIE has supported the establishment of four-way linking to tackle the crisis of A/H5N1 in Egypt. Until it was established, there had not been any communication or data sharing among the different actors. Ministries themselves were not talking to each other, as was the case among private sector actors.

An inception workshop, held in 2011, led to the four-way linking (also called 2 × 2) of national institutions, which was initiated to bring together through a taskforce professionals engaged in animal health and public health in Egypt. The aim was to improve national level qualitative risk assessment for zoonotic A/H5N1 with specific objectives to: improve the linkages and sharing of epidemiological information and virological (including sequence) information on A/H5N1 between the human and animal health sectors; and facilitate the implementation of a mechanism for joint risk assessment.

Since 2012, the four-way linking task force met six times; FAO hosted three of these meetings. These meetings have been a good platform for sharing updated information on H5N1 in humans and poultry (including the current situation in terms of human cases and on the virological aspects of the outbreaks in poultry) and resulted in rapid risk assessment of the influenza situation for further control decision-making. A similar set-up could be used to address common concerns such as zoonoses, AMR and foodborne infections.

Four-way linking involves the following organizations

Ministry of Agriculture:

- Veterinary Epidemiology Unit (General Organization for Veterinary Services)
- Animal Health Laboratory (National Laboratory for Quality Control of Poultry Production), Central Laboratory for Evaluation of Veterinary Biologics

Ministry of Health and Population:

- Epidemiology Unit (Epidemiology and Surveillance Unit)
- Human Health Laboratory

International organizations:

- Food and Agriculture Organization of the United Nations (FAO)
- World Organisation for Animal Health (OIE)
- World Health Organization (WHO)

Other stakeholders:

- NAMRU-3
- USAID
- Poultry producers
- Other private companies

Four-way linking: overall advantages

- Enhances national ability to conduct effective risk assessment with the objective of linking epidemiological/virological information from the animal health and public health sectors in time and space
- Allows an overview of the complete national animal health and public health system from field influenza investigations through to the analysis of epidemiological information and virological data
- Helps identify linkages, and technical and policy gaps
- Enables follow-up with joint training to address gaps

Four-way linking: other practical advantages

- Trace back – chicken or duck
- Phenotypic variants
- Identifying surveillance gaps
- Communication
- Research
- Global scale

Benefits of four-way linking for Egypt

- Human infections: sector origin? Link human and poultry outbreaks
- Virus strains in different sectors? Always poultry exposure or risk human-to-human transmission
- Human infections: also in escape variants?

Achievements in Egypt

- Mapping of public health and animal health stakeholders and data exchange
- National task force (with clear terms of reference) established involving all the four units (country FAO and WHO staff continue provision of technical assistance)
- Mechanism of data sharing and channel of communication agreed between stakeholders
- Plans to carry out joint A/H5N1 virus risk assessment
- Forthcoming joint activity: training for Central Public Health Laboratory personnel on gene analysis organized at National Laboratory for Quality Control of Poultry Production
- For sustainability, the task force will have to be institutionalized as a legal body recognized by the government.

Some question to be answered

What are the terms of reference of the task force?

This is needed at the very beginning of the task force

Who are not willing to participate and how have you dealt with them?

Some organizations were not on board in the early days. This was rectified through relentless follow-up and a campaign to convince them of their importance in the task force.

How can we incentivize good practices?

USAID is funding the A/H5N1initiative. Funding has to be sought for this initiative.

World Health Organization
Regional Office for the Eastern Mediterranean
P.O. Box 7608, Nasr City 11371
Cairo, Egypt
www.emro.who.int