OIE/WHO Sub-Regional Workshop on zoonotic diseases in Central Asian and South Caucasus countries

Astana, Kazakhstan, 15-16 November 2018

Meeting Report

1. Scope and purpose

Interactions and convergence of people, animals and the environment has created a situation through which health of animals is inextricably linked with health of human. The “One Health” concept is founded on an awareness of major opportunities existing to protect public health through policies aimed at preventing and controlling zoonosis and emerging diseases, at the interface between humans, animals and the environment.
Putting this “One Health” initiative into practice has been facilitated by a formal alliance on this topic between World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO) and World Organisation for Animal Health (OIE). In 2010, the three Organisations have published a Tripartite Concept Note clarifying their reciprocal responsibilities and their objectives in the prevention and control of health risks at the human-animal-ecosystems interface. This basic document was then enlarged by a tripartite commitment in 2017, reaffirming their commitment to provide multi-sectoral, collaborative leadership in addressing health challenges.

Over the last 3 decades, approximately 60% of existing human infectious diseases are zoonotic and 75% of new emerging human infectious diseases reported have an animal origin.
In Central Asia and South Caucasus countries, WHO and OIE offices, working closely with the competent authorities, identified, among the numerous zoonosis, three priority diseases, of paramount importance for human and animal health: Brucellosis, Echinococcosis and Rabies. All of them are spread worldwide, with high economic and public health impacts, and may benefit with a multi-sectoral collaboration in Member Countries.

Brucellosis

Brucellosis is endemic in Central Asian and South Caucasian countries, facing some of the highest human brucellosis incidence rates in the world. Although national authorities have developed strategies to eradicate it for many year, according to FAO in 2013, cases reported in human population still ranged from 116 per million people in Kazakhstan to 362 in Kyrgyzstan. Only Uzbekistan reported a lower rate (less than 18 cases per million), however still far from the 4.1 cases per million of the Russian Federation, or the 0.3 in Germany and United Kingdom and the 0.09 in Canada. Public health officials also acknowledged the severely persistent underdiagnosed brucellosis in human population.

Echinococcosis

The incidence of human alveolar echinococcosis is usually < 0.5 per 100,000. However, rates of infection can range from less than 1 per 100,000 to more than 200 per 100,000 in certain rural populations that keep a close contact with domestic dogs. Over 1 million people are estimated being currently affected by echinococcosis. The WHO is working to approve effective strategies to combat the echinococcosis, by 2018.
All countries invited to participate at the meeting are reporting echinococcosis cases over the year. Although data provided by countries demonstrates general decreasing trend of echinococcosis morbidity, strengthening echinococcosis surveillance in all countries is still an important need.

Rabies

In 2015, WHO, FAO, OIE and the Global Alliance for Rabies Control (GARC) came together to adopt a common strategy to achieve "Zero human Rabies deaths by 2030" and formed the United Against Rabies collaboration. A global strategic plan, entitled 'Zero by 30', will guide and support countries as they develop and implement their national rabies elimination plans that embrace the concepts of One-health and cross-sectoral collaboration.
Monitoring and surveillance of the disease should be a central element of every national rabies programme. Declaring rabies a notifiable disease, including mechanisms for the transmission of data to the national level, to the OIE and to WHO, is crucial to establish functional reporting.

According to WHO, in 2016, human rabies cases have been reported in Azerbaijan, Russian Federation, Tajikistan and Uzbekistan, while Armenia, Georgia, Kazakhstan and Turkmenistan reported zero cases. No data was available from Kyrgyzstan for 2016. However, the country reported 2 human rabies cases in 2015.

2. Objectives of the meeting

This first meeting on zoonosis in the region was convened with the overall objective to increase country awareness about global activities and list all types of challenges which countries face to implement the global initiatives at national level. More specifically, the objectives were to:

- ✓ present the One Health concept and the synergies between animal health, public health and environmental specialists at international level;
- ✓ provide an update on situational and scientific information on brucellosis, rabies and echinococcosis, at global, regional and country levels;
- ✓ develop/strengthen functional and sustainable national mechanisms for routine multi-sectoral coordination and collaboration on health issues at the human-animal-ecosystems interface;
- ✓ discuss effective means or options for these three diseases' prevention, control and elimination strategies and their challenges for the countries;
- ✓ present main measures/capacity to prevent zoonosis in Public Health;
- ✓ improve regional cooperation to fight these diseases in the framework of the "One Health" concept.

The participants were specialists from both the health and veterinary sectors from: Kazakhstan, Armenia, Azerbaijan, Georgia, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Uzbekistan, experts, representatives from UN agencies and international organizations.

3. Themes in the meeting

A. Setting the scene for zoonoses

❖ One health concept

[Djahne Montabord / OIE]

Globalisation, climate change, changes in human behavior, giving pathogens numerous opportunities to spread faster, to colonise new territories and to evolve into new forms is the context to develop the One Health concept. The actions achieved since 2010 testify to the commitments of OIE, WHO and FAO and their strong collaboration. The three focus areas were reaffirmed in the second Tripartite's strategic document: **antimicrobial resistance** (2015 Global action plan and 2016 UN High level meeting on AMR), **rabies** (Global Conference in Geneva in 2015, with its joint pledge to eliminate dog-mediated human rabies deaths by 2030 and the annual World Rabies Days) and **avian influenza** (improvement of surveillance systems and development of collaboration since 2005, through OFFLU and GISRS). All are bases for the national and regional actions developed in the region and are complementary to Joint External Evaluations, or actions on tuberculosis, MERS-CoV, sample shipment.

The IHR-PVS national bridging workshops, a system bringing together human, animal and environmental sectors of a country is a tool to build bridges, evaluating capacity of all sectors and identifying gaps in the implementation of standards.

❖ One health for Neglected Tropical Diseases: policies and operationalization

[Albis Francesco Gabrielli / WHO]

The One Health concept requires that inter-sectoral measures are implemented to tackle the risks inherent to interaction between humans, animals and the environment. Such concept is applicable to several neglected tropical diseases (NTDs), notably those with a zoonotic reservoir or deriving from close contact with animals. Five NTDs have been prioritized by WHO under the One Health concept: rabies, *Taenia solium* taeniasis/cysticercosis, cystic and alveolar echinococcosis, foodborne trematodiases and snakebite envenoming. The WHO NTD Global Roadmap was published in 2012 and includes milestones and goals until 2020 for each of the above conditions, except snakebite envenoming which was added to the NTD portfolio only in 2017. NTDs have been included in the Sustainable Development Goals (SDG), notably SDG3.3 (ending the epidemics of NTDs), and are also highly relevant to SDG3.8 (achieve Universal Health Coverage).
A new NTD Global Roadmap is under preparation. It will guide WHO's work between 2021 and 2030 through the formulation of public-health milestones and goals. In order to steer such process, WHO has put together a list of basic indicators covering both impact (e.g. incidence and prevalence of infection) and outcome (e.g. coverage of interventions), and is currently inviting countries to share the relevant data, with the aim of conducting a situation analysis and projecting expected progress towards 2030.

❖ Brucellosis: situation analysis at global and regional levels

[Adrian Whatmore / APHA, UK]

Brucellosis remains one of world's most widespread zoonoses and is highly ranked in significance in authoritative reports[1]. Trends to larger farms and intensification may increase the impact of brucellosis[1]. *Brucella* species, and characteristics of human brucellosis, were discussed. Transmission is through direct contact with infected animals or through consumption of contaminated and unpasteurised dairy products. Examples of UK data, where bovine brucellosis was eradicated in the 1980's, were used to demonstrate the direct relationship between control in animals and reduction in human disease.
Prevalence globally was discussed with highest prevalence in human and animals apparent in the Middle East and Central Asia, though there are extensive data gaps, and brucellosis is likely a significant issue in Africa, Central and South America and other parts of Asia. In highest income parts of the world brucellosis has been eradicated or largely controlled (Northern Europe, North America, and Australasia) and epidemiology of disease in humans reflects travel to endemic areas, laboratory acquired infection or contact with unregulated dairy products (e.g. recent vaccine associated cases in USA). The direct, indirect and intangible costs of human brucellosis were outlined[2] as were examples of modelling of the economic and human health benefits of animal disease control[3].
Issues impacting control of brucellosis in humans were outlined, including lack of an internationally approved human vaccine, cultural misconceptions leading to suboptimal control measures (lack of milk heat treatment), informal markets for dairy produce dominating in low/middle income countries, diagnostic issues (appropriate tests, under/over reporting?) and lack of well resourced, ongoing cross border control measures being applied to animals.

[Claire Ponsart / ANSES, FR]

Animal brucellosis infection can occur via multiple differing routes. *Brucella* organisms, which are small aerobic intracellular coccobacilli, localize in the reproductive organs and associated lymph nodes of host animals, causing abortions and sterility. They are shed in large numbers in the animal's urine, milk, placental fluid, and other fluids. The clinical presentation in animal populations largely varies depending on host species. Overall, in bovine brucellosis (*B. abortus*), caprine brucellosis (*B. melitensis*), and swine brucellosis (*B. suis*) animals can present with pyrexia (undulant fever), mastitis, weak offspring, spontaneous abortion, and carpal hygromas. Spontaneous abortion is recognised as the cardinal sign of brucellosis infection[4]. Brucellosis remains endemic in Latin America, southern Europe, Africa, Central and Southeast Asia, and the Middle East, particularly in agro-pastoral areas.

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1 Grace *et al.* Mapping of poverty and likely zoonoses hotspots. ILRI, Kenya (2012) 119 pp.
2 Franc *et al.* Brucellosis remains a neglected disease in the developing world: a call for interdisciplinary action. BMC Public Health. 2018 Jan 11;18(1):125.
3 Roth *et al.* Human health benefits from livestock vaccination for brucellosis: case study. Bull World Health Organ. 2003;81(12):867-76.
4 Hull *et al.* Comparisons of brucellosis between human and veterinary medicine. Infect Ecol Epidemiol. 2018, 8(1): 1500846

The World Animal Health Information System (WAHIS)[5] aims to compile the number of animal brucellosis cases for *B. abortus, B. melitensis*, and *B. suis*. Example of the FAO roadmap for Brucellosis was used to emphazise essential components to set up an action plan against brucellosis: **i)** a baseline survey of the prevalence of brucellosis infection in animals; **ii)** development and implementation of a control strategy based on the survey findings; **iii)** development of a surveillance system to ensure early warning of the spread of brucellosis disease or infection to new areas; **iv)** monitoring of results for reporting progress and measuring changes in infection/ disease incidence; **v)** review and updating of control strategies in response to these results[6]. Data from Kazakhstan were used to demonstrate the importance of epidemiology and phylogeography to fully understand the disease[7].

Brucellosis breakout session

The participants agreed on main points concerning brucellosis: (1) key challenges in countries (2) a real need to better link human and veterinary health sectors and (3) a real collaboration needed with OIE and/or WHO.

Challenges

The discussion among participants highlighted main issues to develop the knowledge on Brucellosis and its control in the countries.

On the one hand, public awareness may have to be developed for people to adapt their cultural behaviors to scientific realities (household milk is often not boiled, absence of equipment for pasteurised milk in villages, where homemade/locally made cheese is very popular, lack of awareness on the need for personal protection equipment when handling potentially infected animals, …). On the other hand, participants expressed their concern on different unsolved issues, among which, the role of camels as being of potential underexplored epidemiological significance in some countries (and heat treatment of camel milk is considered to adversely affect taste), the lack of knowledge on the significant role of different Brucella species, the poor understanding of root causes of human infections, …

Additionally, the official policies for Brucellosis eradication sometimes need for improvement, such as moving to animal eradication as a long-term solution or developing/improving the compensation system for infected animals.

Improved intersectoral collaboration

Proposals have been made to improve the intersectoral collaboration, such as joint databases and integrated electronic systems, joint epidemiological strategy in investigations for services to inform each other, mutual laboratory development (e.g. common reference laboratory for human and animal cases), joint training/CPD for staff in both sectors to build engagement, better education of physicians in significance of brucellosis or common involvement of public and private sectors.

WHO/OIE input

To strengthen the National Reference Laboratories, WHO and OIE support, through possible specific project if needed, will be considered, relying on OIE/WHO Reference Laboratories: training of specialists on laboratory and field investigation, enhancement of quality controls, validation of tests and international collaboration at laboratory level (participation in proficiency testing), including these laboratories in a regional network to be developed.

❖ Echinococcosis: situation analysis at global and regional levels

[Paul Torgerson / Zurich University and Meritxell Donadeu/ Melbourne University]

In their presentation, Paul Torgerson and Meritxell Donadeu summarized the global situation of both alveolar and cystic echinococcosis. Cystic echinococcosis (CE), caused by *Echinococcus granulosus* has a global distribution, with most countries being endemic for this parasite.

There are a few countries where it is historically absent (eg South East Asia) or has been eliminated as a result of a successful control programme (eg New Zealand). Both central Asia and the Caucuses

[5] http://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home

[6] El Idrissi, 2014. FAO works to curb the burden of brucellosis in endemic countries. FOCUS ON. 2014, 8. http://www.fao.org/3/a-i3916e.pdf

[7] Daugaliyeva et al. Genotyping of *Brucella melitensis* and *Brucella abortus* strains in Kazakhstan using MLVA-15. Infection, Genetics and Evolution 2018, 58:135–144

are intensely endemic for this disease, with thousands of cases being reported each year. In some localities the incidence of surgically treated patients is as high as 20 cases per 100,000 per year. Despite this, there is considerable evidence that some countries are under reporting the true number of cases treated. For instance, in Uzbekistan, independent audits of hospital records reveals an incidence twice to three times that of the officially reported number of cases to WHO. There is also considerable evidence that the incidence of human CE has increased dramatically since the dissolution of the Soviet Union. This may be due to changes in slaughtering practices of livestock, especially lack of veterinary supervision of slaughter and hence, the increase in availability of infected offal to dogs. Elsewhere, intensely endemic regions include western China, the Middle East, parts of Africa and Latin America.

Control of cystic echinococcosis is through education, dog management and periodic anthelmintic treatment of dogs with praziquantel, slaughter control and vaccination of livestock with the EG95 vaccine. Education as a sole control measure is not successful but is important to gain acceptance of other control measures within the population. To achieve control, it is essential to treat dogs at least four times a year, especially if other measures are not available. The EG95 vaccine for use in sheep is highly effective in preventing sheep becoming infected. It is now being used in control programmes in China and Argentina and could be used as a valuable control tool in the Central Asian and Caucasus but is subject to registration or dispensation by the appropriate authorities. Another issue for control is the lack of adequate slaughter facilities in some of the most intensely endemic districts in this region. This makes veterinary supervision of slaughter and removal of infected offal a challenge, and will need infrastructure investment, possibly backed by legislation to overcome this problem.

Alveolar echinococcosis (AE) is caused by *Echinococcus multilocularis* and is a fatal parasitic disease in humans if it is untreated. The parasite has always been endemic across northern Eurasia and is also endemic to north America. Over most of its range, human AE is a rare and sporadic disease. However, in parts of western China and in Kyrgyzstan, large numbers of cases have been reported from some communities. In Kyrgyzstan, 200 or more cases per year have been reported recently and, in some rayons, such as the Alay Rayon, there are prevalences of up to 5% in some villages. Elsewhere, the disease is likely to be under reported. For example, in the Russian Federation, there is a mismatch between the relatively small numbers of cases reported to the central epidemiological services and the much larger numbers reported by surgeons in the published literature.

Because of the wild life cycle of *E. multilocularis*, control is more challenging for AE than for CE. However, there is some evidence that, in the localities having high numbers of human AE cases, there is a concomitant high prevalence of the parasite in domestic dogs. Thus, regular anthelmintic treatment of dogs with praziquantel in these areas should reduce the risk of transmission to humans.

Echinococcosis breakout session

The improvement of the knowledge and the control of Echinococcosis is proposed to develop a clear framework for the regulation, based on programmes and strategies, and to work on the mechanisms for programmes implementation.

For this second point, participants insisted on the points to concentrate on:

- organization (create a Coordination Committee on zoonoses, with approved functions and position and working groups in charge of drafting their action plans (to be submitted for approval based on the strategy approved by the Committee), develop steering committees, plans for activities adapted for each of the authorities and for each disease, improved inter-agency communication mechanisms, …),
- knowledge, based on OIE/WHO standards and guidelines: training of specialists, improvement of prevention, evolve from a passive to an active surveillance, strengthen surveillance tools and intergovernmental prevention measures,
- requirement for scientific evidences,
- improvement of prevention: early diagnostics, treatment, deworming in the environment, vaccination (prevention is a wide notion),
- at a global level, modify the international classification of diseases, to take separately into account the alveococcosis.

❖ Rabies: situation analysis at global and regional levels

[Albis Francesco Gabrielli / WHO]

Rabies is a lethal zoonotic disease, estimated to cause one death every 9 minutes globally. 40% of deaths occur in children and 80% in rural areas. Dogs are responsible for the transmission of 99% of cases of human rabies worldwide, and this is why FAO/OIE/WHO/GARC's strategic plan for rabies ("Zero by 30", that is, to end human deaths from dog-mediated rabies by 2030), focuses on dog-mediated rabies. Such goal will be achieved through two preventive interventions (dog bite prevention and mass dog vaccination) and one response intervention (post-exposure prophylaxis).
With regard to current endemicity of dog-mediated rabies, countries are classified as follows: **(1)** endemic for both human and dog rabies; **(2)** endemic for dog rabies only; **(3)** sporadic dog rabies and human rabies; **(4)** sporadic dog rabies only; **(5)** no dog rabies; **(6)** no information. Incidence of human deaths due to rabies is the highest in sub-Saharan Africa and southern Asia. It should be noted, however, that epidemiological information on rabies is limited, and that underreporting to WHO is an important obstacle to the full appreciation of its burden of disease.
With regard to Central Asia and South Caucasus countries, although some of them share data with WHO, information reported is patchy and incomplete. Some countries may have more data than what is reported to WHO. They have been invited to share them with WHO, using the link provided: http://www.who.int/rabies/advancing_global_rabies_data_collection/en/). WHO is inviting each Member State to share data on the following basic indicators: **(i)** number of human rabies cases reported; **(ii)** number of animal bite cases reported, by animal species; **(iii)** number of people who received PEP. WHO is also collecting information on the following indicators reported by countries to OIE: **(a)** estimated dog population; **(b)** number of dog rabies cases reported; **(c)** number of rabies cases reported in animals other than dogs; and **(d)** proportion of dogs that received rabies vaccine.

[Alexandre Servat / ANSES, FR]

Rabies is a fatal and neglected zoonosis having a global distribution, caused by neurotropic RNA viruses of the lyssavirus genus. Rabies viruses (RABVs) which are the type species for lyssaviruses, have established multiple independent transmission cycles in a broad range of carnivore host reservoirs.
More than 55,000 human deaths occur annually mostly in Asia and Africa. Nevertheless, unlike many other diseases, all the necessary tools to eradicate rabies are available: rabies is 100 per cent preventable, owing to vaccination of animals and humans.
Proof-of-concept programmes for rabies control and elimination, supported by various available guidelines issued by WHO, FAO and OIE with the help of experts, have demonstrated that canine rabies vaccination campaigns can be successfully implemented. Mass vaccination of dogs with a minimum coverage of 70% can break the rabies transmission cycle and lead to a zero incidence in both animals and humans. Elimination of rabies in wildlife may also be perceived as challenging. However oral rabies vaccination (ORV) has proved to be an efficient tool to eliminate the disease in wild animal reservoirs. The successful ORV strategies applied in Western Europe during three decades has led to the control and the elimination of fox rabies from the major part of Europe.

Whatever the reservoir (canine or wildlife), rabies control and elimination require a global One Health approach that encompasses the prioritization of rabies, burden estimation, integrated surveillance, awareness, laboratory capacities, access to PEP, sustainable funding, local and governmental long-term commitment, and interdisciplinary interactions from veterinary, environment and human health sectors.

Rabies breakout session

Participants from several countries raised the question of stray dog populations encountered in many remote areas and in rural areas. No strategies have been put in place to face the increasing number of free roaming dogs resulting from the total absence of dog reproduction control, the abandonment of domestic animals by owners that migrate from rural to urbans areas. This may pose serious human health and animal health problems with potential transmission of zoonotic diseases such as rabies.
Dog population management is fully integrated in rabies control measures. Beside this, dog rabies vaccination is often not practiced in the countryside. Georgia reported some measures implemented in Tbilisi where dogs may be captured, rabies vaccinated and dewormed before being released. However, such initiative is scarce and do not reflect the situation in rural areas or in other cities.
It is agreed from participants that:

- the absence of dog population control programme is a potential source of human and veterinary health problems,
- a strong commitment of veterinary authorities (together with other governmental bodies) is required to take measure on stray dog populations,
- awareness and education of public is necessary to promote a responsible ownership,
- sustainable funding are necessary to give access to dog rabies vaccination (parenteral or oral route),
- controlling reproduction (surgery or chemical sterilization) is an effective tool to control populations of dogs but requires here again financial resources and commitment of private and public veterinary sectors.
- OIE and WHO should share dog population control successes obtained in other places.

For human health, participants also raised issues related to the introduction of new recommendations on rabies immunization in humans, that is, appropriate usage of vaccines and immunoglobulins in post-exposure prophylaxis and pre-exposure prophylaxis.
Recommendations formulated by participants focused on two areas:

1. dissemination of new guidance through translation of existing normative references into Russian (notably WHO Expert Consultation on Rabies: WHO TRS N°1012. Third report);
2. capacity building of health staff on intradermal administration of rabies vaccine (as per new recommendations), considering that intramuscular injection is currently the only known way of administration in most settings.

B. Normative update

❖ Third report of the WHO Expert Consultation on Rabies (WHO TRS 1012): what is different now?

[Albis Francesco Gabrielli / WHO]

The third WHO Expert Consultation on Rabies met in Bangkok, Thailand, on 26-28 April 2017. Technical recommendations made by participants were included in the meeting's report, which was published in 2018. Such Third Report contains the most current information and guidance on rabies prevention and control and supersedes the Second Report published in 2013. It is meant as a technical reference document for the strengthening of country-level programmes against rabies. It covers the following domains: **(1)** burden of rabies; **(2)** classification of lyssaviruses; **(3)** pathogenesis of rabies; **(4)** diagnosis of rabies in humans and animals; **(5)** management of patients before and after death; **(6)** vaccines and rabies immunoglobulins for humans; **(7)** prevention of human rabies; **(8)** prevention and control of rabies in dogs; **(9)** prevention and control of rabies in wild animals; **(10)** surveillance of rabies; **(11)** reaching zero human deaths from rabies; **(12)** global and regional activities on rabies; **(13)** research on rabies. New items added to the Third Report include guidance on: **(i)** palliative care for rabies patients in low-resource settings; **(ii)** practical advice on rabies surveillance; **(iii)** prudent use of PEP; **(iv)** strategies for mass dog vaccination; and the **(v)** core elements of validation of zero human deaths for rabies, verification of interruption of rabies transmission, and declaration of rabies-freedom status.
The updated, fifth edition of the manual on "Laboratory techniques in rabies" was also released by WHO in 2018.

❖ The new WHO position on rabies immunization in humans

[Albis Francesco Gabrielli / WHO]

Between 2016 and 2018, WHO went through an extensive process aimed at updating current recommendations on immunization for rabies (administration of vaccines and immunoglobulins). The process involved in-depth analysis of new evidence by a dedicated working group, followed by endorsement of proposed changes by WHO's Strategic Advisory Group of Experts (SAGE) on Immunization, and the publication of the new guidance. The main innovations and recommendations include:

(1) Recommended shift from intramuscular (IM) to intradermal administration (ID) of rabies vaccine both for post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP), as the most cost-effective option, entailing considerable savings in reason of the lower dosage

required, and consequently a lower risk of vaccine shortages; such shift is recommended also in case of off-label use (i.e. when the vaccine is recommended by the manufacturer for IM administration only);

(2) Expedited vaccination schedules for both PEP (in non-immunized and previously-immunized individuals) and PrEP. Notably, duration of PEP in non-immunized individuals can be reduced to 1 week if intradermal administration is adopted; various intramuscular regimens previously recommended by WHO remain valid, although they are now considered less cost-effective;

(3) Limitation of PrEP to individuals at high risk of rabies virus (RABV) exposure, such as those at occupational risk or travellers to remote areas who may be at risk of exposure; in addition, sub-population in highly endemic settings with limited access to timely and adequate PEP can be considered for PrEP, notably if dog bite incidence is >5% per year or vampire bat rabies is present;

(4) Prudent use of RIG, with the aim of preventing shortages of biologicals and increasing their access, to be achieved through:
   1. A prioritization of patients with the highest risk of exposure to RABV. Such patients are classified as a high-risk sub-group within category III exposures, notably those resulting from multiple bite wounds, deep wounds, bites to head and highly-innervated parts of the body, and bites from animals considered as likely to be affected by rabies; as well as those occurring in patients with severe immunodeficiency;
   2. Administration of RIG only at the wound site (into and around the lesion), while the practice of injecting what remains of the dose at a distant site intra-muscularly is discouraged;
   3. Discontinuation of the practice of skin testing before administration of eRIG, in reason of the high degree of purification achieved by currently-available biologicals

(5) The introduction of recombinant monoclonal antibodies (RmAb) as a valid alternative to human and equine immunoglobulins (hRIG and eRIG). A monoclonal antibody product was licensed in India in 2017. Being produced through bio-engineering and thus not a blood-derived product, it is of more stable quality. It is in use already in several countries and is suitable to neutralize a wide range of rabies virus strains circulating in the world.

❖ OIE achievements on Rabies

[Djahne Montabord / OIE]

OIE proposes specific tools made available to countries, such as PVS missions (Performance of Veterinary Services), a unique strategic initiative to develop an assessment and evaluation to assist countries in identifying weaknesses in their system that make it difficult for them to comply with the minimum standards and guidelines of the OIE, laboratories twinning programmes, a concept of twinning between Laboratories or Collaborating Centres, the aim of which is to achieve an even geographical distribution of expertise and Reference Laboratories, giving easier access to expertise for the rapid detection and diagnosis of disease, among which Rabies. The availability and interest of Rabies vaccine banks, providing high-quality rabies vaccines at an affordable price and in a timely manner, can also enable countries to develop mass vaccination campaigns, essential to any effective national rabies elimination strategy.

Specific communication and awareness material, available through the intersectoral collaboration of OIE, WHO, FAO and GARC (the Global Alliance for Rabies Control), activities developed for the World Rabies Day, the Stray-dog management initiatives, associated with mass dog-vaccination campaigns and development of awareness among children need a strong social and political commitment within the countries.

❖ WHO/OIE/FAO Collaborating Centres: role and possible areas of support

[Djahne Montabord / OIE] / [Donna Zilstorff / WHO]

[F. Cliquet, A. Servat (ANSES, Rabies): P. Bonelli, G. Masala, C. Santucciu (IZS, Echinococcosis) / A. Whatmore (APHA, Brucellosis) / C. Ponsart (ANSES, Brucellosis)]

The networks of Collaborating Centre for WHO and OIE are references for countries to get access to approved expertise in a specific designated sphere of competence. They are committed to provide their expertise internationally, promoting OIE's and WHO's policies, standards and priorities. They provide scientific and technical assistance and expert advice on topics linked to diagnosis and control of the disease for which they are responsible. When recognised as Reference Laboratories, they

have the responsibility to provide high quality disease diagnostic services, particularly in the case of doubts or controversies about sample analyses, to participate in collaborative research and training, including research training. Referring to the networks of Collaborating Centres is a win-win experience, in quality, exchange of knowledge, experience, improvement of cooperation and enhancement of visibility and recognition.

The terms of reference of OIE and WHO reference centres have been described in details.
All collaborating centres participating in the meeting have been given the opportunity to present their specific field of activities proposed to the countries, trainings, expertise, diagnosis, research projects, educational programmes developed. Information provided was made available to participants after the meeting.

4. Conclusions and recommendations

Based on the information gathered throughout the meeting, the last session of the meeting was to develop recommendation for future actions, adopted and approved in the final plenary session.

The participants agreed the following recommendations:

For the Member States:

1. to strengthen political commitment through high level advocacy to accelerate prevention and control of zoonosis;
2. to foster intersectoral collaboration, countries are encouraged, as a first step, to conduct national bridging workshops;
3. to regularly share data on zoonosis and experiences in surveillance and control of zoonoses with OIE/WHO;
4. in collaboration with OIE/WHO, to identify operational research priorities on epidemiological/epizootic situation, prevention and control of zoonoses;
5. to identify and characterize, in terms of morbidity, social and economic impact zoonoses of public health importance with the aim to update prioritization;
6. to develop/revise joint (human/animal) strategy and action plan on priority zoonoses, using the One Health approach.
7. to develop and/or update national guidance and regulations in accordance with OIE/WHO normative guidance;

For OIE/WHO:

1. to provide technical support and guidance and continue to facilitate cross sectoral collaboration among public health and animal health sectors at national and regional levels
2. to support national bridging workshops in countries;
3. to document countries experiences to promote and facilitate sharing best practices across countries;
4. to support countries in strengthening of epidemiology / epizootiology capacity;
5. to disseminate existing normative guidance on clinical management, surveillance and control of zoonoses;
6. to support mobilization of resources to accelerate prevention and control of zoonosis
7. to continue facilitating and supporting this initiative and promote an intersectoral cooperation through different activities on the national / subregional / regional levels.

Annex 1: Key references for all WHO Rabies presentations:

- WHO. Third Report of the WHO Expert Consultation on Rabies (WHO Technical Report Series 1012). WHO, 2018 (ENG) (http://www.who.int/rabies/resources/who_trs_1012/en/)

- WHO. Rabies vaccines: WHO position paper – April 2018. Weekly epidemiological record. No. 16, 2018, 93, 201-220 (ENG, FRA, RUS, ARA) (https://www.who.int/wer/2018/wer9316/en/)

- WHO. Human rabies: 2016 updates and call for data. Weekly epidemiological record. No. 7, 2017, 92, 77-88 (ENG, FRA) (https://www.who.int/wer/2017/wer9207/en/)

- WHO. Laboratory techniques in rabies. Fifth edition. Two volumes (ENG) (https://www.who.int/rabies/resources/9789241515306/en/)

- FAO/OIE/WHO/GARC. Zero by 30. The global strategic plan to end human deaths from dog-mediated rabies by 2030. Geneva, 2018 (ENG) (https://www.who.int/rabies/resources/9789241513838/en/)

Annex 2: List of acronyms

AE	Alveolar echinococcosis
APHA	Animal Plant and Health Agency
CE	Cystic echinococcosis
FAO	Food and Agriculture Organization of the United Nations
GARC	Global Alliance for Rabies Control
GISRS	Global Influenza Surveillance and Response System
IHR	International Health Regulations
MERS-CoV	Middle East Respiratory Syndrome Coronavirus
NTDs	Neglected tropical diseases
OFFLU	**O**IE-**F**AO global network of expertise on animal in**flu**enzas
OIE	World Organisation for Animal Health
ORV	Oral rabies vaccination
PEP	Post exposure prophylaxis
PPE	Personal protective equipment
PrEP	Pre-exposure prophylaxis
PVS	Performance of Veterinary Services
RNA	Ribonucleic acid
RABVs	Rabies viruses
RIG / eRIG / hRIG	Rabies immunoglobulins / equine RIG / human RIG
RmAb	Recombinant monoclonal antibodies equine
SAGE	Strategic Advisory Group of Experts of the WHO
SDG	Sustainable Development Goals
TRS	Technical Report Series
WAHIS	World Animal Health Information System
WHO	World Health Organization

Annex 3: List of participants

Sector (A : animal H : human)	Name	Position
Countries		
Armenia		
A	Mr Hayk Soghbatyan	Leading specialist of veterinary inspectorate of the State Service for Food Safety of the Ministry of Agriculture
A	Mr Hovik Batikyan	Chief specialist Veterinary Inspection, State Service for Food Safety of the Ministry of Agriculture (SSFS)
H	Mr Robert Kavkasyan	Epidemiologist, Department of Epidemiology of Infectious Diseases National Center of Disease Control and Prevention, Ministry of Health
H	Ms Karine Gevorgyan	Epidemiologist, Department of Transmissive and Parasitic Diseases National Center of Disease Control and Prevention, Ministry of Health
Azerbaijan		
A	Ms Roza Aliyeva	Sector manager of microbiology
A	Mr Mirfazil Abdullayev	Chief of department Food Safety Institute
H	Mr Kamran Efendiyev	Head of epidemiological department Republican plague control station, Ministry of Health
H	Mr Suleyman Mammadov	Head of Parasitology Department Republican Centre of Hygiene and Epidemiology, Ministry of Health
Georgia		
A	Ms Lena Ninidze	National Food Agency - Chief Specialist of Animal Especially Dangerous Infectious Diseases Supervision Division. Veterinary Department
A	Mr Vladimer Baratashvili	National Food Agency - Chief Specialist of Animal Especially Dangerous Infectious Diseases Supervision Division. Veterinary Department
H	Ms Nana Mamuchishvili	Senior Specialist, Vaccine Preventable, Respiratory and Zoonotic Diseases Division, Communicable Diseases Department, LEPL National Center for Disease Control and Public Health
H	Ms Tsiuri Tushishvili	Senior Specialist, Vaccine Preventable, Respiratory and Zoonotic Diseases Division, Communicable Diseases Department, LEPL National Center for Disease Control and Public Health
Kazakhstan		
A	Ms Saltanat Abylkasymova	Head of Department of Veterinary Committee
A	Mr Amangeldy Yeshmukhametov	Head of Department of Veterinary Committee
H	Mr Zhandarbek Bekshin	Chairman to Public Health Protection Committee Ministry of Health
H	Ms Ayjan Jukenova	Leading expert, Epidemiological surveillance department Public Health protection Committee, Ministry of Health

Sector (A : animal H : human)	Name	Position
H	Ms Zhanat Zhamalbekova	Leading expert, Epidemiological surveillance department Public Health protection Committee, Ministry of Health
H	Ms Aray Zekenova	Leading expert, Epidemiological surveillance department Public Health protection Committee, Ministry of Health
Kyrgyzstan		
A	Mr Joldoshbek Kasymbekov	Director of the Center for Veterinary Diagnostics and Expertise in the Northern Region
A	Mr Murat Abdyraev	Head of the department of antiepizootic supervision
H	Ms Gulnara Minbayeva	Parasitologist, Department of Disease Prevention and State Sanitary and Epidemiological Surveillance, Ministry of Health
H	Ms Zhumagul Usubaliyeva	Parasitologist, Department of Disease Prevention and State Sanitary and Epidemiological Surveillance, Ministry of Health
H	Mr Kalysbek Kydyshov	Epidemiologist, Republican center of quarantine and specially dangerous pathogens, Ministry of Health
Russia		
A	Mr Karina Rogova	Specialist of Department for international cooperation (VGNKI)
A	Mr Artem Metlin	Deputy director for research and development (ARRIAH)
H	Ms Olga Skudareva	Deputy Head, Div organization sanitary protection of territory, Epidemio surv dept Federal Service - Surveillance Consumer Rights Protection and Human Wellbeing
H	Ms Evgenya Tsoy	Head, Department for Science, Innovations Development and Management of medical and biological risks to health, Ministry of Health
H	Ms Elena Boyko	Head, Department of expert support for biological safety, Centre for Strategic planning and Management of medical and biological risks to health
H	Ms Tatiana Guzeeva	Chief Expert, Division of organization of sanitary protection of territory, Epidemiological surveillance department, Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing
Tajikistan		
H	Mr Azizullo Sharipov	Director of the Republican Center for Tropical Diseases Ministry of Health and Social Protection (MoHSPP)
H	Ms Shahlo Tagoeva	Senior Specialist of Epidemiology Department State Surveillance for Health and Social Protection of Population, MoHSPP
Turkmenistan		
A	Mr Rahym Ashyrov	Head of Department of Animal health
A	Mr Babanazar Kulhanov	Head of Department of parasitology in Central veterinary laboratory

Sector (A : animal H : human)	Name	Position
H	Ms Gurbangul Ovliyagulova	Head, Department of high dangerous diseases infectious surveillance SES, Ministry of Health
H	Ms Sachly Nuryyeva	Head, Department of epidemiological surveillance and parasitology SES, Ministry of Health
Uzbekistan		
A	Ms Ozoda Sharipova	Chief of Department at the Republican State Center for Animals Diagnostics and Food Safety
A	Mr Salokhiddin Khasanov	Deputy Head of Animals Health Department of the State Veterinary Committee
H	Mr Botirjon Kurbanov	Deputy chief doctor Republican center of State sanitary-epidemiological surveillance, Ministry of Health
Experts		
A	Ms Claire Ponsart **(ANSES)**	EU, National & OIE/FAO Animal Brucellosis Reference Lab. Bacterial Zoonoses Unit - Animal Health Laboratory (ANSES)
A	Mr Alexandre Servat **(ANSES)**	Head of Rabies Diagnostic / Vaccine team, ANSES - Nancy rabies and wildlife laboratory EU Reference Laboratory for Rabies and Rabies Serology, OIE Ref Lab for Rabies WHO Collaborating Centre for Research and Management in Zoonoses Control
A	Mr Paul Robert Torgerson **(Zurich University)**	Professor of Veterinary Epidemiology Vetsuisse Faculty
A	Ms Giovanna Masala **(Istituto Zooprofilattico della Sardegna)**	DVM-Head Laboratory, Dip in Microbiology and Virology OIE Reference Laboratory for Echinococcosis
A	Ms Cinzia Santucciu **(Istituto Zooprofilattico della Sardegna)**	DSc, PhD, Dip Clinical Pathology OIE Reference Laboratory for Echinococcosis
A	Mr Piero Bonelli **(Istituto Zooprofilattico della Sardegna)**	DVM, PhD, Dip in Animal Health OIE Reference Laboratory for Echinococcosis
A	Mr François Gary **(Phylum)**	Phylum partner Consultant
H	Mr Adrian Whatmore **(APHA), UK Brucellosis**	Head of Bacteriology, Animal and Plant Health Agency (APHA), UK Head, OIE/FAO/WHO Reference laboratory for Brucellosis
H	Ms Meritxell Donadeu **(Univ Melbourne, Echinococcosis)**	Senior Fellow University of Melbourne, Australia
International organisations		
OIE		
A	Mr Mereke Taitubayev	Head of OIE office for Central Asia
A	Ms Djahne Montabord	Technical advisor (OIE office for Central Asia)

Sector (A : animal H : human)	Name	Position
A	Ms Aigerim Zhorgabayeva	Assistant - Translator (OIE office for Central Asia)
World Health Organization		
H	Mr Albis Francesco Gabrielli	Medical Officer, Team Leader, Communication & Capacity Building Department of Neglected Tropical Diseases (WHO HQ)
H	Mr Elkhan Gasimov	Technical Officer, Malaria and other Vector-Borne and Parasitic Diseases / Division of Health Emergencies and Communicable Diseases // (WHO Regional Office for Europe)
H	Ms Donna Zilstorff	Assistant Division of Policy and Governance for Health and Well-being (WHO Regional Office for Europe)
H	Mr Oleg Chestnov	WHO Representative and Head of WHO Office (WHO Country Office, Kazakhstan)
H	Ms Laura Utemissova	Consultant (WHO Country Office, Kazakhstan)
H	Ms Khadicha Boymatova	National Professional Officer on Nutrition, Food Safety and Antimicrobial Resistance (WHO Country Office, Tajikistan)
Representatives of other organisations		
	EEC Ms Anna Smolina	Chief expert of the Department of veterinary measures Department of Sanitary, phytosanitary and veterinary measures
	ADB Mr Giovanni Capannelli	ADB Country Director for Kazakhstan
	World Bank Mr Ato Brown	World Bank Country manager in Kazahstan
	FAO Kazakhstan Mr Kairat Nazhmidenov	Country representative
	CDC Ms Gulzhan Muratbayeva	Centers for Disease Control and Prevention (CDC)/Central Asia Regional Office
	CDC Ms Megan Gregor	Centers for Disease Control and Prevention (CDC)/Central Asia Regional Office
	CDC Ms Bakhytkul Zhakipbayeva	Clinical Epidemiologist