Review

ONE HEALTH AND BIOSAFETY - NEED OF HARMONIZATION IN MONGOLIA

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BACKGROUND

The One Health concept recognizes that the health of humans is connected to the health of animals and the environment. The major aim of the One health is to improve health and well-being through the prevention of risks and the mitigation of effects of crises that originate at the interface between humans, animals and their various environments.

Regardless of which of the many definitions of One Health is used, the common theme is collaboration across sectors. Collaborating across sectors that have a direct or indirect impact on health involves thinking and working across silos and optimizing resources and efforts while respecting the autonomy of the various sectors. To improve the effectiveness of the One Health approach, there is a need to establish a better sectoral balance among existing groups and networks, especially between veterinarians and physicians, and to increase the participation of environmental and wildlife health practitioners, as well as social scientists and development actors.

As this kind of collaboration newly introduced in Mongolia, there are numerous complications and difficulties may arise, that eventually could lead to the results, with higher negative impact to the public and personal health. From the technical perspective, it is undoubtfully important to evaluate the system and reveal the gap and weakness of each stakeholder in this important network and try to introduce common standard operational procedures for the handling and maintaining infective agents to avoid the unpleasant spill over the pathogen into the environment.

One health in Mongolia;

With the support of World Health Organization (WHO), the Intersectoral Coordination Committee on Zoonoses was officially established in Mongolia in February, 2010, although many collaborative activities had already been undertaken since 2006.

The overall vision of the Coordination Committee is to have "strong human and animal health sectors, together with emergency response and national inspection agencies working in partnership toward the attainment of a healthier community". The Coordination Committee has responsibility for developing joint policy on the prevention and control of priority zoonotic diseases; for approving action plans produced by a technical working group; for making recommendations on risk assessment, early warning and response activities during outbreaks; for reviewing and revising zoonotic diseases standard operational procedures (SOPs) and guidelines to reflect intersectoral collaboration; for providing methodological assistance to improve the capacity of professional institutions at the national and subnational level; for coordinating cooperation among different sectors in carrying out early detection and response functions; and for monitoring and evaluating overall zoonotic disease prevention and control.

The coordination committee organized the first national conference on zoonoses in June 2010. The participants were professionals from both the human and veterinary sectors at national and subnational levels. This was the first ever joint meeting between two sectors at a professional level. The meeting reviewed results of joint

assessment on existing capacity and system for surveillance and response in the following areas:

- Human resources
- Response capacity
- Information and surveillance
- Laboratory
- Logistics and supplies.

After the National conference, the intersectoral coordination mechanism was formally set up at all levels in Mongolia. At the community level, social awareness, public education, and media play an important role. It has also enabled the use of better risk communication and health education strategies at the community level. Risk communication and promotion of programs directed primarily at occupational risk groups and school children were implemented with assistance from local government. At the national level, the coordination mechanism was aimed at improving information exchange, expertise sharing, mutual technical support, and harmonization of legislation. In 2011, a joint strategy for long-term risk reduction of priority zoonotic diseases for 2011–2015 was developed by the Ministries of Health and of Food and Agriculture.

Laboratory network and sectoral vill or desire to collaborate;

The communication and cooperation of veterinary and human health laboratories have increased significantly in the last years. Laboratories share information, experience, diagnostic kits, laboratory specimens and lab equipment for surveillance, response, and research activities. Health laboratories have benefited from more advanced laboratory resources of veterinary laboratories, including personnel. During an unusual outbreak of human anthrax in 2011, the veterinary laboratory assisted in validating results and undertook confirmation tests. Subnational veterinary laboratories in all 21 provinces have been equipped with PCR equipment and reagents.

The veterinary laboratory also supported laboratory diagnosis of a rabies outbreak in Uvurkhangai province and in an unusual anthrax outbreak in Khovd province. Following annual serological surveys, the analysis of the laboratory findings was carried out jointly by laboratory staff from the veterinary and health laboratories, and the methodologies used in both sectors were reviewed and experiences shared.

As a result of human and animal sector collaboration, the diagnostic capacity of human health laboratories has been improved significantly. New advanced methods and techniques for isolation, identification, and confirmation of zoonotic viral and parasitic pathogens have been introduced at the national level. A number of commercially available diagnostic kits have been introduced for diagnosis at the NRCZD and the number of diseases diagnosed by molecular assays has increased significantly.

Serological and molecular diagnostic tools have become available for the diagnosis of tick-borne encephalitis, Lyme disease, and Rickettsia which had previously been diagnosed only by clinical presentation. However, Hantavirus, West Nile virus, Japanese encephalitis virus, Crimean Congo hemorrhagic fever virus, dengue virus, and many others cannot be diagnosed due to technical limitations, and thus the true burden and epidemiology of these diseases in Mongolia is still unknown.

Several complications still exist that constrain sharing of resources between human and animal diagnostic laboratories and the biggest challenge for the Intersectoral Coordination Committee on Zoonoses will be to change the legal and ethical environment. Mongolia is planning to establish a laboratory network between public health, clinical, veterinary, and food laboratories in 2012–2013.

Biosafety and One health;

Although there is no fixed and well defined terminology of bioterrorism, but undesirable use of biological agents, due to political, religious, ecological and many other ideological purposes of the single personal or group of people can be understood as bioterrorism and there is increasing awareness in the bioterrorism issues globally.

In comparison to nuclear or chemical mass destructive weapons, it is not only significantly cheap and easy to produce biological weapons, but also it can cover huge territory and affect millions of susceptible populations and people

within relatively short period of time. There is increasing trend in regards of the number of species of pathogens used in bioterrorism is increasing and much sophisticated methods are being used in the preparation of bio weapons, including genetic engineering (US Department of Defense, Chemical and biological defense program 2010).

Due to careless, improper and wrong utilization of biological agents and lack of basic knowledge of biosafety, it leads to the cross contamination and infection of personals of medical and veterinary diagnostic and research laboratories and eventually causes the more severe complications and death as well.

One of the essential tools to protect or reduce the risk of bioterrorism is highly knowledgeable and well disciplined biosafety performance of personals and professionals, working in close contact of biological factors.

Selected cases of laboratory risk;

As, Arnold G, Wedum (1997) informed, more than 3500 human cases were recorded with 160 deaths, caused by over 120 different species of pathogen.

During 1930-1940, there were several cases of typhus fever (Topping, 1944) and also, 15 cases of human Q fever with 1 death were happen at NIH in March-May period of 1940, during the early stage investigation of Q fever strains in Australia and US started from 1938 (Hornibrook, J.W нар, 1940).

Due to absence of air filtration unit and safety cabinet, laboratory case of airborne diseases (10 cases of lymphocyte choriomenengitis at NIH in 1966 (Baum, 1966), viral hemorrhagic fever (Kulagin, 1962), Histoplasma capsulatum infection (Hanel, 1967), Coccidioides immitis (Hanel, 1967)- infection and rikketsial typhus (Topping, 1944)) were reported.

The number of authors has recorded the accidental pipette driven infection with *Shigella,* Salmonella, Cholera, B.anthracis, Brucella, Diphteria, Hemophilus influenzae, Leptothrix, Meningococcus, Streptococcus, Trypanema, (Sulkin, 1963; Enders, 1945), Coxsackie virus (Shaw,1950), Hepatit virus (Kuh, 1950), Venezuelan equine encephalite virus (Ft.Detrick Case, 1958), chikungunya (Shah, 1965), scrub typhus (Van den Ende, 1946) and out of all infected lab employers 84% were airborne infected and 92% were blood transmitted (Pedro B.S. Pedrosa ба Telma A.O. Cardoso, 2011).

Reid D.D. (1957) observed that 3-9 times higher risk of contamination of lab workers with Mycobacterium tuberculosis, then the normal people.

There was negligible risk of Anthrax in United States until bioterrorism related anthrax outbreak occurs in 2001. Centers for Disease Control and Prevention informed that laboratory employer has infected with cutaneous Anthrax in 2002.

Beside that Francisella tularensis was circulating among laboratory employers not dependently from bioterrorism (Shapiro D.S. нар, 2002), and 23 Anthrax cases were confirmed in US in 2001, out of which 11 were pulmonary and 12 were cutaneous.

These latest information are confirming that the laboratory infection among employers were significantly decreased in comparison to mid 90th of 20th century (McCoy, 1939; Hornibrook, 1940; Huebner, 1947), but there is still warning number of cases were reported yearly, due to careless performance of employers, irresponsible behavior of laboratory staff, weak laboratory SOP, insufficient air filtration and air handling facility and lack of control of air flow of experimental animals.

What information do we have in Mongolia? Are we safe in regards of the laboratory risk of pathogen spill over or bioterrorism? Are we in safer condition than any other above mentioned countries or laboratories? Are the pathogens that we studying, safe?

Due to very limited or absence of data in regards of the laboratory biosafety and biorisk management issues in Mongolia, it can be counted as black hole or empty area that need to be clarified and identify the level of biosafety and biosecurity and level of risk as well.

Future ways of improvement

Harmonization of existing infrastructure

The intersectoral committee on One health is working to coordinate activities between related sectors and it headed by the vice Ministers of ach related Ministries. There is no visible sustainability, as this kind of structure really dependent from personal leadership and will of cooperation and once it is lost or weakened, the functionality and/or even future existence of the structure is an issue.

As One Health is global initiative with increasing tendency to be implementable in many countries, there is visible need to have the structure that coordinate and manage all One health issues in nationwide, as well as to be a player in international network of One health.

To make this structure viable and strong and avoid sectoral misunderstandings and ambitions, the Ministry of Health, Ministry of Agriculture and Industry, Ministry of Nature and Environment should play a leading role on the establishment of such a structure.

Harmonization of educational institutions and curriculum

One Health is a new trend and new need. There should be knowledge, experience and behavior as One health professional. To get a new generation of ONE HEALTH, there is a need to develop training curriculum for medical and veterinary, as well as environmental protection universities and introduce widely.

Another issue is to have post graduate program for One Health to promote young generation in the science to be enrolled in the One Health research and network.

The last, but not least in this part is change the way of thinking of decision makers in Public health, Animal health and environmental health at all levels. From the sustainability point of view, there is great need to well harmonized and structured legal and regulation environment for One health and the role of decision makers is essential in this sphere.

Harmonization SOPs at different laboratories;

The biorisk, that continuously faces laboratory employers and practitioners, who are routinely work with live pathogens, as virus, bacterial, fungi, a parasites and protozoan's, simultaneously requires both care, attention and professional attitude.

The chapter 1.1.2 of OIE (World organization for animal health) manual for diagnostic tests and vaccines for terrestrial animals (2010) explains the special measurements to be taken to meet the biosafety of veterinary laboratories and animal tools.

OIE has announced that 60% of all zoonotic diseases and over 75% of all emerging and re-emerging diseases are have animal origin and it could be used as bioterrorism tool, as it could have significant negative impact to the economy and public health of certain country, as well as cause the mass social chaos. (OIE, 2011).

In that sense, it is logical to emphasize that there is a lot common for both human and veterinary laboratories in regards of the pathogen, that they studying or using, as well as methodologies that being used in their daily life.

All 21 aimags has it's own veterinary service with diagnostic laboratories and about 10 aimags has Epicenter for zoonotic diseases, which are branch of National Zoonotic disease center.

From the personal observation, there is clear sign of unidentity of methodologies and guidelines in both medical and veterinary laboratories of all level and sectoral ambition is seems to be some kind of restricting factor to harmonize the technical expertise and methodology of both laboratories.

As the way to harmonization, there is a need to standardize of methods, which are scientifically validated and internationally transferable. By introducing the same or similar standards to the routine activity of diagnostic and research laboratories on the handling of the important pathogens, which has One health nature, could have put the strong base on the harmonization of performance of named laboratories.

The important thing to consider on is there is no good standard or bad standard, or simply speaking, absolute standard. The way to relay on standard is neutrality, as the background of the standard, as per my understanding, neutral. This is just to assist you to have common sense in laboratory methods and then this consistency will lead to the identity or harmonized functionality of laboratory practices.

Harmonization of budgeting or better utilization of resources

The most important and practical advantage of introduction of One health concept into developing country is budgetary issue.

It is the smartest way to utilize the limited budget in more appropriate and economic way, as is allows avoiding the duplication of work and responsibility and helps to get income and results

in shorter period of them with more impact. The harmonization of budgetary issue is also supporting factor to strengthen One Health network, as it promotes the creation of ONE HEALTH team to compete for the grant, to implement an project and to act for the outbreak as well.

It is advisory that there is step by step approach is fundamental to strengthen One health in Mongolia with wise use of above advised approaches as individual activity and/or complex outreach.

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