International Standards and Strategies for the Surveillance, Prevention and Control of Brucellosis

Marija Kisman, Doncho Donev, Aleksandar Kisman
1Institute of Social Medicine, Faculty of Medicine, Ss. Cyril and Methodius University, Skopje, Republic of Macedonia; 2Emergency Medicine Clinic, Faculty of Medicine, Ss. Cyril and Methodius University, Skopje, Republic of Macedonia

Abstract

Aim. To review key international recommendations and coordination on alert and response mechanisms for prevention and control of animal disease threats, including brucellosis.

Methods. National and international reporting systems for early warning and response of zoonoses outbreaks on animal health and diseases were reviewed.

Results. Brucellosis routine surveillance detection must be undertaken, particularly among high-risk groups (farmers, shepherds, workers in slaughterhouses, butchers, veterinarians, and laboratory personnel). It is mandatory for early case-based reporting by health care providers/laboratory to upper levels of the public health sector and the animal health sector. Early warning of outbreaks and capacity for prediction of its spread to new areas is an essential pre-requisite for the effective containment and control of epidemic animal diseases, including brucellosis. Outbreaks early warning with a known zoonotic potential enables control measures that can prevent human morbidity and mortality. The Global Early Warning and Response System is a joint system that builds on the added value of combining and coordinating the alert and response mechanisms of OIE, FAO and WHO for the international community and stakeholders to assist in prediction, prevention and control of animal disease threats, through sharing of information, epidemiological analysis and joint field missions to assess and control the outbreak.

Conclusion. Early warning and response is based on the concept that dealing with a zoonoses outbreak in its early stages on an intersectoral basis is easier and more economical than having to deal with it once it is widespread.

Introduction

Veterinary Public Health was defined by the WHO in 1999 as "the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science". About 75% of the new diseases that have affected humans over the past 10 years have been caused by pathogens originating from an animal or from products of animal origin [1]. Many of these diseases have the potential to spread through various means over geographical areas and to become global problems. Brucellosis is a global zoonosis and one of the most common zoonoses in the European Region. Epidemiological data on the disease are missing or frequently incomplete. This is partly explained by the lack of proper laboratory facilities in some areas as well as by poor cooperation and exchange of information between veterinary and health services.

According to the WHO a zoonosis is defined as 'any disease or infection that is naturally transmissible from vertebrate animals to humans'. This is also stated in...
During the past decades, many previously unknown human infectious diseases have emerged from animal reservoirs, from agents such as human immunodeficiency virus (HIV), Ebola virus, West Nile virus, Nipah virus and Hanta virus [3]. The current outbreak of pandemic influenza as well as the recent outbreak of severe acute respiratory syndrome (SARS) and avian influenza have shown the potential of microorganisms from animal reservoirs to adapt to human hosts. More than three-quarters of the human diseases that are new, emerging or re-emerging are caused by pathogens originating from animals or from products of animal origin. A wide variety of animal species, domesticated, peri-domesticated and wild, are reservoirs for these pathogens, which may be viruses, bacteria, parasites or prions. In this context, the real challenge for public health is the organization of an effective surveillance system for the prevention and control of zoonotic diseases, considering the wide variety of animal species that need to be constantly assessed and the often complex natural history of the pathogens at the point of their appearance as reemerging or reassorted. Epidemiological history shows that the cascade of events leading to the emergence of a new disease is different each time. They may be virological or microbiological alterations and adaptations; changes in the micro- or macro-environment; globalization of human travel and the agriculture, food production and trade; and a wide variety of human behavioural factors. The deteriorating public health systems and the increasing number of people who are potentially more susceptible to opportunistic infection by agents of animal origin are important as well. It is almost impossible to envisage from which geographical areas or which animal reservoirs the greatest risks to human health originate, what will be the main risk factors, and how these risks will develop. To achieve an effective surveillance, prevention, and control of newly evolving threats from animal reservoirs an absolute prerequisite is to have established and institutionalized strong links between the different sectors involved [3, 4].

Brucellosis is a major global zoonotic disease, widely distributed in both humans and animals. The infection is almost invariably transmitted to people by direct or indirect contact with infected animals or their products. The duration of the human illness and its long convalescence means that brucellosis is an important public health problem for the reason of its human health problem and economic impact on the diseased individual and society at scale. There is quality time lost from normal activities, high costs of pharmacological therapy, increased number of hospital days, and a post active illness recovery period [5]. An early detection and reporting of the human diseases, with support from both clinical diagnosis of the disease with a prompt laboratory confirmation to be followed with antibiotic and supportive treatment, greatly reduce the time a patient may be incapacitated.

It is becoming evident that a large number of countries and entire regions as a whole, which are in fact the most endangered, lack human and laboratory resources for an effective diagnosis or treatment, or those services are not available at all. Moreover, they are countries where programmes for the detection and prevention of the infection in humans and animals are not adequately carried out [5]. To those countries, this situation presents a constant threat making the endemic spread and presence of brucellosis an active workforce and economic depriving factor, but the same endangers the neighbouring countries from disease re-emerging in animal and humans. Intersectoral cooperation in support of all levels of the health system with particular focus on the primary health care sector plays an important role in the control of brucellosis and may contribute to the development of appropriate infrastructures in areas of animal production, food hygiene, and health care. On the other hand the prevention and control of brucellosis needs supportive action from various sectors, including those responsible for food safety and consumer education [5]. One of the key factors of brucellosis control is an effective intersectoral early warning or alert system for surveillance. This is an issue that requires in-country and inter-country cooperation and coordination.

What alert systems are available?

We aimed to identify and analyse what reporting systems for early warning and response of zoonoses outbreaks currently exist and in which ways countries could benefit and include available data from their existing reporting systems.

The early warning of outbreaks and the capacity for prediction of spread to new areas is an essential pre-
requisite for the effective containment and control of epidemic zoonoses, including brucellosis. Early Warning and Response is based on the concept that dealing with a disease epidemic in its early stages is easier and more economical than having to deal with it once it is widespread. From a public health perspective, early warning of outbreaks with a known zoonotic potential will enable control measures that can prevent human morbidity and mortality [6].

Worldwide the following international organizations such as the Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health (OIE), and World Health Organization (WHO), each of them has an individual organization based system for early warning of animal and zoonoses diseases, depending on the type of the organization. Each of those systems identifies and incorporates brucellosis reporting. OIE has an animal health information search and verification system for official information from various sources on the existence of outbreaks of diseases or exceptional epidemiological events that have not yet been officially notified to the OIE. It then relies on the capacity of its member-countries and on their capabilities to verify the outbreak information. The World Organization for Animal Health operates an early-warning system to warn the international community of exceptional epidemiological events in its member-countries [6], known as an alert system. The OIE World Animal Health Information System (WAHIS) gathers a comprehensive range of information on notifications and follow-up reports submitted by member-countries in response to exceptional disease events occurring in these countries as well as follow-up reports about these events, regular reports on the OIE-listed disease situations in each country and reports that provide background information on animal health, on laboratory and vaccine production facilities, etc. [7]. All this is supplied to the World Animal Health Information Database (WAHID) Interface which enables investigation of available information by country (or group of countries), by disease, control measures, or allows comparing the situation through bulletins, electronic messages and reports for better disease containment and control. Additionally, FAO has also developed information search and verification systems of information from various sources and a Global Framework for the progressive control of Transboundary Animal Diseases (GF-TADs) [10].

WHO systematically gathers official reports and rumours of suspected human outbreaks from a wide range of formal and informal sources. Reports of suspected outbreaks are received from ministries of health, national institutes of public health, WHO Regional and Country offices, WHO collaborating centres, civilian and military laboratories, academic institutes, and non-governmental organizations. A specific WHO initiative called a Global Outbreak Alert Response Network (GOARN) which is a technical collaboration of existing institutions and networks, gathers human and technical resources for the rapid identification, confirmation and response to outbreaks of international importance [11].

Most probably the only system at an international level that is gathering the animal and human health early warning, reporting and response activities regarding brucellosis outbreaks (among other diseases of animal origin), is the 2006-established Global Early Warning and Response System (GLEWS) for major animal diseases including other zoonoses [6].

The Global Early Warning and Response System is a joint system that builds on the added value of combining and coordinating the alert and response mechanisms of OIE, FAO, and WHO for the international community and stakeholders to assist in the prediction, prevention and control of animal disease threats, including zoonoses, through the sharing of information, epidemiological analysis and joint field missions to assess and control the outbreak, whenever needed [6]. To intelligence sources aimed to detect and report on infectious diseases of the OIE, WHO and FAO are in greater part complementary. To avoid overlapping and unjustified duplication of efforts, reliable and systemized sharing of information on disease alerts is increasing the capacity and quality for early warning of the three organizations [6, 12].

A basic regulatory text on the GLEWS initiative is agreed by all three organizations and serves as a reference in internal and external communications on GLEWS. A list of diseases of common interest has been defined according to which the reporting is based. An internet web page is established (http://www.glews.net/) that constantly feeds information on early warning and response to animal disease threats [12].

Countries can benefit from this initiative by having easily available and accessible information on current outbreaks of animal diseases and zoonoses and could use the possibility of a joint technical input by all three
organizations.

In endemic countries where investigation of all reported cases may not be feasible, a representative proportion of reported cases should be investigated routinely.

At the European level, the European Centre for Disease Prevention and Control (ECDC) Programme on food and water-borne diseases and zoonoses (FWD) among other activities has the aim of improving early detection and coordinated response to FWD outbreaks with an EU dimension [13]. Despite the fact that the FWD at present covers 20 diseases among which is brucellosis, the Programme has selected six priority diseases for which a new surveillance network is established. Unfortunately, brucellosis is not one of those six priority diseases. Nevertheless, the ECDC is constantly growing and enhancing its scope of work [13]. With that, the possibility in future of expecting more activities in the domain of zoonoses and including brucellosis, such as early warning and alert systems and ECDC to build a response structure for emergencies in this domain, is probable.

In the Republic of Macedonia a system for early warning and surveillance of communicable diseases exists and it is syndrome based. Neither this system nor the case-based communicable diseases reporting system, are directly linked with the veterinary sector surveillance and reporting.

The possibility of surveillance for brucellosis in the Republic of Macedonia exists through the Law on Communicable Diseases (2004) [14], the Programme on examining the appearance, prevention and control of brucellosis in humans in the Republic of Macedonia [15], (which is annually adopted and financed by the Government) and by the Early Warning System for Detection of Communicable Diseases Surveillance (EWARN).

The Law on Communicable Diseases covers 47 pathogens/diseases with mandatory notification based on laboratory confirmation and it is a routine surveillance system which also enables early warning on a clinical symptoms basis. However, the country lacks resources or facilities for laboratory confirmation of all 47 pathogens/diseases.

The EWARN is a multi-syndromic, non-case-based surveillance system for suspected communicable diseases. It has started as a pilot project in three cities (Skopje, Kumanovo and Tetovo) in the country and is implemented countrywide in January 2008. During the following year, an amendment to the Law on Communicable Diseases incorporated this type of reporting for primary health care doctors [16]. Case definitions have been provided for eight syndrome categories. Accumulated syndromic data are collected by doctors from primary health care in a one-page user-friendly format and reported to the nearest Centre of Public Health on a weekly basis.

Despite the fact that the EWARN reporting system satisfies its basic goals of sensitive and timely alert surveillance and consequently enables the national epidemiological system to investigate and if need be respond to warning, in the light of brucellosis alert it needs further enhancements. Anyhow, the EWARN is a flexible system that provides room for expansion into other syndromes and this could be built on not only to include brucellosis but also other zoonoses.

A more serious problem persists in communication at the community level between human health and veterinary health authorities. Brucellosis is perceived more as a veterinary problem. Nevertheless, awareness of the need for enhanced food testing and laboratory confirmation of human cases needs to be increased. With possible strengthening of intersectoral cooperation to be achieved through joint outbreak investigations, shared assessment of available epidemiological data and joint research projects in order to elucidate the epidemiological situation of zoonotic diseases including brucellosis [17].

Conclusion

The potential threat to the international public health community from brucellosis and other zoonoses has to be mitigated by continuous interplay between international partners and organizations on the one hand and national governments on the other, with the aim of strengthening collaborative intersectoral human health and veterinary health system, sharing of information, and timely actions. Involvement of those entities should not be in collision with the independent monitoring of the nongovernmental sector. In this context, national and regional networks have an important impact and accountability. The national authorities should strive to enhance the use and the proven benefit from inter-agency and intersectoral systems such as GLEWS.

At a national level, the capacity for rapid response to emerging brucellosis or brucellosis endemicity is crucial. To achieve this, the national human and veterinary health surveillance and response systems need to be synchronized and able to cooperatively undertake actions.
References


