

International monitoring and surveillance of animal diseases using official and unofficial sources

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Summary

The need for quality and timely animal disease information, including data on zoonoses, has become more crucial than ever, not only for animal health stakeholders but also for the general public worldwide. Since its creation in 1924, the World organisation for animal health (OIE: Office International des Épizooties) has played an active role in sharing disease information among countries and in the prevention and control of animal and zoonotic disease spread. Recently, the OIE established a single list of animal diseases with new criteria for inclusion in this list. The overriding criterion for a disease to be listed is its potential for international spread. Other criteria include its zoonotic potential or its capacity for significant spread within naive populations. Special attention is paid to the detection and listing of emerging infectious animal diseases. Member countries are obliged to submit immediate notifications and follow-up reports if infections of the listed diseases or exceptional epidemiological events occur within their country. Early warning of emerging and re-emerging animal diseases is essential for prompt precautionary measures to be taken, at national and international levels, to protect both animal and human health. At times, a proactive approach is required to ensure greater transparency. For the past few years the OIE has been examining different sources

of unofficial information on disease outbreaks. These are analysed and if necessary, verified. One of the external sources of information used by the OIE to improve transparency is ProMED-mail, an internet-based reporting system that derives its data from a comprehensive range of official and unofficial sources, the media and on-site observers. Free of political constraint and staffed by professionals to ensure credibility, it is able to post very rapid preliminary and unofficial reports and summaries.

Keywords

Animal diseases, Early notification, Early warning, Emerging diseases, Information systems, International organisations, ProMED-mail, Regional organisations, World organisation for animal health, Zoonoses.

Monitoraggio e sorveglianza delle malattie animali a livello internazionale mediante l'uso di fonti di informazione ufficiali e non ufficiali

Riassunto

Il bisogno di disporre di informazioni puntuali e tempestive sulle malattie animali (comprese le zoonosi) è diventato di cruciale importanza non solo per le figure professionali normalmente implicate nella sanità animale ma anche per un pubblico più vasto. Fin dalla sua creazione nel 1924,

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L'Organizzazione Mondiale per la Sanità Animale (OIE, precedentemente denominato Office International des Epizooties) ha rivestito un ruolo attivo nella diffusione delle informazioni di carattere zoonosanitario e nella prevenzione e controllo delle malattie animali e delle zoonosi. Recentemente l'OIE ha stabilito una lista unica di malattie animali notificabili e i criteri che determinano l'inclusione di una malattia in questa lista. Il criterio principale è rappresentato dal potenziale di diffusione internazionale di una malattia. Altri criteri sono quelli legati al potenziale zoonotico della malattia e/o la sua capacità di diffondersi in una popolazione indenne. Un'attenzione particolare è posta nei criteri per rilevare, ed eventualmente includere nella lista, una malattia emergente. I Paesi Membri dell'OIE sono tenuti a segnalare ogni evento di rilevanza epidemiologica (es. prima apparizione di una malattia sul proprio territorio o riapparizione inattesa della stessa) attraverso l'invio di un rapporto immediato e i successivi rapporti di notifica. Un sistema di allerta per le malattie animali emergenti e ri-emergenti è essenziale per la messa in atto di misure di protezione a livello nazionale e internazionale al fine di tutelare la salute pubblica e animale. Talvolta un approccio pro-attivo è richiesto per garantire una migliore trasparenza e per questo, negli ultimi anni, l'OIE ha esaminato differenti fonti di informazione non ufficiali che riportavano notizie su focolai di malattie animali. Queste fonti sono state analizzate e verificate. Una delle fonti esterne utilizzata dall'OIE è ProMED-mail, un sistema di raccolta di informazioni, attivo su internet, che raccoglie i suoi dati da una vasta gamma di documenti ufficiali e non ufficiali, media e osservatori presenti sul luogo dell'evento. Libero da vincoli politici e sostenuto dall'attività di riconosciuti professionisti che ne assicurano la credibilità, questo sistema è capace, in tempi molto rapidi, di registrare rapporti preliminari non ufficiali su determinati eventi e di riassumere e diffondere le informazioni rilevanti.

Parole chiave

Malattie animali, Malattie emergenti, Notificazione immediata, Sistema di allerta, Sistemi informativi, Organizzazioni internazionali, Organizzazione Mondiale per la Sanità Animale, Organizzazioni regionali, ProMED-mail, Zoonosi.

Introduction

The exchange of information on animal diseases among countries was one of the principal reasons behind the creation of the World organisation for animal health (OIE: Office International des Épizooties) (1). Strengthened by its long tradition and experience, the OIE has continuously developed its animal disease information system for the benefit of member countries and for animal health worldwide. Recent changes in reporting requirements for epidemiological events and disease by member countries, as well as the more frequent use of information and communication technologies, will continue to place the OIE as the principal source of quality animal disease information destined to benefit the international community.

The OIE animal health information system, which includes an early warning system and a monitoring system, covers the entire spectre of animal health information required by member countries and other stakeholders; it constitutes the principal source of official information. The active search for and verification of unofficial information and rumours has led to a tangible increase in the quality and credibility of 'official' information.

Historical background

The authors present the OIE animal health information system as it operates today and explain some of the steps taken to develop the system,

including a brief history of the events that led to the creation of the organisation in 1921. A discussion follows, explaining the nature of and reason for recent changes to the system.

The 1920s

As mentioned above, the exchange of animal disease information among countries was one of the prime reasons for creating the OIE (renamed in 2003 as the World organisation for animal health but the acronym 'OIE' remains) and dates back to the first international conference held in March 1921, over 85 years ago. This task was defined as a priority for the organisation and was appended, in the form of a document entitled 'Organic statutes of the OIE', to the International Agreement for the creation of the OIE on 25 January 1924 (1). This document, and in particular article 4b thereof, states that the main objectives of the OIE are 'to collect and bring to the attention of the Governments or their sanitary services, all facts and documents of general interest concerning the spread of epizootic diseases and the means used to control them'. Concerning the obligations of government members of the organisation, Article 5 of this document states the following:

'The Governments shall forward to the Office:

- 1) by telegram, notification of the first cases of rinderpest or foot and mouth disease observed in a country or an area hitherto free from the infection
- 2) at regular intervals, bulletins prepared according to a model adopted by the Committee, giving information on the presence and distribution of the following diseases: rinderpest, rabies, foot and mouth disease, glanders, contagious pleuropneumonia, dourine, anthrax, swine fever and sheep pox'.

From the 1980s to 2004

The number of diseases listed by the OIE increased from nine in 1924 to approximately 100 in the early eighties. Diseases were classified in lists A

and B (replacing previous lists A, B and C).

List A diseases were defined as 'transmissible diseases that have the potential for very serious and rapid spread, irrespective of national borders, that are of serious socio-economic or public health consequence and that are of major importance in the international trade of animals and animal products'. There were 15 list A diseases (www.oie.int/eng/maladies/en_oldclassification.htm#listeA). Monthly reports on the presence or absence of these diseases provided a source of information on the distribution of these diseases and annual reports constituted the basis of the monitoring system.

List B diseases were defined as 'transmissible diseases that are considered to be of socio-economic and/or public health importance within countries and that are significant in the international trade of animals and animal products'. The list was composed of 94 diseases (www.oie.int/eng/maladies/en_oldclassification.htm#listeB). Reports on the presence or absence of these diseases were based on the response to a questionnaire that was submitted by member countries to the OIE each year.

During this period, diseases were added to one list or the other on an ad hoc basis. Changes were adopted or rejected during the annual general meeting. Proposals for alterations to the list were made by delegates from countries that were facing epizootics or epidemics of unlisted diseases or by other delegates who sought greater protection for their countries to avoid the introduction of diseases that were not listed. This ad hoc listing of diseases sometimes led to lengthy discussions at the annual meeting on whether a disease should be included in one list or the other. One example was bovine spongiform encephalopathy (BSE) that was introduced to list B in 1990 following the increased concern of member countries and consumers at that time.

The OIE animal health information system today

Single OIE disease list

In 2001, the OIE was instructed by its member countries to establish a single list of animal diseases that replaced lists A and B. In 2004, science-based criteria for listing a disease (4) were defined and approved by member countries (Table I). The aim was to develop criteria that would be acceptable to all member countries and to ensure that if a disease was really important, it would be listed. The overriding criterion for a disease to be listed is its potential for international spread. In addition, other criteria are considered, such as zoonotic potential or capacity for significant spread within naive populations. Measurable parameters exist

within each criterion. If a disease fulfils at least one of these parameters and meets one or more criteria, in addition to the potential for international spread, then the disease is included in the OIE list. Emerging diseases may be included in the list if they have a zoonotic impact and/or a significant impact on the mortality and/or morbidity within a naive population. The requirement to report emerging diseases that have a significant morbidity/mortality or zoonotic potential is designed to avoid the spread of these diseases to other areas and regions. The inclusion of new emerging diseases in the list will assist in addressing these diseases more efficiently and will contribute to reducing disease spread. This is important as the number of emerging diseases will certainly increase as a consequence of globalisation, urbanisation, climate change, etc.

Table I
Criteria for listing a disease in the OIE disease list

Basic criteria (always considering 'worst case' scenario)	Parameters (at least one 'yes' response indicates that the criterion has been met)
International spread	Has international spread been proven on three or more occasions? or Are more than three countries with populations of susceptible animals free of the disease or facing impending freedom (based on Code provisions, especially Appendix 3.8.1)? or Do OIE annual reports indicate that a significant number of countries with susceptible populations have reported absence of the disease for several consecutive years?
Zoonotic potential	Has transmission to humans been proven (with the exception of artificial circumstances)? and Is human infection associated with severe consequences (death or prolonged illness)?
Significant spread within naive populations	Does the disease exhibit significant mortality at the country or compartment level? and/or Does the disease exhibit significant morbidity at the country or compartment level?
Emerging diseases (a newly recognised pathogen or known pathogen behaving differently)	Is there rapid spread with morbidity/mortality and/or apparent zoonotic properties?

Notification and epidemiological information

Immediate notification and follow-up

Under the new notification system, not only diseases but also infections without clinical signs and other significant epidemiological events must be reported by a member country to the OIE within 24 hours. The reporting requirements are stipulated in Article 1.1.2.3. of Chapter 1.1.2. entitled 'Notification and epidemiological information' of the *Terrestrial animal health code* (3). These requirements were adopted by member countries in 2004 and implemented in 2005.

Events of epidemiological significance that require immediate notification by member countries were clarified and adopted by member countries in 2004. These events were published in the above articles of the *OIE Code* and are as follows:

- the first occurrence of an OIE-listed disease or infection in a country or zone/compartment
- the re-occurrence of a listed disease or infection in a country or zone/compartment following a report by the delegate of the member country declaring the previous outbreak(s) eradicated
- the first occurrence of a new strain of a pathogen of a listed disease in a country or zone/compartment
- a sudden and unexpected increase in morbidity or mortality caused by an existing listed disease
- an emerging disease with significant morbidity/mortality or zoonotic potential
- evidence of a change in the epidemiology of a listed disease (e.g. host range, pathogenicity, strain of causative pathogen), in particular if the disease has a zoonotic impact.

The requirements of new reporting criteria are similar to those previously used for reporting former list A diseases but now apply to a lengthier list of diseases. Furthermore, the new criteria clearly state that member countries should report infection even when there is no clinical manifestation of the disease. The new obligations of member

countries were designed to prevent the spread of emerging diseases, including those of a zoonotic nature. The requirements go even further by addressing a new concept which is the notification of an emerging event, even if the aetiological agent is unknown or has yet to be identified.

The OIE monitoring system

Prior to 2005, the obligations of member countries were to provide monthly information on the presence or absence of the 15 former list A diseases. An annual questionnaire provided information on diseases included in former lists A and B. List B contained a significant number of zoonotic diseases but the data collected were incomplete.

The number of outbreaks, cases, etc. during an entire year for a given country was provided without specific information on the geographic location. The monthly breakdown did not offer member countries the possibility to provide quantitative information. Since 2005, member countries are obliged to report on OIE-listed diseases on a regular basis (and, at least, once every six months). Information can be provided in a monthly breakdown (for each month of the period) and by first administrative division (e.g. by province for Canada, by region for Italy etc.). The OIE recommends that countries submit standard forms, at least for diseases that are notifiable within the country and for which quantitative information is normally available. Other templates are available to ensure that information is provided for the entire country by month and by first administrative division or for the entire country over a six-month period.

Active search and verification of unofficial information and rumours

In May 2001, the International Committee of the OIE authorised the Central Bureau (headquarters) to question any delegate of a member country regarding animal health incidents reported in the media (newspapers, scientific journals,

ProMED-mail, etc.). In 2002, the OIE commenced an active search for information from different sources of unofficial information. In addition, rumours on disease outbreaks were investigated, using specialised software engines for internet searches of sources such as ProMED-mail, the global public health intelligence network (GPHIN) and online newspapers etc. The need for such auxiliary sources has increased significantly since 2005, when emerging diseases with significant morbidity/mortality or zoonotic potential were added to the list of diseases that require immediate notification. Information obtained from such sources is analysed and evaluated in relation to the existing background information in OIE databases and archives. The first step is to determine whether or not the nature of the event meets the reporting

requirements of the OIE *Code* as outlined above. If this initial analysis suggests that the event must be reported, the delegate of the country concerned is requested to confirm or deny this unofficial information.

The overriding objective of this activity is to improve the efficiency of the OIE early warning system to ensure enhanced animal disease awareness and preparedness of member countries and to improve transparency of the animal health situation worldwide.

The decision tree presented in Figure 1 summarises the different steps involved in the active search for unofficial information. Figure 2 illustrates the various steps involved in verifying that information.

Results of active searches and verification of unofficial information are presented in Table II.

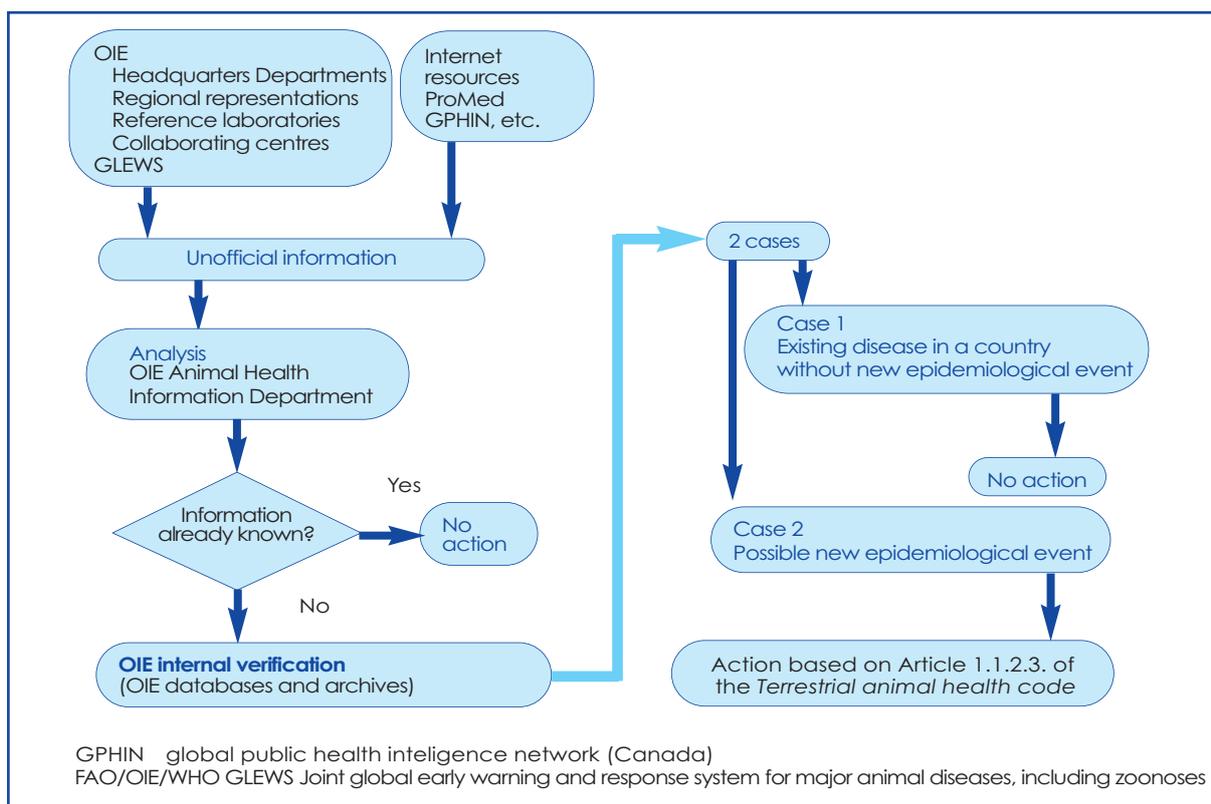


Figure 1
Principal steps in the active search for unofficial information

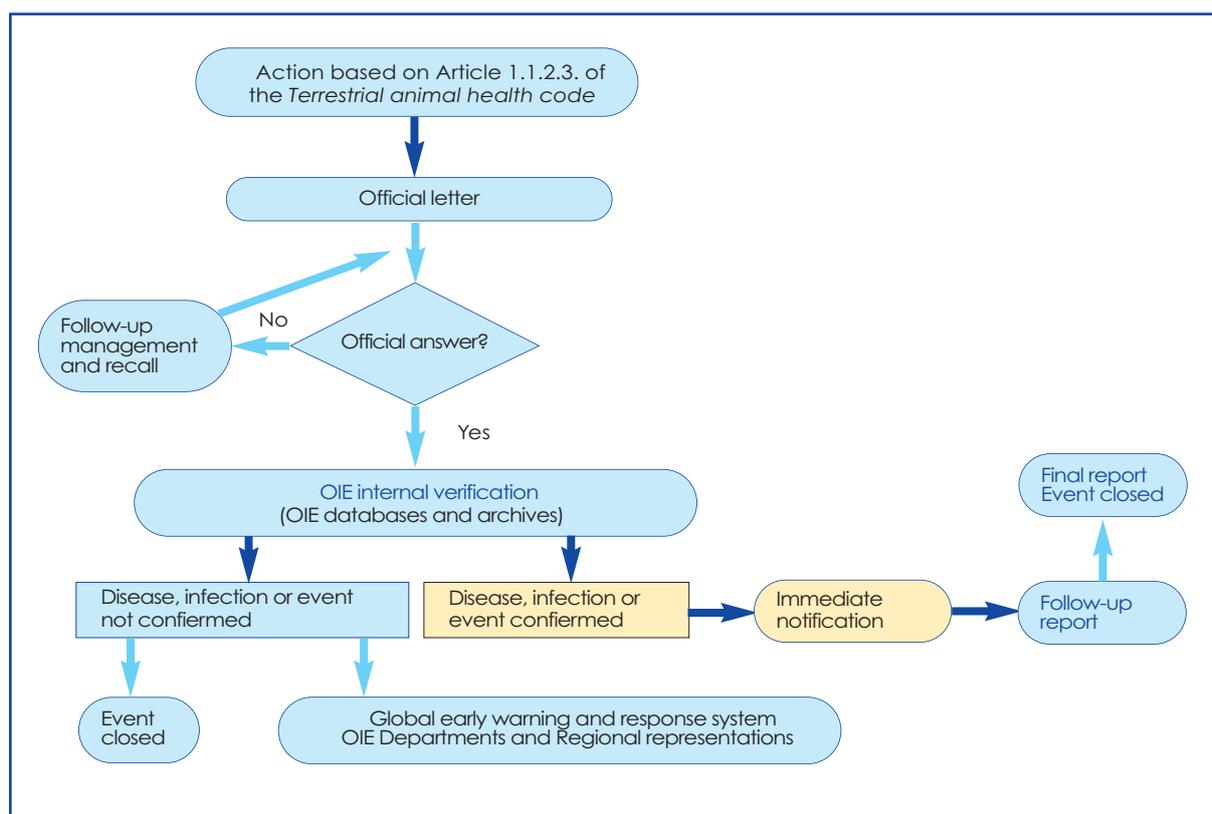


Figure 2
Principal steps in the verification of unofficial information

Other sources of information (official and unofficial)

Reports of animal disease outbreaks are posted on the internet by a wide variety of official and unofficial sources. This review will list several of them.

The Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES), established by the Food and Agriculture Organization (FAO) in 1994, maintains an internet website that provides press releases and alerts on animal health emergencies. Some publications, such as the *FAOAIDENews* that provides an update on the avian influenza situation, uses official (primarily sourced from the OIE) and non-official sources of information (such as GPHIN, ProMED, etc.). The website is supported and, where possible,

verified by information gathered by FAO experts in the geographic areas covered. These data are published periodically and distributed as a listserv (a communication tool that offers a large number of members the opportunity to post suggestions or questions to a large number of people simultaneously).

The World Health Organization (WHO) publishes reports which are restricted to zoonoses, some of

Table II
Results of efforts by the OIE to retrieve and verify unofficial information, 2002-2005

Year	No. of exchanges of correspondence	No. of official responses	Absence of response
2002	32	18	14
2003	29	24	5
2004	85	67	18
2005	97	74	23

which (such as avian influenza) in a frequent and intensive manner and others less frequently. The WHO provides maps of the highly pathogenic avian influenza (HPAI)-infected regions, which are updated on a routine basis. These maps present the distribution of the disease in man and in animals (from the OIE source). The WHO also publishes the *Weekly epidemiological record* for the public. For information on emerging zoonoses, such as Rift Valley fever, Nipah virus, severe acute respiratory syndrome (SARS) and, more recently, avian influenza, these publications provide valuable and updated information that is obtained exclusively from official sources. Only reports of laboratory-confirmed cases, in both humans and animals, are published.

The European Union (EU) maintains several electronic information and notification systems related to animal health. Most of these originate from the General Directorate for Health and Consumer Protection, but can also be provided by other EU institutions, such as the European Food Safety Authority.

The main purpose of the EU animal disease notification system (ADNS) application is to record and document a list of selected (currently 30) infectious animal diseases. These are restricted to diseases of farm animals, mainly mammals but also fish and bees, in accordance with the provisions of the relevant Commission Directives. In addition, the EU documents classical swine fever (hog cholera) in feral pigs and HPAI in wild birds. A weekly email message is sent to ADNS participants, summarising all primary and secondary outbreaks that have been recorded. The system embraces 32 participating countries and also includes data from non EU-member countries from Europe.

Eurosurveillance aims to be a free and open-access multiformat journal that publishes authoritative, peer-reviewed information on communicable diseases from a European perspective. In 2005, it

embarked on the process of becoming the regular scientific communication tool of a new agency, the European Centre for Disease Prevention and Control (ECDC), and other professional partners of the ECDC. The ECDC is mainly engaged in strengthening Europe's defences against infectious diseases, such as influenza, SARS and human immunodeficiency virus.

Some national veterinary authorities, principally in industrialised countries, maintain websites which may also provide important epidemiological information. There are currently more than 40 such national animal health websites.

The GPHIN in Canada automatically searches the internet for outbreak information and reports from the media. This internet-based 'early warning' system gathers preliminary reports of public health significance in seven languages on a real-time basis, applying translatory efforts. It is managed by the Centre for Emergency Preparedness and Response (CEPR), a Canadian public health agency. If necessary, the information is translated and is made available to (paying) subscribers. GPHIN initially addressed topics related primarily to human health, but recently, in collaboration with international organisations, such as the OIE and FAO, has included animal diseases.

The Center for Infectious Disease Research and Policy (CIDRAP) of the University of Minnesota is another potential source of epidemiological information on some zoonoses. Although limited to a restricted number of infectious diseases in humans, it applies rapid translation of scientific information and provides updates in a timely and regular manner.

ProMED-mail

One of the more comprehensive, non-official programmes for monitoring emerging diseases in humans and animals is ProMED-mail. This online program, established in 1994, operated by the International Society for Infectious Diseases,

is a non-profit, professional organisation. The principal intent of ProMED-mail is to assist local, national and international organisations by disseminating data on outbreaks of emerging infectious diseases as rapidly as possible wherever they occur (2).

ProMED-mail is a fully moderated listserv (all reports that are posted have been pre-approved and edited by ProMED-mail staff). Twenty-two individuals from nine countries collaborate in synthesising incoming data into useful reports. Inputs come from a variety of sources. First, participant/subscribers to ProMED-mail send information for reports. This may be in the form of first-hand reports. For example, a veterinarian may have noted an outbreak of a cattle disease in a location and report the details in an email to ProMED-mail. Many readers send news stories from local or national publications, others provide additional data related to previously posted reports or 'requests for information'.

In addition to this passive receipt of information, the ProMED-mail staff and a network of volunteer 'rapporteurs' uncover news of emerging diseases from numerous sources. These include the news media and local, regional, national and international public health and veterinary websites. Many of the subject area moderators of ProMED-mail subscribe to lists and publications specific to their area of interest and they in turn provide relevant information to ProMED. The steadily growing panel of regional networks also provides input to the system.

At any given time, the editor or one of four associate editors serves as the 'top moderator,' who is the focal point for all incoming and outgoing outbreak information. Between 1996 and 2004, ProMED-mail published reports of diseases that had occurred in 191 countries.

Since December 1995, ProMED-mail has maintained a specialised list on animal health and emerging

animal diseases (AHEAD). Most items in this list are moderated by the four veterinary experts and, when appropriate, in liaison with the expert moderators for viral, bacterial and parasitic diseases or epidemiology. The moderators verify the validity of reports (often by checking, sometimes by telephone, against alternative sources). The remainder of the reports is placed in a standard format with references to outside literature and to prior reports in the ProMED-mail archives, with a commentary on the nature and circumstances of the disease or outbreak. This constitutes the important added value of placing the information within its context and constitutes good analysis in relation to historical background and scientific information.

Between its inauguration in 1994 and April 2006, ProMED-mail issued 25 054 postings, of which 14 071 concerned animal health and/or zoonotic issues. ProMED-mail can independently post preliminary and unofficial reports, as well as summaries. In the new electronic environment, it is important to understand that ProMED-mail is an early warning and disease reporting system and is not intended to be a comprehensive surveillance system. Due to its independence from the political establishment and economy-driven parties, ProMed is able to disseminate with expediency the information required for effective, early handling of emergency situations by national and international animal health authorities, such as the OIE.

The following data, pertaining to the three years 2002-2004, demonstrates the potential of ProMED-mail as a supportive source of information to the OIE for improving transparency in disease information. During this period, 121 reports of former OIE list A diseases were circulated by both ProMED-mail and the weekly OIE *Disease Information* publication. Of the 121 disease incidents, ProMED-mail published a

total of 37 incidents earlier than OIE. There have also been 117 report postings that were only carried on ProMED-mail and not by the OIE. Most of the reports published by ProMED-mail and not by the OIE related to endemic situations which did not require immediate notification (i.e. suspected but unconfirmed cases or cases in wildlife, which at the time did not require official notification). However, several list A disease incidents were not reported to the OIE. Recently, such situations have been related to the avian influenza panzootic. For example, when rumours of suspected outbreaks were attributed by official authorities to fowl cholera (a bacterial disease), ProMED-mail, in its commentaries, indicated the need to rule out HPAI and requested additional information. This was followed by the diagnosis and notification of HPAI. In another case, official notification of foot and mouth disease (FMD) in a country, allegedly severely affected by the disease, came only months after a ProMED-mail request for information. This request came in response to a published report of clinical signs that were suggestive of FMD. The above two examples demonstrate that exerting pressure to report disease can result in improved transparency. An essential component of ProMED-mail is the reporting on emerging disease situations and on undiagnosed 'die-offs' of animals. From 1994 to April 2006, 255 AHEAD postings addressed undiagnosed animal health issues and 174 'die-offs' in animals. A total of 373 postings were titled 'Request for information'. 'New' diseases such as Nipah, Hendra and SARS have been reported to and by ProMED-mail in their early stages. On 10 February 2003, ProMED-mail was the first to post the rumours, from a professional source, of the SARS incident in Guandong, China. With the recent addition of emerging animal diseases to the OIE notification requirements, especially when

these diseases are suspected of having human health implications, the information provided by ProMED-mail could be of particular importance to the OIE, especially when the country does not comply with its international obligations to notify. The number of withheld or delayed OIE notifications has decreased over the past three years, demonstrating improved transparency. This improvement can largely be attributed to the proactive approach of the OIE to verify unofficial information, such as that disseminated by ProMED-mail.

Conclusions

The new obligations of member countries to notify the epidemiological events described above, combined with an active search and verification by the OIE of information and rumours on epidemiological events is increasing the efficiency of the OIE early warning system for the benefit of the international community.

Information collected as part of the OIE monitoring system is of enhanced quality and provides a better picture of the animal disease situation worldwide. This information includes data on disease distribution and control, prophylaxis programmes and policies, the staffing of veterinary services and the availability of veterinary laboratories and diagnostic facilities in member countries.

The diversification of sources of information, including non-official information and rumours, is important for end-users. It is of utmost importance to ensure that a balanced picture is provided on the animal disease situation in a given country, region or in the world. This disease information is the key component required by animal health officials to conduct a risk analysis and risk evaluation of a potential disease threat. The lack of efficient national animal disease

surveillance and alert systems, combined with poor laboratory support in many countries, helps to explain the inability to handle disease events and emergencies. This has to be corrected by improved veterinary services worldwide, especially in countries where the animal sector has limited resources. It is in the interests of the international community to consider animal health as an international public good and ensure that the required resources are available, for a safer world. The lack of transparency in some countries, as well as poor governance, should be publicly condemned and combated because a national disease problem has the potential of becoming a regional or international event, thereby jeopardising not only animal health but also the health and welfare of human beings.

Acknowledgments

The authors would like to express their sincere thanks to Antonio Petrini for translating the texts in Italian.

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