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Outbreak of chikungunya in the French Territories, 2006: lessons learned

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Description of the epidemic on Réunion Island

March-December 2005

On 17 March 2005, the Institut de Veille Sanitaire (InVS) launched an alert about the risk of chikungunya fever to the French territories in the Indian Ocean, based on information about an outbreak on the Comoros from the World Health Organization (WHO).

The first imported case was confirmed at the end of April, followed in early May by three autochthonous cases. These led to an intensification in monitoring through a surveillance system coordinated by the regional epidemiology unit. It relied on a combination of case reports and active and retrospective case-seeking around reported cases by the vector control team as part of their mosquito eradication activities.

The increasing burden

The first reports of atypical and serious cases and of mother-infant vertical transmission were received in late September. At the same time, mortality surveillance began, initially by an analysis of death certificates. The epidemic accelerated dramatically from 19 December 2005. At the end of December, the number of weekly cases jumped from less than 400 to more than 2,000. Strategies of surveillance and vector control had to be reviewed. The objective of surveillance then turned towards comprehensive monitoring of the epidemic and estimates of incidence. The change from one system to another entailed some communication problems, both among professionals and in the media. The media pointed out the disorganisation, and public confidence in institutional communication eroded.

Monitoring the epidemic and estimating its impact (Réunion Island)

The epidemic peaked in early February 2006. Overall, between March 2005 and June 2006, the surveillance system estimated that almost 266,000 people (about 35% of the population) had a clinical form of chikungunya on Reunion Island [1]. In 2006, the regional health bureau processed 254 death certificates that mentioned chikungunya as a cause of death, compared with none in 2005.

At the same time, InVS epidemiologists conducted active case finding for hospitalised severe and atypical forms. An atypical form was defined as any clinical presentation requiring hospitalisation with laboratory-confirmed infection and symptoms other than fever and joint pain. A severe form was defined as a case requiring Intensive Care Unit (ICU) treatment. We identified 878 cases of atypical forms of chikungunya, including 44 maternal-neonatal, 224

paediatric and 610 adult cases. Digestive or cardiovascular disorders were the symptoms observed most frequently. Overall, 222 hospitalised adults required ICU treatment and support of at least one vital function and 11% (65) died [2].

Finally, mortality surveillance showed that the total number of deaths on the island increased with the epidemic peak. Observed mortality was significantly higher than expected for February (+33%) and March (+25%). This was no longer the case in April (+10%, not statistically significant) or May (+0%) and since June 2006, mortality has been lower than expected [3].

Situation in Mayotte

The first cases were reported in Mayotte in April 2005, and the initial epidemic phase ended in June 2005. During this period, the surveillance system set up by the health and social services (DASS) of Mayotte identified 73 suspected cases. A second epidemic wave started in January 2006 and peaked in mid-March. Over the entire epidemic period, physicians of Mayotte reported 7,290 suspected or confirmed cases. Because of the low rate at which patients sought medical care, the surveillance system allowed the follow up of the course of the epidemic but did not reflect the real scale of the epidemic. It had to be completed by population-based studies with and without serologic antibody assays. Analysis of serum samples from pregnant women in October 2005 and in April 2006 showed that, during this period, the percentage of women who had been infected rose from 2.5 to 25%. A survey carried out in May 2006 by InVS, estimated that one quarter of the 170,000 inhabitants reported symptoms compatible with chikungunya. An InVS serosurvey at the end of 2006 showed that 38% had been infected by the virus and that, among them, one quarter reported that they did not have chikungunya, and could therefore be considered asymptomatic.

Situation in the West Indies

Both the exchanges between Réunion Island and the French districts in America and the presence of the *Aedes* mosquito in these areas made the introduction of the virus possible there. Measures implemented once the first imported case was reported in February 2006 were described in a plan [4] with four components:

- encouragement for all travellers returning from areas with a risk of transmission to report that they had visited such an area, even if they had no symptoms. Control measures were undertaken to take into account even the possible asymptomatic cases;
- early reporting by all healthcare professionals of suspected and confirmed cases;
- systematic intervention by mosquito eradication workers at the home of travellers and cases and reinforcement of mosquito eradication activities, associated to communication activities;
- prevention of transmission in health care settings.

Once the Indian Ocean epidemic began, nine imported chikungunya cases were identified in the French districts in America: three in Martinique, three in Guadeloupe, and three in Guyana. They remained isolated and did not lead to any secondary transmission.

Situation in metropolitan France

Neither the geography nor the climate of Europe is similar to those of the French overseas districts described above. Nonetheless, the main virus vector on Réunion Island, the *Aedes albopictus* mosquito, has been found in several metropolitan districts, especially along the Mediterranean coast and in Corsica. Given that nearly 300,000 tourists from metropolitan France visit Reunion Island each year, imported chikungunya cases must be quantified for assessment of the potential risk of autochthonous transmission in mainland France. Each month since the beginning of the epidemic in the Indian Ocean, InVS has extracted data from the database of four laboratories that diagnose chikungunya in metropolitan France.

Between 1 January 2006 and 31 December 2006, a total of 783 cases of chikungunya were identified [5]. The peak in February-March 2006 matched the epidemic peak in Réunion Island. Except for one case of infection associated with a healthcare procedure, no case of native chikungunya transmission has yet been reported in metropolitan France. The Minister of Health ordered that chikungunya be added to the mandatory reporting list in July 2006, with a reinforced reporting system in the Alpes-Maritimes and Corsica as well as in the French West Indies and Guyana.

Lessons learned from the outbreak and perspectives

Extent of the risk associated with arboviruses in the overseas areas

The chikungunya epidemic brutally reminded us that arboviruses are a developing health risk in overseas France because of their potential emergence or extension to new territories or the appearance of still more threatening forms.

Need for a surveillance system appropriate for specific health risks

The health risks associated with infectious diseases in the overseas territories of France have several particularities. Numerous vector-borne diseases are rampant there. They include malaria in Guyana and Mayotte, dengue in all the territories (with hemorrhagic forms emerging since the 1980s), Chagas disease in Guyana, West Nile disease in the West Indies, and so on.

A reliable, representative sentinel network of General Practitioners is an essential basis for a reactive system for this specific health risks, but might also enrol every partner in the health care system. The chikungunya epidemic showed the importance of being able to follow in almost real time the changes in non-specific indicators related to mortality and to hospital activity, especially emergency department units. The investment of laboratories is also of primary importance to confirm emerging pathogens or the implication of well-known germs in new clinical presentations.

Need to rely on all participants of the healthcare system in health crises

The difficulties in the exchange of information during the epidemic highlighted the importance of collaborating with all the actors of the healthcare system, including physicians in private practice for daily surveillance and hospital staff physicians for reporting the serious and emerging disease forms, even excluding emergency situations.

Important role of the media and the social mobilisation

Social communication and mobilisation were absolutely necessary even for strengthening the surveillance system and for implementing control measures. The role of the media is essential, but this event underlined the difficulty of communicating with sufficient reactivity, transparency and quality in the scientific information required.

Need for mobilising rapid expert assessment and reinforce the connection between epidemiological surveillance and research

The chikungunya crisis illustrated the need for a broad capacity of expertise, at the local as well as the national levels. This expertise, if it is "pluralist" (that is, combines research, public health, and clinical medicine) and multidisciplinary (calling in particular on the social sciences), should allow pertinent and shared analyses of various answers to these questions. The creation in early 2007 of the Centre de Recherche et de Veille dans l'Océan Indien (Regional Centre for Indian Ocean Health Surveillance and Research, CRVOI) in Réunion Island, as a scientific interest group in which InVS participates can be considered as a regional response to this need. An international meeting on chikungunya and other arboviral emerging diseases, taking place in December 2007 in Réunion Island, should be a good opportunity to share epidemiological and scientific research points of view.

Increasing importance of the international aspect of health surveillance

Attention to health events occurring abroad that might affect the French population is especially important in the overseas districts, which are at the heart of regional environments whose epidemiologic risks they share and with whom they have many population exchanges. The chikungunya outbreak illustrated once again the importance of a reliable epidemic

intelligence network. The Indian Ocean health crisis in 2006 led the countries of this region, including France for Réunion and Mayotte, to propose the reinforcement of the pre-existing regional network for epidemic alert and response. This project, supported by the WHO and the Indian Ocean Commission, should be operational by the end of 2007.

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First World Rabies Day, 8 September 2007

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World Rabies Day will be inaugurated on 8 September 2007. This initiative involves human and animal health partners from local to international level with the goal of supporting human rabies prevention and animal rabies control through awareness and resources [1].

Rabies, both a vaccine-preventable and a neglected disease, is a global public health problem [2]. More than 3 billion people, over half the world's population, are at risk for rabies, especially in countries in Africa, Asia and Latin America. There are about 55,000 human rabies deaths per year, mainly occurring in Asia and Africa, and approximately 30-50% of the cases are in children [3]. A WHO Expert Consultation on Rabies was done in 2004 to estimate the rabies burden of disease and its distribution worldwide [4].

Rabies post-exposure treatment is an emergency action as once clinical symptoms occur rabies is a fatal disease [5-7]. So far there has been only one documented case of a patient that survived rabies infection [8]. Even though human and veterinary vaccines exist, the use of these to prevent and control rabies varies greatly worldwide [3].

Rabies is also a zoonosis, disease of terrestrial animals and bats which is transmitted to human mainly through the bite of infected dogs and cats [3].

In Europe, the WHO Collaboration Centre for Rabies Surveillance and Research maintains the Rabies Information System website and publishes the "Rabies-Bulletin-Europe" [9].

The open access database queries option allows dynamic queries of the European database to be performed; this includes the distribution of rabies by European countries, year (2000 to 2006), species (domestic animal, wildlife and bats), human cases and maps. This data helps to assess the public health impact of rabies in Europe and to guide prevention and control programs.

In Europe (WHO region) in 2006, there were 9,172 reported cases of animal rabies distributed as following: domestic animals – 2,984, wildlife – 6,152 and bats 34. There were two human