[SCIENTIFIC AND TECHNICAL ADVISORY GROUP ON YELLOW FEVER RISK MAPPING (GRYF)]

Second teleconference
28 April 2016
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Review of meeting report from 1st teleconference

The report was approved by the members of the Scientific and Technical Advisory Group on Yellow Fever Risk Mapping (GRYF) and will be posted on the GRYF website.¹

Briefing session on ongoing yellow fever outbreaks related to Angola

The Secretariat provided an overview of the situation on the Angola outbreak and imported cases in other countries.² ³

Angola

This is the first outbreak in Angola for 28 years. The last outbreak in Angola occurred in 1988 with 37 cases and 14 deaths. Angola is classified as a medium-risk country for yellow fever. The yellow fever vaccine was introduced into WHO’s Expanded Programme of Immunization (EPI) in 1980, and has been part of Angola’s routine vaccination programme since 1997. However, coverage from the routine immunization programme at district level is below the WHO recommended 80% coverage rate.

Since the outbreak in Angola⁴ ⁵ began in December 2015, a total of 2143 suspected cases have been reported, with 277 deaths. Of the 2143 suspected cases, as of 28 April 2016, 661 cases (70% of them from Luanda province) were laboratory-confirmed. A total of 67 districts in 13 out of Angola’s 18 provinces now have laboratory-confirmed cases, most of them imported cases from Luanda. However, there is documented local transmission (autochthonous cases) in six of the provinces, including other major urban settings such as Benguela and Huambo provinces. Surveillance systems indicate that all 18 of Angola’s provinces have now reported suspected cases of the disease (as per the yellow fever case definition).

Since February 2016, a total of 7.5 million people have been vaccinated in 3 provinces, including Luanda. There is persistent local virus transmission in Luanda despite the vaccination of more than 6 million people in that province alone. A mass vaccination campaign was launched on 17 April and achieved 91% coverage. To vaccinate an additional five provinces which have local transmission, WHO is procuring additional 3.2 million doses of vaccine.

¹http://www.who.int/ith/yellow-fever-risk-mapping/en/
²http://www.who.int/emergencies/yellow-fever/en/
³http://www.who.int/topics/yellow_fever/en/
⁴http://www.who.int/emergencies/yellow-fever/en/
The virus in Angola is largely concentrated in Luanda and is likely to have been introduced to the capital city following increased yellow fever viral circulation among monkeys in the forest. When introduced in urban areas, the high density of *Aedes* species mosquitoes combines with low immunity/vaccination rates of the population to provide the right conditions for large epidemics. The level of urbanization in Africa has soared from 15% to 40% over the last 50 years and is forecast to reach more than 55% in 2050.

The Secretariat also provided an overview of cases exported from Angola to the Democratic Republic of Congo (DRC), China, Kenya and Morocco as follows:

- **DRC:** 16 laboratory confirmed cases and a possible 2 cases of local transmission
- **China:** 11 confirmed cases, no local transmission
- **Kenya:** 2 confirmed cases, no local transmission
- **Morocco:** 1 suspected case (clinical diagnosis), no local transmission.

All confirmed cases mentioned above were imported from Angola. In the DRC two probable cases of local transmission are under investigation. The yellow fever outbreak reported in Uganda on 26 April 2016 does not seem to be related to the Angola outbreak. Further details and discussion on each country are given below.

**Democratic Republic of Congo**

The government of the DRC officially declared an outbreak of yellow fever on 23 April. As of 29 April, a total of 42 cases (probable or confirmed cases) were reported. As of today there are 16 laboratory-confirmed cases imported from Angola and reported in Kongo Central and Kinshasa provinces. At least 10 of these 42 cases are suspected of being locally-acquired and are under investigation. At least 2 cases of locally-acquired infections have been reported in Kinshasa as well as in Matadi in Kongo Central province (pending confirmation of local transmission from the Institut Pasteur in Dakar, Senegal).

An investigation team with the support of a virologist from the Institut Pasteur in Cameroon conducted an outbreak investigation from 7 to 18 April to assess the presence of local transmission and the risk of amplification. The entomological survey found a high density of *Aedes aegypti* mosquito larvae, samples of which have also been sent to the Institut Pasteur in Dakar for infectivity investigation. High entomological density indicates that the risk for amplification of disease is very high.

A vaccination campaign will start next week. The DRC is a GAVI eligible country and, as such, potential reactive vaccination campaigns will be funded by the GAVI Alliance. The plan is to vaccinate eight health zones with at least two districts in Kinshasa and the six districts of Kongo Central where laboratory-confirmed cases were identified.

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6http://www.who.int/csr/don/11-april-2016-yellow-fever-drc/en/
(a total of nearly 2 million persons). If local transmission is laboratory-confirmed, other districts will be targeted accordingly.

**Kenya**

Between 15 and 18 March 2016, the National IHR Focal Point of Kenya notified WHO of 2 cases of yellow fever imported from Angola. Both cases are male Kenyan nationals in their early 30s, working in Luanda, Angola. Both travelled while symptomatic and neither were vaccinated against yellow fever prior to travelling to Angola. Reverse transcription polymerase chain reaction (RT-PCR) and enzyme-linked immunosorbent assay (ELISA) were performed on samples of both cases by the Kenya Medical Research Institute (KEMRI). RT-PCR was negative for the 2 cases; however, samples from both cases tested positive for anti-YF IgM antibody.

The risk of sustained local transmission is considered to be minimal since the density of the competent vector, the *Ae. aegypti*, is very low in Nairobi and neither of the 2 cases arrived in a viraemic state. However, it is important to highlight that yellow fever introduction represents a potential threat in areas of the country where the risk factors for yellow fever are present (human susceptibility, prevalence of the competent vector, animal reservoirs). The possibility of further international disease spread from Kenya to other countries is also considered to be low; nevertheless, the report of yellow fever infection in non-immunized travellers returning from a country where vaccination against the disease is mandatory underlines the need to reinforce the implementation of vaccination requirements in accordance with the International Health Regulations (2005).

**China**

Between 4 and 12 April 2016, the National IHR Focal Point of China notified WHO of 2 additional imported cases of yellow fever. To date, a total of 11 laboratory-confirmed yellow fever cases imported from Angola have been reported in China.

The risk of establishment of a local cycle of transmission in China is low since the current climatic conditions are unfavourable for the *Ae. aegypti* vector. WHO continues to monitor the epidemiological situation and conducts risk assessments based on the latest available information.

The Chinese government has taken the following measures:

- intensifying multisectoral coordination and collaboration;
- strengthening surveillance, vector monitoring and risk assessment;
- enhancing clinical management of yellow fever cases;
- conducting vector control activities;
- carrying out public risk communication activities;

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7http://www.who.int/csr/don/6-april-2016-yellow-fever-kenya/en/
• deploying a medical team to Angola to provide yellow fever vaccination to unvaccinated Chinese nationals.

**Morocco**
In Morocco there is 1 suspected case of yellow fever (clinical diagnosis).

**Vaccine supply**
The question of vaccine demand and supply was discussed during the teleconference and is summarized as follows:

<table>
<thead>
<tr>
<th>Global demand per year</th>
<th>Global supply per year</th>
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<tbody>
<tr>
<td>61–71 million doses*</td>
<td>70–80 million doses</td>
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* including doses for preventive campaigns (30–35 million), routine immunization (25–30 million) and ICG stockpile (6 million).

The Yellow Fever Initiative was launched in 2006 to secure global vaccine supply and boost population immunity through vaccination. Since the initiative was launched, significant progress has been made in West Africa to bring the disease under control. More than 105 million people have been vaccinated and no yellow fever outbreaks were reported in West Africa during 2015.

However, since 2010, the location of yellow fever has shifted from West Africa to central and east Africa where no preventive mass vaccination campaigns have been conducted. The outbreak in Angola raises concerns about the need to strengthen risk assessment and mass vaccination in central and east Africa.

Although there has been no reported case in Nigeria so far, the situation in this country was discussed by GRYF participants who raised concern about vaccine supply in such a large population. A solution is actually foreseen in case of extreme urgency to be able to conduct a vaccination campaign in Nigeria right away.

At the end of March 2016, the emergency vaccine stockpile was replenished and approximately 10 million doses of vaccine are now available. WHO has halted routine immunization in order to be able to address such extreme emergencies. An approach under consideration, but not yet approved, is to dilute the vaccine in order to increase coverage (1 dose could be sufficient for 5 persons). This approach is being assessed to understand the possible implications for effectiveness and adverse effects.

WHO is working with partners and manufacturers to ensure that supplies are available where they are most needed.
**WHO travel advice and IHR obligations**

WHO urges Member States – especially those where the establishment of a local cycle of transmission is possible (i.e. where the competent vector is present) – to strengthen controls of the yellow fever immunization status of travellers to all potentially endemic areas. On the basis of available information, WHO does not recommend any travel or trade restrictions on countries with current yellow fever outbreaks.

**WHO preventive measures**

Yellow fever can be prevented through vaccination and mosquito control. The yellow fever vaccine is safe and affordable, and a single dose provides lifelong immunity against the disease. Mosquito control can also help to prevent yellow fever, and is vital in situations where vaccination coverage is low or the vaccine is not immediately available. Mosquito control includes eliminating sites where mosquitoes can breed, and killing adult mosquitoes and larvae by using insecticides in areas with high mosquito density. Community involvement through activities such as cleaning household drains and covering water containers where mosquitoes can breed is a very important and effective way to control mosquitoes.

**Presentation of country assessments**

**Kenya**

The working group in charge of analysing the request from Kenya was composed of Oyewale Tomori, Amadou Sall and Lucille Blumberg.

Oyewale Tomori briefed the meeting about the teleconference of the yellow fever independent expert group on risk assessment, which took place on 30 October 2015. The group observed that a low prevalence (< 1.7%) was shown on naturally-acquired antibodies in persons. Also, on the basis of the findings of the entomological survey, the presence of larvae is potentially elevated in some ecological zones. However, the interpretation of data is difficult because of the low number of adult mosquitoes. The expert group decided not to recommend any preventive mass campaign vaccination at this point but rather to continue with the routine EPI immunization of children and to strengthen yellow fever surveillance, with testing of suspected cases in at-risk areas.

In light of the worsening situation in Angola and in view of the low prevalence of immunity among Kenyans, some members of the Advisory Group wondered if it would not be advisable to strengthen the recommendations, notably to recommend a risk assessment and measures for inbound and outbound travellers from Kenya.

Members of the Advisory Group were invited to provide comments by email to the Chair of the expert group on whether the current WHO risk assessment of yellow fever...
fever in Kenya and yellow fever vaccination recommendations for travellers to Kenya should be maintained or adjusted.

Follow-up on requests from Argentina, Panama and Peru

As agreed during the first teleconference, four working groups composed of GRYF members and advisers were created to review each pending country request. The objective of the GRYF working groups is to establish a dialogue with the country for a common understanding of the yellow fever risk mapping classification. The method of work is as follows:

1. To identify contacts with the assistance of the regional and country offices in the country where the risk is being revised.
2. To understand country rationale and help the country provide the scientific justifications required by the GRYF for decision-making.
3. To present expert analysis to the GRYF for discussion and decision-making

Argentina
Working Group: Adelle-Lisa Chang On, Susan Henry, Kalpana Baruah, Pedro Vasconcelos, Emily Jentes
No progress was reported. Susan Henry agreed to chair this group, but requested more guidance and support from the Secretariat on what is expected.

Panama
Working Group: Jennifer Erin Staples, Daniel Salomon, Hervé Zeller
No progress was reported. Erin Staples agreed to take this work forward in collaboration with the Pan American Health Organization (PAHO) but she also requested more guidance from the Secretariat. Roberta Andraghetti mentioned that some studies have been carried out in Panama which could provide input into this process. It was also mentioned that there is a national laboratory in the country which could become involved in this data-gathering process.

Peru
Working Group: Mark Gershman, Nestor Sosa
Mark Gershman reported that no progress had been made because no contacts had yet been received from the Secretariat. The Secretariat informed the group that PAHO and the Peru WHO country office had been contacted and two focal points were being confirmed; these would then identify the appropriate country counterparts. The Secretariat explained that a working group had been formed in Peru to gather the right expertise, that this dialogue was expected to start in three weeks, and that it was important to interact with the country team in Spanish.

Medical exemption for yellow fever vaccination
The Secretariat explained that the rationale for the inclusion of this point on the agenda was a request by the Ministry of Health of South Africa for advice on how to manage travellers from countries at risk of yellow fever in view of the AIDS 2016 Conference. This conference will take place in Durban in July and will entail a large number of persons (expected to be more than 5000) travelling to the country, including many who are HIV-positive. The South Africa Government may accept waiver letters provided they explain the reason for exemption (e.g. immunodeficiency, or at risk of complications from the vaccine).

The senior legal adviser in the IHR Secretariat explained that the IHR include provisions that could be useful if a traveller arrives from a country where yellow fever or its vector are present with a waiver on medical grounds documented by a physician’s declaration in either English or French. Under the IHR, the competent authorities are requested (though not mandatorily) to take this declaration into account and to follow one of the following options:

1. Letting the traveller enter the country without vaccination, with or without obligation to report any occurrence of fever during the stay and including information on how to maximize prevention; or

2. Proposing to quarantine the traveller for up to six days and, in case of refusal by the traveller, either accepting or refusing the traveller’s entry into the country.

This information will be enclosed in the recommendations prepared for the organizers of the AIDS 2016 Conference.

**Closing remarks**

The GRYF was informed that a meeting of the WHO Ad-hoc Advisory Group on aircraft disinsection for controlling the international spread of vector-borne diseases took place in Geneva from 21 to 22 April 2016. Among the follow-up is the designation by WHO of areas in which conveyances arriving from these areas should be subject to vector control.

The Advisory Group was informed that a major effort was being made by WHO to keep the public informed about the current yellow fever outbreaks in Africa. New information was being published on the WHO website, in addition to the Disease Outbreak News. The WHO Director-General had sent a circular letter to all Ministers of Health emphasizing the importance of the vaccination.
The Chair requested the support of the Secretariat for the subgroups and reminded the members of the Advisory Group to make comments by email on the Kenya risk assessment and its recommendations.

**Next meeting of the Advisory Group (by teleconference) will be tentatively Thursday 9 June 2016 (time TBC)**
Annex 1. List of participants

MEMBERS
Dr Kalpana Baruah (rapporteur)
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Professor Lucille Hellen Blumberg
Deputy Director, National Institute for Communicable Disease (NICD), National Health Laboratory Service (NHLS), South Africa

Mark Gershman, MD
Medical Epidemiologist, Travelers’ Health Branch, Division of Global Migration and Quarantine, Centers for Disease Control and Prevention, Atlanta (GA), USA

Ms Susan Henry
Principal Consultant, Third Element Consulting, and Risk & Governance Discipline Program Leader, Emergency Management Australia, Attorney General’s Department, Australia

Dr Amr Mohamed Kandeel (excused)
Chief, Preventive and Endemic Diseases Sector, Ministry of Health and Population, Egypt

Professor Mapatano Mala Ali
Department of Epidemiology and Nutrition, Ecole de Santé Publique, Democratic Republic of Congo

Dr Chang On (excused)
County Medical Officer of Health, Ministry of Health, Trinidad and Tobago

Dr Amadou Sall (not confirmed)
Director of the WHO Collaborating Centre for arboviruses and viral hemorrhagic fevers, Institut Pasteur de Dakar, Senegal

Dr Néstor Sosa (excused)
Director General, Instituto Conmemorativo Gorgas de Estudios para la Salud (ICGES), Panama

Professor Oyewale Tomori (Vice Chair)
Professor of virology, Redeemer’s University, Nigeria

Dr Pedro Fernando da Costa Vasconcelos (Chair)
Head, Department of Arbovirology and Hemorrhagic Fevers, Director, National Reference Laboratory for Arboviruses, Director, National Institute for Viral Hemorrhagic Fevers, Brazil

Dr Herve Zeller
Senior expert and Head, Emerging and Vector-borne Disease Programme, European Center for Disease Prevention and Control (ECDC), Sweden

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CDR, USPHS, Division of Global Migration and Quarantine, Centers for Disease Control and Prevention, USA

Dr Jennifer Erin Staples
Medical Epidemiologist, Arboviral Disease Branch, Division of Vector-borne Diseases, Centers for Disease Control and Prevention, USA

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