Managerial Brief on Global Health Needs - Yellow Fever

Subject: **Yellow Fever and its impact on Global Health**

To: ABC Investment Company

This brief provides an overview of Yellow Fever – it's incidence, progression, and development; affected population vis-à-vis demographics and geographies; and lastly, the availability of treatment, prevention and related costs in different environments.

I. Yellow Fever

Yellow fever is a mosquito-borne viral fever and has a high fatality rate.

II. Incidence, Geography, and Demographics

Yellow fever affects all ages, but disease severity and lethality is highest in the elderly. The common clinical manifestations of Yellow Fever are renal failure, and shock. Very high virus loads have been found in the liver and spleen of fatal cases. The late phase of the disease is characterized by circulatory shock. Primarily reported in Africa and South America, the fever's usual transmission cycle involves monkeys and daytime biting mosquitoes (Aedes species in Africa; Haemagogus species in South America).

- In Africa, a wide array of Aedes mosquitoes are responsible for transmission. During the rainy season the virus circulates via mosquitoes in the vegetational zone in proximity to human settlements. A domestic mosquito can also breed in containers used to store potable water in heavily settled areas. *(so called "urban yellow fever")*
- In South America, the larval development of mosquitoes occurs near tree holes containing rainwater. Persons entering forested areas are at risk of infection *(so-called "jungle yellow fever")*; hence predominance in young males engaged in forest clearing and agriculture.
- Yellow Fever is an epidemic disease problem of considerable magnitude. Mosquito-borne epidemics in Africa occur where large human populations reside in high density and immunization coverage is low. Human-to-human transmission in the absence of the mosquito does not occur. Historically, fewer cases have occurred in South America than in Africa, primarily because vaccination coverage is relatively high (80 to 90 percent in endemic areas of South America). In typical years, there are several hundred cases officially notified, but in epidemic years up to 5000 cases are reported. In both Africa and South America, only a small proportion of cases are officially recorded because the disease often occurs in remote areas, recognition of outbreaks is delayed, and diagnostic facilities are limited. Case fatality rates in Africa and South America are 20-30% and 50-60% respectively. Since World War II, only 10 expatriate/traveler cases have been reported in Africa and South America.

III. Onset and Progression

The onset of illness appears abruptly three to six days after the bite of an infected mosquito. The classical illness is characterized by three stages:

- **Period of infection** — lasts for three to four days. The patient is febrile and complains of generalized malaise, headache, photophobia, pain in knee joints, anorexia, nausea, vomiting, restlessness, irritability, and dizziness. At this phase, it is virtually impossible to distinguish yellow fever from other acute infections.
- **Period of remission** — A period of remission lasting up to 48 hours may follow the period of infection, characterized by the abatement of fever and symptoms. Patients with abortive infections recover at this stage. Approximately 15 percent of individuals infected with yellow fever virus enter the third stage of the disease.
- **Period of intoxication** — The period of intoxication begins on the third to sixth day after the onset of infection with return of fever, prostration, nausea, vomiting, and jaundice. This phase is characterized by variable dysfunction of multiple organs including the liver, kidneys, and cardiovascular system. Hemorrhage is a prominent component of the third phase of illness. Patients exhibit variable signs of central nervous system (CNS) dysfunction including delirium, agitation, convulsions, stupor, and coma. The outcome is determined during the second week after onset, at which point the patient either dies or rapidly recovers. Approximately 20 to 50 percent of patients who enter the period of intoxication succumb to the disease.

IV. Treatment, Prevention, and Costs

- The treatment of yellow fever consists of supportive care; there is no specific antiviral therapy available. Management of patients may be improved by modern intensive care, but this is generally not available in remote areas where yellow fever often occurs. Travelers hospitalized after return to the United States or Europe have had fatal outcomes in spite of intensive care, demonstrating the inexorable course of severe yellow fever.
- Supportive care should include maintenance of nutrition, treatment of hypotension by fluid replacement and drugs if necessary, administration of oxygen, dialysis if indicated by renal failure, and treatment of secondary infections.
- PREVENTION — In the United States, the vaccine (YF-VAX) is manufactured by Sanofi-Pasteur (Swiftwater, PA). Another vaccine formulation derived from a different passage series of the same vaccine virus strain, 17DD, is manufactured in Brazil. The World Health Organization (WHO) international certificate of immunization is valid for 10 years; a booster 0.5 mL dose is required every 10 years for the certificate to be reissued.
- The WHO is revising the geographic risk areas to create an evidence based analysis of the probability of exposure to yellow fever.
- For patients not covered by health insurance, the cost of a yellow fever vaccination typically includes: a consultation fee, sometimes a fee to administer the shot, and the cost of the single required dose of vaccine. The total cost typically ranges from $150 to $350.

REFERENCES

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