

Dengue prevention and control during COVID-19 pandemic

Introduction

Dengue and other *Aedes*-borne diseases (such as Chikungunya and Zika) affect 129 countries with over 4 billion population at risk of these diseases around the world. The year 2019 witnessed an unprecedented outbreak of dengue in many countries in the Americas, with more than 3.1 million cases reported, including 28,176 severe cases, and 1,535 deaths (1). Dengue epidemics tend to have seasonal patterns, with transmission often peaking [during and after the rainy seasons](#). There are several factors contributing to this increase and they include high mosquito population levels, susceptibility to circulating dengue serotypes, favorable [temperatures](#), precipitation and humidity, all of which enhance the reproductive potential and feeding patterns of mosquito populations, as well as the dengue virus incubation period (2). Dengue continues to affect several countries in 2020 and there are reports of increase in cases in several countries. As of May 9th, more than 1.4 million cases of dengue cases have been reported in the Region, including 3,183 severe dengue, and 473 deaths.

The COVID-19 pandemic is placing immense pressure on health care and management systems of the Americas Region. PAHO has emphasised the crucial need to sustain efforts to prevent, detect and treat vector-borne diseases. Prevention and control of dengue and other arboviral diseases at the present crucial period is of utmost priority. The combined impact of both COVID-19 and dengue epidemics could have potentially devastating consequences in the population at risk. In the initial year or so of the pandemic, it is expected that climate will not play a major role in modulating circulation of COVID-19.

Basic guidelines for strategic lines of action

Member States are urged to make use of their resources effectively under the present circumstances where staff are also diverted to provide COVID-19 response. This can be achieved by combining activities such as the following:

Integrated surveillance: Countries must be encouraged to continue the epidemiological surveillance and provide reports of suspected and confirmed dengue cases.

- Since clustering of cases is common in both diseases (dengue and COVID-19), efforts must be made to strengthen surveillance and differential diagnosis during laboratory confirmation in each affected locality.
- Prior information of hotspots of dengue should be targeted for intensive vector control.
- Indeed, established clinical surveillance networks for dengue can expand their detection criteria to incorporate COVID-19 symptoms, to maximize the use of resources.
- Sentinel entomological surveillance will help to assess the changes in the risk of vector-borne diseases, and impact of vector control measures.

Diagnostics: Many COVID-19 and dengue diagnostic tests are based on PCR, however they use different reagents and type of sample (oropharyngeal/nasopharyngeal swabs for COVID-19 and blood/serum for dengue). Regarding serological tests, both viruses are not antigenically related (i.e. they belong to a different and distant viral family), therefore cross reaction is an unlikely event.

- In malaria co-endemic areas blood smear test must be done to rule out the presence of malaria in the patient.
- RDTs have shown low sensitivity so the negative predictive value is very low, and a negative result will not rule out a case. Due to this, implementation and use of these types of tests for public health purposes should be carefully assessed, and ELISA should be prioritized for serology.
- Although there is one report of possible dengue RDT false positive results in two COVID-19 cases, there is no evidence supporting antibody cross reactivity (3).
- Efforts must be made to strengthen virus surveillance and laboratory diagnostic capacity in all countries.

Case management: Measures to guarantee a proper clinical care to suspected dengue cases must be a priority with a strict application of Infection Prevention and Control measures in a context of COVID-19 transmission.

- Strengthening at the primary health care level is key to manage dengue case. Medical staff should provide proper clinical care for dengue patients through the early clinical diagnosis and recognition of warning signs for severity in dengue (such as abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation, mucosal bleed, lethargy or restlessness, liver enlargement >2 cm, and increase in haematocrit) (4).
- These measures will help to prevent the progression of illness to severe dengue and deaths, which in turn will also help to reduce the number of patients that need to be referred to hospitals, thus avoiding saturation of these facilities as well as the intensive care units.
- At the same time, all secondary and tertiary level hospitals should be prepared to manage severe dengue cases.
- Consider development and implementation of protocols for clinical management of acute febrile illness, based on a scenario of co-circulation of arboviral diseases, vaccine-preventable diseases (e.g. measles), COVID-19 and other respiratory viruses (e.g., influenza).
- Although human-to-human transmission through direct contact is not related to dengue fever, it is important that health care workers be aware of infection prevention and control measures and compliance to standard precautions¹ during the provision of care.

¹ Standard precaution: a set of practices that should be implemented during the care of patients in any health facility or where care is provided. These practices include hand hygiene, rational use of personal protective equipment, safety injections practice, sterilization and disinfection of medical devices, waste management, and environmental cleaning. For more information, see Pan American Health Organization. Prevention and control of healthcare-associated infections. Basic Recommendations. Washington, D.C.: PAHO; 2018. Available at: <https://iris.paho.org/handle/10665.2/34570>, access date May 21, 2020.

Vector control: Source reduction of mosquito breeding sites and adult control measures should be implemented in areas affected by or at risk of dengue.

- Under the present situation, even during lock-down, households should be encouraged to work together in and around their homes to get rid of stagnant water, reduce solid wastes and to ensure proper covering of all water storage containers. This can be done as a weekly family activity.
- In areas not under lock-down, vector control measures targeting the larvae and the adult mosquitoes need to be implemented and vector control staff should use PPE while carrying out community-based control measures with social distancing.
- Vulnerable groups (elderly, pregnant women, infants and the sick) should be encouraged to use insect repellents and intersectoral coordination should be initiated to get more support from non-health sectors.
- Additional vector control measures such as larvicide, targeted IRS and indoor space spraying can be used to control dengue outbreaks depending on the resources, capacity and action plans developed at the local level (details are given below).
- Spatial application of insecticides (fogging) is necessary with the aim of rapidly eliminating the adult mosquito population and reducing dengue transmission, and WHO prequalified insecticides are recommended (5), and preferably based on evidence of susceptibility of the local population of *Aedes* to the applied products. Indoor Ultra low volume fogging can be used to reduce the use of insecticides and target the intervention.
- The intradomicile application or targeted indoor residual spraying should be selectively directed at resting places of the *Aedes aegypti*, such as under furniture and on dark, wet surfaces (6). Precautions must be taken not to fumigate storage tanks for drinking and cooking water. This intervention in treated areas is effective for period of up to 4 months; and can be used in health centres, schools and places of worship.

Community involvement: All efforts should be made to get community support for the prevention of both COVID-19 and dengue.

- Simple IEC materials can be shown through the media (including social media) for both diseases where possible, in view of the lock down.
- Since people are recommended to stay in their homes during the lockdown periods, households should be encouraged to eliminate mosquito breeding sources, both domiciliary and peri-domiciliary.
- Highly productive mosquito breeding sites such as water storage containers (drums, overhead tanks, mud pots etc.) should be targeted for prevention of breeding. Other breeding sites such as roof gutters and other water holding containers should also be cleaned periodically.
- Local teams regularly know how to make this information more effective, and sometimes national campaigns and messages are not as effective as local initiatives.
- In areas where schools and colleges have resumed classes, special sessions should be devoted for awareness drive for COVID-19 and dengue prevention. Media campaigns can continue for dengue prevention and control of *Aedes* mosquito breeding.

Conclusion: The temporal coincidence in several countries implies the two outbreaks may happen during the same period with possible co-infections with both viruses leading to overlap of symptoms, misdiagnosis and case management. Efforts must be made to lower the population of mosquitoes prior to the onset of rains and this should result in lowering the number of dengue cases during the peak season.

References cited:

1. Pan American Health Organization. *PLISA Health Information Platform for the Americas: Dengue cases*. Washington, D.C.: PAHO; 2020. Available from: <https://www.paho.org/data/index.php/en/mnu-topics/indicadores-dengue-en/dengue-nacional-en/252-dengue-pais-ano-en.html>. [Accessed 15th May 2020].
2. Pan American Health Organization. *Integrated Management Strategy for Dengue Prevention and Control in the Region of the Americas*. Washington, D.C.: PAHO; 2018. Available from: <https://iris.paho.org/handle/10665.2/34860>. [Accessed 15th May 2020].
3. Yan G, Lee CK, Lam LT, Yan B, Chua YX, Lim AY, et al. Covert COVID-19 and false-positive dengue serology in Singapore. *The Lancet Infectious Diseases*. 2020;20(5):536.
4. Pan American Health Organization. *Dengue: guidelines for patient care in the Region of the Americas*. 2. ed. Washington, D.C.: PAHO; 2016. Available from: <https://iris.paho.org/handle/10665.2/31207>. [Accessed 15th May 2020].
5. World Health Organization. *Prequalification Vector Control*. 2020. Available from: <https://www.who.int/pq-vector-control/prequalified-lists/en/>. [Accessed 15th May 2020].
6. Pan American Health Organization. *Manual for Indoor Residual Spraying in Urban Areas for Aedes aegypti Control*. Washington, D.C.: PAHO; 2019. Available from: <https://iris.paho.org/handle/10665.2/51637>. [Accessed 15th May 2020].