Prevention of Mosquito-borne Diseases

July 2019
- Common mosquito-borne diseases
- Prevention of mosquito-borne diseases
  - Work of the Government
  - Elimination of Mosquitoes
  - Personal Protection
Mosquito-borne Diseases

- Common diseases
  - Dengue fever
  - Japanese encephalitis
  - Malaria
  - Zika virus infection

- Others
  - Chikungunya fever, West Nile virus infection, Yellow fever
Dengue Fever
Dengue Fever

- **Causative agent**
  - Dengue viruses
  - encompass 4 different serotypes
  - Each of which can lead to dengue fever and severe dengue (also known as 'dengue haemorrhagic fever')

- **Vectors**
  - *Aedes albopictus*
  - *Aedes aegypti*

Source of photo: Food and Environmental Health Department
Dengue Fever - Habitual Behaviour of Aedes Albopictus

- Usually breed in stagnant water
- Usually active in dark or shaded places outdoors, but indoor activity is also possible
- Distance of flight: less than 100 meters
- Most active: 2 hours before sunset (5 - 6pm) and then morning (8 - 9am)
Dengue Fever - Mode of Transmission

- Transmitted to humans through the bites of infective female Aedes mosquitoes

- When a patient suffering from dengue fever is bitten by a vector mosquito, the mosquito is infected and it may spread the disease by biting other people

Incubation Period: 3 to 14 days (Commonly 4 to 7 days)
Dengue Fever - Mode of Transmission

- Cannot be spread directly from human to human
- In Hong Kong, dengue fever is mainly spread by *Aedes albopictus*
- *Aedes aegypti* has not been found in recent years
**Dengue Fever - Clinical Features**

- High fever
- Severe headache
- Pain behind the eyes
- Muscle and joint pain
- Nausea and vomiting
- Swollen lymph nodes
- Rash
Dengue Fever - Clinical Features

- Some infected people may not have obvious symptoms

- Some may only have mild symptoms like fever
  - Or have non-specific febrile illness with rash
Dengue Fever - Clinical Features

- Symptoms of first infection
  - usually mild
  - Once recovered, lifelong immunity to that serotype of dengue virus will develop

- Subsequent infections with other serotypes of dengue virus are more likely to result in severe dengue
Severe Dengue

- A complication of dengue fever
- Severe and potentially fatal
- Initially, there are non-specific symptoms of dengue fever
  - high fever, which lasts for 2 – 7 days and can be as high as 40 – 41°C
- Later, there may be bleeding tendency:
  - such as skin bruises, nose or gum bleeding, and possibly internal bleeding
- In severe cases:
  - circulatory failure, shock and death
After Recovery

- Immunity is attained against that serotype from its subsequent infection

- **No** effective protection is conferred against subsequent infection by the other 3 serotypes
Dengue Fever - Management

- There is no specific medication for dengue fever and severe dengue.
- Dengue fever is mostly self-limiting.
- Symptomatic treatment is given to relieve discomfort like fever and pain.
- Patients with severe dengue need to be treated promptly with supportive management, with appropriate and timely treatment, death rate is less than 1%.
For more information about Dengue Fever

- Please visit the Centre for Health Protection website
Japanese Encephalitis
Japanese Encephalitis

- **Causative agent**
  - Japanese encephalitis virus

- **Vector**
  - *Culex tritaeniorhynchus* (most active from dusk till dawn)
Japanese Encephalitis – Mode of Transmission

- The mosquito breeds where there is abundant water such as rice paddies.
- Becomes infected by feeding on pigs or wild birds infected with the virus. The infected mosquito transmits the virus to humans and animals during biting. Within 4 - 14 days, infected mosquitoes bite healthy individuals, transmitting the virus.
Japanese Encephalitis - Mode of Transmission

- While Japanese encephalitis is principally mosquito-borne, a human case of Japanese encephalitis transmitted by blood transfusion was recorded in Hong Kong.
- In addition, overseas scientific literature showed that organ transplant is also considered to be a potential mode of transmission.
Japanese Encephalitis - Clinical Features

- Most infections occur without apparent symptoms or with mild symptoms such as fever and headache.
- More severe infection is characterised by rapid onset of headache, high fever, neck stiffness, impaired mental state, coma, tremors, convulsions (especially in children) and paralysis.
Japanese Encephalitis - Management

- There is no specific treatment for this disease
- Supportive therapy is the mainstay of treatment
- The case-fatality rate can be as high as 30% among those with symptoms
- Of those who survive, 20% – 30% suffer permanent intellectual, behavioural or neurological problems such as paralysis, recurrent seizures or inability to speak
Japanese Encephalitis - Vaccination

- Vaccination for Japanese encephalitis is available in Hong Kong
- Generally not recommended for members of the general public
Japanese Encephalitis - Vaccination

- Vaccination is recommended for travellers who plan to stay one month or longer in endemic areas, particularly in rural areas.

- Short-term (less than one month) travellers if they plan to have significant extensive outdoor or night-time exposure in rural areas during the transmission season of the disease should also receive vaccination.
For more information about Japanese Encephalitis

- Please visit the Centre for Health Protection website

Malaria
Malaria

- **Causative agent**
  - A group of malaria parasites

- **Vector**
  - Anopheline mosquito
Malaria - Mode of Transmission

- When the Anopheline mosquito bites a malaria patient, the mosquito becomes infected and will pass on the disease when it bites another person.
- Malaria is not transmitted from person to person.

7 - 30 days later

Infected person  →  Healthy person  

Infected mosquito
Malaria - Mode of Transmission

- Can be transmitted through contaminated blood or blood product transfusion, organ transplant, or shared needles or syringes

- May also be transmitted from a mother to her foetus/newborn baby before or during delivery
Malaria - Clinical Features

- Fever
- Chills
- Headache
- Muscle pain and weakness
- Cough
- Vomiting
- Diarrhoea and abdominal pain
Malaria - Complications

- Include anaemia, generalised convulsion, circulatory collapse, organ failure such as kidney failure, coma and death if the disease is not treated promptly.
- Malaria infection during pregnancy can have adverse effects on both the mother and the foetus.
- Therefore, pregnant women should not visit malarious areas unless this is absolutely necessary.
Malaria - Management

- There are effective drugs against malaria
- Early diagnosis and prompt treatment are crucial
- Doctor would prescribe a course of anti-malarial drugs with other supportive measures
- Patient should complete the whole course of medication to ensure clearance of the malaria parasites
Malaria - Vaccination

- There are currently no registered vaccines against malaria in Hong Kong
Malaria –
Special Notes when Travelling Abroad

- If travel to areas where malaria is common, arrange a consultation with doctor at least 6 weeks before the trip for preventive measures and obtain *anti-malarial drugs for prophylaxis* if necessary

- Should start taking the drugs before the trip, continue throughout the journey and until some time after leaving the area
For more information about Malaria

- Please visit the Centre for Health Protection website
  https://www.chp.gov.hk/en/healthtopics/content/24/30.html
Zika Virus Infection
Zika Virus Infection

- **Causative agent**
  - Zika virus

- **Vectors**
  - *Aedes albopictus*
  - *Aedes aegypti*
Zika Virus Infection - Mode of Transmission

- Zika virus is mainly transmitted to humans through the bite of an infected Aedes mosquito.

- *Aedes aegypti*, which is currently not found in Hong Kong, is considered the most important vector for Zika virus transmission to humans.

- Other *Aedes* mosquito species such as *Aedes albopictus* which is commonly found in Hong Kong are also considered as potential vectors.
Zika Virus Infection - Other Mode of Transmission

Sexual transmission

- Zika virus has also been found in human semen and transmission by sexual contact has been confirmed
- Sexual transmission of Zika virus between men who have sex with men has been documented in the literature
Zika Virus Infection - Other Mode of Transmission

- Other modes of transmission such as blood transfusion and perinatal transmission are possible
Zika Virus Infection - Clinical Features

- Most Zika virus infection is asymptomatic (i.e. no symptoms)
- The incubation period of Zika virus infection ranges from 3 - 14 days
- Include skin rash, fever, conjunctivitis, muscle or joint pain and general malaise. These symptoms are usually mild and last for a few days
Zika Virus Infection

- The current major concern is the association with adverse pregnancy outcome (microcephaly) and neurological and autoimmune complications such as Guillain-Barré syndrome (GBS)
Zika Virus Infection

- The World Health Organization has concluded that Zika virus infection during pregnancy is a cause of congenital brain abnormalities, including microcephaly, and that Zika virus is a trigger of GBS.

- Apart from GBS, acute disseminated encephalomyelitis (a disease of the central nervous system) was found to be one of the neurologic manifestations possibly resulted from Zika virus infection.
Zika Virus Infection - Management

- There is **no** specific medication for Zika virus infection
- Mainstay of treatment is symptomatic relief and prevention of dehydration
- If symptoms worsen, patients should seek medical care and advice
Zika Virus Infection – Vaccination

- At present, there is no effective vaccine against Zika virus infection
Zika Virus Infection - Special Notes when Travelling Abroad

- If going to areas with Zika virus transmission (affected areas), travellers, especially persons with immune disorders or severe chronic illnesses, should arrange a consultation with doctor at least 6 weeks before the trip.

- Take extra preventive measures to avoid mosquito bites.
During the trip, if travelling in rural affected areas, carry a portable bed net and apply permethrin (an insecticide) on it.

Permethrin should NOT be applied to skin.

Seek medical attention promptly if feeling unwell.
Zika Virus Infection - Returning from affected areas...

- Travellers who return from affected areas should apply insect repellent for at least 21 days after arrival in Hong Kong

- If feeling unwell e.g. having fever, should seek medical advice promptly, and provide travel details to doctor
Zika Virus Infection - Prevention of Sexual Transmission*

A. Travellers should consider not having sex during travel to affected areas, or else condom should be used.

B. Male and female travellers returning from affected areas should abstain from sex for at least 3 months and at least 2 months respectively upon return, or else condom should be used.

C. Pregnant woman should not have sex with her partner who had travelled to affected areas, or else condom should be used throughout the pregnancy.

Women preparing for pregnancy should note Points A and B above. If they or their male sex partners plan to travel to affected areas, they should consult their doctors for advice on the risk.

* This precautionary measure may be revised as more information becomes available. Individuals with further concerns regarding potential sexual transmission of Zika virus should contact their doctor for advice.
Zika Virus Infection -
Special Notes for pregnant women

- Pregnant women **should not** travel to areas with Zika virus transmission

- Use of mosquito repellent containing DEET during travel and returning from these areas for a period of **at least 21 days** are advised for all travellers including pregnant women
Zika Virus Infection – Pregnant women are advised to

- Attend antenatal follow up regularly and tell the attending doctor history of recent travel
- Observe for symptoms of Zika virus infection and seek medical advice as soon as possible if feeling unwell
- Abstain from sex with her partner who had travelled to affected areas, or else condom should be used throughout the pregnancy
For more information about Zika Virus Infection

- Please visit the Centre for Health Protection website
Prevention of Mosquito-borne Diseases
Work of the Government

- Effective prevention of mosquito-borne diseases relies on the support and cooperation of both public and private sectors with the government.
Publicity and Health Education

- Provide health education on personal protection against mosquito-borne diseases for general public
- Publicise personal protection against mosquito-borne diseases for travellers
- Latest updates on mosquito-borne diseases for healthcare workers through periodicals, mails and internet
Disease Surveillance

- Dengue fever, Japanese encephalitis, Malaria and Zika virus infection have all been listed as a statutory notifiable disease
- Established a web-based Central Notification Office (CENO On-line) to facilitate disease surveillance
Disease Surveillance

- Contact tracing, epidemiological investigations on disease outbreaks
- Liaise with relevant departments, e.g. Food and Environmental Department for following up control measures
- Collaborate with other departments and Hospital Authority in formulating response measures to prevent local spread of mosquito-borne diseases
Disease Surveillance

- Maintain close liaison with nearby regions and oversea countries
- Make announcement to general public on reported cases and disease situation of nearby regions and remind public of preventive measures
The **most effective way** to prevent mosquito-borne diseases is to:

- Keep the environment clean
- Remove stagnant water
- Prevent breeding of mosquitoes
- Prevent mosquito bites
Mosquito Elimination Checklist (1)

- Are containers and other items where water could accumulate disposed of properly? (e.g. throwing empty cans, foam rubber boxes, cups and bottles into a covered bin)

- Are water containers covered properly?
Mosquito Elimination Checklist (2)

- Are ditches free from blockage?
- Are containers with stagnant water cleaned regularly? (For examples, vases, saucers underneath flower pots, water storage device of an air-conditioner, water tanks and pools)
- Are uneven ground surfaces filled to prevent the accumulation of stagnant water?
Remove Stagnant Water

- Change the water in vases at least once a week
- Avoid using saucers underneath flower pots
- Cover water containers tightly
- Ensure air-conditioner drip trays are free of stagnant water
- Put all used cans and bottles into covered dustbins
Prevent Breeding of Mosquitoes

- Store food and dispose of garbage properly
Prevent Breeding of Mosquitoes

- Cover all water containers, wells and storage tanks tightly
Prevent Breeding of Mosquitoes

- Remove or puncture any dumped tyres to prevent the accumulation of stagnant water
Prevent Breeding of Mosquitoes

- Keep ditches free from blockage
Prevent Breeding of Mosquitoes

- Remove stagnant water immediately if mosquitoes are found to be breeding
- Use environmentally friendly insecticides such as lavicidal oil if necessary
Prevent Breeding of Mosquitoes

- Top up all defective ground surfaces
Prevent Breeding of Mosquitoes

- In cultivation ponds, water tanks or large containers, biological controls such as keeping fishes to eat mosquito larvae would be a good option.
Elimination of Mosquitoes at Home

- Dispose of domestic wastes, empty bottles, cans and lunch boxes properly into a covered bin to prevent the accumulation of stagnant water.
Prevent Mosquito Bites – Personal Protection

- Wear loose, light-coloured, long-sleeved tops and trousers, and use DEET-containing insect repellent on exposed parts of the body and clothing
- Use mosquito screens or bed nets when the room is not air-conditioned
- Place anti-mosquito devices near entrances such as windows and doors
If Travelling in Rural Affected Areas...

- Carry a portable bed net and apply permethrin (an insecticide) on it
- Permethrin should NOT be applied to skin
- Seek medical attention promptly if feeling unwell
Preventive Measures While at Outdoors

Take additional preventive measures when engaging in outdoor activities:

- Avoid using fragrant cosmetics or skin care products
- Re-apply insect repellents according to instructions
Tips for using insect repellents

- Pregnant women and children of 6 months or older can use DEET-containing insect repellent.

- For children who travel to countries or areas where mosquito-borne diseases are endemic or epidemic and where exposure is likely, children aged 2 months or above can use DEET-containing insect repellents with a concentration up to 30%.

- For details about the use of insect repellents and the key points to be observed, please refer to ‘Tips for using insect repellents’ at: https://www.chp.gov.hk/en/features/38927.html.
If Having Symptoms...

- Having been bitten by a mosquito and displaying symptoms afterwards; or
- If feeling unwell after returning from affected areas e.g. having fever
- Should seek medical advice promptly, and provide travel details to doctor
Enquiries / Websites

- Centre for Health Protection, Department of Health
  Website: [www.chp.gov.hk](http://www.chp.gov.hk)

- Travel Health Service, Department of Health
  Website: [www.travelhealth.gov.hk](http://www.travelhealth.gov.hk)

- 24-Hour Health Education Hotline, Department of Health
  ☎ 2833 0111

- Food and Environmental Hygiene Department
  ☎ 2868 0000 or ☎ 1823
  (Both are 24-hour hotlines handled by “1823”)
  Website: [www.fehd.gov.hk](http://www.fehd.gov.hk)
Elimination of mosquitoes is the most effective preventive strategy

Let’s remove stagnant water and eliminate mosquitoes
Thank you!