NEW PARADIGM FOR DENGUE SURVEILLANCE

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Current Surveillance System

- Aedes larval survey
- Case investigation
- Health Education
- COMBIE
- DDBIA
- Entomological
- Epidemiological
- Community participation
- Enforcement
Gaps in Dengue Surveillance

• House to house larval surveys has been the hallmark of Aedes surveillance
• Lack of evidence on the most feasible, sustainable, and cost-effective approach
• Lack of sensitive, reliable and simple field methods for vector surveillance
• Lack of evaluation of current control methods of vectors
New Strategies for Vector Control

- RIDL
- Outdoor residual spraying
- Auto dissemination ovitraps – to disseminate IGR
- Wolbachia
OXITEC’s RIDL Technology

Stock colony supplied with tetracycline

Select males for release

Transgenic female
Transgenic male
Field female

Dead Larvae

In the absence of tetracycline
The discovery that A. aegypti transinfected with the wMel strain of Wolbachia showed limited DENV replication

IMR has embarked on a study; time frame is around 5 years

Positive and Negative Aspects of Ovitraps

Positive

Cheap & easy to use
Sensitive measure of presence & absence

Negative

Indirect measure of adult population
Allows infected mosquito to lay eggs and continue to transmit
Surveillance System

- To provide an early warning of an impending dengue epidemic

- Surveillance results can alert public to take action

- Physicians to diagnose and treat DF/DHF cases
New Paradigm

- Target the adult mosquito
- Surveillance
- Control
GOS Trap
Rapid Detection of Dengue Virus in Mosquitoes

Lee et al (2013). AMJTMH 88:888-892
• Study site Mentari Court apartments situated in Petaling District.

Mentari Court Apartment
• 7 block plus 3 Podium Car Park
• Able to detect the infected *Aedes* mosquito before a case is reported

• Silent transmission is occurring from humans to mosquitoes
Three-dimensional plot of cases along NS1-positive mosquitoes and lags, with reference at none NS1-positive detected

Cases occurred after a lag of one week after NS1-positive mosquito pool was detected, but peaked at 2 weeks lag

43 pools of *Ae. aegypti* positive MIR 53.5 per 1000
Recent Research

Asymptomatic humans transmit dengue virus to mosquitoes


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Significance

Our work provides evidence that people who are infected with dengue virus without developing detectable clinical symptoms or prior to the onset of symptoms are infectious to mosquitoes. At a given level of viremia, symptom-free people were markedly more infectious to mosquitoes than clinically symptomatic patients. Our results fundamentally change the current paradigm for dengue epidemiology and control, based on detection of dengue virus-infected cases with apparent illness.
Asymptomatic Cases of Dengue

- Asymptomatic cases are more infectious to mosquitoes compared to dengue patients
- Fogging is usually carried out after a case has been reported
- A single infected *Aedes* mosquito can transmit dengue virus to three people during one blood meal
A new paradigm for *Aedes* spp. surveillance using gravid ovipositing sticky trap and NS1 antigen test kit

Sai Ming Lau, Tock H. Chua, Wan-Yussof Sulaiman, Sylvia Joanne, Yvonne Ai-Lian Lim, Shamala Devi Sekaran, Karuthan Chinna, Balan Venugopalan and Indra Vythilingam

We have provided initial evidence to show a simple field method for Vector surveillance
Thus need to move forward to the next step - RCT
War Against Mosquito

• Why mosquito is winning?

• Who is to be blamed?

• What should be our next steps?
Conclusion

1st
• An early warning system
• Take action when positive mosquito is obtained

2nd
• Carrying out fogging when a case has been reported is too late
• Reduction in ovitrap index or adult density is not an indicator that the method used is successful

3rd
• Should show that cases of dengue have been reduced
• Randomised control trial needs to be carried out
Collaborators

Selangor Health Dept.
Thank You