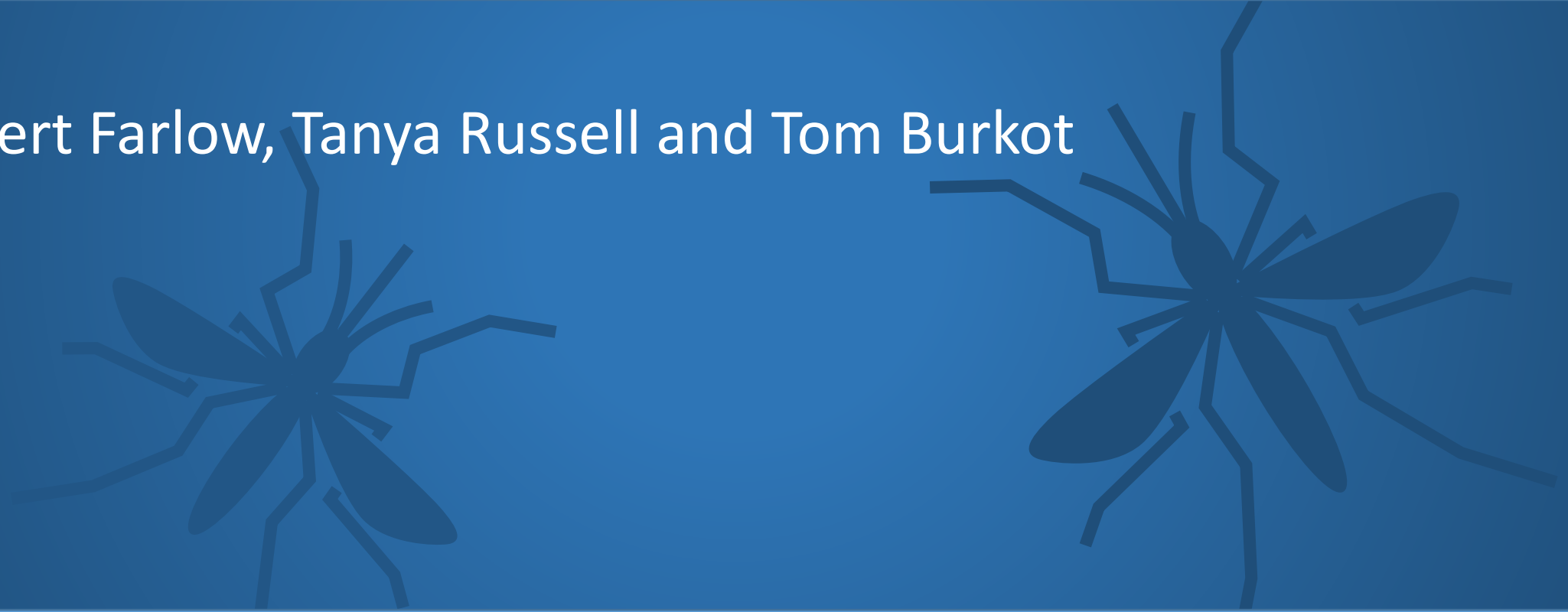


Nextgen tools to improve NMCP vector surveillance

Robert Farlow, Tanya Russell and Tom Burkot



The Road Ahead: Priorities for New Techniques*

Identified by Malaria Research and Control Community



1. **Human Landing Catch replacement** → to determine biting rates
2. **Age grading mosquitoes** → requires new methods
3. **Surface active ingredient detection** → requires quantitative non-bioassay method
4. **Field applicable rapid assays** (such as RDTs) for →
 - a. Species identification
 - b. Insecticide resistance and resistance mechanisms
 - c. Sporozoite infections
5. **Automated multiple parameter analyses** for →
 - a. Adult density, species ID, IR status and sporozoite infection
 - b. Characterize larval habitats - Remote sensing (drone or other)

*for TPP Development

(N = 40 interviews:
NMCP/MOH, IVCC, University, i2i, and CDC)

Surveillance tools used for adult mosquitoes

Tool category ^a	Entomological outputs ^b		Operational Logistics ^c			
	Range of indicators	Effective-ness	Labour	Costs	Training/ Ease of use	Supplies
Human landing catch	■	■	■	■	■	■
CDC light trap	■	■	■	■	■	■
Human-baited trap	■	■	■	■	■	■
Animal-baited trap	■	■	■	■	■	■
Other traps	■	■	■	■	■	■

- Effective or advantageous
- Moderate
- Ineffective or had major limitations

Draft TPPs for NextGen surveillance tools

Surveillance

Effective adult sampling (alternative to HLC)

Automated traps (collect, count and identify to species)

Quantitative larval sampling

Analytical techniques

Age grading of adult *Anopheles* specimens

RDT to identify *Plasmodium* in *Anopheles* specimens

Test for insecticide resistance in adult mosquitoes

Quality Assurance

Quantification test for surface active ingredients

*As identified by the malaria control and research community

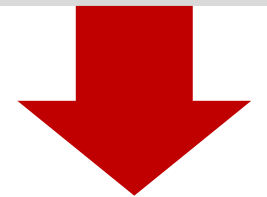
Biology knowledge gaps to optimize NextGen surveillance*

INFORMING SURVEILLANCE DEPLOYMENT

1. Adults
 - a. Following vectors between blood feeding sites and oviposition sites
 - b. Outdoor resting site characterization
2. Larvae- habitat characterization (markers for larval presence/potential)

OPTIMIZING NEW SURVEILLANCE TOOLS

1. Attractants for use in traps
 - a. Carbon dioxide replacements
 - b. Human odors and other blood seeking lures
 - c. Oviposition attractants
2. Genomic sequence data for all major vectors for all regions



**Next
Gen**

*As identified by the malaria control and research community

Data collection/translation/interpretation

1. Algorithms

- a. Deployment for **representative sampling**
- b. Defining /stratifying **receptivity**
- c. Correlating insecticide resistance data to Intervention impact
 - i. Bioassay data
 - ii. Genetics data
- d. Understanding how hut data related to efficacy at scale

2. Translation of surveillance data

- a. Trap data /biting rates to population estimates
- b. Larval habitat productivity/receptivity



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Further information

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RESEARCH

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Nextgen Vector Surveillance Tools: sensitive, specific, cost-effective and epidemiologically relevant



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KEY POINTS

Vector surveillance needed to preserve the effectiveness of present control strategies and to stratify intervention deployment

Vector Surveillance

- **Quick win:** Use the data being collected
- The need for local data to guide control will increase as control options increase

Improved vector surveillance needs:

- Increasing the capacity and efficiency of entomology staff
- High level advocacy for vector surveillance
- Expanding the number of surveillance indicators being measured

NextGen surveillance methods:

- Have the potential to overcome some capacity and efficiency limitations
- Vector data needs to be epidemiologically relevant



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