Spatial repellents: Roadmap to global recommendation of spatial repellents for public health use

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Spatial Repellents & Disease Control

Continuous release of active ingredient over time and space

Added Value
Addresses daytime, early-evening and indoor/outdoor vector biting

Varied modes of action

Innovation
New actives, alternate target sites, exploitation of post-exposure effects
Closing the Knowledge Gap on SR Public Health Value
Large-Scale Clinical Trials

Coils vs Control = 77-80% PE (p<0.001)

Coils vs Control = 60% PE (p<0.05)
Passive Emanator – Transfluthrin* (2 week Duration)

*Transfluthrin is one of six registered ‘spatial repellent’ compounds commonly found in commercially available mosquito control products globally based on WHO specifications. The U.S. Environmental Protection Agency (EPA) recently approved transfluthrin products for indoor use (2018).
Sumba Island, Indonesia - Primary Outcomes

16.4% and 11.3% reduction in anopheline attack rate indoors and outdoors, respectively.

Incidence (Time to First Infection)

- Up to 65.6% PE (p < 0.001) in overall infection (first and all subsequent) in clusters with entomology collections.

- 27.7% PE p = 0.151
- 33.3% PE p = 0.083
- 55.3% PE p = <0.0004
Iquitos, Peru - Primary Outcomes

A 28.6% reduction in indoor adult *Ae. aegypti* female mosquito abundance, significantly different than control.

34.1% PE (p=0.0236) against ABV infection in subjects susceptible to Zika or wholly susceptible or monotypic to DENV
Trial Outcomes – WHO Public Health Value Assessment

*Recommendations from Indonesia and Peru trials Posted in 10th and 12th VCAG Meeting Reports*

“...the [Indonesia trial] shows promising results [malaria] but was underpowered for demonstrating clear protective efficacy ... there is a pressing need for further evidence.”

“VCAG concludes results provide convincing evidence of protective efficacy ... this study fulfils the criteria for one of the two epidemiological trials required for assessment of the public health value of spatial repellents against Aedes-borne viruses.”
This project is made possible thanks to Unitaid funding and support. Unitaid finds new ways to prevent, treat and diagnose HIV/AIDS, tuberculosis and malaria more quickly, more cheaply and more effectively. It identifies innovative health solutions that show promise and invests in them to establish their viability so that partner organisations can then make them widely available. Unitaid addresses innovation barriers by supporting an integrated approach to health, accelerating the development and market introduction of better health products and by influencing the dynamics of the innovation landscape to benefit people in low resource settings.
Intervention – ‘MOSQUITO SHIELD™’ (4 week Duration)
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Mali Trial

Sikasso Region, Kolondieba District
Issaka Sagara, Suzanne Van Hulle et al.

**Study Site:** Malaria transmission rates 205/1000 population in 2018 (Pf prevalence 29.7%). Documented resistance to pyrethroids, carbamates, organochlorines, organophosphates.

**Epidemiology** - 60 clusters (30 SR / 30 Placebo). Total of 1,920 subjects, 24mo follow up. Single cohort (>6 mo-10 yrs) with intervention for estimates of PE.

**Entomology** – 20 clusters (10 SR / 10 Placebo) to estimate impact of the SR on entomological measures using monthly CDC-Light Trap (indoor density) (indoor density) and quarterly indoor / outdoor human landing catches (HLC) in 12 clusters (6 SR /6 Placebo).

In Month 8 of a 24 month follow-up.

*Final analyses of protective efficacy anticipated Mar 2024*

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Sri Lanka Trial

Gampaha District, Negombo, Wattala and Kelaniya MoH Areas
Hasitha Tissera, Anoja Dheerasinghe et al.

Study Site: Force of primary infection of 0.141 (case range 300-708 in 2018).


Entomology - All participating houses will be monitored entomologically using Procopak aspiration to capture indoor *Aedes aegypti* prior to deployment and then 1x month during intervention to estimate impact on *Ae. aegypti* population densities and blood fed status.

*Cluster mapping and delineation completed*


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Operational Use Trial
Bidibidi Refugee Camps in Yumbe, Uganda
Suzanne Van Hulle, Momar Mbodji et al.

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_Epidemiology –_ 3 study arms:

- **Reference Arm - Study Team**
  Delivered – 16 clusters
- **Community Health Worker Delivery**
  – 16 clusters
- **Voucher System** – 16 clusters
- **GOAL** – determine the most appropriate delivery method for rapid roll out.

_Design:_ Evaluate the protective efficacy (PE) of spatial repellent (SR) on malaria in pregnant women and children under five.

*Trial awaits a green light based on Kenya interim analysis*

Anticipated completion by Q4 of 2024*
Advancing SR Products Towards Public Health Use

2014-2019
- Sealed film that emanates once opened, for a 2-week duration of protection indoors.
- Product evaluated in clinical trials in Indonesia and Peru.

2019-Present
- Improved version of 2-week product that provides 1-month of protection indoors.
- Currently being evaluated in clinical trials in Kenya, Mali, and Sri Lanka.
- Both malaria trials scheduled to be completed by March of 2024.

Next Steps
- Awaiting green light for operational trials to be conducted in displaced person camps in Uganda.

Optimal distribution channels and cost-effective for operational implementation.
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