Building Partnerships

Creating Solutions

Saving Lives

IVCC Strategic Framework: ‘End to End’ Product Development

- New public health insecticides with novel modes of action
- Long lasting IRS formulations and dual active ingredient LLINs
- Solutions blocking outdoor disease transmission

Building stakeholder partnerships
Improvements in the reliability and consistency laboratory and field data
Improved and efficient application technology for IRS
Integrated Vector Management, Insecticide Resistance Management and Integrated interventions

Access, Delivery and Market Shaping

IMPACT
IVCC Access Objectives

• **Minimising time to optimal impact**
  - Regulatory and normative process (I2I)
  - Market Analysis and Intervention (NgenIRS and NNP)

• **Supporting evidence and impact based deployment of innovative vector control technologies**
  - Creating the evidence of impact and cost effectiveness (NgenIRS and NNP)
  - Modelling Tools and Data for Country and Global level decision making (Imperial College malaria tools development)
  - Supporting the case for Global funding of new vector control products (Economic models of the costs and impact)

• **Effective and sustainable management of products as Insecticide Resistance Management tools**
  - Supporting creation of Policy, Guidelines and Standard Operating Procedures (Providing evidence and implementation experience)
  - Sustainable management of the New AIs (Stakeholder Alliance for Resistance management)

• **Sustaining vector control innovation**
  - Sustainable Global Access Plans (Binding partner agreements)
  - Robust competitive markets (NgenIRS and NNP providing market pull)
  - Sustainable Target Product Profiles (Feedback from field experience to product design)
Next Generation IRS (NgenIRS)

Programmatic Update
Reversing the Spiral: Next Generation IRS

The Market for 3rd Generation IRS
Underlying Causes of Shortcomings

- High Price
  - Weak evidence of Impact / Cost Effectiveness
- Low Uptake / small market
  - No Forecast / Long Lead times
- One Supplier

Market Shaping Intervention

- Reduce Price
  - Complete evidence of Impact and Cost Effectiveness
- Increase Uptake / coverage
  - Forecast and underwrite Demand
- Multiple Suppliers
## Next Generation IRS Project

<table>
<thead>
<tr>
<th>Demand</th>
<th>Accelerate uptake of 3GIRS products</th>
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<td>Market stability</td>
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**What we do in PARTNERSHIP**

The NgenIRS project is a 4 year Unitaid-funded market shaping initiative

- Launched early 2016
- Investment of $65.1 million

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**Goal**

Increased use of 3GIRS products in Insecticide Resistance Management (IRM) programmes

**Outcome**

A sustainable, growing and competitive market for effective 3GIRS products at affordable prices
### Next Generation IRS Project Accomplishments

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- **Downward market trend reversed with over 30 countries procuring 3GIRS with donor and domestic funding**

- **Development of global forecasting tool provides manufacturers with the ability to plan better and reduce costs**

- **From only 1 product in 2016 to 3 products with two more in the pipeline**

- **Prices reduced from over $23 per unit to an average about $16 and trending to $15 or less by 2020**

- **Compelling evidence showing impact and cost-effectiveness of IRS in combination with LLINs and MDA**
Reversing the Downward Trend in IRS Demand

Estimated IRS insecticide volumes procured in Africa
2010 - 2017

* Assumes an average of 8 people protected per unit of IRS; Data source: WHO and consultation with NMCPs and implementation partners

*Possible People Protected*
Cumulative impact estimates: 2016-2018

Co-payment Partner Coverage Expansion

<table>
<thead>
<tr>
<th>Year</th>
<th>People protected by NgenIRS copaid volumes</th>
<th>Possible people protected with same budget at full price</th>
<th>Possible increase in people protected thru NgenIRS</th>
<th>% increase in people protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>5,917,099</td>
<td>3,786,730</td>
<td>2,130,369</td>
<td>56.3%</td>
</tr>
<tr>
<td>2017</td>
<td>25,441,963</td>
<td>15,422,057</td>
<td>10,019,906</td>
<td>65.0%</td>
</tr>
<tr>
<td>2018*</td>
<td>30,572,979</td>
<td>20,322,263</td>
<td>10,250,715</td>
<td>50.4%</td>
</tr>
<tr>
<td>totals</td>
<td>61,932,041</td>
<td>39,531,051</td>
<td>22,400,990</td>
<td>56.7%</td>
</tr>
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</table>

An additional 14 million people are estimated to have been protected by 3GIRS procured at NgenIRS negotiated volume discount pricing during the same 3 year period.

* 2018 Coverage data are estimates pending final reporting
NgenIRS Public Health Impact

61.9 Million people
Estimated number of people protected throughout Africa by IRS programs receiving NgenIRS co-payment support (2016-2018)

Between 2.6 and 5.2m malaria cases averted
Between 7,900 and 15,800 lives saved
Estimated number of cases averted and lives saved by IRS programs receiving NgenIRS co-payment support (2016-2018)

11 of 14 NgenIRS partner countries are planning to spray multiple 3GIRS products in 2019
Evidence Base Being Established to Show Impact and Cost-effectiveness of 3GIRS

- Cluster Randomized Trial in Mozambique: The impact of 3GIRS in addition to standard LLINs

- 85% reduction in An. *funestus* densities in 2018
- 20% reduction in cohort incidence
- Odds of infection reduced 46% in 2018 prevalence survey
- 3rd year extension to look at SumiShield
Evidence Base Being Established to Show Impact and Cost-effectiveness of 3GIRS

- Observational (non-randomized) evidence of impact – Mali
- 2017 PMI AIRS IRS operations were shifted from Ségou region to Mopti Region

- Removal of 3GIRS from Bla District in Mali resulted in 70% increase in incidence.
- Cost of IRS in Mali’s Ségou region was estimated at $33.75 per case averted*

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Evidence Base Being Established to Show Impact and Cost-effectiveness of 3GIRS

- Use of 3GIRS associated with 26% and 47% reductions in malaria cases in Zambia and Uganda respectively.

- Retrospective analyses looking at epidemiological and entomological data will continue in Burkina Faso, Ghana, Mali, Zambia.

*Wagman et al. Malar J (2018) 17:19*
New Nets Project (NNP)

Programmatic Update
New Nets Project Scope

Current status of Dual AI LLIN Market

- Weak evidence of efficacy; high barriers to evidence creation
- Cost effectiveness data absent
- Single supplier of dual AI LLINs; pipeline hesitant
- Demand limited by policy and price
- Procurement based on coverage not impact

Outcome of the New Nets Project

- Efficacy established; entomological correlates determined
- Cost effectiveness data generated
- Pilot implementations grow market and reduce price

Next Phase TBD

- Multiple suppliers of dual AI LLIN
- Procurement targeted by cost effectiveness & resistance data for increased impact

Current status of Dual AI LLIN Market

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New Nets Project Team Roles

- IVCC Lead and Coordinator
  - Negotiations with Industry Partners,
  - Co-Payment system and contracts to reduce price.
  - COGs understanding and ability to get Industry to cooperate on COGs.
  - Links to the vector control product development pipeline.
  - Links to Ag Chem CEO forum and the ask from industry.

- PATH
  - Cost effectiveness determination from pilot implementations

- PSI
  - Technical assistance to pilot implementations

- LSHTM
  - Cluster Randomised trials of Dual AI LLINs and Entomological Correlates in trials

- Tulane
  - Cost effectiveness trials and data collection design

- Imperial College
  - Modelling of trials design and implementation impact

- LSTM
  - Entomological correlates of epidemiological Impact
New Nets Project Overview

Interceptor G2 and Royal Guard LLIN Cluster Randomised Efficacy Trials

Operational Cost Effectiveness Data from Pilots

Co-payments for Dual AI LLINs in Pilots

Volume Guarantees for New Nets (BMGF)

New Nets Project Duration 4 Years

Country Pilots

2018

• Project Startup
• Country engagement
• Pre-pilot assessment
• COGs and Market research
• RCT in Tanzania begins

2019

• 4 Effectiveness Pilots:
  - Burkina Faso
  - Mali
  - Rwanda
  - Mozambique
• RCT in Benin begins

2020

• 1 Effectiveness Pilot
• 1 Operational Pilot

2021

• 2 Operational Pilots

2022

• Repeat 2019 Pilots

2023

• Post project

Cost Effectiveness

Policy and Process evolution

Market intervention

Efficacy
# Overview of Cluster Randomized Trials

<table>
<thead>
<tr>
<th></th>
<th>Benin</th>
<th>Tanzania</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funder</strong></td>
<td>UNITAID/Global Fund via IVCC</td>
<td>The Department of Health and Social Care UK, DFID, MRC and Wellcome; top-off &amp; hut trial from BMGF</td>
</tr>
<tr>
<td><strong>Organizations Involved</strong></td>
<td>CREC/LSHTM</td>
<td>NIMR/KCMUCo/LSHTM</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>RCT with associated hut trial</td>
<td>RCT with associated hut trial</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Cove, Zagnanado, Ouinhi in Zou Department, Benin</td>
<td>Misungwi (southern Lake Victoria)</td>
</tr>
<tr>
<td><strong>Local Vectors</strong></td>
<td><em>An. gambiae</em> and <em>An. coluzzii</em></td>
<td><em>An. gambiae</em>, <em>An. arabiensis</em>, <em>An. funestus</em></td>
</tr>
<tr>
<td><strong>Dates</strong></td>
<td>Sept 2018 - Aug 2022 (1 year baseline, net distr. Dec 2019, + 2 years post-intervention)</td>
<td>Net distribution January 2019, + 2 years post-intervention</td>
</tr>
<tr>
<td><strong>Arms/Nets tested</strong></td>
<td>3 arms: Royal Guard, IG2, Interceptor</td>
<td>4 arms: Royal Guard, IG2, Olyset Plus, Interceptor</td>
</tr>
</tbody>
</table>
Benin RCT

Designed to be complimentary to Tanzania RCT to provide second data set for VCAG review of additional public health value of IG2 and Royal Guard

| Epidemiological Data | Indicators collected | 1º: malaria incidence in 6-10y  
2º: x-sectional prevalence in 6-10y, anaemia in U5s |
|----------------------|----------------------|----------------------------------|
| # of subjects        | incidence: 25 children*60 total clusters  
prevalence: 40 HH *60 total clusters |
| Frequency of collection | incidence: 2x/month for 24 m.  
prevalence: 2x total (@12m and 24m) |

| Field Entomological Data | Indicators | 2º study indicator: EIR  
mosquito density, indoor/outdoor ratio, parity rate, proportion with misshapen ovaries |
<table>
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<tbody>
<tr>
<td>Sample size</td>
<td>8 HH per cluster * 60 clusters</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>each cluster visited once/2months</td>
<td></td>
</tr>
</tbody>
</table>
| Insecticide resistance testing | frequency and intensity to perm, alpha, PPF, chlorfenapyr in 3 clusters per arm (9 total)  
screening subset for vgsc, cyp6 |

| Net Data | Indicators collected | bioefficacy via WHO cone, cylinder, or tunnel test  
chemical content by HPLC  
fabric integrity via hole counting  
net ownership/access/use |
New Net Effectiveness Pilots

- Will provide data for cost-effectiveness evaluations
- Five pilots
- Criteria for pilot country selection:
  - SSA Global Fund or PMI country – high disease burden and constrained resources
  - Documented pyrethroid resistance
  - Planned campaign in targeted year
  - Country stability and preparedness to participate in a new LLIN campaign
  - Logistics capabilities to store and distribute LLINs to the right area
  - High performing surveillance system
  - Capacity for entomological studies
  - The pilot countries are split over Africa (East, West, Central, Southern)

First pilot deployment = Burkina Faso in June 2019
In New Net Project pilot countries, upcoming mass distribution campaigns will utilize a combination of LLIN types.

- Some districts will distribute G2 LLINs
- Some districts will distribute standard LLINs
Pilot Study districts are matched in terms of:

(a) Disease burden (prevalence and reported case incidence)

(b) Vector species composition

(c) Insecticide resistance profile
In each pilot district (IG2 and Standard LLIN comparator), enhanced surveillance activities will monitor the impact of mass LLIN distribution on:

- **Vector bionomics**
  - Species compositions & densities
  - Species-specific biting patterns
  - Sporozoite rates & EIR estimates

- **Malaria epidemiology**
  - Passive case incidence
  - Annual infection prevalence surveys

- **Human behavioral determinants of risk, as the intersection between**
  - Time at risk of mosquito blood feeding
  - Human activities not protected by a bed net

These datasets will feed into a broader analysis of the cost-effectiveness of dual AI LLINs.
**Ento/Epi Correlates**

**Can Phase II experimental hut trial outcomes serve as a surrogate for epidemiological and transmission outcomes?**

LSHTM and Imperial:
- Huts constructed in vicinity of both Benin and Tanzania RCTs
- Nets: standard washed or field sampled over time
- Ento outcomes modelled to determine how predictive of trial results

Companion work by LSTM funded by BMGF:
- Augment Tanzania and Benin hut trials, add huts to Burkina Faso pilot
- Behavior tracking around nets
- Investigation of sublethal effects
- Detailed field resistance data collection
- Model data and compare with field ento/epi
- Define min set of ento data to predict epi outcomes

*Massue et al, Malar J (2016) 15:165*
Thank you for your continued support and collaboration!!!