Role of Outdoor Transmission Control to Contain / Eliminate Multidrug Resistance Foci in Mekong Countries

Dr Steven Bjorge
WHO Cambodia
Containment / Spread

• Artemisinin Resistance Containment Project 2009-2011
  – To “contain” multi-drug resistant malaria
  – Did we do it?

• Two definitions of containment and spread:
  – Prevent a specific mutated **genotype** from moving elsewhere (presumably by transport in human body)
  – Prevent a phenotype (different clones, independent selection) from appearing in other sites

• All epidemiological evidence **at this time** points to independent selection of artemisinin resistance at different sites, because there is no evidence of movement/communication between the sites.

• So Containment was successful, the genotype in western Cambodia did not spread to other areas.
<table>
<thead>
<tr>
<th>Year</th>
<th>A+Mef</th>
<th>Pailin</th>
<th>Battambang</th>
<th>Pursat Mean</th>
<th>Oddar Mean</th>
<th>Preah Vihear</th>
<th>Rattanakiri</th>
<th>Snoul</th>
<th>Kpg Speu</th>
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</thead>
<tbody>
<tr>
<td>2001</td>
<td>-</td>
<td>50</td>
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<td>-</td>
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<td>50</td>
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<tr>
<td>2002</td>
<td>81</td>
<td>86%</td>
<td>83</td>
<td>95%</td>
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<td>75</td>
<td>-</td>
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<td>2003</td>
<td>-</td>
<td>93%</td>
<td>92</td>
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<td>97%</td>
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<td>85</td>
<td>93%</td>
<td>85</td>
<td>80</td>
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<tr>
<td>2005</td>
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<td>94%</td>
<td>89</td>
<td>90%</td>
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<td>2006</td>
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<td>82</td>
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<td>64</td>
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<td>2009</td>
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<td>49</td>
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## Cambodia TES results

<table>
<thead>
<tr>
<th></th>
<th>Western</th>
<th>North</th>
<th>Eastern</th>
<th>South</th>
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</thead>
<tbody>
<tr>
<td><strong>DHA-Pip</strong></td>
<td><strong>Pailin</strong> /Samlot, Sampov Lou</td>
<td><strong>BTB</strong> /Veal Veng</td>
<td><strong>Preah Vihear / Rovieng</strong></td>
<td><strong>Rattana kirid /Veun Sai</strong></td>
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<tr>
<td><strong>2008</strong></td>
<td>53 100%</td>
<td>80 100%</td>
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<td><strong>2009</strong></td>
<td>39 92%</td>
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<td>60 100%</td>
<td>57 100%</td>
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<tr>
<td><strong>2010</strong></td>
<td>29 76%</td>
<td>60 93%</td>
<td>-</td>
<td>60 100%</td>
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<tr>
<td><strong>2011</strong></td>
<td>-</td>
<td>-</td>
<td>44 91%</td>
<td>-</td>
</tr>
<tr>
<td><strong>2012</strong></td>
<td>Malarone 31 81%</td>
<td>21 91%</td>
<td>-</td>
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</table>
Interventions

• May-July 2009:
  – Universal, complete LLIN coverage at 1 family-size net per person
  – Institution of community-based diagnosis and treatment
    • RDT: Pf/pan
    • ACT: dha-p
  – “Plus”
    • LLIHN to every family for forest-use
    • LLIN loaner scheme for seasonal farm workers
    • IEC – billboards, radio, TV, taxi drivers, multi-lingual
Pailin

• 4 years later, after aggressive intervention, people are already forgetting what “Pailin” meant. This was the place that symbolised multi-drug resistance.

• Now Pf is so low that we cannot make sample size for Therapeutic Drug Trials.
Cambodia

• Early 2012, completed a universal coverage campaign of 1 LLIN per person for 3 million people at risk of malaria.

• Malaria continues its downward trend.
  – 70,000 cases in 2012 from over 100,000 in previous years.
Residual Malaria

• Good name, because that is where we are at, but which species? After the easy gains of LLIN distribution and VMW coverage, Pv remains/becomes dominant.

• Removing the camouflage of dominant Pf, Pv can seem to increase, but how many mixed infections are missed, because Pf is so obvious, and Pv not.
Residual Malaria

• Important to not lose sight of truth:
  – Maintaining village-based LLIN coverage maintains low incidence
    • Anophelism without malaria
  – then can deal with the residual cases, hard-to-reach, outdoor, early biting, etc.
Residual Malaria

• Mobile Malaria Clinics
  – Current tactic for dealing with unaffiliated, ad hoc, tropical aggregations of workers.
    • Prevention of deaths, reduction of cases.
  – Most difficult-to-reach of all groups
  – Exploitive of economic opportunity – get rich – no “long-term” because so impermanent.
  – Restricted by GF accounting rules from giving unaccountable nets (need verifiable proof of delivery)
Artemisinin Resistance

• How important is artemisinin when it is the partner drug that effects the cure?
  – If we have no more effective antimalarials, then we have to go to 7-day artemisinin

• If you have
Asymptomatic Infection

- Asymptomatic is not a genotype, as far as I know; it is a phenotype
  - It is a reflection of the immune status of the host.
  - IF asymptomatic, and no transmission, no problem,
    - if there is transmission, there will be infected non-immunes who WILL express symptoms.