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OUTLINE STRATEGY FOR MALARIA CONTROL IN COMPLEX EMERGENCIES



RBM Complex Emergencies Network

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nature that are not mentioned.

1. Rationale

Malaria is a major communicable disease of the tropics and subtropics, killing more than one million people each year. Roll Back Malaria (RBM) is a new global partnership that will address this priority health issue at the country and local level. The objective of RBM is to significantly reduce the global malaria burden through interventions adapted to local needs and by reinforcement of the health sector. RBM was launched in October 1998 by WHO, World Bank, UNICEF and UNDP. WHO will provide strategic leadership to the global partnership which is drawn from malaria affected countries, UN organisations, bilateral development agencies, non-governmental organisations and the private sector. RBM will build on all current malaria efforts to achieve targeted levels of coverage in the affected population.

Malaria is a disease of the poor, especially of those in remote areas with no easy access to health services. Malaria is also associated with conflict or the aftermath of conflict, as it is a disease that flourishes in conditions of crisis and population displacement. Complex emergencies have been defined as “situations affecting large civilian populations, involving war or civil strife, food shortages and population displacement, resulting in excess mortality and morbidity”. In complex emergencies, the factors that contribute to the malaria burden include:

- breakdown of health services and of malaria control programmes
- movements of non-immune people or concentration of people in high risk areas for malaria
- weakened nutritional state of the displaced population
- environmental deterioration that encourages vector breeding
- problems of supply of food and medicine and difficulty of access

Conflict results in instability and lack of governance. UN organisations and NGOs (international and local) often take responsibility for providing health services in collaboration with the host country. The insecurity makes long-term planning impossible and the breakdown in systems can cause major difficulties for health care delivery. RBM has identified malaria control in complex emergencies as an important initiative to reduce the global burden of malaria. It also recognises that the problem of malaria in such situations deserve special attention, and that strategies used in stable situations must be adapted for complex emergencies.

An important component of RBM is the establishment of networks composed of experts who can provide technical support to interventions in endemic countries. One of these networks will be on Malaria Control in Complex Emergencies. This RBM Network represents a opportunity to bring together malaria experts that specialise in providing health services in complex emergencies, to share and learn from their experiences and from that to develop and assist implement a strategy for effective malaria control in complex emergencies. The challenge is to implement malaria control programmes that are scientifically optimal and operationally feasible for each situation. The strategy will guide coordinating and implementing agencies – UN, NGOs and national authorities - on how to plan malaria control in complex emergencies, on how to select the most appropriate interventions, on case management, on surveillance and response, prevention and personal protection, resource and training needs, coordination, and what

should be monitored and evaluated. Gaps in knowledge needing further research will be identified.

Roll Back Malaria

Objective

The malaria burden in participating countries is significantly reduced through

- interventions adapted to local needs
- reinforcement of the health sector with first priority being given to high transmission areas of Africa

RBM project helps through

- creating a global partnership for advocacy, financial support, co-ordination, monitoring
- creating country level partnerships to ensure harmonised strategies
- providing consistent technical guidance through technical support networks
- endorsing technical content of strategies based on WHO strategies/international best practices
- ensuring that partners adopt appropriate strategies and implement in a harmonised manner

2. Definitions

Complex emergencies evolve from the acute to the post-emergency phase. The acute phase may be defined as the period where the crude mortality rate is above one death per 10,000 per day. The acute phase is characterised by a number of events: population displacement internally (internally displaced persons - IDP) or cross border (refugee) but may affect a static population or an ethnic group, a change in authority at local or national level, a breakdown in infrastructure (health, logistics), impaired access to food, and higher mortality. The acute phase may last only a few months.

The post-emergency phase begins when mortality rates return to the level of the surrounding population and basic needs are met. During the post-emergency phase there is reasonable confidence in security, the health situation is under control, longer term approaches can be initiated, and more input can be made into capacity building and reconstruction. However, the post-emergency phase can transit rapidly backwards if the conflict resumes or slowly forwards if stability is maintained.

In chronic emergency countries, usually characterised by political deadlock of some kind, some areas of the country may stay in an acute phase while others move towards the post-emergency phase.

Different levels of health service are achievable in the acute and post-emergency phases, and different operational strategies or approaches may be required. Some operational agencies specialise in helping in the acute phase, others in the post-emergency phase. The malaria control strategy outlined in this paper summarizes what can be attempted at the different phases of the emergency.

3. Strategy

3.1 Development of a plan

In order to implement appropriate and effective malaria control, it is essential to develop a plan. The elements of a good plan are:

1. Situation analysis
2. Define objectives for malaria control based on the severity of the problem, human/material resources available, level of control in the host country and the expected future movements of refugees
3. Select strategies - the following sections give details of these strategies
4. Decide on activities
5. Develop a workplan with responsible officer, objectives and targets
6. Agree with all interested parties on organisational framework
7. Develop indicators for monitoring and evaluation, and plan how they will be measured
8. Plan operational research, if gaps in necessary information are identified
9. Develop a budget

3.2 Situation analysis and assessment

An initial assessment of the situation is essential in order to plan the appropriate response, to decide upon the most effective interventions, and to avoid costly or life-threatening mistakes. An assessment team of experienced and qualified people with a mix of complementary skills in disease control and operations should be mobilized to assess the underlying causes and establish objectives and priorities. It is also important to assess the displaced community itself, to determine human resources available and methods to ensure their involvement in interventions. Information should be collected on:

- *Environment*
 - *geographical factors, water, agriculture*
 - *seasonal variation in rainfall and temperature*
 - *site selection*
- *Population*
 - *density, age & sex*
 - *ethnic structure*
 - *displaced & host, settlement patterns*
- *Epidemiology*
 - *disease endemicity*
 - *vectors and breeding sites*
 - *identifying at risk communities or areas*
- *Security*
 - *military & other authorities*
 - *access to vulnerables*
- *Available resources and logistics*
 - *human*

- *health facilities*
- *drugs, etc*
- *funds*
- *logistics, import practices*
- *legal, registration policy*

Assessment guidelines exist already and should be used, but specific malaria information must be added such as local drug resistance, government health policy, and pre-emergency national malaria control guidelines. Team members should be drawn from local health professionals, operational NGOs and from other agencies that can provide skills in epidemiology, vector control, medicine and organisation. Presence of a donor representative may ensure project funding.

The situation may have to be re-assessed when the acute phase is over since different strategies will be needed.

3.3 Site Planning

If camps are unavoidable, good site selection may reduce or prevent malaria. It is vital that the assessment is made as early as possible to lobby against potentially malarious sites that might support vector breeding.

3.4 Disease management

3.4.1 Diagnosis

Diagnosis is essential. Microscopic diagnosis may not be possible in the acute phase of an emergency or where there is a very weak health system. Where no microscopy is possible diagnosis must depend on clinical symptoms and knowledge of the risk of malaria, recognising that this is not very accurate. In much of Africa, even under stable political and economic conditions, clinical diagnosis is used in areas of high transmission, as presence of parasitaemia does not correlate well with disease. Slide confirmation is particularly important in areas where drug resistance necessitates use of expensive drugs or where treatment failure due to resistance can progress rapidly to severe malaria. It is also important in limiting unnecessary use of drugs.

The recently developed rapid diagnostic tests are very useful for screening large numbers of patients, but are currently too expensive for individual diagnosis in most places, and also remain positive after treatment and do not accurately measure parasite density. In Cambodia where antimalarial treatment is becoming extremely expensive, there is consideration of use of rapid tests for routine diagnosis.

3.4.2 Treatment

The treatment provided should be based on knowledge of drug resistance patterns in the area. This is particularly important as displaced populations are especially vulnerable due to low immunity (from malnutrition or lack of previous exposure to malaria) and to risk of being unable to seek retreatment if treatment fails.

Local up to date information on drug resistance is essential for developing appropriate

treatment policy. Local health authorities who may have the information already and operational agencies should collaborate on obtaining the information. Other causes of treatment failure, such as non-compliance, vomiting and poor quality drugs should always be monitored. Drug efficacy monitoring should follow standard procedures as developed by WHO. As drug resistance is rapidly developing it is also important to evaluate second line or future treatments prospectively.

Combinations of artemisinin derivatives and various other antimalarials are currently being used in South East Asia due to the spread of drug resistance. These combinations are under evaluation in Africa at present, and information on safety and efficacy is expected in 1999. Depending on the results there may be a change in approach to chemotherapy in Africa aimed at protecting the few remaining effective antimalarials from rapid development of resistance of *Plasmodium falciparum* whilst providing the patient with an acceptable treatment. There is a major concern about what to do when sulfadoxine-pyrimethamine resistance becomes more widespread, as it already has in Southeast Asia.

Management of severe malaria should be according to the national treatment protocols/WHO recommendations and guidelines. Training manuals will be developed by WHO.

Treatment of *Plasmodium falciparum* gametocytes with primaquine is not recommended, as evidence of its effectiveness is inadequate, and it can be dangerous in glucose 6 phosphate dehydrogenase (G6PD) deficient individuals. Artemisinin derivatives have been shown to have a gametocytocidal effect, and combinations including them may lead to a reduction in transmission in some areas.

WHO will maintain a database of national treatment protocols of emergency affected countries where these protocols exist. If protocols need to be adapted in the event of a complex emergency, this should be developed and endorsed by WHO. The database should also include information on drug sensitivity, simple protocols for sensitivity testing and mapping of malaria and malaria risk (epidemiological, climatic, land use, etc) in complex emergency countries. The WHO/HINAP project will hold malaria data on complex emergency countries on its website.

3.4.3 Chemoprophylaxis and preventive treatment

In complex emergencies, chemoprophylaxis for malaria should be limited to pregnant women, expatriate staff, and special groups such as the army. The drugs available for chemoprophylaxis in these situations are chloroquine, proguanil, pyremethamine/dapsone, mefloquine and doxycycline.

In highly endemic *P.falciparum* areas, where malaria in pregnancy is associated with high maternal and infant morbidity and mortality, semi-immune primi- and secundigravidae should receive intermittent preventive treatment with an effective, preferably one-dose antimalarial drug delivered in the context of antenatal care. Such intermittent treatment should be started from the second trimester onwards and not be given at intervals less than one month apart. Studies indicate that HIV-positive pregnant women may need such intermittent treatment on a monthly basis during all pregnancies.

The ratio of low birth weight (LBW) in primigravidae versus multigravidae in a population in a malaria endemic area may be used to identify the endemic areas where malaria

control in pregnancy is inadequate and where intermittent treatment should be beneficial to pregnant women.

Non-immune pregnant women exposed to falciparum malaria transmission are at high risk of severe disease, death, and high rates of pregnancy failure. They should have access to prompt and adequate medical care. In addition, in exceptional circumstance it may be suitable to offer weekly chemoprophylaxis, if compliance with an effective and safe antimalarial drug can be assured. Where weekly chemoprophylaxis is not possible, non-immune pregnant women exposed to malaria transmission should at least be offered directly-observed intermittent treatment.

Recent studies from Thailand show LBW associated with maternal vivax malaria infection during pregnancy. This may be an indication for weekly chloroquine prophylaxis in some situations where compliance can be assured.

3.4.4 Service delivery

A clear, understandable, implementable treatment regimen should be established and communicated to all involved in health service delivery.

First line treatment may need to be changed if drug resistance studies show that the national policy is ineffective.

On-site training of health workers is needed to improve case management: the cost of drugs, the consequence of non-compliance and potential side effects should be clearly spelled out to avoid confusion.

Accessibility of the population to the health structures is important, and may determine the most appropriate type of health systems, including mobile clinics and community health workers where indicated.

Ongoing rigorous evaluation of the case management strategy is essential to identify needs to improve it.

Quality control of the laboratory should be given high priority.

In the acute phase, cash incentives may be needed to carry out control interventions, but food-for-work is an option. Delivery of services should be integrated with primary health structures or networks (e.g. using local NGOs or community based organisations) as soon as possible. Delivery systems should be diversified and community participation encouraged to reduce costs and to improve efficiency and coverage. In the post-emergency phase the commercial sector may provide sustainable supply of nets and insecticide (sachets or tablets for home-treatment).

3.5 Prevention

3.5.1 Acute phase

The choice of intervention for disease prevention in the acute phase is not prescriptive and will vary according to effectiveness, feasibility, cost and speed of supply. The key local factors influencing choice are:

1. Type of shelter available
 - permanent housing, tents, plastic sheeting
2. Human behavior
 - culture, sleeping practices, mobility

3. Vector behavior

- biting cycle, indoor or outdoor resting

Some promising new methods of prevention (insecticide treated tents, clothing) have been implemented to good effect in emergencies in Asia and Africa. These are still under development and are not necessarily transferable to other regions owing to differences in culture, dress, malaria endemicity or vector habits.

- Insecticide treated mosquito nets (ITN) are suitable if nets were previously used by the population, and if living in structures that allow mosquito nets to be supported or hung. ITN may be appropriate for those who regularly travel cross-border to insecure areas. Not precluded in other situations but
 - if people are new to nets, they may be less likely to use the nets appropriately (good IEC essential)
 - consider human or environmental factors that may lead to loss or damage of nets, or hasten insecticide decay
 - procurement of nets means higher initial costs than for other methods (see cost analysis estimates below).
- Permethrin sprayed blankets and other materials are a promising initial option for those under temporary shelters made of standard UNHCR plastic sheeting or where correct use of ITNs is in doubt
 - treated bedding has not been tested outside Asia or in highly endemic conditions
- Permethrin treated outer clothing worn in the evening or in bed is effective in south Asia but needs testing in highly endemic African conditions. Insecticide sprayed tents for “transit” buildings, temporary treatment facilities, and family shelters
 - not tested outside Asia
 - use of plastic sheeting more common in complex emergencies in Africa and conventional sheeting is not suitable for insecticide treatment
- Indoor spraying of residual insecticide (“house spraying”) has been the method of control most often used in chronic refugee situations. It is suitable for refugee populations who have built or are occupying mud huts or houses. To be effective the local mosquito vector must be indoor resting (seek expert advice) and the programme must treat all the houses.
 - effective in West and South Asia when sprayed at the beginning of the transmission season but less effective in SE Asia
 - limited effectiveness in highly endemic parts of Africa
 - has to be repeated annually in Asia and at 3-6 month intervals in stable endemic areas; repeated application becomes expensive in chronic emergencies
- Environmental control may be difficult during the acute phase except on a local scale, and impact is often limited. To reduce the number of vector breeding sites:
 - drain clean water around water tap stands & rain water drains
 - larvicide vector breeding sites if these are limited in number (seek expert advice)
 - drain ponds, but may not be acceptable if used for washing

Local epidemics justify additional resources for spraying operations. In areas where malaria is seasonal, by the time these become fully operational epidemic conditions may have declined.

Relative efficacy and cost effectiveness

The alpha-cyano pyrethroids, such as deltamethrin and lambda-cyhalothrin, are the most

effective insecticides for indoor spraying or treatment of nets. Permethrin is preferred for topsheets or blankets since it has a very low human toxicity.

Among Afghan refugees in Pakistan, insecticide treated nets, tents, and housing appear to be equally effective against malaria (giving about 60% protection against falciparum malaria). Treated bedding and clothing are 10-20% less effective than treated nets. In endemic Africa, treated bednets are the most effective intervention (reducing malaria death by 42% and morbidity by 45% in the Gambian trials).

Treated bedding and clothing are cheaper than nets in camps since only insecticide has to be provided. House spraying is cheaper than nets if done only once or twice. If people are willing to pay for nets, nets become more cost-effective than house spraying (see below: post-emergency phase).

Cost analysis is a useful substitute for cost-effectiveness analysis when local effectiveness is not known. When the effects of the interventions being compared are broadly similar (see above), then cost analysis on its own may be sufficient to make a choice.

In West Asia (Afghanistan/Pakistan), the cost per person protected* per year is:

Treated nets	\$1.5 (in first year, \$0.25 thereafter)
Treated blankets	\$0.25 (cost of blankets/sheets excluded)
House spraying	\$0.5
Tent spraying	\$0.25

* Includes cost of insecticide and nets but not of operations. Assumes that house is occupied by 10 people and a net by 3-4 people.

3.5.2 Post-emergency phase

Agencies need to carry out regular strategic reviews of the control programme and re-evaluate interventions as:

- emergency needs change and mortality is brought under control
- beneficiary involvement and skills improve
- displaced people living in plastic shelter or tents construct local style huts; this will allow increased use of mosquito nets or indoor spraying
- this phase allows a longer term approach and provides opportunities for establishing wider use of self protection methods

As malaria is a focal and controllable disease it may be necessary to redeploy resources to where they are more needed.

- Treated materials and nets
 - Some cost recovery should be introduced for new nets as people's livelihoods improve
 - Retreatment process needs to be established on a cost recovery basis
 - Free or reduced cost distribution is essential for some vulnerables (widows with young children, orphans etc.)
- Environmental control may be possible during rehabilitation of irrigation and water supply sources; collaboration needed with agencies responsible for agricultural and

rural development.

- House spraying should become increasingly focal; prioritization of camps for spraying should be based on sound indicators such as malaria incidence rates to ensure cost-effectiveness.
- Funds saved from house spraying might be allocated for nets and more sustainable interventions instead.

Net treatment process

- Ideally recipients should impregnate the materials themselves as this reinforces awareness of the insecticide, its importance in protection, and encourages proper net care. However, in the acute phase, this might cause additional delay to initial implementation, so pre-treatment is acceptable in this phase.
- Re-treatment should always be done by recipients, with training in safety.

3.5.3 Inappropriate interventions at any stage of the emergency

- Aerial spraying; too dangerous in acute phase, too expensive in post-emergency phase.
- Scrub clearance (there is no evidence that this reduces man-vector contact).
- Outdoor spraying with residual insecticide; expensive, environmentally contaminating, usually fails to reach the targeted vector, limited impact.

3.6 Malaria Surveillance

3.6.1 Surveillance indicators

Malaria surveillance is essential to assess the impact of the disease on the displaced population in a complex emergency. It is also necessary to plan and implement an appropriate control programme and to monitor progress. Malaria surveillance should be done in the context of integrated disease surveillance.

The information sources or indicators available will depend on whether the region cannot, could, or does support malaria transmission. Historical epidemiological information and recent climatic records (seasonal rainfall and temperature patterns) may provide evidence of a potential malaria problem. These data may be held by health authorities or meteorological services. Mapping of malaria and malaria risk is presently an active area of research in Africa, and this might be extended to complex emergency countries as part of the preparation for dealing with any future epidemic. In addition to key climatic variables, indicators reflecting population movement and breakdown of health services may predict outbreaks or epidemics. Demographic changes to watch out for, known to trigger epidemics in complex emergencies, are:

- migration of non-immune groups into areas with current malaria transmission
- migration of infected groups into malaria-free areas which are capable of supporting renewed transmission
- movement of infected groups into an area with established malaria transmission but of a different strain

These may be exacerbated by environmental changes that favour vector breeding or increased man-vector contact.

Despite its limitation, a clinically defined case definition must suffice during the acute phase of an emergency since microscopic confirmation is unlikely to be available particularly in high transmission areas. In unstable endemic areas, even the best clinical algorithms may wrongly classify a disease episode as being malaria and may also fail to identify many true cases of malaria; microscopy diagnosis should be provided as soon as possible to improve case management and surveillance. In stable endemic areas, microscopy may not be so useful for defining cases; anaemia in children and pregnant women, low birth weight, and high rates of splenomegaly, may serve as supporting indicators.

Epidemiological information systems are essential in all malaria control programmes to assess the country's malaria situation, allow the forecasting of epidemics, define risk groups, and monitor programme progress. Although data collection is difficult in the acute phase of an emergency, minimal information is required in order to assess the impact of malaria and to prepare a response:

- Species of *Plasmodium*
which species are present, in what ratio, and in which seasons?
- Mortality
what evidence is there for excess mortality or for malaria being the cause?
- Morbidity
what is the incidence of fever and incidence of malaria?
what is the evidence for an increase in incidence of malaria?
which age groups are affected (<5, 5-14, >14y)?
pregnancy outcomes (low birthweight, stillbirth, prematurity)

These indices are only meaningful in relation to population as the denominator. During an emergency population size may be difficult to estimate.

- Slide positivity rate as a measure of parasite prevalence is a very useful malariometric index in unstable malaria areas, since it is independent of population size and may show a sudden increase during an epidemic. Its interpretation depends, however, on the criteria used for taking slides. In such areas *Plasmodium* parasitaemia is equivalent to a malaria episode. In areas with stable malaria, asymptomatic malaria is common, slide positivity may not reflect disease so accurately, and rates must be interpreted cautiously.
- Entomological inoculation rate may be discounted during the acute phase since the components of this index (human biting rates and sporozoite rates of vectors) are difficult to obtain and the index has little immediate value for programme management. During the post-emergency phase, if expertise is present to interpret the data, such information collected over the course of a year may aid evaluation and re-planning.

3.6.2 Surveillance and epidemic investigation

Where malaria is potentially a problem, the resources and expertise needed to investigate any outbreak should be prepared in advance. Epidemic preparedness measures for malaria should be taken jointly with other diseases of epidemic potential in the area e.g. identification of laboratory for sensitivity testing, stockpiles of drugs/equipment. In the event of a suspected outbreak, the investigation should ideally be conducted by epidemiologists or others skilled in outbreak investigation with local health workers so that knowledge and skills developed can be used again in future outbreaks.

To ensure that data are of the required quality, an excess of information should not be requested from the health care system. But to respond appropriately to the outbreak, the following minimal information is required:

Population

*Who is affected?
Where are they from?
How are they living?*

Disease

*Number with acute febrile illness
Number with confirmed uncomplicated malaria
Number with microscopically confirmed severe malaria
Number of malaria deaths
Number of maternal deaths due to malaria
Proportion of children with anaemia
Proportion of pregnant women with anaemia
Drug resistance; the proportion of treatment failures*

Management

*Number of health facilities
Available staff and expertise
Access of population to the health facilities
Availability of drugs and supplies
Malaria policy and treatment guidelines*

Exceptional circumstances justify an exceptional response, and in an epidemic there may be a need to deviate from national treatment protocols. WHO should have an advisory role in such instances.

3.7 Epidemic response

Deciding on the intervention to adopt will depend upon available resources, state of the health system, and other health priorities. The main aim of the response must be to reduce mortality and disease burden. Three strategies for intervention might be feasible according to the situation:

1. Mass treatment of fever cases
2. Case detection by outreach services
3. Passive case detection

In a severe outbreak the majority of fever cases may be due to malaria. Even if microscopy was available there may not be time to confirm the diagnosis of every suspected case. Mass treatment of febrile cases is then justified. If, exceptionally, an expensive treatment is required because the malaria is multi-drug resistant, use of microscopy or the more expensive rapid diagnostic kits might be justified. Microscopy is, however, very useful for monitoring epidemic trends through the monitoring of slide positivity rates (i.e. malaria as a proportion of all febrile illness) in samples of slides taken from fever cases at regular intervals.

Health services should reach as deeply into the community as possible and make full

use of community health workers if available. Active case detection is fully justified during an outbreak when there is mortality due to malaria and referral systems are unavailable.

Ideally, treatments should be short and simple (preferably one-day) to avoid the necessity for follow up or the chances of severe malaria developing.

Passive case detection is not a sufficient response in the acute phase if excess mortality is documented and the population is dispersed. It is more suited for chronic refugee situations when mortality is under control. Then, laboratory services with quality control are essential not just for routine case management but also for surveillance of disease trends. Such data may be used to justify implementing vector control or personal protection. Consolidated microscopy data trends are also useful for assessing the impact of control interventions. When refugees are settled in numerous camps, consolidated microscopy data and population data from each camp may be used to estimate malaria incidence rates which may be used in turn as an indicator to prioritize camps for targeting of prevention. The monitoring of field laboratories from a central reference laboratory and imposition of quality control forms the basis for a health information system.

3.8 Disease awareness education

Simple messages are needed that:

- improve understanding of disease
- encourage appropriate treatment-seeking behavior
- make the connection between protection against mosquitoes and prevention of disease
- improve mosquito net retention and correct use
- emphasise who needs protection most (usually children and pregnant women)

Health messages may be delivered through community health workers (CHWs), posters, leaflets, and the mass media.

3.9 Training

Who to train?

- Policy makers
- Health co-ordinators: National/local/expatriate NGO staff
- Clinical workers

Content

The epidemiology of malaria and appropriate control measures may differ greatly between Asia and Africa, so region-specific material may be needed. Control measures may differ between the acute and post-emergency phase. There should be information on how to organise malaria control, basic features of malaria control, diagnosis and treatment using WHO training manuals and methods of prevention and surveillance.

Active supervision of health staff and regular updating of materials are important.

Issues

- The RBM technical support network has an important role to play.
- With the high turnover of NGOs there is an ongoing need for training.
- Evaluation and follow-up are important looking at change in practice.
- Malaria control should not be taught in isolation but as part of a broader training.
- A training programme should be planned to lead to the greatest possible degree of self-sufficiency of displaced health workers, so that they can continue to work when the emergency is over.
- In chronic refugee situations the training needs will change and in some cases may need to take into consideration the refugees' repatriation.

3.10 Coordination

3.10.1 Organisational framework among agencies

Coordination and information sharing may

- reduce security risk
- improve efficiency
- prevent duplication of activities
- provide common logistic systems
- mediate or improve agency negotiating power with authorities or factions

Coordination might be provided under a UN umbrella agency or by a special coordination body which agencies subscribe to. Within such fora it is possible to establish sector committees to address specific health issues.

3.10.2 Division of responsibility

During a complex emergency, a health agency may take responsibility for a specific geographical area and run general health care services within it, or may specialise and take responsibility for a particular health service role (e.g. CHW training, laboratory quality control, EPI) over a wider area. Either way coordination is essential; in the former case, to ensure standardised protocols, in the latter case, so that general health agencies can benefit from specialised services. Malaria is a specialist activity that should be implemented through the general health services. That is as true for a complex emergency as it is for stable conditions. General health agencies (MOH, UN or NGOs) might, for example, coordinate with an agency specialising in laboratory training services who has taken on the responsibility for ensuring the quality of diagnosis and treatment in NGO clinics. Another agency specialising in disease control might take responsibility for malaria prevention, and provide technical advice, commodities, or training to agencies that want to implement personal protection or vector control in their specific area of operation.

3.10.3 External expertise

Several agencies can provide specialist assistance on malaria:

RBM resource networks

WHO

CDC
Tropical Medicine Institutes
Malaria Consortium
Specialist NGOs
National Malaria Control Programmes and ministries of health

There is no single formula for enlisting assistance, and this will depend on coordination arrangements within each complex emergency.

3.11 Monitoring and evaluation

Management and disease indicators should be set from the outset and monitored throughout to ensure programme quality, progress, coverage, and to guide strategic direction.

The number of indicators needs to be rationalized. The disease indicators selected will depend on the state of development of the surveillance system (see section 3.5) while the operational indicators will depend on intervention selected.

New indicators (e.g. stocks and accounting) need to be established in the post-acute phase if cost-recovery or revolving funds are introduced.

Periodic, systematic evaluation of the programme (needs, plans, implementation, and impact) provides evidence of progress or need for change.

Evaluation of epidemiological impact may be impossible during the acute phase but should be considered during the post-acute phase when the population settles and laboratory diagnosis becomes available. Confirmation of disease control will justify continued implementation and helps secure further financial support. Suitable evaluation methods include cross sectional prevalence surveys (i.e. mass blood surveys) and simple case control studies at clinics (e.g. comparison of slide positivity rates between personal protection users and non-users). Technical advice on design should be sought.

3.12 Operational research

The following is a list of areas where further operational research is needed.

3.12.1 Protection from malaria in pregnancy

Strategies to protect pregnant women are available but more research needed in complex emergencies. Research on various interventions would be valuable.

3.12.2 Insecticide treated materials

Treated blankets and outer clothing: Preliminary research in Asia indicates these could be useful in the acute phase as they get around some of the constraints inherent with bednets, namely the need for appropriate behaviour, logistics and supply problems, expense). Further work is needed on:

- suitability of alpha-cyano pyrethroids over permethrin (especially irritancy and other side-effects)
- suitability of different materials and treatment methods (spraying, immersion)
- efficacy under highly endemic conditions or by other cultures (especially in Africa)

Insecticide treated mosquito nets: Use and impact in acute phase. There is scepticism that ITN would be used appropriately or have an impact. To define policy, need further case studies and evaluation making use of rapid immuno-diagnostics and case-control methods. Washing practices, and use of low-dose treatments to accommodate frequent washings.

Treated (layered) plastic sheeting: Treated tents have been shown to work but plastic sheeting is favoured increasingly by relief agencies. Sheeting cannot be treated using conventional methods. Treatment of laminated polyethylene sheeting, analogous to the 'olyset' slow release treated nets, may substitute.

3.12.3 Vector control

Impact and acceptability of ULV aerosoling of camps and buildings: Aerosoling is normally only done under special circumstances:

- during an acute epidemic
- newly established camp or mobile population
- when no other method will work
- to control fly borne disease (e.g. shigella) or dengue

Because evaluation is difficult in the acute phase, effectiveness would be better demonstrated in post-acute conditions in paired intervention/control camps (even though the camps selected would not normally be aerosoled except in an epidemic).

3.12.4 ITN operational strategies

Mosquito net distribution strategy effectiveness in acute and post acute phases: the range of delivery strategies possible (e.g. clinics, CHWs, mobile teams, private sector) needs to be further developed and evaluated with respect to costs and cost-effectiveness; uptake, coverage and equity achievable; best IEC methods for stimulating demand creation and appropriate use; "essential protection kits", single dose sachets. And how to achieve a transition from free provision in the acute phase to cost recovery in the post-emergency phase

3.12.5 Case management

The Private Sector: In the post-emergency phase aid declines but the government may not be able to fully resume a provider role. The private sector may take over this function but with little sense of accountability or responsibility. Accreditation or certification systems, with monitoring of quality control, regulated by government or WHO, may stimulate improved prescribing practices, improve case management, and reduce user costs.

Better understanding of different communities' beliefs and treatment-seeking behaviors is essential for developing appropriate treatment policy.

Monitoring drug efficacy and assessing the efficacy and practicality of newer treatment regimes continues to be necessary

