MOSQUITO CONTROL CHALLENGES AND AMCA[1]

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Mosquito and related vector control is an important activity conducted to protect and improve the health and well-being of the public. Great strides have been made but problems and challenges exist. We can take pride in past accomplishments and be optimistic about the future without being complacent. After years of improvement in mosquito control we seem to be at a plateau poised for another surge forward or downward depending upon how we respond to the new challenges. The challenges are technical, sociopolitical and economic. Just as mosquito and vector control programs have to change, adapt and reorient to evolving situations, so must the AMCA.

In the United States we are fortunate in having successfully eliminated malaria and yellow fever. Other vector-borne diseases, mainly dengue and encephalitis still exist and threaten to become more serious. Periodic introductions of malaria and other vector-borne diseases of humans and livestock present a real danger and necessitate vigilance. The economic effects of the threat of arthropod-borne diseases and of the direct attack of mosquitoes on humans and livestock are great in many areas and provide ample justification for organized, scientific mosquito control programs. In some areas mosquito control alone is not sufficient and control of other vectors is a necessary part of the program to protect and improve the health and well-being of the public.

Multipest management programs may become more common due to demand, greater efficiency and the advantages of broader public support. The AMCA will have to respond to that trend.

In many areas of the world outside the United States there are more acute threats from vectors and vector-borne diseases. Mosquito-borne malaria and human filariasis are devastating diseases affecting millions of people. The great successes in eradicating malaria in certain countries in the 1960's has been followed by lack of success and resurgence of malaria in some countries in the 1970's. There has been an increase in human filariasis and dengue in recent years. Although the malaria risk has been essentially eliminated for 400 million people there are still countries with over 2 billion inhabitants at moderate high risk from malaria. In 1978 there were nearly 14 million documented human cases of malaria.

Although eradication of a vector-borne disease is the ideal solution, it is now widely recognized that in many areas it is not likely to be feasible and vector population suppression on a continuing long term basis will be necessary. This has resulted in more widespread interest and concern with how to design, implement and sustain integrated vector and disease management programs as part of primary health care as advocated by the nations of the world in the Declaration of Alma-Ata, 1978 (Lepes, T. 1980. Review of the global situation of malaria and its control. WHO 7AMC/WP/80.3:(d); Mouchet, J. 1982. Vector control at community level. WHO/VBC/82.847.). The need for multimethod integrated vector control tailored to local situations has been recognized and promoted internationally as evidenced by the WHO Report of the Interregional Seminar on Integrated Control of Mosquito Vectors, Adana, Turkey 1981 (WHO/VBC/81.7). The AMCA should assist in these international problems wherever possible. Greater international exchange will benefit all concerned and is a two-way street.

While it is recognized that mosquito control in the United States is not the same as elsewhere in the world, there are many common attributes. Hence, the underlying problems and challenges are similar even though the details may differ significantly. What are some of these challenges and how might AMCA assist in meeting them?

TECHNICAL CHALLENGES. Management of mosquito and mosquito-borne diseases by using a multimethod integrated control strategy tailored to local conditions will continue to require selective use of insecticides along with biological control and environmental management. Problems exist with all three control approaches. First, with insecticides we have a limited number of safe and effective materials and some are useless in certain areas due to resistance. The new exciting introduction as a larvicide is *Bti* which some may wish to categorize as a biocontrol agent since the bacteria produces the toxin. The insect growth regulators (IGR's) have been effective larvicides with practical applications. Certain synthetic pyre-

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throids as adulticides are effective but the prospects of early resistance development are great. The time and costs of developing new chemicals for mosquito control are great and sometimes the market is rather limited. Perhaps in the future AMCA could take a more active role in coordinating the testing and exchange of data on new insecticides.

This raises the problem of the effects of pesticide regulation on the availability of safe, effective chemicals in the future for mosquito and vector control. Reasonable regulation is necessary and AMCA should take a responsible position in that regard and not a knee-jerk, anti-regulation stance. In the case of EPA (United States Environmental Protection Agency) proposed data and labelling requirements for pesticides (Federal Register, November 24, 1982), the draft of labelling guidelines for mosquito and vector control was unsatisfactory and the AMCA, through the President and Executive Director on the advice of the Scientific and Regulatory Liaison Committee, obtained recognition of the special needs of mosquito and vector control. More appropriate and useful guidelines should result.

In another EPA action, however, no action was taken but should have been. However, knowledge of the proposed action came too late. I refer to the proposal by EPA (Federal Register, September 15, 1982) to waive all efficacy requirements for public health pesticides (except those for microorganisms). This means that efficacy data will no longer be required for pesticides registered to control mosquitoes, cockroaches, fleas, ticks, lice, biting flies, house flies, poisonous spiders, fire ants, hornets, wasps, bedbugs and rodents. A spokesman for EPA told me that this will go into effect later this year and it is part of the Administration's deregulation philosophy. Some may say this waiver of efficacy requirements will make more pesticides available for mosquito control. But what kind of pesticides? Will they be effective? Development of a new pesticide will not be significantly expedited because the costs and time required to obtain efficacy data are minor compared to that required for the toxicology and environmental hazard data.

Scientifically it makes sense to use only pesticides that are effective as well as safe. This waiver action at the federal level is not based on scientific reasons. The loser is the public due to increased risk from insect-borne disease and the waste of money if unproven pesticides are used. The state and local governments lose because much of the money for public health insect control is spent by them and they rely on the federally registered pesticides being effective. This also has ramifications outside the United States, for the registration and sale of pesticides in the U.S. for mosquito control sets an example that is often followed or at least influences use of a pesticide in other countries.

These regulatory actions illustrate that AMCA must improve its ability and reputation as a source of reliable, objective input early in the pesticide regulatory process. In view of the efficacy waiver for public health pesticides, there will be a greater need for AMCA to assist in the rapid dissemination of pesticide test data among mosquito control workers. How to accomplish these activities will be a challenge.

Second, with biological control we really have not progressed very rapidly. If you want to include *Bti* as a biological control agent then it is the notable success. There are promising leads with certain fungi (*Lagenidium* and *Culicinomyces*) and nematodes. Practical application is questionable, however, due to problems in production and distribution. I believe that a practical approach with *Lagenidium giganteum* as well as other fungi in the future may be simplified by culturing at the local level for inoculation into mosquito breeding sites where recycling of the fungi can give prolonged mosquito control. Technically the use of biological control agents requires skills and knowledge of mosquito population ecology which are often beyond the resources of local mosquito control programs. As with pesticides, AMCA should take a more active role in coordinating the testing and exchange of data on biological control.

Third, with environmental manipulation we have often neglected or forgotten the importance of source reduction and water management in mosquito control. These are being rediscovered, however. At the same time we are now more aware of the potential for ecological damage from indiscriminate ditching, draining, filling or impounding operations. More sophisticated considerations and evaluation of environmental impacts are required than in early times. Yet the resources for such assessments are extremely limited. It is costly and time consuming to evaluate, for example, open marsh water management in several areas. However, there is no rational alternative for we cannot simply transfer the technology from one area to another without risk of unacceptable ecological damage and even unsatisfactory mosquito control. Thus environmental management is technically a more difficult task than in early times.

These technical challenges illustrate that mosquito vector control is becoming increasingly sophisticated. AMCA must actively support research and training in support of mosquito control operation.

SOCIOPOLITICAL CHALLENGES. Since mosquito

control deals with the triad of Mosquitoes-Human-Environment as part of resource management it is inevitable that sociopolitical considerations come into play. This can be supportive or destructive to sound mosquito control. This is true anywhere in the world. Often failures in malaria control have been attributed in large part to sociopolitical considerations. Mosquito control programs in the U.S. have expanded or contracted in relation to sociopolitical considerations not changing mosquito densities.

The paramount challenge is development. There is rapid growth and unwise land use in many places. Often housing and people are put in flood plains, coastal habitats, etc. where mosquitoes naturally are abundant and then excessive mosquito control efforts are needed. In other cases the development itself alters the natural drainage in the area and creates mosquito populations where they were not abundant before and the result is the need for mosquito control. In either case, the costs of development are hidden and afterwards the public has to pay for the increased burden of mosquito control. In many areas of the world in attempts to upgrade the economy, massive dams and agricultural irrigation projects have been constructed. This has created extensive new mosquito breeding areas and increases in malaria in many instances. An example is the Adana area in Turkey where, after the construction of dams and an irrigation system, the incidence of malaria rose from only a few cases per year to over 20,000 in 1980 and promises to go higher. At the same time the agricultural use of pesticides on the extensive new cotton plantings on the irrigated land is rapidly inducing pesticide resistance in the mosquito population.

These development decisions are sociopolitical ones arrived at without regard for mosquito and vector control. Obviously those in public health vector control must take a broad view of all aspects of an area's resource management and development and promote the incorporation of mosquito and vector management in the early planning stages. The challenge to AMCA is how to assist in this process through education of policy and decision-makers in society.

ECONOMIC CHALLENGES. The third challenge to mosquito control and AMCA is economic. Money is limited and priorities must be set. The quiet, effective public health mosquito control programs often suffer. In fact, the very success in the past makes the threat of mosquitoes and other insect vectors seem unreal to the budget makers. Funds for research at the federal and state level are pitifully little and as a result there is a threat of stagnation in the development of scientifically sound mosquito control methods. The developing countries cannot afford the full costs of research needed in their lands and yet international funds are very limited. A worsening world economy exacerbates the problem. When there is talk about cutting government spending, the citizens should realize that cuts in public health mosquito and vector control are not in their vested interest. Those involved in mosquito control should strive to present sound scientifically based information to the public so that informed citizens can influence policy and budgetary decisions at all levels.

These technical, sociopolitical and economic challenges illustrate that mosquito control cannot operate efficiently in isolation from events around it. More and more mosquito control must be coordinated with an attempt to have influence on human behavior, economic development and resource management. Mosquito control at the local level must closely interact with other agencies and disciplines as a leading member of the public health and resource development teams. As an example, changes in agricultural land use and the instigation of agricultural integrated pest management programs cannot be ignored by mosquito control programs. Rather, mosquito and vector control programs will see the need to broaden their perspectives and be advocates of area-wide integrated pest management. To advocate, as some do, that all mosquito control involves is the attempt to use technology to achieve a very high level of mosquito control and it is not management is to short-change and demean the importance of the endeavor. The endeavor involves sociopolitical and economic components along with the technical and is of great significance to society for it deals with the complex undertaking of managing pest populations in an ecologically sound manner as part of the public health, economic and resource management programs (Axtell, R. C. 1979. Principles of integrated pest management (IPM) in relation to mosquito control. Mosq. News 39:709–718).

AMCA is evolving to assist in meeting some of these challenges. In my short term as President I feel good that we have initiated some steps although one always wishes more could be done. Some examples are:

1. Modernization of the central office with computer facilities to handle more efficiently routine budgeting, billing and mailing. Hopefully this will eventually lead to a retrievable data base on mosquito control publications and reports to expedite information exchange. In the future

perhaps rapid exchange of pesticide and biological control field test data can be accomplished.

2. Initiation of improvements in the format and appearance of *Mosquito News*, the Journal of the AMCA. Hopefully this will enhance the image of mosquito control and encourage greater use of the journal for dissemination of information.
3. Initiation of a joint AMCA-CDC training course in mosquito control. It is anticipated that this will lead to regular regional training sessions to assist workers in the field and at the same time enhance public awareness of the importance and complexities of mosquito control.
4. Initiation of planning, script development and funding for a film on mosquito control suitable for public education by means of television. Such a film will enhance the image and public support for mosquito control.
5. Initiation of a complete revision of the AMCA bylaws to clarify and make more efficient the operation of the organization and to provide flexibility to meet the challenges in mosquito control.
6. Initiation of a study to implement international cooperation. Some form of international regional directors is envisioned.
7. Initiation of incentives for recruiting new members. AMCA will be stronger as it grows larger and thereby can have a greater impact on policy matters relating to mosquito control. Every worker in mosquito control should be a member of AMCA and not rely on the employer or agency being the corporate member.

I have no doubt that the AMCA will continue to grow and serve its members and society in meeting the challenges of mosquito and vector control. It has been an honor and a pleasure to contribute to that growth and service as your President for 1982.