On September 13, 2002, alPHA’s Council of Medical Officers of Health (COMOH) agreed that a concerted effort must be made to plan public health strategy for West Nile Virus in 2003. With several cases (including one death) confirmed at the time, it was evident that careful thought had to be put into decisions about what modifications would be needed to surveillance, education and control for next year. As questions remain about the predictability and severity of the effects and patterns of the disease and public health resources remain scarce, it was also evident that planning would have to begin much earlier than in the past.

In less than two months, a steering committee consisting of medical officers of health, alPHA staff and Public Health Branch representatives had set a busy agenda for a day-long workshop, including guest speakers from the Provincial and Federal governments as well as New York City, to attempt to look at existing evidence as a basis for what local public health agencies might do next season.

The meeting was attended by well over 100 medical officers of health, senior public health managers, community health residents and government staff, making it one of the largest alPHA has ever hosted. All 37 Ontario health units were represented.

**Morning Session – Chair, Dr. Susan Tamblyn (MOH, Perth)**

**Introduction – Dr. Colin D’Cunha, Director, Public Health Branch and Chief Medical Officer of Health**

Dr. Tamblyn opened the workshop by introducing Chief Medical Officer of Health Dr. Colin D’Cunha, who encouraged colleagues to carefully consider what the best strategies would be for next year based on the evidence that we have and our capacities to execute them.

**General Overview – Dr. Peter Buck, Health Canada**

Dr. Buck began with a short description of the disease, its mode and cycle of transmission, and its effects on humans (ranging from asymptomatic to severe CNS disease and long – term sequelae to fatality). He continued with a summary of surveillance in Canada over the last two seasons (mosquito, bird and human), as well as geographic and temporal distribution of the disease in the US.

He pointed out that human infections have increased significantly in 2002, with 72 probable and 38 confirmed cases (including one death) in Ontario. He also mentioned some preliminary evidence of
possible breastfeeding, transfusion and transplant – related infections.

More information on Health Canada’s West Nile Virus Surveillance activities can be found at http://www.hc-sc.gc.ca/pphb-dgspsp/wnv-vwn/index.html

Local Experience – 2002 Dr. Bob Nosal, MOH, Halton Region Health Department

Dr. Nosal gave a concise summary of his health unit’s detailed WNV surveillance data from birds, mosquitoes and humans. These data suggested a correlation of positive mosquito pools with the appearance of WNV in birds in a given area, and that the increase in dead bird sightings would be a fair guideline for predicting human cases. At the very least, this would be a trigger for stepping up communications to the public and physicians.

While no firm conclusions could be drawn on whether these data would in fact predict effects on the human population, Halton’s rough analysis did suggest that careful surveillance would be very useful in identifying patterns.

Dr. Nosal’s presentation is available at www.alphaweb.org

WNV in Birds- Dr. Ian Barker, University of Guelph / Canadian Cooperative Wildlife Health Centre

Dr. Barker’s presentation focussed on data gathered from many jurisdictions on the bird vector as an early warning. The evidence that he presented also suggested that outcomes often match expectations based on surveillance data. The first job of the local public health agency is thus to mobilize the public to report dead birds, then mobilize resources to collect and analyse data, as this function is not being carried out by the federal or provincial governments.

He pointed out that such public announcements do have an effect on the number of sightings and the motivation to report, which leads to perceived spikes in the prevalence of the virus, but this does not make them any less useful.

Still unclear are geographic “hot spots” as predictors of where the virus is likely to appear the following season, as it is unknown whether recrudescence or reintroduction are the mechanisms behind the reappearance.

He also reported the detection of the virus in bird urine, feces and oronasal tissues, which may suggest a previously unknown direct transmission route. He also introduced the possibility of the appearance of WNV in pets and wild species common to populated areas.

More information is available at http://wildlife.usask.ca/

The presentation is available at www.alphaweb.org
Questions Raised

- How long does WNV take to kill its avian host?
- What is the risk of direct transmission of WNV from dead birds to people handling them?
- To what extent does the evidence presented above support larviciding and adulticiding? What evidence is there that these controls are effective in reducing host populations? What evidence is there that reducing host populations will reduce the risk to humans?
- What kinds of comparisons of one year’s patterns to the next have been undertaken?
- What is the significance of positive birds late in the season?

While we do know that it takes 6-10 days for WNV to run a fatal course in a bird, it remains unknown what the risks of post-mortem transmission is. This type of research (in addition to more general research on infectivity, duration etc.) is not being carried out in Canada, as we do not have the Level 3 containment facilities required.

It was pointed out that arboviral behaviours are generally unpredictable, due to variations in climatic and habitat conditions. It was also pointed out that data is still being analysed from this past season in order to glean more solid evidence to answer some of these questions. Once this process is complete, a combination of consensus and evidence will need to be employed to decide how local resources will be deployed to deal with WNV in 2003.

Human Surveillance – Clinical presentation – Dr Neil Rau, Infectious Disease Specialist, Credit Valley Hospital

Dr. Rau gave a very interesting presentation on the subtleties of detecting WNV in humans. He used several patient cases to illustrate that given the characteristics of the most severely affected populations, clinical presentation may be easily mistaken for other conditions (sepsis, alcohol withdrawal, other more common neurological disorders) and thus not properly identified and inappropriately treated.

While he singled out severe muscle weakness as an indicator of encephalitic illness, he indicated that a lumbar puncture for analysis of CSF is the most reliable way of detecting it. In so doing, treatments for mistaken conditions (such as antibiotic courses) can be avoided. This point has altered attitudes about the importance of timely confirmation WNV. While these confirmations may not alter the clinical management of WNV, they may alter management of the patient case.

His presentation is available at www.alphaweb.org

Human Surveillance – Laboratory Testing – Pauline George, Head Immunodiagnostics (A), Ministry of Health and Long-Term Care, Laboratories Branch

The purpose of this presentation was to give an overview of test procedures, WNV statistics so far and lab challenges. A brief description of the principles of the preliminary HI test, what they are looking for and how long it takes (3 days). The Winnipeg federal lab does the confirmatory test, which takes about two weeks.

She reported the statistics on tests performed, confirmed cases and their locations, and pointed out that there are still results pending. The present preliminary estimate is over 300 cases.
She then illustrated the challenges presented by WNV on the provincial lab. The dramatic increase in WNV test volumes overwhelmed them to the point that they have fallen behind on just about everything else. In addition, significant logistical issues such as staff, reagent and equipment shortages, training in new test methods, transportation of dangerous goods and communication/reporting capacities presented themselves, putting a significant strain on the lab infrastructure. A plea was thus made for funding, staffing, refinement of case criteria, test component resources, and serious consideration of an additional level 3 biosafety lab here in Ontario.

**Human Surveillance – Epidemiology – Dr. Matthew Hodge, Ministry of Health and Long-Term Care, Public Health Branch**

Dr. Hodge gave a brief overview of data gleaned from questionnaires being analyzed at the MOHLTC. His presentation is available at www.alphaweb.org.

**Questions Raised**

- How do we measure the effectiveness of altering human behaviours, i.e. increased use of insect repellants, decisions to remain indoors during times of significant mosquito activity?
- How does a clinician determine the difference between deaths with WNV and deaths from WNV?

For the first question, the consensus seemed to be that there would be no statistically significant way to evaluate the effectiveness of these measures (or of the communications that may have led to them), but that intuition suggests that they remain important components to WNV response.

For the second question, there was a feeling that it may not matter if the patient wound up in the ICU because of WNV in the first place. It was here that it was suggested that early diagnosis, while of little benefit in managing the disease could be quite significant in the management of resources, as pointed out by Dr. Rau.

aPHa / COMOH will discuss this further with a view to advocating for some of the issues raised by Pauline George.

**Adult Mosquito Surveillance 2002 – Dr. Robbin Lindsay, National Microbiology Laboratory, Health Canada and Dr. Fiona Hunter, Medical Entomologist / Director, Wildlife Research Station / Professor, Dept. of Biological Sciences, Brock University.**

Dr. Hunter gave an overview of mosquito trap use and placement standardization, where permanent sites would be used to track baseline data, seasonal patterns, and species in a given area, and hotspot sites would be established following a dead bird event for testing and risk assessment. She reported that these hotspot sites became unexpectedly numerous and hence a top priority. During this phase, it also became evident that the CDC Light Traps were more effective than gravid traps in yielding useful samples.

She then summarized the arduous tasks of sorting and counting specimens and recording. Data she presented included identified species, percentage caught, which tested +ve for WNV, thus which ones seem to be the most significant bridge vectors. Nine species were identified as such, two of which (*A. Vexans* and *Coquillettidia Perturbans*), are very common in the areas where surveillance was carried out. This type of analysis will likely prove very useful when evaluating risk to humans, as well as in
determining what controls may be necessary. Dr. Hunter pointed out for example that larviciding may not be practical for certain bridge vectors given their habitats.

Her presentation is available at www.alphaweb.org

Dr. Robbin Lindsay followed with a detailed presentation on what is known so far from submissions to the National Microbiology Laboratory. Data analysis is ongoing, but preliminary information was given on progress in what is known about infection in mosquitoes, how many health units submitted specimens, # of mosquitoes, which were most common, and which tested positive. 37 different species are now known vectors.

He contended that surveillance would remain important for next season, if for no other reason that positive mosquito pools were in fact indicative of the likelihood of the appearance of human cases in a given area. He also pointed out that local surveillance would increase skill sets, knowledge of habitats and lead to more informed control decisions. He also reinforced the requirement for increased capacities for data collection and analysis as well as abatement activities.

His presentation is available at www.alphaweb.org

Afternoon Session – Chair, Dr. Howard Shapiro (AMOH, Peel Region)

The Federal Perspective - Dr. Peter Buck, Health Canada

Dr. Buck introduced the National Guidelines for Response to West Nile Virus (still under development), whose overall goal is to provide a framework for local response strategies, including surveillance, communications and vector control activities. These activities are determined in the context of a gradient of five “risk categories”, and are cumulative.

Dr. Buck distributed two handouts summarizing the intent and content of these soon-to-be-released Guidelines. These handouts have been scanned and are available at www.alphaweb.org.


The New York Approach – Components of an Urban Mosquito Control Program – James Gibson, Assistant Commissioner, Bureau of Veterinary and Pest Control Services, Division of Environmental Health, New York City.

Mr. Gibson was invited to give the perspective of a major urban centre that has now four years of experience dealing with West Nile Virus. He gave a detailed presentation on the policies and procedures of the New York City Department of Health’s Office of Vector Surveillance and Control, and what led to their development.

As expected, topics covered included surveillance (standing water locations, dead birds, larval / adult mosquitoes, human), public outreach and communication activities, and control methods. He also gave a short overview of NYC’s Web-based data management system, a comprehensive tool for tracking surveillance activities, complaints and reports, as well as for generating standard work orders and automated statistical analyses.
All of this was a result of the Mayor’s Office WNV Task Force, which involved commissioners from 20 departments in the city structure (including health, housing, emergency services, economy, sanitation, transport etc.). Each was given specific tasks depending on capacities, in surveillance, cleanup, logistical support, control, property assessments etc. At the end of the day, $10M was spent on WNV response where the Health Department total budget is about $4.5M.

Although it was clear that many of the uncertainties that we face here around WNV still exist after 4 years in New York, their response process has led to a significant enhancement of public health infrastructure, with collaborative achievements in reducing standing water and illegal dumping sites through property assessments, prevention and control measures, and alterations in individual behaviours and knowledge.

He also reiterated the importance of land and vector surveillance as a means to focus control efforts in order to reduce the use of the required pesticides. Following 1999 outbreak, the entire city was sprayed three times. Proper surveillance and source reduction activities now allow for targeted control programs.

In summarizing New York’s larval control activities, he reported that enforcement activities such as issuing notices of violation (March 15-October 31) to eliminate standing water sources have been effective, and that aerial applications of larvicide (a bacterial agent) may be effective for large areas of limited access.

As for adult control, the decision making process is still evolving, but a combination of factors (positive mosquito pools, species composition, infection rates, human population density, human cases) is carefully analyzed. In New York, as here, the public is just as concerned about pesticides as about the disease itself.

Mr. Gibson also pointed out that efforts are made following pesticide applications to gather reports of eye or skin irritation in people in those areas.

_The Policies and Procedures Manual of the New York City Department of Health Bureau of Regulatory & Environmental Health Services Office of Vector Surveillance and Control_ can be ordered from alPHa, at $53.50, to cover reproduction, shipping and GST. Please contact Jennifer Wright at 416-595-0006, ext. 24, or at jennifer@alphaweb.org. It includes about 400 pages of details of administration and practice, areas of focus, regulations and enforcement, Material Safety Data Sheets, prevention and control, logic models, etc.


**Panel Discussion West Nile Control Options, 2003 - James Gibson; Robbin Lindsay; Brian Gibson**

What follows is an overview of some of the points made during the final segment of the day, an open panel discussion based on some of the questions that local public health agencies will need to consider when devising their strategies for next year. A PowerPoint list of these questions is available at [www.alphaweb.org](http://www.alphaweb.org).

**WHAT IS THE EVIDENCE THAT MOSQUITO CONTROL PROGRAMS ARE EFFECTIVE?**

- There is good evidence that they reduce populations and thus theoretical risk, but it is more difficult harder to make statements about the transmission of WNV itself.
• Measurable impacts on mosquito populations include age structure and infection rates.
• It is more difficult to measure the effectiveness of larviciding.
• Reservoirs are poorly understood – questions remain about which vectors are most significant.

**WHAT ARE THE FACTORS TO BE CONSIDERED IN DECIDING WHETHER OR NOT TO INITIATE A MOSQUITO CONTROL PROGRAM? IS A POSITIVE BIRD ENOUGH TO BASE A CONTROL DECISION ON? HUMAN CASE?**

• History of activity, mosquito / bird density and levels of infection, population density and human cases.
• Seroprevalence monitoring activities were identified as important factors by Brian Gibson.
• James Gibson pointed to the political will of those who oversee budgets. Hope was expressed that the Public Health Branch mention of the importance of seroprevalence monitoring would translate into Ministry funding for it.
• J. Gibson also reiterated that the focus on WNV has contributed to political will and strengthened Public Health infrastructure by using the capacities of other agencies.

**WHAT IS THE MOST IMPORTANT FIRST STEP IN A MOSQUITO CONTROL PROGRAM? ROLE OF ADULTICIDING?**

• WNV demands a hierarchy of responses. The first steps are habitat reduction and larviciding, followed by adulticiding as a contingency plan.
• Presenting the evidence behind the decision to proceed (or not proceed) with a mosquito control program in a good public communication strategy is key.
• Evaluation of capacities: logistical problems in acquiring necessary products, negotiating contracts including liability issues etc. must be worked out.

**TIMING AND FREQUENCY OF LARVICEDE APPLICATION?**

• Though this was not discussed at length during this segment, James Gibson earlier suggested that there is still trial and error here. In NYC, it was determined that May might be too early. Evidence was also presented that late-season larviciding would be wasteful due to the life-cycle patterns of the vectors.

**IS THERE A WAY TO TARGET CONTROL ACTIVITIES?**

• Surveillance helps to at least determine what must be done and where.
• Determination of most important bridging vector may also assist in targeting efforts.

**URBAN – RURAL DIFFERENCES**

• It was pointed out that true distribution of WNV activity is difficult to assess. For example, if there appear to be few dead birds in a rural area, this may mean only that nobody has seen them.
• Controlling standing water sources is likely not a reasonable approach in rural areas. James Gibson took this opportunity to reiterate that the NYC program would not be effective in such rural areas and reported as an example that New Orleans recruited the US Air Force to spray huge areas of Wetlands.
• It was also pointed out that Ontario Health Units composed of a mix of urban and rural areas and several municipalities may face difficult obstacles to a unified and consistent response program.
**IS A SURVEILLANCE PROGRAM USEFUL IF CONTROL PROGRAM IS NOT BEING CONSIDERED?**

- James Gibson pointed out that surveillance activities in New York had a positive set of side effects (e.g. illegal dump identification and cleanup) where health arguments have added more regulatory weight to the cleanup orders.
- Surveillance is especially important where capacities are finite, as control efforts can be concentrated where good will come of them.
- Vector data would be useful in triggering control strategies ahead of the appearance of human cases.
- Mapping in the smaller areas that otherwise might not consider control programs based on raw numbers may be valuable in determining the types of targeted control methods that could be employed.

**WHAT ARE REGULATORY REQUIREMENTS FOR LARVICIDING?**

- This was not a significant discussion point, but Geoff Cutten from the Ministry of the Environment distributed information on this. It is available at [www.alphaweb.org](http://www.alphaweb.org).

**WHAT PESTICIDE IMPACTS SHOULD BE CONSIDERED?**

- Environmental Impact Statements in the US concluded that there is not much evidence to suggest that there are significant ecological impacts. Active monitoring of waterways for fish kills and pesticide residues were carried out.
- It was pointed out that Canada’s licensing process is predicated on a request from manufacturer to have it evaluated. Geoff Cutten referred to his handouts and gave a short sum of what is and is not available in Canada for control methods.

**Conclusion**

While this day-long session may have resulted in as many questions as answers, a wealth of information and points of view on WNV response were discussed in an open and representative forum. Data are still being analyzed by the provincial and federal health ministries, with reports and guidelines no doubt to follow. What was discussed today will no doubt prove valuable to these ministries as well as the field in making decisions for next season.

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