11.08.21 Mosquito Control Task Force (MCTF) DPH Presentation – Minutes

November 8, 2021, 12:30 p.m. via Zoom

Meeting Topic:

- DPH presentation and Q&A

Kevin Cranston stepped in for Beth Card who was not available for the meeting. Roll call was conducted at approximately 12:30 p.m. and a quorum was established. Task Force members in attendance included Kim LeBeau, Kathy Baskin, Russell Hopping, Bob Mann, Priscilla Matton, Jennifer Pederson, Richard Robinson, Heidi Ricci, Stephen Rich, John Lebeaux, Richard Pollack, and Anita Deeley.

Kevin Cranston introduced Dr. Brown from DPH. Dr. Brown acknowledged the hard work that the MCTF has done and noted that the DPH Toxicologist was not available today, so Dr. Brown would speak to the pieces that fall under her subject matter expertise, though DPH is happy to work with MCTF to bring in others with other areas of expertise as needed.

Dr. Brown initiated her presentation and noted that DPH performs three main categories of activities for mosquito control.

- Surveillance: DPH conducts mosquito and human/veterinary surveillance. DPH also looks at post aerial spray data: they look at syndromic surveillance data to see if there are changes in healthcare-seeking behavior after spray events and also efficacy data (for which they collaborate with MCDs and MDAR).
- Lab testing: DPH does testing for mosquitoes and veterinary/human cases.
- Risk assessment and communication: Surveillance requires communication of results and information as to how individuals can protect themselves. DPH focuses on public health actions not related to spraying but DPH does collaborate with partners when the risk is high or increasing for outreach before aerial sprays. DPH also collaborates with CDC, academic partners, and others.

    - Surveillance

Dr. Brown acknowledged that there are many complex ecological systems at play. Habitat, infected birds, appropriate mosquito vectors, and human habitats contribute to arbovirus risk. Risk modifiers can increase/decrease human risk: proportion of infected bird population, size of mosquito vector populations, weather, and human behavior. These are all interconnected. Surveillance targets include mosquito vectors, human/animal cases, and weather. DPH doesn't have the capacity to investigate the proportion of birds that are infected.

    - Drivers of EEE activity

Some drivers are the same as WNV, but they are not exactly the same. DPH monitors some factors in advance; they look at the prior year's activity, the rainfall from the prior fall and current spring, and juvenile mosquito populations. During the season, DPH monitors temperature, rainfall, populations of adult mosquitoes, and infection rate in mosquitoes. After the season, DPH retrospectively monitors viral genetics.

    - Rare diseases

EEE and WNV are rare. Asymptomatic infections represent a significant amount of cases for WNV (for every severe case of WNV, there are around 100 asymptomatic cases), but it's unclear how many EEE asymptomatic cases there are. Dr. Brown noted for WNV, mosquito vectors are more opportunistic so there are more cases. Mosquitoes and birds that carry WNV also tend to live in urban environments, so there are more common interactions with people.

For EEE, mosquito must bite a bird to acquire the virus, which is a less common event. EEE activity is focused outside of urban habitats.

- EEE surveillance

There are long-term trap sites in SE Massachusetts (a historic hot spot for EEE), which allows for good, standardized comparisons of data over time. DPH is working with MCDs to do trapping in emerging areas. There is trapping that happens in places not under MCDs' jurisdiction but that have the potential as emerging areas. Note that "emerging areas" can be areas of historic risk – Dr. Brown showed a map of cases of EEE in horses in 1938.

Dr. Brown acknowledged that there is bias in sampling because sampling is done in areas likely to have large mosquito populations. But given DPH's long experience with the data, they have a good sense of how to evaluate positive findings. Trapping usually starts in an area known to be high risk and then spreads out once the virus is identified to see how the risk progresses during a season. There is also responsive trapping, in which case trapping starts after something appears in an area that previously didn't have traps.

- WNV surveillance

There aren't long-term trap sites available for WNV in the same way that there are for EEE given that EEE is an older disease in MA. Traps are set in known areas of risk, which tend to be urban areas with large mosquito populations. Again, the sampling is biased because DPH wants to be able to identify the virus ASAP (there is also responsive trapping). Surveillance provides information on the relative abundance of mosquito vector populations, differentiating enzootic from bridge vectors (mammal biting vs. bird biting). DPH showed some graphs from long-term trap sites demonstrating the relative abundance of mosquito populations compared to 5-10-year means.

Dr. Brown emphasized that surveillance is very labor intensive: teams must go out and set traps, leave them, come back, and collect the mosquitoes, then count and sort mosquitoes by different species groups. Not all mosquitoes are tested – testing is done for members of species that are most relevant for EEE/WNV. Mosquitoes are pooled into groups of 50 to extract as much information as possible.

- Case investigations

Once a human or veterinary case has been identified, DPH starts conducting investigations. For animals, DPH collects information on the animal's location, recent travel, and vaccination status, and informs the owners of the risk. For humans, knowing about outdoor activity, known mosquito exposure, and recent travel is important; however, information-gathering is more complicated because humans move around more and sometimes the patient isn't able to provide info or it's emotionally difficult to get info from friends/family. DPH works hard to get the best information possible to guide public health action.

- Arbovirus surveillance and response plan

It is noted that DPH uses all available data to come up with arbovirus risk. Tiered risk levels are supposed to be based on "objective" criteria but are assessed in conjunction with more subjective information like weather and experience. Tiered public health recommendations are relatively consistent with CDC's recommendations, particularly for WNV. (CDC doesn't have tiered recommendations for EEE because EEE isn't prevalent nationally). DPH communications focus on personal protection – e.g. avoiding peak activity time, wearing certain clothing, etc. DPH is aware of the other tools available, such as larviciding which seems to be effective for WNV but not necessarily EEE. Ground spraying occurs under specific high-risk circumstances for EEE and is done according to recommendations from mosquito control experts, particularly when the other risk reduction tools aren't sufficient.

- Risk communication

There are specific triggers to do press releases. DPH also updates the website daily with mosquito testing results and risk level changes.

- Laboratory testing

It is noted that DPH uses PCR testing for mosquitoes, which detects viral genetic materials. There are two different sections (targets) of genetic material used to ensure the test's specificity. For animals and humans, DPH does serology tests that detect antibodies to viruses. There are two tests, a screening test that is prone to false positives and a confirmatory test that is extremely specialized and not available in commercial laboratories. PCR is also used in certain circumstances. The State Public Health Laboratory (SPHL) has a huge amount of experience with testing for WNV and EEE. There are QA/QC protocols and the lab is overseen by CLIA (a lab certification program) and CDC. SPHL also participates in the Select Agent Registered Program.

Dr. Brown discussed how there were certain benefits of the current centralized program: there is greater standardization, coordination of testing and the release of results (which can enhance the real-time situational awareness), and there is a greater ability to assess risk across municipality borders because there is an understanding of how the data is collected and what the results might mean. When individual communities use their own protocol, it can complicate things. There is an electronic data-sharing system so that MCDs and MDAR have access to the mosquito data. DPH also wants to make sure they're conducting the "right-size" surveillance – once EEE has been found in a particular location, it might continue coming up in that location, but that doesn't necessarily mean the risk levels are higher. Over the years, DPH has developed the ability to understand what appropriate surveillance levels should be. Another benefit of the current system is that DPH can store samples for additional studies.

Dr. Brown was asked that if DPH were to rely on private vendors for testing, what might be required of those vendors? Dr. Brown indicated that DPH would want the same lab testing turnaround time that we have now (24 hours), the lab would need to meet a minimum quality standard, the lab would need to participate in select agent registration/have the ability to transfer EEE-positive specimens for additional studies (which places an additional burden on the SPHL because they have to make sure the samples are used appropriately), the lab should have knowledge of both WNV/EEE ecology and have staff trained in the ability to identify mosquitoes to the species level, and finally, the lab should have the ability to share data on a close to real-time basis. DPH has not had the experience of working with any vendor so far that meets most of these requirements.

- The efficacy of mosquito control

Dr. Brown noted how this is an extremely complex topic to study since it is not possible to do controlled experiments and it is hard comparing across geographies/years. She demonstrated the efficacy table that is available in the Arbovirus Surveillance Plan but noted that this aerial spray efficacy table wasn't a direct measurement of human risk, although the size of the vector population is a driver of human risk, so reducing the vector population would theoretically drive a temporary reduction in human risk. Of course, WNV and EEE are both rare, and evaluating the relationship between action and outcome is easier when there is a more frequent outcome.

- Available data online

It is noted that there are city/town data for the most recent mosquito season, mosquito data for the years 2014-2020, and data for positive veterinary specimens. Human cases are subject to privacy and confidentiality policies, and they are reported by county, as well as the likely location of exposure. Not everyone is comfortable sharing information about their cases and that must be respected.

- Communication about aerial spraying

DPH contributes heavily to communications about aerial spraying. There are pre-spray calls with MDAR, notification to environmental groups, outreach to beekeepers and organic farmers, updates to the website, joint press releases with MDAR, FAQs maintained in multiple languages, working with partners on the distribution of information (e.g. to make sure it's accessible), etc.

- Communication challenges

Dr. Brown stated that it's not possible to reach everyone, and people aren't always receptive to messages if afraid of the content. Common message from people who call DPH include: if they want someone to fix the issue, if they have concerns about use of insect repellant, if they want specific information about when and where spraying is happening, and most frequently, if they either support or are against spraying.

- Long term changes likely related to risk

Dr. Brown noted that there are likely relevant ecological changes happening that will affect risk in the future, because we're seeing changes in the timing and spatial distribution of EEE.

Heidi Ricci asked a clarifying question: Is ground-based spraying happening in MCDs initiated based on surveillance data or is it determined independently by the MCDs? Dr. Brown responded that this question was best directed at the districts, since DPH has no regulatory authority over MCDs or pesticide use. Richard Pollack responded to Heidi Ricci's point and stated that MCDs are in close contact with MDAR throughout the mosquito season and usually increase ground spraying when the risk seems to be rising.

Bob Mann asked a question in the chat: "Can you give me some idea what the arborvirus situation would look like if we withdrew all control efforts, including IPM and pesticide use? In our report, the "no control" scenario does not reach back to the pre-pesticide era. What did human morbidity and mortality statistics for mosquito-borne diseases (not necessarily EEE alone) look like in, say, 1900 or before?" Dr. Brown said that there is data on cases going back to ~1938 that DPH can share with MCTF, but she didn't feel like any strong conclusions could be drawn about comparing mortality/morbidity before and after the widespread use of pesticides, since so many things have changed since then including increases in the human population and movement into EEE-prone areas.

Upon completion of Dr. Brown's presentation and Q&A wrap up, Kevin Cranston heard a motion to close out the full Task Force meeting to revert to the Best Practices subcommittee meeting at approximately 1:17 p.m. A motion was made to adjourn by Richard Robinson and seconded by Richard Pollack. All in favor said aye.