What Seniors Say About West Nile Virus – The Threat is Not Over

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Abstract

Public health surveillance reports indicate that the recent rapid population increase among senior citizens is accompanied by a nationwide spread of West Nile virus (WNV), an emerging disease that poses a threat to the elderly. Information gathered from senior citizens in the County, showed that overall, 81.6% of seniors knew that WNV is spread to humans through the bite of an infected mosquito; but only 63.2% knew that older adults have a higher risk of severe complications from WNV infection. A tailored health education outreach program, based on the health belief model and epidemiologic triad, was implemented to share about WNV infection prevention and control. This included the reduction of mosquito breeding and bites; improved use of personal protective measures for outdoor exposures at dusk and at night; and use of repellants. Because the threat of WNV is not over, it is important to keep seniors and other vulnerable populations involved in issues that affect their health, community, and environment

Keywords: West Nile virus, seniors, health education, beliefs

Introduction

West Nile virus (WNV) is an arthropod-borne virus of the genus Flavivirus, first discovered in Uganda in 1937 (Smithburn, Hughes, Burke, & Paul, 1940). The virus can infect humans, birds, mosquitoes, horses, and some other mammals including dogs and cats. In humans, WNV causes a febrile illness with headache, malaise, arthralgia or myalgia, conjunctivitis and possibly a rash (Chin, 2000). Huang et al. (2002) described the first isolation of the virus from a human patient with WNV encephalitis in the United States.

Although well established in Europe, Asia, and Africa, WNV is an emerging infection in the United States. Thus, some members of the community tend to believe rumors or other false information about the disease, which could place communities at increased risk of WNV infection. Locally, some individuals wrote to the newspaper purporting that West Nile virus and other emerging diseases constitute a hoax perpetuated by the media, health care providers, public health practitioners, and politicians. Scientific rebuttals to educate the community about this misleading belief were published in the Pocono Record by Bitto (2004) and by the Technical Advisor to the American Mosquito Control Association (Conlon, 2004). West Nile virus infection is not a hoax – severe complications of WNV include encephalitis, meningitis, paralysis, coma, and death, which may occur among vulnerable and elderly populations. This has health education implications and health educators in every locale need to share WNV information with citizens. Furthermore, it may be the right time to put infectious diseases back on the front burner of public health education concerns.

West Wile virus (WNV) remains an emerging infectious disease that is increasingly assuming importance across the United States. By 2003 all but 4 states reported WNV virus activity (Centers for Disease Control & Prevention [CDC], 2003). O'Leary, Marfin, and Montgomery et al. (2004) reported that the 2003 WNV epidemic in the United States (9,862 human cases) was comparable in magnitude to the 2002 epidemic, but shifted geographically to affect western states. By mid-October 2004, states reported 3.2 % case fatality among 1,951 human WNV cases; with numerous dead birds,

infected horses and peri-domestic animals: seroconversions in sentinel chicken flocks; and WNV-positive mosquito pools (CDC, 2004). Among humans, the median age of patients was 51 years with age range from 1 month to 99 years, and illness onset occurred during April through November, 2004. In Pennsylvania, on July 20, 2005, the Health Secretary announced that tests showed the first 2005 human case of West Nile Virus infection (Pennsylvania Department of Health, 2005).

Seniors are particularly at risk of WNV infection, and when infected suffer serious complications. Twenty-seven confirmed cases and seven deaths of senior citizens during the 1999 Queens, New York City West Nile Virus (WNV) epidemic demonstrated that the elderly are at risk from this new disease in North America (CDC, 1999a; CDC, 1999b; Nash et al., 1999). Recent demographic surveys also indicate that the population of seniors is increasing rapidly overall. Locally, seniors comprise 12.3% of the population in Monroe County (U.S. Census Bureau, 2001)

Both birds and mosquitoes are involved in the West Nile virus transmission cycle, particularly mosquitoes of the genus Culex and Anopheles. Virus-infected over-wintering mosquitoes maintain the cycle of transmission in many states, and WNV is now a leading cause of reported human arboviral encephalitis in the U.S. On a continuing basis, Centers for Disease Control and Prevention (CDC) develops revised guidelines for surveillance, prevention, and control of WNV. Comprehensive surveillance, prevention, and control measures for West Nile Virus must involve a component that provides outreach programs to the elderly (Bitto, Hakim, & Pula, 2002; Hakim & Bitto, 2004).

Design and Methods

Implementing an Educational West Nile Virus Intervention

Located in the southern part of the Appalachian Mountains, Monroe County's natural beauty and its 609 square miles attract many residents, including retirees. Regional concern for senior citizens in Monroe County, led to a "Town and Gown" collaboration. Collaborating Agencies included East Stroudsburg University that provided technical assistance, Monroe County Vector Control, Pennsylvania Department of Health, and Monroe County Area Agency on Aging, which provides a wide array of services for older residents of the County such as Wellness Center/Prime Health Programs designed to enhance disease prevention and health promotion among senior citizens. This served as an avenue for a countywide delivery of WNV health education to seniors. Needs assessment was based on a prior survey conducted in 2002 by Monroe County Vector Control.

Senior citizens and the staff/volunteers at each of the senior clubs participated actively during the WNV health education and training sessions. The sessions were typically held just before the midday meal, and the pace at these training sessions was modulated to suit participants' needs. Participants asked pertinent WNV-related questions and seniors shared comments, opinions, and their experiences with several critical WNV issues. The ensuing group discussion of answers to questions helped to reinforce WNV training. At each senior club, fact sheets, contact information for reporting nuisances/standing water, and other materials were distributed including Monroe County Vector Control literature and contact information for additional information and assistance. These WNV prevention training sessions were based on the conceptual and theoretical framework of the epidemiologic triad and the health belief model to help increase senior citizens' awareness of WNV prevention and control. Material covered in the educational sessions included the following topics:

1. Discussion of questions and other issues raised by seniors in attendance,
2. Relevance and the need for WNV education among seniors in the County,
3. Recognition of WNV symptoms and signs,
4. Seeking prompt and appropriate medical care,
5. WNV transmission and mosquito-bird connection,
6. Recognition of artificial container breeding sites,

7. High-risk situations and behaviors,
8. Mosquito abatement techniques,
9. Use of personal protection Clothing and use of sprays, Avoiding outdoors from dusk to dawn,
10. Discussion of seniors' perception of pesticide risks, and
11. WNV and other arthropod borne diseases such as Lyme disease.

Please see Appendix A for additional material on WNV prevention and control that can be shared with communities.

Background information was obtained about participants and their beliefs. Monroe County Area Agency on Aging provided the list of senior clubs, and identified a suitable schedule for visiting each senior club in the County. In this cross-sectional descriptive survey, an anonymous instrument was modified and administered, with permission, from an instrument originally developed by the Brookline, Massachusetts Health Department (Steinert, Balsam, Karsten, & Newman, 2002). Self-administered survey questions were completed at the senior club leaders meeting, plus all four senior clubs, widely geographically distributed around the county (north, south, east, & west). Senior club leaders' input was only counted once at the leaders' meeting, and leaders were asked not to repeat the survey during their own local club meeting. Data entry and survey data analysis were conducted using Microsoft® EXCEL and SPSS® statistical computer packages (Microsoft Corporation, 2003; SPSS Inc, 2003). Descriptive analyses included frequency distributions and cross-tabulations.

Results

There were 79 participants at the senior clubs. Figure 1 shows a sample of senior's comments and questions regarding WNV. These demonstrated concern about the disease and a need to know more. Figure 2 shows the age distribution of seniors. Only two (2.5%) of the seniors were in the 50 – 59 year age group, 15 (19.0 %) were 60 – 69 years, 27 (34.2 %) were 70 – 79 years, 30 (38.0 %) were 80 – 89 years, and 5 (6. 3%) were 90 years and older. Sixty participants (75.9%) were female and 19 (24.1%) male. Majority of participants were white, in keeping with the general population in Monroe County. In addition, about one-half of the participants lived in apartment buildings and the other half in single dwelling units.

- I am glad you told me about WNV. It's interesting and I did not know mosquitoes could be so dangerous!
- This is very interesting! Please give us the Agency cards so we can report dead birds.
- I am glad you people are doing something about WNV. I thought no one was doing anything.
- Although I am a fisherman, I stopped fishing because of WNV!
- Where do mosquitoes breed? Did the drought make this a bad year for mosquitoes? How far do mosquitoes fly?
- How do birds get WNV and what is the role of birds in the transmission of WNV infections? Do animals that eat the birds get sick?
- Do mosquitoes only like some birds and mammals or can all animals get infected?
- My neighbor's swimming pool is a nuisance – not chlorinated and not drained, can mosquitoes fly from that pool to affect me?
- It seems from the news that WNV has spread all over the US.
- Is WNV similar to Lyme disease? What is the connection with deer?
- I did not know horses are affected by WNV.

Figure 1
A Sample of Senior Citizens' Questions and Comments Shared
During the West Nile Virus Health Education Seminars

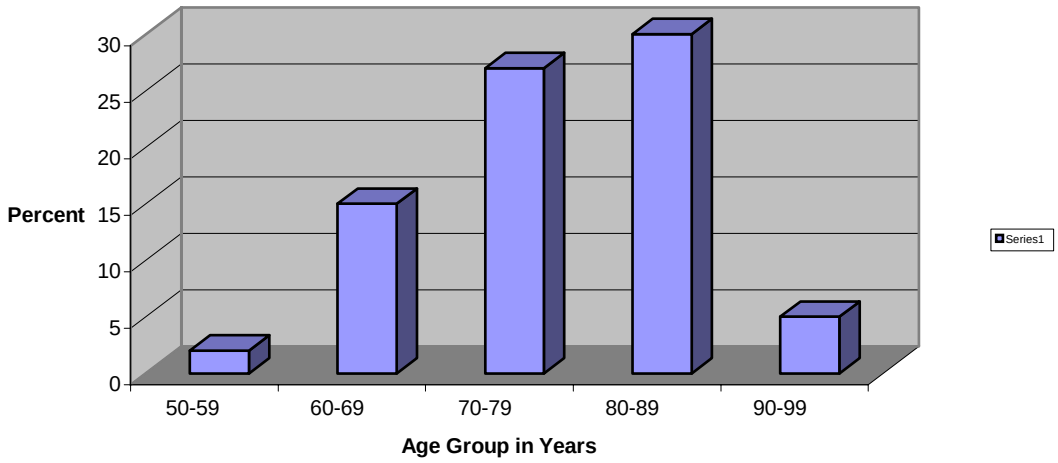

Figure 2
Age Distribution of Participants in Years Keeping the Elderly Involved West Nile Virus Study

Table 1 shows the combined responses for all senior club members regarding their WNV knowledge, beliefs, attitudes, and self-reported behaviors and practices to prevent WNV infection. Whereas 65 (82.3%) seniors were aware that WNV is spread by the bite of an infected mosquito, only 50 (63.3%) knew that older adults have a higher risk of infection, if bitten by mosquitoes. About one-half of seniors were very concerned about getting WNV and 29.1 percent of seniors believed that most people experience no symptoms if bitten by mosquitoes. With regard to prevention of WNV infection, only 34.2 percent of seniors reported that they always used insect repellents when outdoors and 24.1 percent reported that they always avoid areas where mosquitoes are a problem.

Table 1
Senior's Knowledge, Beliefs, Attitudes and Behaviors Regarding West Nile Virus Infection

Knowledge, Beliefs, Attitudes and Behaviors	**No. (Percent)**
WNV is Spread By Bite of Infected Mosquito	
True	65 (82.3)
False	1 (1.3)
Don't Know	13 (16.5)
Total	79 (100.0)
Older Adults Have Higher Risk of Infection, If Bitten By Mosquitoes	
True	50 (63.3)
False	6 (7.6)
Don't Know	23 (29.1)
Total	79 (100.0)
Most People Experience No Symptoms If Bitten By Mosquitoes	
True	23 (29.1)

Knowledge, Beliefs, Attitudes and Behaviors	No. (Percent)
False	33 (41.8)
Don't Know	23 (29.1)
Total	79 (100.0)
How Concerned Are You About Getting WNV?	
Very concerned	43 (54.4)
A little Concerned	26 (32.9)
Not concerned at all	1 (1.3)
Don't Know	9 (11.4)
Total	79 (100.0)
Use of Insect Repellents Outdoors	
Yes (Always or sometimes)	27 (34.2)
No	35 (44.3)
Not Applicable	17 (21.5)
Total	79 (100.0)
Avoid Areas Where Mosquito Are A Problem	
Always	19 (24.1)
Sometimes	20 (25.3)
Never	12 (15.2)
Not applicable	28 (35.4)
Total	79 (100.0)

Discussion

Senior citizens attending seniors' clubs in Monroe County and the volunteers/staff serving them were very interested in sharing their experiences and learning about ways to prevent WNV infection. The mean age of respondents in this current study was 76.9 years compared with a mean age of 50.9 years in a WNV general population survey of residents in Brookline, Massachusetts (Steinert, Balsam, Karsten, & Newman, 2002). Overall, 65 (82.3%) of seniors in the current study correctly identified that WNV is spread to humans with the bite of an infected mosquito. This compares with 95.1% awareness that WNV is spread by the bite of an infected mosquito reported in the Brookline, MA general population study. Overall, 50 (63.3%) seniors in the current study knew that older adults have higher risk if bitten by a mosquito compared to 67.9% in the Brookline, MA study.

In response to the three general knowledge questions on WNV (mosquito spread by, experiencing symptoms after the bite, and higher risk for older adults), 16.5% to 29.1% of seniors in the current study responded "Don't Know." This compares with a range of 4.3% to 30.2% "Don't Know" responses for the same questions in the Brookline, MA study. With regard to the other knowledge questions about specific WNV protection behaviors such as wearing long-sleeved shirts, the total proportion of seniors in the current study (not shown in Table 2) who responded correctly was 77.6% to 85.5% compared with 63.0% to 93.2% in the Brookline, MA study. In the current study (not shown in Table 1), 31.3% of seniors always or sometimes used insect repellant when outdoors compared with 46.5% of Brookline, MA general population who always or sometimes used insect repellent when outdoors, and 31.6% of Queens, New York population who often or rarely/sometimes used insect repellent when outdoors (Mostashari, Bunning, & Kitsutani et al., 1999).

Overall, the constructs of the Health Belief Model were relevant among this group of seniors. There was sufficient motivation among many seniors to make the WNV issue salient (perceived susceptibility). Adopting WNV prevention and control measures was associated

with seniors' perceived threat/severity of infection. With a higher sense of perceived threat, seniors seemed more likely to take recommended preventative steps and fewer WNV risk behaviors. Similar associations were found between lower WNV risk behavior and indicators of perceived severity of infection, perceived benefits of taking steps to prevent WNV infection, perceived barriers and cues to action. Seniors seemed to have a high likelihood of taking recommended action.

Lack of self-efficacy and perceived barriers applied to seniors who had philosophical, allergic, or other problems with using insect repellents. Some seniors had several reasons for not using repellents when outdoors and these issues were addressed during the health education intervention - including allaying their fear regarding toxicity of pesticides. Senior citizens living alone also discussed their physical difficulties with doing the yard work necessary to protect their homes from mosquitoes, and yet other seniors said they needed their children or other volunteers to help clean the gutters on their roofs, or to empty artificial water containers in their surroundings. Again, this is an area that will need WNV health education to involve families and other community volunteers as a resource for protecting seniors by helping to keep their dwellings and surroundings free from mosquitoes. For seniors living in special communities, management and operational staff in those facilities as well as the seniors will need WNV health education.

The informal and relaxed atmosphere of the usual club setting with their peers enhanced both the survey and the WNV health education intervention. An additional advantage is that seniors did not have to make an extra trip to attend the WNV health education seminars. Regarding the ongoing epidemic of WNV in the United States, health educators need to continue outreach efforts to senior citizens, their families and health care providers, and other care givers and on how to prevent and control West Nile virus infection. It is important to involve seniors attending seniors clubs or other related events.

Conclusion

This study on keeping the elderly involved with reference to West Nile Virus prevention in Monroe County was based on CDC (2001) guidelines, which include public outreach and public education. The target population of senior citizens was effectively reached using the epidemiologic triad conceptual model, behavioral science, and social marketing methods for health education on prevention and control of this vector borne disease - West Nile virus infection. In addition, Monroe County Vector Control and its collaborators continue to implement enhanced surveillance, specialized laboratory diagnosis, and larval source reduction to reduce human exposure and prevent WNV infection in the Poconos. This has implications for health educators, practitioners and researchers in other locales. The overall model presented in this paper emphasizes collaboration across public service/public health agencies and educational institutions.

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Appendix A

Precautions to Prevent Mosquito Bites

Pennsylvania Health Secretary Dr. Calvin Johnson recommends these simple precautions to prevent mosquito bites, particularly for those most at risk:

1. Make sure screens fit tightly over doors and windows to keep mosquitoes out of your home;

2. Consider wearing long-sleeved shirts, long pants and socks when outdoors, particularly when mosquitoes are most active at dawn and dusk, or in areas known for having large numbers of mosquitoes;

3. When possible, reduce outdoor exposure at dawn and dusk during peak mosquito periods (usually April through October); and

4. Use insect repellents according to the manufacturer's instructions. An effective repellent will contain DEET. Consult with a pediatrician or family physician if you have questions about the use of repellent on children, as repellent is not recommended for children under the age of two months. Two other insect repellants, Picaridin (KBR 3023) and Oil of lemon eucalyptus [p-menthane 3, 8-diol (PMD)], a plant based repellent, was tested against mosquitoes and provided protection similar to repellents with low concentrations of DEET.

5. Pennsylvanians also can reduce the risk of West Nile virus by eliminating the places where mosquitoes breed. Mosquitoes can breed in any puddle that lasts more than four days.

6. Health Secretary Johnson continued, "Pennsylvania Department of Environmental Protection (DEP) and our county partners are working hard to eliminate mosquitoes and mosquito breeding grounds in public areas, but we need homeowners help," Secretary of Environmental Protection Kathleen McGinty said: "For standing water on your property, remember this – ·Dump it, ·Drain it, Treat it." Pennsylvania Secretary of Environmental Protection Kathleen McGinty suggests some additional simple steps that can be taken around the house:

    a. Dispose of tin cans, plastic containers, ceramic pots or similar water-holding containers that have collected on your property.
    b. Pay attention to discarded tires. Stagnant water in tires are where most mosquitoes breed.
    c. Drill holes in the bottom of recycling containers left outdoors.
    d. Have clogged roof gutters cleaned every year, particularly if the leaves from surrounding trees have a tendency to plug up the drains. Roof gutters can produce millions of mosquitoes each season.
    e. Turn over plastic wading pools when not in use. Stagnant water in a wading pool becomes a place for mosquitoes to breed.
    f. Turn over wheelbarrows and don't let water stagnate in birdbaths. Both provide breeding habitats for domestic mosquitoes.
    g. Aerate ornamental pools or stock them with fish. Water gardens can become major mosquito producers if they are allowed to stagnate.
    h. Clean and chlorinate swimming pools not in use. A swimming pool left untended by a family on vacation for a month can produce enough mosquitoes to result in neighborhood-wide complaints. Mosquitoes may even breed in the water that collects on pool covers.

i. Use landscaping to eliminate standing water that collects on your property. Mosquitoes may breed in any puddle that lasts for more than four days. For standing water that can't be eliminated, homeowners can buy BTI products at lawn and garden, outdoor supply, home improvement, and other stores. This naturally occurring bacteria kills mosquito larvae but is safe for people, pets, aquatic life and plants.

j. West Nile virus is spread to people and animals by infected mosquitoes. The virus can cause West Nile encephalitis, an inflammation of the brain. While anyone can contract the virus, older adults and people with compromised immune systems are at highest risk of developing the disease. People with mild infections of West Nile virus may experience fever, headache, body aches, skin rash and swollen lymph glands. People with more serious infections may experience high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions and paralysis. Johnson advises anyone with any of these symptoms to contact a doctor. There is no specific treatment for West Nile virus. While most people fully recover, in severe cases, hospitalization is needed. Pennsylvanians should presume that West Nile virus is present throughout the state and should take appropriate precautions. Last year (2004), 15 cases of human West Nile virus were detected in Pennsylvania, resulting in two fatalities. In 2003, West Nile virus was detected in 237 Pennsylvanians and contributed to the deaths of eight people. For more information about West Nile virus, including current test results for mosquitoes, birds and horses, visit the West Nile virus website at http//www.westnile.state.pa.us/ or call the Department of Health at 1-877-PA HEALTH.

*Additional material on WNV prevention and control that can be shared with communities Source: Pennsylvania Department of Health, 2005. Health Secretary says tests show first human case of West Nile Virus this year in Pennsylvania. Retrieved July 30, 2005. http://www.dsf.health.state.pa.us/health/cwp/view.asp?Q=241951&A=190